S. HRG. 103-900

UNITED STATES DUAL-USE EXPORTS TO IRAQ AND THEIR IMPACT ON THE HEALTH OF THE PERSIAN GULF WAR VETERANS

HEARING

BEFORE THE

COMMITTEE ON BANKING, HOUSING, AND URBAN AFFAIRS UNITED STATES SENATE

ONE HUNDRED THIRD CONGRESS

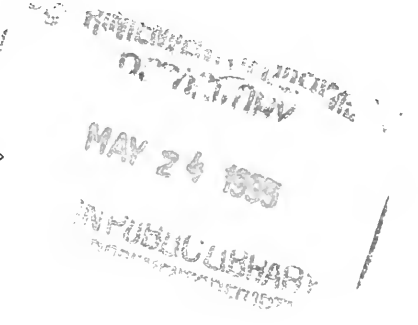
SECOND SESSION

ON

UNITED STATES CHEMICAL AND BIOLOGICAL WARFARE-RELATED DUAL-USE EXPORTS TO IRAQ AND THEIR POSSIBLE IMPACT ON THE HEALTH CONSEQUENCES OF THE PERSIAN GULF WAR

MAY 25, 1994

Printed for the use of the Committee on Banking, Housing, and Urban Affairs



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CONTENTS

WEDNESDAY, MAY 25, 1994

	Page
Opening statement of Chairman Riegle	1
Opening statements, comments, or prepared statements of:	
Senator D'Amato	6
Prepared statement	87
Senator Boxer	7
Senator Faircloth	9
Senator Bond	11
Prepared statement	88
Senator Bennett	12
Senator Kerry	58
Senator Moseley-Braun	90
Senator Campbell	90

WITNESSES

Edwin Dorn, Under Secretary of Defense for Personnel and Readiness, U.S. Department of Defense, Washington, DC; accompanied by: Dr. Theodore M. Prociv, Deputy Assistant to the Secretary of Defense for Chemical and Biological Weapons, U.S. Department of Defense, Washington, DC; and Dr. John Kriese, Chief Officer for Ground Forces, Defense Intelligence Agency, Washington, DC	14
Prepared statement	91
Response to written questions of:	
Senator Riegle	104
Senator D'Amato	121

AFTERNOON SESSION

Dr. Mitchell Wallerstein, Deputy Assistant Secretary for Counterproliferation Policy, U.S. Department of Defense, Washington, DC	60
Dr. Gordon C. Oehler, Director, Nonproliferation Center, Central Intelligence Agency, Washington, DC	67
Prepared statement	93

ADDITIONAL MATERIAL SUPPLIED FOR THE RECORD

Letters concerning Persian Gulf War Health Issues	98
Department of Veterans' Affairs Gulf War Syndrome Registry	102
U.S. Army Medical Materiel Agency—Medical Customer Shopping Guide for Saudi Arabia	196
May 25, 1994 Committee Report	225
October 7, 1994 Committee Report	434

UNITED STATES DUAL-USE EXPORTS TO IRAQ AND THEIR IMPACT ON THE HEALTH OF THE PERSIAN GULF WAR VETERANS

WEDNESDAY, MAY 25, 1994

U.S. SENATE,
COMMITTEE ON BANKING, HOUSING, AND URBAN AFFAIRS,
Washington, DC.

The Committee met at 10:10 a.m., in room SD–106 of the Dirksen Senate Office Building, Senator Donald W. Riegle, Jr. (Chairman of the Committee) presiding.

OPENING STATEMENT OF CHAIRMAN DONALD W. RIEGLE, JR.

The CHAIRMAN. The Committee will come to order.

Let me welcome all those in attendance this morning.

This is a very important hearing and we'll take whatever time we need today to pursue all of the issues that Members want to raise. Of course, we have a follow-on hearing later in the afternoon.

I'm going to give an opening statement that summarizes what brings us to this hearing this morning. Then I'm going to call on Senator D'Amato and other Members in the order in which they've arrived.

I also want to acknowledge the presence in the room of some of our Gulf War veterans who are suffering from the Gulf War Syndrome. I appreciate very much both their service to this country and their attendance this morning.

Back in 1992, the Committee on Banking, Housing, and Urban Affairs, which is the Committee which has Senate oversight for the Export Administration Act, held an inquiry into the United States export policy to Iraq prior to the Persian Gulf War. During that hearing it was learned that U.N. inspectors had identified many United States-manufactured items that had been exported from the United States to Iraq under licenses issued by the Department of Commerce, and that these items were used to further Iraq's chemical and nuclear weapons development and missile delivery system development programs.

The Committee has worked to ensure since that time that this will not happen again and the Export Administration Act legislation we reported out yesterday by a 19 to nothing bipartisan vote is an illustration of that.

Nearly a year ago, several Persian Gulf War veterans from Michigan contacted my office to complain that the Department of Veterans' Affairs was not adequately treating the myriad of medi-

cal symptoms that they were suffering from. These veterans were suffering from what has come to be known as Gulf War Syndrome.

Many of them were being treated symptomatically, with no long-lasting, positive effects on their health. Others were being referred for psychiatric evaluation because personnel in the Department of Veterans' Affairs were at a loss to explain their physical symptoms.

We'll come back to that later today.

Then, in July 1993, the Czechoslovakian Minister of Defense announced that Czechoslovak chemical decontamination units had detected the chemical warfare agent Sarin in areas of northern Saudi Arabia during the early phases of the Gulf War. They had attributed the detections to fallout from coalition bombing of Iraqi chemical warfare agent production facilities.

In September 1993, I released a staff report on this issue and, in turn, issued an amendment to the fiscal year 1994 National Defense Authorization Act, that provided preliminary funding for medical research of the illness and an investigation of reported exposures and sicknesses of our Gulf War veterans.

When I released that report, the estimates of the number of veterans suffering from these unexplained illnesses varied from hundreds, according to the Department of Defense, to thousands, according to the Department of Veterans' Affairs. It is now believed that tens of thousands of U.S. Gulf War veterans are suffering from the symptoms associated with the Gulf War Syndrome. Meanwhile, hundreds, and possibly thousands, of servicemen and women still on active duty are reluctant to come forward for fear of losing their jobs and, in turn, losing their medical care and coverage.

These Gulf War veterans are reporting muscle and joint pain, memory loss, intestinal and heart problems, fatigue, nasal congestion, urinary urgency, diarrhea, twitching, rashes, sores, and a number of other symptoms. They began experiencing these multiple symptoms during and after, often many months after, their tour of duty in the Gulf.

I might say that, in virtually every case, these veterans were in excellent physical condition when they went over to the Gulf. In fact, under the voluntary Army arrangements, you have to be in exceptionally good condition today just to qualify for service in the Armed Forces, and that was particularly true for many who were asked to serve in the Gulf War. So we're talking about people with exceptionally strong health profiles before their service in the Gulf.

The Department of Defense, when first approached regarding this issue by the Committee staff, contended that there was no evidence that U.S. forces were exposed to chemical warfare agents. However, on September 7, 1993, a Defense Department medical official told my staff that the issue of chemical and biological warfare agent exposure had not been explored because it was the position of "military intelligence" that such exposures never occurred.

Then, during a November 10, 1993, press briefing at the Pentagon, the Department of Defense acknowledged that the Czech government did detect chemical agents in the Southwest Asia theater of operations. After analyzing the results of the Czech report, the Department of Defense concluded that the detections were unrelated to the "mysterious health problems that had victimized some of our veterans."

The Ranking Member of this Committee, Senator D'Amato, and I have released today a report detailing an inquiry into this issue that provides important new information based upon Government documentation and other official reports.

The report establishes, first of all, that, contrary to the Department of Defense assertions, there is clear evidence that the chemical agents detected by the Czechs and others were at sufficient levels to harm U.S. troops.

Second, it establishes that the chemical agent detectors used by U.S. forces during the Gulf War were not sufficiently sensitive to detect sustained low levels of chemical agent and to monitor personnel for contamination. U.S. Army Material Safety Data Sheets, called MSDS, indicate that chronic exposure to levels of over 1/10,000th milligram per cubic meter of Sarin is hazardous and requires the use of protective equipment. The minimum amount of chemical agent required to activate the automatic chemical agent detection alarm that was commonly used during the war was 1,000 times greater than this amount.

In other words, the levels for the alarms used in the war were set at a rate 1,000 times greater than the actual level that we know from other military records to be damaging and hazardous to people if they are exposed to them over a period of time.

Third, the report provides detailed weather and information from unclassified satellite imagery which confirms that during much of the war, the smoke plumes from the coalition bombings were moving directly over U.S. troop positions.

Fourth, it explains that the United States did not have effective biological agent detectors deployed with the capability to confirm whether or not troops were being exposed to biological agents.

During a November 1993, unclassified briefing for Members of the United States Senate, in response to direct questioning, a DoD official said that the Department of Defense was withholding classified information on the exposure of U.S. forces to biological materials.

Then in a Department of Defense-sponsored Conference on Counterproliferation held at Los Alamos National Laboratory on May 6 and 7, 1994, this same official admitted that biological agent detection is a priority development for the Department of Defense since there currently is no biological agent detection system fielded with any U.S. forces anywhere in the world.

Fifth, it provides evidence that the United States shipped biological materials to Iraq which contributed to the Iraqi biological warfare program.

The report also draws upon direct eyewitness accounts from full interviews of more than 600 Gulf War veterans who were directly interviewed by Committee staff. A representative cross-section of 30 of these individuals is presented in full detail in the report, but it is very illustrative of the entire body of interviews that we have now taken, and we are continuing to take interviews and we will continue to do so.

The information provided by the veterans indicated that exposure to chemical and possibly biological agents was widespread—widespread! Detections were confirmed by chemical specialists deployed in Saudi Arabia, in Kuwait, and in Iraq.

Despite the fact that during the air war, the chemical alarms continued to sound frequently, and despite the fact that the Czech, the French, and some United States commanders were confirming they were sounding because of trace amounts of nerve agents in the air, from the coalition bombings of Iraqi chemical facilities, storage depots and bunkers, United States troops were often told that there was no danger. Some reported to the Committee that they turned the alarms off because they sounded so often during the air war.

After the war, in addition to tens of thousands of other chemical munitions, U.N. inspectors—now listen carefully to this—U.N. inspectors found and destroyed 28 SCUD chemical warheads containing the chemical nerve agent Sarin.

According to a Department of Defense official, these warheads had been obtained from the former Soviet Union. The report also cites an increasing number of cases of spouses and children who report the same symptoms as the veterans, indicating a strong possibility of the transmissibility of the syndrome. This is an extremely worrisome issue that now confronts those families in the country. The emerging pattern of information in this area in terms of family problems of spouses and children requires immediate additional investigative effort. And I don't want to hear the Defense Department or anybody else in the Executive Branch of Government say that we don't have the money to do this job. We waste money on a million other things.

[Applause.]

It's time we got to the bottom of this problem.

The report also recommends the immediate declassification and release of all classified or special access information relating to Iraqi chemical and biological warfare programs and information related to the detection or discovery of chemical, chemical precursor, or biological warfare-related materials. It's time to put it all out into the light of day.

It demands that a thorough and detailed epidemiological study be conducted on all Gulf War veterans—on all of them—to determine the origins and causes of the illnesses and the report of transmission of the syndromes to family members. It calls for the establishment of a comprehensive medical testing regime for all symptomatic Gulf War veterans and their family members.

We have not had a situation like this before and it's not enough to use a Catch–22 part of the Government military establishment to say that if a family member is now sick because of an exposure, that we don't have any procedure to provide health care for them. I think we have to establish a procedure to provide health care for them. That's part of our responsibility. That's what America is supposed to be all about—about honor and decency with respect to our service men and women, and certainly to their families that are now showing these same symptoms and these same medical problems.

The report also calls for the positive presumption of service connection for the purposes of receiving necessary medical treatment and determining disability compensation and vocational rehabilitation eligibility.

We can't have a situation in this country where we have veterans that have served 10, 20, or 30 years, who went over to the Persian Gulf in excellent health and who have come home and who are sick, like some in this room today, and have the military establishment, in effect, walk away from them. And not only not provide the kind of adequate medical treatment and coverage, but to leave them in a situation that when they're out of the service, and if they don't have a service-connected disability adequate to support themselves, they can't possibly go out and get private health insurance. The insurance companies don't want them, or if they do, they charge a premium that those veterans can't afford to pay.

We're not going to have this in America. The Executive Branch had better wake up, from the Secretary of Defense up and down the line. It's time we give a positive presumption of service connection for the purposes of receiving necessary medical treatment and determining disability compensation and vocational rehabilitation eligibility. It's the minimum we can do.

Finally, it calls for Government-financed health care for the spouses and children determined to have contacted a service-connected illness from a Gulf War veteran.

If the Department of Defense intended to conceal these exposures during the Gulf War to avoid the physical and mental disruption their use would have had on our tactical planning and deployment at the time, then there might be some way of understanding, at least in a battle situation, why that might be their thinking. But now that the war is over, hoping to avoid responsibility for the casualties of this conflict is an entirely different matter.

Over the last 8 months, our office has been contacted by over 1,000 Gulf War veterans directly. In addition to veterans from the United States, we've also been contacted by sick veterans of the Canadian, British, and Australian armed services who served in the Persian Gulf and who also suffer from this disabling syndrome.

This is not a mental problem with the veterans. It may be a mental problem over at the Defense Department. It is not a mental problem with the veterans.

[Applause.]

The veterans of the Gulf War have asked us for nothing more than the assistance that they have earned. I think any refusal to come to their full assistance and to that of their family members who also have these problems now, would cause any thinking person to just question the integrity of the operation that's calling the signals with respect to getting to the bottom of this issue.

I want to just say one other thing before yielding to Senator D'Amato, and I appreciate very much his leadership and concern on this issue.

I've served here now for 28 years, through seven Presidents. I've seen our Government lie to us before in other war situations. I saw how long it took for our Government to understand we had a problem with Agent Orange. We had sick veterans all across this country trying to cope with the problems, and their family members trying to cope with the problems, but nobody could figure it out in the military establishment. We're not going to have that repeated in this situation.

If I find anybody that comes before our Committee and who, under oath, gives false testimony, incomplete testimony, misleading testimony, or disingenuous testimony designed to create a false picture, we're going to pursue that individual with every single piece of authority that we have to see to it that they don't serve in this Government and that whatever the truth is, that the truth come out. We're not going to tolerate that kind of situation.

It has nothing to do with party. I've been in both parties in my service in the Congress and I've served under Presidents of both parties and Secretaries of Defense under both parties. It has nothing to do with that. It has to do with what the truth is, and about honor and integrity, and our military structure, and our responsibility to our veterans and their families.

I care a lot more about what happens to the veterans than I do about our former Secretaries of Defense. In fact, at the end of the day, they're a lot more important because they're the ones that go out and get the job done, especially when the dirty work has to be done.

[Applause.]

So I'm tired of all of the circuitous, incomplete, and mental lapses that I'm getting out of the military establishment. I want to say it as bluntly as I can because we're not going to settle for that, and if anybody thinks so they're sadly mistaken.

I urge everybody to read this report today. If we have to have a hearing where we bring the veterans in one by one and have 100, 200, 300, or 400 and do it day after day after day to get the attention of the people at the top of this Government, then I'm prepared to do it.

This is not going to be an issue that gets swept under the rug. We've seen that happen before. It's not going to happen now, not with anything that falls under the jurisdiction of this Committee.

Senator D'Amato.

[Applause.]

OPENING STATEMENT OF SENATOR ALFONSE M. D'AMATO

Senator D'AMATO. Mr. Chairman, let me begin today by expressing my appreciation for your commitment to addressing the serious issues that are raised, whether the exposure to chemical and biological agents during the Gulf War with Iraq are causes of what has come to be known as the Gulf War Syndrome.

Whether or not the exposure to immunization from the possible effects of these chemicals may have played a role in bringing about a situation in which no one can deny, cannot be explained away by simply saying that these are problems that come as a result of a state of mind that one has, as opposed to very real illnesses that may have been caused by any one of these factors.

The report is very illuminating. Pages 134 and 135 take us to the issue of the question of the effectiveness of the drugs and the long-term impact that were administered to the veterans in an attempt to immunize them against possible biological attacks. These drugs have not received the full approval of the FDA. How many and how often were these drugs used? Which of them were experimental in nature? What have we done in ascertaining the impact of the administration of these drugs on our veterans? Have we made or

begun to make the kinds of studies that can lead us to the information and facts necessary?

I've raised this with the Assistant Secretary just a few moments ago. This has been the subject of some hearings that have been held, not open to the public, touching on some sensitive, very sensitive areas.

The Congress is very much concerned and the Chairman is very, very right. When the Defense Department is issuing orders to people that they should not testify or should not appear publicly in uniform to make known their plight, I believe they're overreaching. And I think it smells, then, of the kind of situation which we should all be contemptuous of.

We want the facts.

I don't know the facts. But I know one thing—it's not good enough to simply try to dismiss the thousands of veterans and their complaints from themselves and their families by saying, it's a mental state of mind. It is improper to attempt to turn this around and make people who are truly ill, where they had no illnesses before, and try to blame this, in effect, on that person, by making them feel that he or she somehow has a mental problem, and that it's not real. And that's exactly what is taking place.

If we treat people with disdain—and that is what is happening—there will come the kinds of reactions that we've seen. I don't think we should loan ourselves to that. I don't believe that most people are doing that deliberately. But I think that is the manner in which it is being perceived.

I believe that the Administration, the Defense Department, must show a greater degree of sensitivity and has to devote more of its resources and energies to getting the facts. It can't wait another 2 or 3 years. It's something that we are entitled to and it's something that we should be letting those who are experiencing these problems know what we're doing.

You can have the best intentions and the best programs in the world in terms of trying to get the facts. But if you're not letting the veterans know, if you're not letting the Congress know, if you're saying, well, we're working diligently, why, then, it loses its impact. I think that it is absolutely imperative that we get these things out on the table. It's not going to be swept away, as the Chairman has indicated.

Let me conclude by saying that I think we owe the Chairman a great debt of gratitude for his persistence in pushing forward and really trying to get the facts and the information that those who are afflicted are entitled to and that the American people and public are entitled to.

Thank you.

[Applause.]

The CHAIRMAN. Thank you very much, Senator D'Amato.

Senator Boxer.

OPENING STATEMENT OF SENATOR BARBARA BOXER

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

You really have been the voice for our Gulf War veterans, not only inside the U.S. Senate, but in the country.

I've been here a short time. And soon after I came, you began to talk about Persian Gulf War Syndrome. You never gave up pushing for the answers and you never let this become a matter of statistics. You've always put a human face on it. Some of those faces are out here today, thanks to you and your work.

I believe, whether from within or without the Senate, this is something you're not going to let die. When people say one person can't make a difference, they never met Don Riegle. I sincerely mean it, and I certainly want to be your partner in this endeavor.

The CHAIRMAN. Thank you.

Senator BOXER. Mr. Chairman, hundreds, if not thousands, of California veterans are now suffering from Gulf War Syndrome. Many of them have come into my office. They've told me of lives disrupted and families destroyed. Every one of them has been a heartbreaking story.

The symptoms of this terrible disease are now well known: Headaches, muscle and joint pain, loss of memory, shortness of breath, skin rashes, diarrhea, and an inability to function.

Mr. Chairman, I had the honor of discussing the Gulf War Syndrome with a woman who has it. I'm not going to put her name out there because I feel that I need to protect her. She's a 26-year-old active-duty Army mechanic. She worked out on the line repairing planes in the Gulf War. She was sent to Saudi Arabia in 1990 and returned in May 1991.

She started to experience terrible symptoms in late 1990. I have her medical report. You can tell from the symptoms, which go on and on, that she was completely debilitated. She experienced daily fevers of 102 degrees every afternoon, dry mouth, bilateral subcoastal stabbing pains of pressure which would last for hours, as long as 1 week, palpitations, chest pain, oral ulcerations, blisters on the lips, numbness in the hands, fatigue, severe headaches, and it goes on and on.

Prior to being shipped to the Persian Gulf, she was a 100-percent, all-American, healthy young woman, with no history of any problems at all.

She wrote to me:

> On May 1, 1991, I returned from Desert Storm. I did not know that the war would start again 3 years later. This time it is not with a foreign nation, but with my own Government. I do not want compensation. I only want my health back. Please help the sick veterans of the Gulf War.

When we send people to face death, we owe them something when they come back. As a matter of fact, we owe them everything when they come back. And I believe that if there is in fact a cover-up going on, whether it's meant to be something to help our country, not to get us down and depressed, for whatever reason, there is no excuse.

We need to get to the bottom of this and, Mr. Chairman, as you point out, we will. It took us a long time to find out about radiation exposure in the 1940's and the 1950's, but we found out about it, and the pain of learning about the cover-up only adds to the agony of the original sin.

We've also learned about the Agent Orange experience. I remember struggling in the House of Representatives for years to get recognition that Agent Orange exposure should have been an auto-

matic disability. Don't you think it's time we made the same kind of conclusion here? We don't have one person or ten people. We have many, many thousands. They all have the same symptoms.

I have a statement submitted to us by Dean Ludholm, Jr., a Gulf War veteran, who joined the California national guard and very proudly volunteered for service in the Gulf War. I just want to close by reading his last paragraph:

Nine months after first accessing VA medical care, I'm still being told to be patient. This bothers me. But it doesn't compare to the anger I feel when other veterans and their families tell me their stories of dealing with the VA and the DoD. They tell me that these Governmental agencies just don't care, as long as they get their research funding. They tell me of waiting many months for medical appointments. They tell me of quick medical screenings that do not look for evidence of illness. They tell me of the financial hardships this illness has caused their families. For the last 3 years, we've been more than patient with the powers that be.

You have the ability to help us veterans and our families.

And then he closes and says:

These are tough times. We want nothing more than to be self-sufficient. You can't know the pain of asking for food stamps and handouts from the communities we live in, and then being told, we're looking to take advantage of the system. Let there be no peace until we have justice.

These are very strong, emotional, and important words. Mr. Chairman, the soldier to whom I referred earlier is now at a private clinic, courtesy of a very generous man. They're trying to get to the bottom of this.

I hope today we will have the wherewithal to get the truth out on the table because it is our responsibility, not some private clinic, to find out what this problem is.

Mr. Chairman, I thank you again for your leadership.

The CHAIRMAN. Thank you very much, Senator Boxer. I appreciate what you've said and I appreciate your leadership on this and also citing those stories of those individuals from California.

Senator Faircloth.

OPENING STATEMENT OF SENATOR LAUCH FAIRCLOTH

Senator FAIRCLOTH. Thank you, Mr. Chairman.

I want to thank you for holding this hearing. It's necessary and it's going to serve an excellent purpose.

In the wake of the Gulf War, it is time we looked back to see what was done wrong and what was done right. We can't change what was done, but we will be accountable for what we do now.

My statement also gets to another cover-up of that conflict, not as touching as the sick veterans, but well worth a review.

The Commerce Department has a lot of questions to answer about its role leading up to the Gulf War. It is also time that we in the Banking Committee revisit a current Commerce Department nominee—Lauri Fitz-Pegado, who played a crucial role in shaping public opinion toward U.S. involvement, and she did it by personally orchestrating perjured testimony before Congress.

Mr. Chairman, in 1990, after the Iraqi invasion of their country, the Kuwaiti government in exile formed Citizens for a Free Kuwait. They hired the lobbying firm of Hill and Knowlton to influence public opinion in this country toward entering the conflict. Lauri Fitz-Pegado was in charge of the effort.

Her strategy was to use alleged witnesses to atrocities, to tell stories of human rights violations in occupied Kuwait. Using their

testimony, she orchestrated what has come to be known as the Baby Incubator Fraud.

She first coached a 15-year-old Kuwaiti girl, identified only at the time as Naira, to testify before Congress that she had seen Iraqi soldiers remove Kuwaiti babies from hospital respirators. Naira claimed to be a refugee who had been working as a volunteer in a Kuwaiti hospital throughout the first few weeks of the Iraqi occupation. She said that she had seen them take babies out of the incubators, take the incubators, and leave the babies "on the cold floor to die."

Naira's emotional testimony riveted human rights organizations, the news mediums, and the Nation. That incident was cited by six Members of the U.S. Senate as reasons to go to war with Iraq.

However, it was later discovered that the girl was in fact the daughter of the Kuwaiti ambassador to the United States. It turns out that Lauri Fitz-Pegado had concealed Naira's real identity. Since then, reputable human rights organizations and journalists have concluded that the baby incubator story was an outright fabrication. Every study commissioned by the Kuwaiti government could not produce a shred of evidence that the ambassador's daughter had been back in occupied Kuwait to do volunteer work in a hospital. It was a total fabrication.

Lauri Fitz-Pegado then put on a repeat performance in front of the U.S. Security Council on November 27, 1990. In the testimony before Congress, they claimed they couldn't fully identify who the witness was because they wanted to protect her family that supposedly was still trapped in Kuwait. But, in fact, they were here on Embassy Row.

In front of the United Nations, Lauri Fitz-Pegado abandoned that pretense and instead employed witnesses who testified using false names and occupations. The most important of these phony witnesses was a man who called himself Dr. Ebrahim. With Lauri Fitz-Pegado there in New York, he claimed to have personally buried 40 babies pulled from incubators by the Iraqis. Dr. Ebrahim told the Security Council that he was a surgeon. But after the war, when the scam was exposed as a total fraud, he admitted to being a dentist and had never buried any babies or seen any. More lies.

The Fitz-Pegado scam continues. Mr. Chairman, as a supporter of our country's involvement in the Gulf War, I am offended that Lauri Fitz-Pegado believes that those kinds of illegal and unethical activities were necessary to get this country to face the threat of Saddam Hussein. None of these facts and allegations were disclosed to either you, Mr. Chairman, or other Members of the Banking Committee when her nomination was voted on here.

If confirmed, Lauri Fitz-Pegado would have control over a global network of 200 trade offices in 70 countries. My opposition is based not on party or ideology. It is based on the fact that there are few people in America who have less business being in charge of our Nation's trade secrets than Lauri Fitz-Pegado.

Lauri Fitz-Pegado's nomination should be returned to the Banking Committee for further review. If it is not, then facts that are far more embarrassing to Ms. Fitz-Pegado and to others in Government will be revealed in other speeches and in long, protracted debate on the Senate floor.

Mr. Chairman, the Banking Committee was hoodwinked by a professional scam artist. Lauri Fitz-Pegado should be asked to disclose her entire past and then be prepared to defend what I believe is a totally indefensible past.

I thank you, Mr. Chairman.

Senator D'AMATO. Mr. Chairman.

The CHAIRMAN. Senator D'Amato.

Senator D'AMATO. Mr. Chairman, I would urge the Chairman to consider the Senator from North Carolina, Senator Faircloth's request.

I know that he does not make this request in anything other than the spirit of honesty and fair play and not in partisanship. I know he feels deeply about this matter. He has conferred with me about it, Mr. Chairman, and I know the Senator and his staff will make available to you and your staff an outline of those matters that he has withheld and has not gone forward on, and that you might then reconsider this request.

I'd urge you to consider that. I think in fairness to everyone, that might be the best course of action, to ask that this be sent back to the Committee for further consideration. I join in the request. I did not oppose the nominee, but I am very much concerned at this point in time before we go further.

The CHAIRMAN. Let me take this request and the suggestion under advisement. Senator Faircloth and I have not discussed this previously, and so this is an issue that we do need to discuss personally beyond what's been said here now. I will plan to do that with you. Then we'll see where we go from there.

Senator FAIRCLOTH. Thank you, Mr. Chairman.

The CHAIRMAN. Thank you. I want to note that Senator Nighthorse Campbell was here and may be able to return. He had another situation.

He's been a very important voice on this issue in the Veterans' Affairs Committee as well, and feels very strongly about this issue. In any event, he's next in the order and I will recognize him at any point at which he returns.

Senator Bond.

OPENING STATEMENT OF SENATOR CHRISTOPHER S. BOND

Senator BOND. Thank you very much, Mr. Chairman. I thank you for calling this important hearing to investigate the causes of the Persian Gulf War Syndrome because many U.S. veterans and their families are currently suffering.

I think we owe it to our veterans to do everything we can to determine the causes of the Gulf War Syndrome, to develop and research cures for these veterans who are affected, and to do whatever we can to better prepare and protect our service personnel from illnesses associated with this syndrome in any future conflicts.

Mr. Chairman, I have a lengthy statement. I am just going to highlight a couple of items on it because, No. 1, I have another commitment at 11 a.m., and, No. 2, I think it might be well if we could get to our witnesses before noon.

The CHAIRMAN. Yes, indeed.

Senator BOND. So I will just summarize to say that we have thousands of American servicemen and women who are suffering from symptoms and undiagnosable disorders. It is consistent with exposure to biological or chemical toxins.

I think, collectively, the facts make it at least possible that these Gulf War veterans were exposed to chemical and/or biological toxins, and I support Public Law 103–210, which provides additional authority for the Secretary of Veterans' Affairs to provide priority health care to the veterans of the Persian Gulf War who have been exposed to these toxic substances, environmental hazards, or whatever caused this syndrome.

I think we have a duty, not only to these veterans, but to others, to investigate fully whether or not chemicals or biologicals were used on the troops and what caused the problems that they are now encountering.

I do have some real concerns. First, I find it disturbing that the Department of Defense has not been as forthcoming on this issue as I feel they must. It's been almost 2½ years since the Gulf War and it does not appear to have been a Defense Department priority to get to the bottom of the causes of Gulf War Syndrome. It may or may not be a result of chemical or biological warfare. But the odds of this syndrome affecting future units in combat is grave enough to warrant full and speedy investigation.

Second, it would appear that a thorough re-evaluation of our defenses against biological and chemical warfare is in order.

Finally, I am concerned about the possibility that these adverse effects on the veterans could have come from the administration of the nerve agent pretreatment drugs and inoculations distributed to our Armed Forces. A research specialist has commented that the drug was unproven. And I really think we have to do more research on the side effects of this drug and the advisability of administering it to our troops. No. 1, could it have caused some of the problems? No. 2, was it effective? What are its risks? I think these open up a tremendous number of questions that should be addressed.

Mr. Chairman, I would like to have my full statement made a part of the record.

The CHAIRMAN. Without objection, the full statement will be made a part of the record. I appreciate your summary comments very much.

Senator Bennett.

OPENING STATEMENT OF SENATOR ROBERT F. BENNETT

Senator BENNETT. Thank you, Mr. Chairman.

I will be brief, as I, too, want to hear from the witnesses. But I want to underline several themes that have been made here.

First, with respect to the responsibility of the Government not to lie to its citizens.

I come from a State where we have a group of people called the Downwinders, people who lived in the 1950's downwind from the atmospheric tests of nuclear weapons that took place in Nevada. The Downwinders were told that they should go out and look at the clouds as they went by because it would be a great experience that they could describe to their children. Then they were told that the

cancer rates that occurred in southern Utah as a result of people who were exposed to that radiation and fallout were somehow just coincidental. The Government clearly lied to its citizens in that circumstance.

So it goes back, as you say, through a lot of Presidents and a lot of Administrations and a lot of parties. One of my heroes, Dwight Eisenhower, was President when that was being done. In the name of national security, we lied to our citizens. We exposed them to health risks and then we tried to cover up after the fact.

More to the point, recently, I toured the military installation at Dougway, Utah. Some people may not know about Dougway, Utah. It is the prime storage facility for nerve gas and other chemical and biological weapons in the United States, and for many years Dougway was the place where the testing of the efficacy of these weapons went on.

Dougway is now entirely defensive, appropriately. We do not do any production or testing of potential American weapons in this regard, but we do a great deal of testing of ways to prevent and defend ourselves against attacks from other countries.

The military is cutting back on its activities in Dougway, saying that these defensive kinds of tests are not needed anymore. I'm not here to debate the military budget on that issue. But I think as we raise these questions, we should very carefully revisit the decision to cut back on America's capability to develop defenses against this kind of thing. Having been so recently at the site where this capability is going on, I think it—well, it comes very firmly to my own approach to this to say, maybe we're too hasty in cutting back some of that defensive activity.

But, ultimately, the thing that will bring the greatest anger as far as the Junior Senator from Utah is concerned is the issue that the Chairman has raised, in another context, the Senator from North Carolina has raised, and that is the issue of lying to Congress. I think it's indefensible to consider that any member of any Administration, in an attempt to cover up an agency position—and by agency, I include Cabinet-level officers—would come before the Congress and attempt to mislead the Congress.

I associate myself entirely with the Chairman's promise—and I think it is a promise, not a threat—to pursue any witness who attempts to mislead the Congress in an effort to protect the reputation of his or her agency. I think that applies to the issues raised, as I say, by the Senator from North Carolina. But it certainly applies to the issues here.

If, as a result of activity on the part of our enemies in the Gulf War, we are sustaining belated casualties, we need to know about it, and we need to know as quickly and as openly and as completely as we can about it. And there is no better constitutional vehicle to find out this truth than the Congress of the United States.

I hope those who represent the Executive Branch understand their constitutional responsibility, taken at the time they raised their hands and took an oath to uphold and defend the Constitution, that that includes being honest and open and straightforward with the Congress and its constitutionally elected officers.

Thank you, Mr. Chairman.

The CHAIRMAN. Thank you very much, Senator Bennett. I appreciate your comments very much.

Let me indicate our first panel of witnesses today includes Edwin Dorn, who is the Under Secretary of Defense for Personnel and Readiness. He is accompanied by Dr. Theodore Prociv—am I pronouncing that correctly?

Dr. PROCIV. It's "pro-siv," Mr. Chairman.

The CHAIRMAN. Prociv—the Deputy Assistant to the Secretary of Defense for Chemical and Biological Weapons; and by Dr. John Kriese, who is the Chief Officer for Ground Forces at the Defense Intelligence Agency.

I want to welcome you all. Let me ask you to please stand and raise your right hand. Do you swear or affirm that the testimony you're about to give is the truth, the whole truth, and nothing but the truth, so help you God?

Mr. DORN. I do.

Dr. PROCIV. I do.

Dr. KRIESE. I do.

The CHAIRMAN. Very good. Thank you.

We have your prepared statement, Mr. Dorn, and I'd like you to take whatever time you need to set forth your understanding of this situation and the statement that you want to make to us this morning.

OPENING STATEMENT OF EDWIN DORN, UNDER SECRETARY OF DEFENSE FOR PERSONNEL AND READINESS, U.S. DEPARTMENT OF DEFENSE, WASHINGTON, DC; ACCOMPANIED BY: DR. THEODORE M. PROCIV, DEPUTY ASSISTANT TO THE SECRETARY OF DEFENSE FOR CHEMICAL AND BIOLOGICAL WEAPONS, U.S. DEPARTMENT OF DEFENSE, WASHINGTON, DC; AND DR. JOHN KRIESE, CHIEF OFFICER FOR GROUND FORCES, DEFENSE INTELLIGENCE AGENCY, WASHINGTON, DC

Mr. DORN. Thank you, Mr. Chairman and Members of the Committee.

Mr. Chairman, in your opening statement, you used three key words—honor, integrity, responsibility. Those are words that I take very seriously and I hope, in that fashion, to work with you—in fact, to work with other Members of this body—to ensure that we do the right thing in this instance.

I'm pleased to provide information to support the Committee's review of how materials contributing to Iraq's chemical and biological warfare program were exported to Iraq from the United States. These are significant issues as you consider measures to strength the Export Administration Act.

Secretary Perry has asked me to be the focal point within the Defense Department for issues related to service in the Persian Gulf during Operations Desert Shield and Desert Storm. I'm here today in that capacity.

Senator, you and other Members of this Committee have made very clear your concern about the health problems that some of our Persian Gulf veterans have developed. We, in the Department of Defense, share that concern.

In recent weeks, we've testified before the Armed Services Committees and the Veterans' Affairs Committees of both Houses. I'll be pleased to share with you the same information we shared with them.

Indeed, before we move on to discuss matters related to the Export Administration Act, I'd like to offer a few points about our efforts on behalf of Persian Gulf veterans. May I begin, Senator, with a memorandum to Persian Gulf veterans, recently co-signed by Secretary Perry and by the Chairman of the Joint Chiefs of Staff.

With your indulgence, Senator, I would like to read this into the record:

As you may know, there have been reports that some Persian Gulf veterans are experiencing health problems that may be related to their service in the Gulf. We want to assure each of you that your health and well-being are top priorities for the Department of Defense.

There are many hazards of war, ranging from intense combat to environmental exposures. Anyone who has health problems resulting from those hazards is entitled to health care.

If you——

And keep in mind, Mr. Chairman, this is being sent to Persian Gulf War veterans:

If you are experiencing problems, please come in for medical evaluation. Active-duty personnel and their eligible family members should report to any military hospital and ask to be included in the Department's Persian Gulf War Health Surveillance System.

You will receive a full medical evaluation and any medical care that you need. Reserve personnel may contact either a military hospital or their nearest Veterans' Affairs medical center and ask to be included in the DoD Surveillance System or the VA's Persian Gulf Health Registry.

You will receive a full medical examination. Depending on the results of the evaluation and eligibility status, reserve personnel will receive medical care either from military facilities or from VA facilities.

This memo goes on, Mr. Chairman.

There have been reports in the press of the possibility that some of you were exposed to chemical or biological weapons agents. There is no information, classified or unclassified, that indicates that chemical or biological weapons were used in the Persian Gulf. There also have been reports that some veterans believe there are restrictions on what they can say about potential exposures.

Please be assured that you should not feel constrained in any way from discussing these issues. We are indebted to each one of you for your service to your country during the Persian Gulf War and throughout your military careers. We also want to be sure that you receive any medical care you need.

Thank you for your service.

Signed, John M. Shalikashvili, Chairman of the Joint Chiefs of Staff, and William J. Perry, Secretary of Defense.

Mr. Chairman, we take the position that the veterans who are sick should receive the best care we can provide. Three years ago, we trusted these men and women to make life and death decisions in the heat of battle. Today, we should trust them if they say they're sick. We're committed to treating the symptoms, to fashioning appropriate compensation for those who are disabled, and to identifying the causes of their illnesses.

An interagency coordinating board ensures that the Defense Department's treatment and research programs complement related efforts by the Department of Veterans' Affairs and the Department of Health and Human Services.

I should note here, Mr. Chairman, that Congress aided our ability to respond last fall by authorizing the Veterans' Administration

to provide priority care to Persian Gulf veterans for conditions that might be related to their Gulf service.

We're especially concerned about those Desert Shield/Desert Storm veterans who since the war have developed symptoms whose causes we cannot identify. These veterans represent a small portion of the nearly 700,000 U.S. military personnel who served in the Persian Gulf region during the conflict and, indeed, they represent a small portion of those who have been treated for illnesses or injuries suffered during the war.

DoD and VA doctors have treated thousands of Persian Gulf veterans for readily identifiable illnesses and injuries. We know of a few thousand people, however, for whom a clear diagnosis continues to elude physicians, and this is the group that we consider to be experiencing the Persian Gulf Syndrome or the mystery illness.

We're working very hard on this. There are lots of theories about causes. We've heard from people who are convinced that we'll find the answer if we only focus solely on parasitic diseases, or focus solely on the effects of Kuwaiti oil smoke, or on industrial pollutants, or on the effects of inoculations, or solely on stress, or on multiple chemical sensitivity. What we are trying to do is maintain a program that explores all the possibilities.

In the course of our work, of course, some possibilities begin to appear less plausible than others. One theory involves Iraq's chemical and biological warfare capability. It's that theory which provides a connection between the health problems of Persian Gulf War veterans and the Senate Banking Committee's review of the Export Administration Act.

At the time of its invasion of Kuwait in August 1990, Iraq clearly represented a case in which past efforts to prevent the proliferation of weapons of mass destruction had not been effective.

Many American policymakers and military commanders were greatly concerned going into that war that Iraq would use chemical and/or biological weapons. They knew they had used chemical weapons in the past and we had evidence that they had acquired a biological warfare capability as well. Our concerns led us to take measures to protect our personnel against such weapons, through immunizations, through special training, equipment, and detection.

The tension surrounding the possible use of chemical or biological weapons was evident to every American who watched on television as journalists scrambled to put on protective masks in response to the SCUD attack warning sirens in downtown Riyadh and other areas. There were many such alarms witnessed by United States and other coalition military personnel and by the civilian populations of Saudi Arabia, Kuwait, and Israel.

Following the war, we confirmed through inspections conducted by the United Nations Special Commission that Iraq did have significant stocks of chemical agents and the weapons systems to deliver them, as well as equipment and material suited for chemical agent production.

All of these chemical agents and related equipment were found stored at locations a great distance from the Kuwait theater of operations. These materials have been undergoing destruction at a centralized location in Iraq under the supervision of the United Nations Special Commission since late 1992.

United States military personnel have been present on site in Iraq and involved in each of the teams overseeing these destruction operations. We've concluded that Iraq did not use chemical or biological weapons during the war. This conclusion is based on analysis of large amounts of detailed data gathered in the theater and reviewed after the war.

First, throughout the operation, there was only one instance of a soldier who was treated for chemical burns that were initially attributed to mustard agent. A subsequent test on the soldier and his clothing, however, did not definitely support that finding. We know of no other reports of any U.S. military, coalition military, or civilians in the region having symptoms caused by exposure to chemical or biological warfare agents.

Mr. Chairman, the effects of chemical and biological weapons are acute and readily identifiable, and our personnel had been trained to look for them. The effects of exposure on unprotected people are painful, debilitating, and often deadly. We did not see those effects in the Gulf.

Second, our detectors were strategically located and, although many detectors alarmed, there were no confirmed detections of any chemical or biological agents at any time during the conflict.

Third——

The CHAIRMAN. Let me just stop you there for a moment.

Did we have in the field machinery or monitoring equipment to pick up biological agents?

Mr. DORN. I will turn to my colleague, Dr. Kriese, to answer that. We can do it now or following the statement.

The CHAIRMAN. Can you give me a yes or no now? I don't want to interrupt the rest of your presentation.

Dr. KRIESE. Let me just briefly say, sir, that there's a difference between detectors and timely detectors. We did not have real-time detectors present, but we did have detectors——

The CHAIRMAN. On biological weapons?

Dr. KRIESE. Yes, sir, that sampled the air and looked for traces of biological——

The CHAIRMAN. So to say that there was no confirmed detection of biological agents, when in fact we didn't have real-time devices there to measure that, is a little misleading, wouldn't you say?

Dr. KRIESE. Sir, I would offer that, as we're sampling air on a continuing basis, we would know about any BW agents shortly after they entered the area.

The CHAIRMAN. Even without monitoring devices?

Dr. KRIESE. The monitoring devices take awhile to give an answer.

The CHAIRMAN. Two years? Three years?

Dr. KRIESE. Dr. Prociv?

The CHAIRMAN. Let me go ahead and let you finish, Mr. Dorn. We'll come back to that.

Dr. PROCIV. Let me just add, the collection and analysis devices, particularly the BIDS, the Biological Identification Systems, take generally in the range of 1 to 2 hours to complete their scheme. But once they do, they identify the species quite readily. We had no positives in that detection system.

The CHAIRMAN. We'll come back to that.

Senator BENNETT. Would the Chairman yield?

The CHAIRMAN. Yes.

Senator BENNETT. I also don't want to interrupt, but I would hope, when you say, we have no such indication, you would address the reports of the Czech——

Mr. DORN. I certainly will.

Senator BENNETT. OK. Thank you.

Mr. DORN. I also want to emphasize the word, confirmed. As you know, there were lots of reports of detections. There is a protocol, however, a procedure which these gentlemen can describe in greater detail, that we use to confirm whether an initial alarm or detection is a valid one.

If I may go on.

Third, no chemical or biological weapons were found in the Kuwait theater of operations. And by Kuwait theater of operations, I mean those portions of southern Iraq and Kuwait that constituted the battlefield. We did not find any chemical or biological munitions, live or spent, among the thousands of tons of munitions recovered on the battlefield.

The international community agrees with these conclusions. This is a complicated and contentious issue, however. To ensure that we've not overlooked or misinterpreted important information, we've asked an independent panel of experts, chaired by Nobel Laureate Joshua Lederberg, to review all the available evidence. We expect to receive the panel's report in June.

We also remain eager to hear from Gulf War veterans who feel they can shed light on the sources of the undiagnosed illnesses.

Mr. Chairman, may I say to Colonel Smith and to other veterans who served courageously in the Persian Gulf, the following: I understand the fear and the frustration that many veterans are experiencing. They're sick and their doctors can't offer them definitive answers. To them, let me say, this Administration is committed to treating you fairly. You stood up for the Nation. The Nation is going to stand up for you.

Now let me turn to the Defense Department's role in the export licensing process.

First, it should be noted that DoD is not a licensing agency. That responsibility falls on the Department of Commerce for dual-use items. The Department of Defense, however, reviews and provides recommendations on export license applications when they're referred to Defense, or to inter-agency groups in which Defense participates.

Records on the ultimate disposition of dual-use biological, chemical, nuclear, or missile technology-related licenses reside in the Commerce Department.

DoD is a member of the inter-agency Subgroup on Nuclear Export Controls, which was in operation throughout the 1980's. This group reviews export requests for nuclear-related dual-use technology.

In the missile area, Defense played a significant role in the establishment of the missile technology control regime in 1987, and subsequently helped set up an interagency license review group in 1990.

In the chemical and biological area, Defense also plays an important role as part of an inter-agency team in reviewing export license requests for items controlled by the Australia Group.

The Department has taken, and will continue to take, its responsibility here very seriously. For example, DoD made an important contribution in halting export of the Argentine Condor Program that was aiding Iraq's weapons of mass destruction program. And we spearheaded the effort to prevent Iraq from acquiring a more capable missile than the SCUD.

Defense also played a leading role in developing the President's Enhanced Proliferation Control Initiative and most recently, the Comprehensive DoD Counterproliferation Initiative. The Department of Defense continues to consider proliferation as a significant military threat.

The growing ability to produce and use chemical weapons is a great concern to DoD. We fully support any measures that will prevent or control this proliferation, which includes strengthening the Export Administration Act.

It is important to remember that all exports made to Iraq in the 1980's were completely consistent with the laws in effect at that time, and Iraq was not considered a hostile country. Defense's role in reviewing exports was greatly expanded in 1991, and would be further expanded through measures you were considering in this Committee.

I would now like to introduce other members of the panel, if I may. Dr. Theodore Prociv is the Deputy Assistant to the Secretary of Defense for Chemical and Biological Weapons. In that role, he oversees the Department's chemical and biological defense program, the Army program to destroy the U.S. stockpile of chemical weapons, and the implementation of bilateral and multilateral chemical weapons treaties, including the chemical weapons convention, which is being considered currently by the Senate for ratification.

Additionally, his office has assisted the Defense Science Board Task Force on Gulf War health effects, which is examining the issue of Gulf War health, and has assisted my staff with technical support in the area of chemical and biological warfare defense.

My other associate is Dr. John Kriese, who is Chief Officer for Ground Forces at the Defense Intelligence Agency. He is responsible for production of intelligence on foreign ground forces and associated weapons systems worldwide, and all aspects of foreign nuclear and chemical programs.

Dr. Prociv and Dr. Kriese are here with me this morning. Dr. Mitchell Wallerstein, who will testify this afternoon, is an expert in counterproliferation and export control for the Under Secretary of Defense for Policy in International Security.

Mr. Chairman, that concludes my opening statement. But before we turn to questions, I wonder if I might beg your indulgence so that Dr. Prociv and Dr. Kriese might say a few words.

The CHAIRMAN. Yes, I want them to do so, but I want to know whether they can give an assurance here, based on their expertise and credentials, that there are no Desert Storm veterans that were exposed to chemical or biological agents during the war period that now account for their illnesses.

Mr. DORN. Mr. Chairman, they will not provide you that assurance because we cannot provide that assurance at this point.

The CHAIRMAN. All right. That puts you on the record and I'm glad to have you on the record stating the fact that you can't give that assurance. I want them to make a direct professional comment on that question before I go any further.

Mr. DORN. May I clarify further?

This is a very contentious area. It is very easy to confuse use of chemical agents with presence of chemical agents and exposure.

I want to distinguish between Iraq's use of chemical or biological agents, a matter on which we are quite confident, and a second question, which is whether or not there may have been chemical agents present at a very low level within the theater of operations. And on that latter matter there continues to be some concern.

The CHAIRMAN. Well, now, wait a minute. Now you're saying there's a reason for some concern. You're saying, as far as you know now, there was no offensive use of these weapons by the Iraqis that you've been able to establish. But you're drawing a very fine line to say that there may very well have been exposures to chemical agents during the war period.

Mr. DORN. As you alluded to in your opening statement, Mr. Chairman, there were reports by the Czechs of the detection of very low levels of chemical agents. Those reports were never confirmed independently.

Nevertheless, last October, I believe it was, representatives from the Defense Intelligence Agency began a re-review of that Czech detection. You know that Senator Shelby also spent 2 or 3 days in the Czech Republic talking with officials who had been involved in that, including the commander of the unit that had made those detections in Saudi Arabia. As a result, we have accepted those detections as likely valid detections, even though we have not found the independent confirmatory evidence.

The CHAIRMAN. We're going to come back to this and I want to keep our respective blood pressures down to a civil level here today.

We have already had testimony here before the Senate from a chemical detection unit officer in the field running a FOX unit who detected chemical agents, and he wasn't a Czech soldier. He was a member of our military.

Mr. DORN. Yes.

The CHAIRMAN. He actually has a print-out of that. He's not the only one, by the way, who's done that. You must be aware of that. Are you erasing that? Are you discarding that as not being——

Mr. DORN. I'm not erasing it at all, Mr. Chairman. Perhaps Dr. Kriese——

The CHAIRMAN. Please, unless you're here to say that these first-person accounts that we've been given by people who are in the field designed to make these measurements are wrong or inaccurate, I think it is misleading for you to say that the only evidence we have is from the Czechs. That's not an accurate statement. Do you want to say again that it is an accurate statement, that we don't have any reports up through our own military chain of command?

Mr. DORN. We have reports through our military chain of command. What I am saying is that we are dealing with a protocol here. As you know, there were any number of reports or alarms of chemical agent detection during the conflict. There was a procedure for verifying those initial detections. Those secondary tests did not verify the initial detection. That is as close as I can come to the technology here. But there is simply a procedure by which one confirms an initial suspicion. Those initial suspicions were not confirmed in hundreds of instances.

Senator BENNETT. Mr. Chairman.

The CHAIRMAN. Yes, Senator Bennett. After Senator Bennett asks his question, with all due respect, I put a question to the two people that you've brought here today, and I want direct, specific, under-oath answers, not from you on this point, but from them. Then if you want to elaborate, Mr. Dorn, you're free to do so.

Senator Bennett.

Senator BENNETT. Mr. Chairman, I simply want to inject this thought into this conversation.

Implicit in your answer, Mr. Secretary, is the idea that there was something wrong with those initial reports. That is, there was something that could not be confirmed. Therefore, there was some malfunction. There was some panic on the part of the individual. There was something—whatever it's attributed to. In every case, as I understand your testimony, you're saying that the initial reports which are included in detail in this report filed by the Chairman and the Ranking Member, Mr. D'Amato, were wrong.

Is there a possibility, sir, that there is something technically, technologically wrong with the confirmation process, that in fact the initial reports were accurate and that the confirmation process, either through lack of time so that there is a half-life or whatever—I'm not a scientist, so I can't really help you very much in trying to find out what it is.

Isn't there a possibility that the statement you have made is 100 percent accurate, but that the procedures used in the confirmation process may be faulty, so that, in fact, we end up with the circumstance that the reports are correct and that the reports did, indeed, find some kind of presence of either chemical or biological agents in the area and that the confirmation process is where we have seen this thing break down, rather than the assumption that the confirmation process is valid in every circumstance and therefore, the reports must be disregarded. Can you comment on that?

Mr. DORN. It's a fascinating question, Senator Bennett, and since it deals with the technical capabilities of our equipment, I'd like to defer to Dr. Prociv to address it.

Dr. PROCIV. Let me try to take that. That's an excellent question.

The way we detect chemical agents now, the initial detection of the alarm comes from an M8 detector. The M8 detector is an ionization detector that's not highly specific. It's sensitive to categories of compounds, so it's a good indication that we may have a problem in the area.

The M8 detector generally will detect between 0.1 and 0.5 milligram minutes per cubic meter. We then follow up with an M256 kit. Now this is a hand-held kit that basically is a little chemical laboratory in your pocket. The M256 kit is very specific and very,

very sensitive. It goes three orders of magnitude better than the M8 alarm does. So even if materials have dissipated after the initial alarm, you should be able to pick it up with the M256 kit. I've worked with that kit and I have a lot of confidence in that kit.

Senator BENNETT. Are you aware of the fact that, reported in this document, there are those who say that their M256 kits did indeed test positive?

Dr. PROCIV. I haven't seen this report and I am not aware of those. I'm sorry, sir.

Senator BENNETT. I'll see if I can find them. Thank you, Mr. Chairman, and I'll call them to your attention later on. I noticed them as I was reading through this report.

The CHAIRMAN. Very good. No, this is a problem that we have. It's like two different worlds here, two different realities.

You folks seem to find one reality and the more we dig into this, a broad number of us, both parties, House and Senate, the more we find a starkly different reality. It's extremely troubling. And when I finish with the questions that we're going to go through today, I think it's going to be even harder for people to understand the position of the Defense Department, that it can't find this problem, can't see this problem, doesn't think the problem exists.

Senator BENNETT. Mr. Chairman, I have found it, with help from staff. I can very quickly respond.

Dale Glover was a Staff Sergeant with——

Mr. DORN. Senator, can you let us know the page? As you know, this report was just produced. We have not had an opportunity to review it.

Senator BENNETT. OK. It's on page 79, Event 13. Dale Glover was a Staff Sergeant with the 1165th Military Police Company. He recalled being awakened at 3:30 a.m. The Battalion NBC NCO was announcing that they were under chemical attack. An M256 kit registered a positive reading for a chemical agent. They went to MOPP level 4 for 4 hours. Afterward, all of them had runny noses.

So here is the case where the kit you have described registered positive, unless you have information that Mr. Glover is somehow mistaken about what happened. But this appears to me to be an eyewitness account contemporary with the event, reporting that the kit that you have described as being very, very accurate, produced a result contrary to that which you just told the Committee occurred.

Dr. PROCIV. Let me take a second to review this, Senator.

[Pause.]

OK. The commentary—by the way, I have Col. Merriman here. She was the NBC officer at the Gulf and worked with the staff there. So all of the NBC reports, NBC events, went through her. This is a document that she prepared for me. It says, Mr. Glover sent out an M43 detector, but not connected to the M42 alarm. When notified they were under attack, Mr. Glover went out to check the M43. The visual signal was blinking on one detector. According to Mr. Glover, there were several possible causes for the detector alarm, like a sonic bomb that occurred shortly before the chemical alert. Pesticides or vehicle exhaust could have set it off.

Mr. Glover and the Battalion NBC NCO conducted a 256 A–1 kit. Both received a positive pale red color on the nerve agent test

spot, but the accuracy of this reading is suspect. Both men were using a red lens in their flashlights. This is a defensive measure. Mr. Glover stated one test kit nerve agent spot was a deeper red than the other test kit. Correct colors for nerve agent tests are blue for safe and clear or peach for nerve. That's the explanation that we've been given.

Senator BENNETT. Can you go back—I don't mean to interfere.

The CHAIRMAN. No, please do, Senator Bennett. This is very important.

Senator BENNETT. Go back to page 66 on this document, Witness No. 04. I have not gone through this that carefully. I was just thumbing through it while we were going on. This kind of sprung out at me.

Witness No. 04, Mr. Harold Jerome Edwards, the chemical NCO in charge of the Nuclear/Biological/Chemical Team for the Naval Mobile Construction Battalion 24 Air Detachment at the King Abdul Aziz Naval Air Station was interviewed by the U.S. Senate staff on January 13, 1994. During that interview, Mr. Edwards said he conducted three M256 tests for chemical agents on the evening of this event.

Mr. DORN. Can we get a date, Senator? We have not looked at this, and so we're not quite certain what time period we're talking about here.

Senator BENNETT. I don't have that here.

The CHAIRMAN. Apparently, January 19 or January 20.

Senator BENNETT. Two of the three tests he conducted were positive for chemical blister agents. He said that the negative test was conducted in an area in between a number of rows of tents. He also said that he reported this information to his unit commander.

Mr. Edwards said that a member of the unit, Tom Muse, blistered in the area under his watch during the event. The all-clear was given from a higher command. Mr. Edwards was called out to serve on a chemical decontamination team that day, and so on and so forth.

But here is another report of an M256 test that was positive, in this case, two positive tests.

We'll keep looking for some more.

The CHAIRMAN. Let me just say for the record, every single one of these documents that are now being produced that are designed to rebut these things, which apparently, nobody knew about, but everybody's prepared to respond to, I want it made part of the record. And can I be assured that we'll have any and all of that information, Mr. Dorn?

Mr. DORN. Yes, you certainly can, Senator.

The CHAIRMAN. Thank you.

Mr. DORN. We appreciate seeing your report so that we have an opportunity to respond to it.

The CHAIRMAN. I'm reminded by staff, and it's important that we add this to the record. Prior to our release of this report, this information was delivered to the Defense Department. This is not new information. You didn't get this last night.

Mr. DORN. That may be right. That's probably——

The CHAIRMAN. Well, find out if it's right. I'm saying to you it's right. So don't leave the inference that you've just had it for a few hours.

Mr. DORN. No, clearly, we knew about this particular information. I'm referring to the broad report.

The CHAIRMAN. Do you know how you knew about it? Because you got it from us.

Mr. DORN. That may be. And let me point out, Senator, I do not see this as an adversary process. As you and other Members of this Committee had pointed out, people occasionally will come to you with information that they do not share with us. They come to you because you are their Senator and they see you as accessible.

We hope we can develop a sharing relationship. A member of your staff, Mr. Tuite, was kind enough to testify and provide information to our defense science board. That may be the source of some of this information. We also have gotten a great deal of useful information through our exchanges with the House and Senate Armed Services Committees and with the Veterans' Affairs Committees. So this should be a constructive process.

I can assure you that my job here is to find out what happened, to ensure that treatment is provided, and ultimately, to get at what's behind the illnesses that some Persian Gulf veterans are experiencing.

I have seen no information which suggests that anyone with whom I've worked in the Defense Department, or in the Congress, has any other mission than to get to the truth.

The CHAIRMAN. Well, you're certainly welcome to put that statement on the record.

The fact of the matter is that it's taking a very long time to get to the truth here. What I would like to do now—Senator Bennett, did you want to pursue any further that one issue, because I want to go back to the outstanding question raised earlier and I want a direct answer from the two experts that are here.

Senator BENNETT. I simply want to summarize what I said earlier, which is the statement that there was no confirmation at all runs contrary to what the Czechs said. You've addressed that by saying, in your opinion, the Czech monitoring was insignificant.

Mr. DORN. No. I said the concentration of agent they detected at the incident that I recall, which was north of King Khalid Military City at Hafir Al Batin on January 19, was a very low concentration of agent. I did not say that the finding was insignificant in a judgmental sense.

Senator BENNETT. OK.

Mr. DORN. We're talking about the level of agent that they reported detecting.

Senator BENNETT. Good. I'm glad to get that clarified.

Mr. DORN. OK.

Senator BENNETT. Then you said there was no confirmation. And my point is there appears to have been some confirmation, for which there may be explanations. But there have been confirmations reported to the Congress.

The question I raise with you has to do with whether or not the confirmation procedure is viable, given the fact that we have what we have—that is, a number, a significant number of people suffer-

ing from something that they apparently picked up in the Gulf, at least there is that common thread, just as there were with the legionnaires who attended their convention, that took us a couple of years to figure out what it was.

There is the possibility that I hope you're hanging onto that your confirmation procedures are flawed and that the existence of these people who have these problems is a prima facie case for the fact that they may be flawed. I don't think that we can just automatically say, well, the confirmation didn't find it. Therefore, there's nothing to worry about.

Mr. DORN. Senator Bennett, this gives me an opportunity to talk about the process and to amplify, if I may, Mr. Chairman, this give and take.

We have received large amounts of information and large numbers of questions from Members of Congress, from veterans organizations, and from others. It is our task when we receive those to track them down, to identify the units and the people involved, to conduct interviews, where necessary.

Ltc. Vicki Merriman, who was introduced earlier, has been involved in a great deal of that tracking down, and we are talking about, in some instances, hundreds of leads that have to be teased out. All of this information then gets resifted through the Lederberg panel or through other ways, so that we can come forward to you. In some instances, we cannot get a direct answer quickly.

The CHAIRMAN. Yes. Well, let me just say at this point, and you'll find this interesting too, I think, Senator Bennett.

In February, the Defense Science Advisory Board contacted the Banking Committee and asked for a list of witnesses who may have—of what may have been direct Iraqi attacks in the context of this discussion. We gave a list of at least one person from each event to the Department of Defense. These persons were then called by the Department of Defense. And I'm going to describe to you what happened.

It's been reported back to us by a number of those interviewed by DoD that, rather than being asked substantive questions about the events and to locate other witnesses that might have been at the events, high-ranking military officers—and we can talk about who they are—said to these individuals that they were mistaken. They were told that the Iraqis did not have the ability to initiate these types of attacks, which we know to be false because we got the stockpiles after the war, if nothing else. And you should know that.

Now, I don't know whether that comes as news to you or not, but I can arrange for you to talk to those people——

Mr. DORN. I will do it, Senator.

The CHAIRMAN. —Who, hopefully, will say to you what they said to us, that they got a phone call saying, tell us everything you know. Lay it all out. It was a scripted phone call where they were presented with an approach that said, it couldn't be a certain thing because that was off the table as a possibility.

I think any time you're using people to do this kind of investigative work that may have some stake in what was done previously,

as well as the decisionmaking chain leading up to these events can—I don't say does, but can—cause a problem.

I've been very troubled by that. I think whoever is making the phone calls, whether it's Ltc. Merriman or anybody else, can't be calling with a scripted approach that tries to tailor the answer that presumably is being asked for from the person that they're calling. And we've had a problem in that area, just for your information.

Mr. DORN. Mr. Chairman, if I can get particulars, I will be more than happy to follow up.

The CHAIRMAN. You'll get them. You'll get them because, again, we're not going to let any assertions be made on the record here where we have contrary information. And I appreciate very much Senator Bennett raising the issue with respect to these testing kits.

Now let me come back to my question to your two colleagues. Can you give us here today your professional certification that there were no exposures of Gulf War veterans to either chemical agents or biological agents out there in that war zone?

Dr. PROCIV. Since I've taken this position, Mr. Chairman, I have reviewed a lot of data and a lot of cases. My statement that I do not believe that any chemical agents were used by the Iraqis——

The CHAIRMAN. No, that's not what I said. I understand doubletalk when I hear it. That's not what I asked you.

[Laughter.]

That's not what I asked you. And with all due respect, let me repeat it again because I'd like an answer to my question, and then if you want to elaborate, you can.

I realize everybody's designed here to veer off into the question as to whether there was an attack, a verifiable attack by the Iraqis to use these weapons. I did not pose that question. I asked you under oath for your professional opinion to give me a certification of your belief and confidence that no Gulf War veterans had any exposure to chemical agents or biological agents while they were in the war zone. Now can you give us that certification, regardless of the source?

Dr. PROCIV. Again, Mr. Chairman, I'm not a medical doctor. I don't understand a lot of the medical symptomology. What I do understand is that when chemical agents are used, and I understand how they are dispersed, I understand how they're detected, in all of the evidence that I have seen that I can say in my own professional certification, I can say that I do not believe that any chemical agents entered the theater of operations and exposed any of our soldiers. That I can say.

The CHAIRMAN. Well, I've got to make sure that I understand every single word in your sentence here. I want to make sure because you're putting your professional reputation on the line, and you're doing it under oath. Meanwhile, I've got a lot of sick veterans all across the country, some in the room today, who heard the chemical alarms going off all the time, even though the chemical alarms were set at a much higher level than we know can cause a problem if there's extended exposure. You know that as well.

But you're telling us, in your testimony today, that it is your best professional belief that we don't have a single veteran coming back from the Gulf War who had an exposure to chemical agents or bio-

logical agents in that war zone. And you're here today under oath with your professional reputation on the line.

Dr. PROCIV. Sir, again, I'm here to say that, knowing what I know and what I've reviewed, I do not understand how any of our veterans could have been exposed——

The CHAIRMAN. I didn't ask——

Dr. PROCIV. I have to say it this way because I'm not a medical doctor, sir.

The CHAIRMAN. Maybe we need a medical doctor to answer the question.

Let me ask the same question of you, Dr. Kriese.

Dr. KRIESE. Sir, in the intelligence community, one of our, if you will, reminders is that absence of evidence is not evidence of absence. So I cannot say absolutely, categorically, that there was no chemical or biological use and nobody was affected. I can tell you that, based on all the evidence I've seen, my judgment is that it was not used. But as a professional, I cannot tell you——

The CHAIRMAN. Now when you say, not used, you mean—by not used, you mean, what? That there was an offensive use of these weapons?

Dr. KRIESE. Yes, sir.

The CHAIRMAN. You've not been able to validate in your own mind an incident or instances where they would have been used in an offensive way.

Dr. KRIESE. That's correct, sir.

The CHAIRMAN. But you also make the point that you're not prepared to rule out the possibility that these agents got loose in some way and may in fact have had an effect on some people. You can't comment one way or the other on that.

Dr. KRIESE. I think it's impossible to prove a negative. I don't mean that lightly, sir. This is a very difficult issue, with low levels, many people involved.

The CHAIRMAN. You see, it's difficult, when you have hundreds, and now thousands, of eyewitness accounts of people who are in the theater of operations and the chemical alarms go off. The chemical alarms sound.

Now the chemical alarms were not just sitting out there waiting. We designed them. We sent them out there. We put them there because we were worried that this might happen. That's why the chemical alarms were there in the first place. That's why all the gear was there in the first place.

That's why we have job titles that some of you carry that talk about biological and chemical warfare, because this is a real issue and it's not somebody's invention. Saddam Hussein has done this in the past, killed his own people with these kinds of weapons. This isn't science fiction or fantasy.

So we understood that there might very well be a problem. We put all the monitors out there and then the monitors kept sounding and people keep taking their MOPP gear on and off. There's no question in your mind about that having happened, is there?

Dr. KRIESE. No.

The CHAIRMAN. OK. How many times, to your knowledge, would you say the chemical alarms went off throughout the whole theater of operation where they were placed to try to detect the chemicals?

Dr. KRIESE. I think Dr. Prociv probably has a better estimate than I do.

Dr. PROCIV. I can't quote an exact number, but there are times when those alarms are deliberately set off. For instance, in the regiment, the NBC platoons are required to, in fact, test those alarms. What may have fallen apart is that they may not have notified the soldiers they were testing the alarms. So, as a minimum, twice a day, they would have tested.

[Applause.]

No, please.

The CHAIRMAN. Let's have order.

Dr. PROCIV. I also will admit that they are prone to false alarms. They are prone——

The CHAIRMAN. But you can see all the possibilities. It's amazing to me how clear your mind is on all the reasons why the alarms could go off—how it could be an accident or mistake or faulty equipment.

So now we have a new question—why are we buying faulty equipment? Why are we putting faulty alarms out there? In fact, I don't understand why we're putting alarms out there that detect a level 1,000 times higher than what we know can cause a problem over a period of time.

Dr. PROCIV. I could quote some numbers there, also.

The CHAIRMAN. Let me ask you this question. I'm going to ask you for the record. Again, I would urge you to measure your answer. Was the M8AI automatic chemical agent detection alarm which was deployed during the war sufficiently sensitive to detect harmful exposure levels of chemical nerve agents?

Dr. PROCIV. The M8—yes, sir.

The CHAIRMAN. Are you saying, then, that there could be an exposure level harmful to somebody that could come in beneath the level that device was scheduled to measure? If there were chronic exposures that went on for a period of time below those levels, couldn't those cause medical problems in people?

Dr. PROCIV. I believe that there is data that shows that chronic levels at very low levels do cause problems. But I believe it's only with——

The CHAIRMAN. But the machines weren't designed to pick that up, were they?

Dr. PROCIV. It was only with mustard, is my understanding.

The CHAIRMAN. Well, we'll get to that. But the machines were not designed to pick up low levels on a chronic level, were they?

Dr. PROCIV. No. The M8 detection, the range of 0.1 to 0.5. You can get myosis, which are the initial symptoms, at 0.005. But the first time that you get a runny nose is at 0.5. That's the second symptom. And 0.5 is well within the detection range of the M8.

The CHAIRMAN. We can go back and forth on this. The fact is——

Mr. DORN. Senator.

The CHAIRMAN. Let me just finish. He and I are having a discussion. I'd be happy to call on you in a minute.

I'm distressed about the fact that we've got a million reasons why we can't find the problem. We can't get to the root of this thing. We have all these sick veterans out there, wives and kids getting sick, and we just can't find out what's causing it.

Now, we're going to stay on this trail because I think it's quite clear what is causing part of it, and it falls into this zone. Not just the exposure to chemical items. I'm convinced that's part of it. You're not convinced that's part of it. We have a difference of opinion on that issue.

When you talk to the sick veterans who were in the theater of operation where the alarms were going off, the ones who are now sick are overwhelmingly convinced that there is a relationship. Now maybe you're smarter than they are and maybe they're smarter than you are. The consequences for them are a lot higher than they are for you because you're not sitting here sick, with all due respect.

[Applause.]

Dr. PROCIV. Sir, if I can just go on the record. I don't disagree that there are sick veterans. I was a veteran myself. I'm very sympathetic toward the veterans. I wouldn't be working for the Department of Defense—I just left a 20-year career in industry to work for the Department of Defense because I believe in this cause.

The CHAIRMAN. Let me give you another example of how powerfully real it is in the lives of real people.

Col. Smith over here who's sitting in the wheelchair spent 30 years in the military himself. He was in excellent health when he went over to the Persian Gulf, actually had prior training as a veterinarian, so he knows something about what causes people to get sick and die, and animals to get sick and die.

He's no longer in the service. I'm doing this from memory, but after a long struggle, he finally received a 20 percent, I think it is, service disability related to his problems, although he can hardly get up out of the wheelchair and walk.

When he was invited to go on the Phil Donahue Show to talk about this problem, as a guy with a background in this area who is very, very sick, he was told by somebody in the military, it would be a good idea for him not to wear his uniform and all those ribbons on his chest.

I've got to tell you, I'm much more concerned right now with sick veterans than I am with veterans like yourself who I respect very much who are not sick. I think if you were sick, if you were sitting in his wheelchair, your feeling about this would be dramatically different.

I think part of the problem here is that the people who ran the operation during the Gulf War are not sick because they were not the ones out into the area of exposure and who have not come back with these problems. And so, I think it's very hard sometimes for us to put ourselves in the other person's shoes. That's why it would be very healthy for some of these interviews to be conducted directly. I'm going to ask, and we're going to bring the witnesses in here, if I have to bring in 500 witnesses and we have to do this hour by hour by hour, we're going to get the Defense Department to pay sufficient attention to this problem.

I don't think that's happened yet, with all due respect. As Senator Bennett points out, with the atomic exposure problem years ago, and as I mentioned with the Agent Orange exposure, I think there's an enormous institutional difficulty for a bureaucracy, whether it's the Defense Department or some other agency of the

Government, to ever come to terms with perhaps some grievance decision errors about equipment, about exposure, about things that maybe weren't properly planned for that happened after the fact. We have some of that here, and we're going to have to deal with it because you have a problem here that's a lot bigger than you understand right now.

You have wives and children that are sick. I don't know how many of them you've talked to. I'm going to give you some names of spouses that are sick, whose reproductive situation has been knocked completely haywire since their husbands have come back from the Persian Gulf, and some women veterans who have come back and whose reproductive situation is completely haywire.

They think, and I believe that they're right in thinking it, that they were exposed to agents out there that have caused this to happen. They had a perfect health profile before they went. In fact, they couldn't have gone without a good health profile.

You need to talk to them, not through intermediaries and the chain of command where everybody understands that if there's a line that we're going to follow here that there were no exposures and we're all going to hue to that point of view, it gets very easy to start to tailor what's being heard into that sort of channel. I've seen it too many times and I think it's happening here.

I want you to talk to some of these people. I want you to sit down and get right up close to them because if there is a problem where this thing is moving through families, as we now have enough anecdotal evidence for me to believe that it is, you ought to get up close to it. You ought to look at it. You ought to look at the sick kids, not just Col. Smith and the others that are here right now who have given as much or more time in uniform as you have and who are now sick and are being tossed out the side door, quite frankly.

That's what's happening because, in effect, there's a problem but we don't know what caused the problem. It couldn't be chemical. It couldn't be biological because we can't find any evidence of that. Therefore, we're not going to aim our treatment regime down that track because if it never happened, then that can't be the cause of the problem. So let's look for other things. Let's look for mental problems. Let's look for this. Let's look for that.

This is not a mental problem. It is a mental problem, I think, in the Defense Department. I think it's fair to say that because the defense establishment has decided that this problem has to be outside certain boundaries. Yet, all of the evidence is accumulating, and we're going to go through it here today. We've gotten sidetracked here, which is a little bit regrettable because I want to nail down specific things here and we're going to do that.

But I think what is happening here is that the Defense Department almost cannot allow itself to come to any conclusion that there could have been or was any significant amount of chemical or biological exposure. I can see a lot of reasons why that could be the conclusion that the Department would find itself backed into thinking that it had to reach.

I would like an assurance—and I don't know if you can give it, Secretary Dorn, or not—I'd like an assurance today, an iron-clad assurance that every active-duty military service person who

served in the Gulf who now is sick and who is afraid to come forward, as many are because they're afraid that they're going to get drummed out of the service. It's tough to find jobs on the outside, especially if you're sick, if you're leaving the military because you've got a health problem. And it's very tough to remain in the military if you've got a health problem, and especially if it's in this area that the Defense Department I don't think is very comfortable with.

We've got to have an assurance, and I'd like it stated explicitly by the Secretary, that no active-duty person will be sent out of the military if they come forward and indicate that they have these problems and that they won't be off-loaded for some other reason that's a fake reason. And that, in fact, if they have to leave the service because they are so sick coming off the service in the Gulf War, that they will get service-connected disability and so they're not just going to go out and land on the scrap heap and find they can't get a job and they're uninsurable.

I think we have to have that assurance, or you're never going to know how many people you have in the active-duty force that are sick. Can you give me that today or can you within the next few days give me a commitment that you'll get that from the Secretary?

Mr. DORN. I certainly can, Senator. I can say that we want people to come forward. We recently fashioned a new program, as you may know, for encouraging people to come forward and for giving them a systematic treatment protocol so that we can ensure that we are searching for everything we possibly can search for and so that we can assure that they're being given the best treatment. We also are working on the appropriate disability compensation rules.

There was an earlier mention by a Member of your Committee that the legislation needs to be changed so that we do not insist on proof of a service connection. That legislation has been proposed by Mr. Montgomery, the Chairman of the House Veterans' Affairs Committee. We have been given an opportunity to comment on it.

But let me say further, Senator, if I can broaden this a little, we are trying not to close our eyes to things. This is one of the reasons we have asked the Lederberg group to look at the possible long-term effects of low levels of exposure to chemical agent. And this is why we have a range of research programs that look at a variety of possibilities from infectious agents to the possibility of environmental exposures.

Senator BENNETT. Mr. Chairman.

The CHAIRMAN. I might just say that there already has been research done on that, as a matter of record, we've included it in our report. It's toward the end in an appendix, having to do with information developed by the U.S. Army Chemical Research Development Engineering Center, indicating the problems that do exist with prolonged low-level exposure. So——

Mr. DORN. I believe Mr. Tuite shared that information with the Lederberg panel.

He did not? OK.

The CHAIRMAN. Presumably, they would know about this.

Mr. DORN. They'll find it.

The CHAIRMAN. It's all the same operation. You see, if this is an issue that everybody really wants to understand, work that's al-

ready been done within the apparatus of the defense establishment ought to be the first thing that comes to the surface.

I would think that if the Defense Secretary turned around and said to the next person in command, I want every scrap of information that we have, anything that we've done. I want to know everything that there is to know that's in our files, records, research on chemical and biological testing, information of any and all sorts. I would assume that within a matter of days, if not hours, people could go like this and all the information he asked for would surface. Or am I wrong in that assumption?

Mr. DORN. We thought so, too. And you may recall that last November, in response to a request from another Senate Committee, we tried in the course of a week or two to produce definitive answers to questions such as those we are discussing today. We think we got pretty close, but it turned out that there was simply more information out there than we could reasonably digest in the course of a few days.

This is one of the reasons the Lederberg group has spent several months looking at this matter. On that panel are people who have spent many years studying a variety of issues that may be related to these illnesses and to possible exposures to a variety of environmental or chemical or biological agents in the Gulf. They are still hard at work producing their findings. But there is a lot of literature here.

The CHAIRMAN. I really don't want anybody else sent out into the field of battle where we're likely to run into chemical and biological weapons, where we know we've got a bad guy on the other side who has been developing these weapons, been using these weapons on his own people, and we say to our service men and women, look, suit up. We're going to send you in there. But we're not quite sure what we're likely to run into. We don't necessarily have the kind of gear we might like to have. We're not necessarily able to measure effectively biological exposures, even though we know this guy's been working on that. But we'd like you, in the name of the American Government and Uncle Sam, to get right on in there.

Here we are facing a situation with the North Koreans. In my mind, the North Koreans may be as entirely capable of diabolical activities of any and all kinds as Saddam Hussein.

I can see why, if you were concerned about biological and chemical weapons activity on the part of the North Koreans, why there might be a reluctance to even want to talk about the issue, so you didn't have a panic with our troops who are up on the front line who might be concerned that 3 years from now, if they're engaged in a fracas over there, they might end up like Col. Smith in a wheelchair.

And so, I would hope that we would never get to the point where the thinking is, let's get the mission done and then we'll treat the walking wounded, maybe, later on down the line or we'll figure out what that problem is at a later time.

I would hope that we would never get into a frame of mind where the objective in the immediate military sense puts the health and safety of our own forces in a secondary situation. Even though that's happened before in your lifetime and mine. It happened in Vietnam, in my opinion, and I think the evidence bears

it out and the Vietnam veterans clearly feel that way. So you don't have to stretch your imagination to imagine scenarios like that because we're living with the after-effects of that right now.

Mr. DORN. May I, Mr. Chairman, associate myself with something Senator Bond said earlier?

The CHAIRMAN. Then I want to call on Senator Bennett, who has been waiting patiently to get in here.

Mr. DORN. Our effort here is, first and foremost, of course, to treat the sick veterans. That we are trying to do. Second, to find out what the underlying causes are and to deal with those.

The CHAIRMAN. But——

Mr. DORN. Senator Bond said something else. He said we have to prepare for the future.

The CHAIRMAN. Well, just one second. Just one second, Mr. Dorn. I think the problem, and the reason you got a murmur out of the veterans who are here, is that so many of them feel that their problem is in the chemical/biological exposure zone. And if the Department feels that that can't be the cause of their problem and therefore, the research efforts are really directed down other channels in any serious way, they feel like they're likely to continue to stay sick and get sicker and die in the meantime because you're going down divergent tracks.

Mr. DORN. If that is the impression I left, please give me an opportunity to clarify it.

One of the reasons we focused in my opening statement on chemical and biological weapons is, it was our understanding that that was this Committee's concern, how those weapons got into the hands of the Iraqis and whether they were used.

However, I want to make absolutely clear that we are exploring every possible or every plausible cause for these illnesses, including the possibility of exposure to some type of chemical agent, the possibility of exposure to various environmental pollutants, the possible long-term health effects of the Kuwaiti oil fires, infectious diseases such as leishmaniasis. There may be others. We are looking at a full range of possibilities.

One of the frustrations for some of the people who are vitally concerned with this is that there are strong proponents of each of those theories. We spend a lot of time explaining why we are trying to develop a program that looks at all of the possibilities rather than honing in solely on multiple chemical sensitivity or the Kuwaiti oil fires. We are examining a full range of possibilities here. Now, how soon will the results come out? This is difficult. This is research. We are not confident how soon the results will——

The CHAIRMAN. How much are we spending at the present time? Do you know offhand?

Mr. DORN. I'll have to get back to you on that because I cannot give you a total. Keep in mind that this research is being done under a lot of auspices. DoD is sponsoring some of it. VA is sponsoring some of it. Some of it is being done through Health and Human Services, their Centers for Disease Control and Prevention. I will try to put together some numbers for you.

The CHAIRMAN. Senator Bennett.

Senator BENNETT. Thank you, Mr. Chairman.

I'll spare the editorial comment that I was about to make. Let me go back to the issue.

The Chairman asked a specific question to which he did not get an answer. I'm interested in the answer. The question was how many times did the alarms go off? The answer was, well, we don't really know, and so on.

All right. I used to give that kind of an answer to a boss that was not sympathetic to that kind of an answer and he would always say to me when I'd say, well, I can't give you an exact number. He'd say, how many would you be surprised if it were more than? Can you give us a ballpark figure? How many would you be surprised if it were more than or less than, and give us kind of a bracket?

Then as you investigate this, and you probably can't answer it here, and I would be surprised if you could, I would like an answer for the record, how many times was the gear replaced after the alarms went off. And to focus exactly on what I'm talking about, I'll direct you to page 65 of the report provided by the Chairman and the Ranking Member.

There, by coincidence, seems to be two occasions here where the alarms went off and the gear was replaced.

The first one, quoting a Mr. Fred Willoughby of Columbus, Georgia, who was with the Naval Mobile Construction Battalion. He has reported that on January 20, 1991, at about 3:00 to 4:00 a.m., he was hanging out outside his tent when he heard a long, loud explosion. Shortly thereafter, a siren sounded and he went inside the tent to get his gas mask. By the time he came out, people were yelling, MOPP 4, MOPP 4, not a drill. Immediately, his mouth, lips, and face became numb all over, a sensation he likened to novocaine at the dentist's office. He was in the bunker for about an hour or an hour and a half. When he came out of the bunker, he and others in his unit were told by the officers and chiefs that what they had heard was just a sonic boom. The next day, the unit was told not to talk about it.

Here's the operative sentence—but the unit's MOPP gear was collected and replaced the next morning. I want to know how many times that happened, where an alarm went off and subsequently to the alarm going off, someone had the MOPP gear collected and replaced.

Go down to the next one just below it. Roy Morrow of Phenix City, Alabama, assigned to the Air Detachment, King Abdul Aziz Stadium.

On January 20, 1991, he heard two explosions between 3:00 and 3:30 a.m. He was awakened, went to the bunker. The unit went to MOPP 2 level for 25 to 30 minutes. The all-clear was then given. When he exited the bunker, Mr. Morrow noticed the Marines running and screaming, MOPP level 4. The siren sounded again. He began to feel a burning sensation on his arms, legs, the back of his neck, his ears, and his face, his lips felt numb. His unit went to full MOPP level 4. Right before he went to the bunker the second time, Mr. Morrow saw a flash in the commercial port of Al-Jubayl. He had a radio in the bunker, so on and so forth.

When they began to discuss it, down in the next paragraph, he's talking with the head of the decontamination team in his unit. And

when they began to discuss it, according to Mr. Morrow, the unit was told that the two explosions were a sonic boom and they were ordered not to talk about it any more. The next day, all of their chemical gear was collected and replaced with new equipment.

I am sure in the logs of those units, the sounding of the alarms, the going to MOPP 4 level, and the collecting and replacing of the equipment is recorded. If there's one thing our military does well, it is multiply paper and record things that went on, and people keep logs.

I would like to know how many times the alarms went off, and after the alarms going off, regardless of the explanation as to why, someone felt it necessary to collect and replace all of the MOPP equipment, because, certainly on its face, it would appear that somebody on the scene at the time was convinced that the gear was contaminated or would not have had it replaced.

Finally, just as another footnote, as I browsed through this——

The CHAIRMAN. I'm wondering, do you have a response?

[No response provided.]

Senator BENNETT. Do you have a response on that? I'm assuming that you don't have that statistic. But if you do, I'd be glad to——

The CHAIRMAN. There ought to be somebody here that knows. There are a lot of people here that are experts in this area. Who can get the closest to an answer?

Dr. PROCIV. I guess the difficulty of coming up with a number, and we will try. We will try to provide one for the record. The only time that a record is made of an alarm is if it's a verified alarm. An NBC 1 report is prepared and that's sent upstairs.

The CHAIRMAN. Now what is a verified alarm?

Dr. PROCIV. An alarm goes off and the M256 kit is used to verify it.

The CHAIRMAN. So when the alarm goes off, if there isn't that kind of a verification, you wouldn't count it, anyway.

Dr. PROCIV. No.

The CHAIRMAN. Would you then kind of switch back to the other point, that maybe it was a faulty alarm or——

Dr. PROCIV. I'm trying to be open-minded here.

We probably wouldn't hear about it, but it may be that the company would keep records, that Central Command would keep records. And so, we will try to get the number.

Senator BENNETT. I find it inconceivable that the alarm would go off and the unit would be on alert, and in their MOPP gear for hours, and then the gear would be collected and disposed of and there would be no record of the incident on the ground that it wasn't verified. That's incredible to me.

Dr. PROCIV. Let me try to explain that, also. Typically, the gear is not changed after an alarm.

Senator BENNETT. I understand that.

Dr. PROCIV. Typically, the gear is changed after a certain number of days of wear life. For instance, the British suit has a 5-day wear life. On the fifth day, everybody changes out of the suit and gets a new one. I'd have to look into each of these cases and see why those change-outs were made. I'm not sure I understand that, other than by coincidence, it may have hit that fifth day.

Senator BENNETT. I can understand that it would be by coincidence. But the Chairman asked the question, how many times did the alarms go off, because the testimony here has said that every single time that the alarm went off, it was because of some nonchemical reason. It was a false alarm. It was in reaction to diesel fuel in the air. It was testing. In every single instance, the testimony is the alarm was not an alarm of actual chemical presence. His question was, how many times did we have those nonchemical stimuli creating an alarm going off? I think that's an answer we ought to get an approximation for.

The second question that I'm asking is, how many times was there a replacement of the gear following the alarm going off? If you say it only happened twice and in both cases, the 5 days were up, I'll accept that. But I want to know how many times it actually happened, whether or not we can put it down to coincidence of the 5 days being up, or if somebody on the ground came to the conclusion that there was in fact contamination there and the gear had to be replaced as a safety measure for his troops. I can see a conscientious commander making that decision and having a record of it somewhere. I want to know if, indeed, that happened.

Finally, just as I was browsing through here, I'd point out to you on page 77, there is another case of an M256 giving a positive reading. William Brady, Battalion Logistics NCO with the 217th Maintenance Battalion.

Deafening sound, a flash of light, everything shook. That does not sound like a sonic boom to me. He remembered the chemical litmus paper turning red and a positive reading from an M256 kit. His nose began to run. He smelled and tasted sulfur and he began coughing up blood a couple of days after the attack.

Once again, you may have an explanation for the M256 working, but I come back to the earlier statement that there is never a verified case.

We do have a pattern here of alarms going off and now individual reports of even the M256 being activated. I don't think there's a lot of credibility, unless you've got an answer for every one of these, for the statement that there was no presence of these things. To a layman, it just seems overwhelming that there's got to be a presumption of presence if these kinds of things kept happening.

Dr. PROCIV. Our conclusions are also based on not just the alarms. It's also the absence of the types of symptoms that we expect to see from nerve agents. We talked to our allies. We have not seen the symptoms there.

Typically, an attack will cause a lot of people to get exposed. So I will take these questions for the record, however, sir, and I will provide you the answers to those.

Senator BENNETT. Let me pursue what you just said because it fits with the line that I was on earlier.

You say, typically, we can expect. Let's hold the possibility that these particular agents were not typical. Let's hold the possibility that, indeed, something happened out there that doesn't meet the typical norm. Back to my earlier question to the Secretary—isn't there a possibility that the confirmation pattern is flawed?

You say, we can't get confirmation of it. Maybe we're dealing with something new here that we weren't previously thinking

about that can produce a different kind of reaction than we were expecting. With that thought in mind, go back and review everything we've talked about. Our confirmation pattern doesn't confirm.

I'm willing to accept that. I don't think you're sitting here lying to me on that issue. I'll accept that you've done the confirmation and the confirmation doesn't confirm. But how do I explain all of the people with Gulf War Syndrome. Just because it doesn't fit the typical pattern does not mean it didn't happen. Start thinking in those terms and maybe this whole thing will be a little different.

I thank the Chair.

The CHAIRMAN. I think, Senator Bennett, that that's an enormously constructive point you've just made.

We know that Saddam Hussein was experimenting with mixing up these cocktails, these so-called chemical cocktails and maybe mixing biologicals in with the chemical cocktails. We don't know what he was finally doing. We just know at the end of the war, even though we bombed the daylights out of every storage place we knew about, and I think in the process threw a lot of this stuff up in the air, which then blew down over our troops, that even after all the bombing, the massive bombing, he still had a huge stockpile of this stuff. That's what the U.N. inspectors found. And we're still destroying it, still getting rid of it. It's not easy to get rid of.

One of the great ironies is that we helped put it together because we sent him the materials in the beginning to get him going, with these licenses that were approved by our own Government to send the biological specimens and so forth.

But I think Senator Bennett is onto something. I think we may in fact be dealing with something here where, when he was threatening us with these kinds of doomsday weapons and other things, that he may have been experimenting with weapons that were different and outside the norm, and that we were not necessarily ready to deal with that.

I think, quite frankly, it's a stunning statement. I know you may not think about it that way, when you say that when these alarms were going off all the time, it's probably because the alarms were faulty or that they were registering the wrong things.

To the people out in the real world that go to work everyday and pay the bills for the defense establishment and everything else, that will have them marching on Washington, if they think that what we were doing is buying alarm systems to protect their sons and daughters that basically weren't any good.

And so, yes, they kept going off all the time, but they were going off for the wrong reasons.

That's like asking people to believe something that's just so unbelievable, that to say it, makes a person sound like a fool, I think to a citizen.

Senator BENNETT. Mr. Chairman.

The CHAIRMAN. Yes.

Senator BENNETT. Could I comment on that because you've triggered a thought here that I'd like to share with the Department of Defense.

We're in a Catch–22. If we say, on the one hand, the alarms going off in every instance was due to malfunction or misreading or diesel oil, or whatever, and then we turn around and say, on the

other hand, we have absolutely no confirmation from anywhere that these agents were present.

It's the second conclusion that's driving the first. If you say, just one alarm functioned properly, and what are the statistical chances that that's true, just one of these M256 readings was accurate, then we do have confirmation.

You've got yourself into a logic box here. If you say they all failed, the M256 all came from people who didn't understand what they were doing. We've checked everyone of them. You then can validate, no, there's no confirmation.

But the overwhelming inference on the part, again, of somebody looking at it from the outside who's not involved, is that it is the second conclusion that is driving the first and it becomes a self-fulfilling prophecy once you get there.

You can't prove a negative, but just think about it for just a minute logically and use the phrase, fuzzy logic, that allows you to go with probabilities, even if you can't pin it down. Is it really logical to assume that every single one of those events was faulty?

Mr. DORN. Senator, let me—perhaps Dr. Prociv can address another dilemma here which has to do with the way one designs the systems and the way one sets them so that one has the maximum possible warning.

It is a system which, unfortunately, is likely to yield some false alarms. But perhaps we can discuss that technology because it does raise an interesting question about how much advanced warning we want in these circumstances and it may guide the way in which this technology is refined in the future.

The CHAIRMAN. Well, before we get off into a long, technical discourse that eats up more time, I want to stay on the point that he's just raised. If you can invent a better system, I'll all for it. Go and do it. If you want the money, I'll vote for the money to do it.

I'm concerned about a lot of sick people right now because the last system didn't work right and we're having a very hard time, I still think, getting an honest understanding of what happened.

I think Senator Bennett is exactly right, that it's the second conclusion that in a sense is driving the first conclusion, that backs you into the notion that you've come in here with a truly unbelievable assertion that every single one of these alarms going off was faulty and didn't mean anything.

I think that that's clearly not the case and I would hope at the end of the day, not just today, but at the end of this, you wouldn't force yourself into believing something that is patently unbelievable.

But there's a more serious and sinister part of it. And that is that that kind of logic also drives the effort to get to the bottom of the medical problems because if you're working off the premise that it can't be chemical exposure or biological weapons exposure, then you don't aim the bulk of your medical research effort with real urgency into that area of exposure.

You look at other things. You can spend a long time looking at everything else that it might be. Meanwhile, you've got very sick people that in many instances, are getting sicker. In other words, their sickness isn't standing still. Their sickness in many cases is progressive.

The thing that alarms me the most right now is that by, in a sense, ruling out the notion that it could be chemical and biological exposure causing a lot of this difficulty, maybe in a mixture with the pretreatment pills and so forth, we are losing very valuable time and causing perhaps an immense amount of grief.

If you've got a biological issue working in all of this, you may have even a bigger threat on your hands than we're accustomed to even thinking about. And so, that kind of logic or illogic, in this case, I think is what people can't accept who look at this.

And to your question, how many times did the alarms go off, I can assert to you right now, based on just the first person accounts that we have had, with discussions with people who have come forward, for whom we have names, places, times, and so forth, that there would be thousands of events of alarms going off. Would any of you dispute that?

You would not dispute that.

Dr. PROCIV. We have no data.

Senator BENNETT. That goes back to my question—what would you be surprised if it were fewer than? Does 1,000 strike you as much too high? You say you have no data, but you obviously——

Dr. PROCIV. I think that I would agree to per-alarm, perhaps 2 to 3 a day. I could see that happening.

The CHAIRMAN. How many alarms were out there?

Dr. PROCIV. We had 14,000 alarms out there.

The CHAIRMAN. So 14,000 alarms going off 3 times a day.

Dr. PROCIV. Big number.

The CHAIRMAN. That's a pretty big number.

Senator BENNETT. Yes. Let me pursue another aspect of the thought that I'm laying down here, that just because it doesn't fit the norm doesn't mean that it didn't happen.

As I understood, Mr. Secretary, your comments were that you found no evidence of the presence of these weapons, let alone the trace of the gases or agents, but no evidence of the presence of these weapons in the theater. Is that correct?

Mr. DORN. That is correct.

Senator BENNETT. OK. I believe, from the first-person reports contained in this document, that most of the instances reported were not in the theater. They were behind the lines back in the maintenance area, subject to SCUD attacks that were later dismissed as sonic booms and not, in fact, SCUD attacks in some cases, but not necessarily in the theater where the tank battle and those other things took place. Is that correct?

Mr. DORN. Those portions of southern Iraq and Kuwait that constituted the battlefield. So you are correct in the way we've defined the Kuwait theater of operations. However, I believe that statement is intended to cover, and I will verify it, but I believe that is intended to cover everything that we found on the battlefields, short of a certain parallel into Iraq.

Now I will confirm that.

Senator BENNETT. You see where I'm going.

Mr. DORN. It obviously would be very important——

Senator BENNETT. Yes.

Mr. DORN. —If this were cleverly worded to obscure that point. It is my sincere hope that it has not obscured that important point.

The CHAIRMAN. We have more than a hope, though.

Senator BENNETT. I don't accuse anybody of cleverly wording it to obscure it. But I have had enough dealings with some military minds, I won't say all, by any means, to suggest that it would never occur to them to go beyond the battlefield as to what the theater would be.

We are dealing now, if we accept these first-person witnesses at face value, with people who are behind the lines, who are subjected to SCUD attacks launched from areas we know not where. That is prima facie obvious because if we knew where the SCUD's were, we would have destroyed them. We were out looking for them. That was the number-one priority of the war, as far as our relationship with the Israelis was concerned.

These are attacks being launched from some area that we may very well have never reconnoitered that took place in an area outside of the theater. So that the information that you gave us here, very conceivably, could be exactly correct and still have missed the point.

Mr. DORN. I will double check the information. However, as you know, a number of these SCUD's landed in populated areas or were destroyed over populated areas. We know that when they were destroyed, they sometimes spewed forth rocket fuel and lots of other debris. I have seen no information suggesting that the debris contained evidence of a chemical or a biological agent.

I will double check that information for you, sir.

Senator BENNETT. I think it would be a useful exercise.

The other comment I would make——

Mr. DORN. Dr. Kriese has a comment on that.

Dr. KRIESE. May I comment, sir?

Senator BENNETT. Surely.

Dr. KRIESE. My understanding is that, after every SCUD attack, we checked for CW and none was found. That was of great concern to our forces.

I think you brought up a very important point as you talk about delivery of agents. You referred to an incident on January 19, or perhaps January 20, this is event 3 on page 64.

This area, we believe, was outside the range of any Iraqi delivery systems, except for SCUD's. And on January 20, there were four SCUD's that landed near Al-Jubayl, two of them about 35 miles away and two about 58 miles away.

I think as we discuss chemical agents, and I don't want to give any appearance that I'm trying to rule something out or in circular logic, but, in my mind, one of the issues is the question of how those agents were inplaced, how they got there.

As we look at the installations that were deep behind the lines, like Al-Jubayl, SCUD is the only way to get there. I'm not saying that they're not there because I don't know how else to explain them. But I think delivery is a very important issue that we've looked at as we've tried to make an assessment of the use of CW and BW weapons.

We've also asked ourselves questions about if there are low levels of CW or BW, why do we never find high levels? Distribution of material is a very difficult problem. Usually, you start from a small canister and release it. Close to the canister, you have high levels

of CW or BW agents. Further away, you find low levels. So this is, again, a puzzle to us. And I don't want to say that I'm ruling anything out.

Senator BENNETT. Yes.

Dr. KRIESE. But as we try to understand how the Iraqis may have used CW or BW agents, these are things that we try to address.

Senator BENNETT. And I think it's appropriate that you try to address them. I think that that's a legitimate question.

I go back to my earlier comment that maybe we're dealing with something here that does not fit our expectations because we're dealing with an individual who has pursued this weaponry far beyond the levels that we have, I think, in our own arsenal. We've decided to pull back from this a long time ago and he has decided to go forward.

Dr. KRIESE. Yes, sir, and I would add that, certainly, one of the things that the intelligence community worries about a lot is the question of technological surprise. So, across the board, we look at unexpected developments in technologies that may be a threat to U.S. forces or the forces of our allies.

This is something that we've looked for and, again, I can't say that it's not there because we haven't seen it, but we certainly pursue those leads whenever we have them.

Senator BENNETT. I have to leave. I just want to conclude with an experience totally unrelated in specifics, but I think quite instructive in its overall message that I had in my formative years as a very young man.

It had nothing to do with war, fortunately. But we were trying to sell tickets to a concert. The public relations firm hired to help us to do this sent their expert into the area where I was operating. He was appalled to find out that I was doing all kinds of things he didn't want me to do.

This happened in the British Isles.

He called his superior in London and he reported to his superior all of the things that I was doing that were contrary to the wishes of this internationally known PR firm. The conversation is still burned in my mind and the lesson that I learned is the one that I want to share with you.

He said, "Yes, dear, I told him that." His superior was a woman, so he could use that terminology in the days before political correctness.

He said, "Yes, dear, we covered that. Yes, dear, we have handled that. Yes, we have done that. That's right. Yes, we've covered all those bases. Everything is fine. There's just one problem—no tickets have been sold."

OK, we can get all of the explanations. We can get all of the examination. There's just one problem—we have a batch of people for whom we cannot give any explanations in terms of their medical circumstance. Maybe the old pattern he was describing in that circumstance and as you are describing in here, has got to be abandoned and we've got to do something different.

That's what I was trying to do when I was trying to sell tickets to the concert and offending people because I was doing things dif-

ferently than they thought they should be done by the classic pattern.

My only defense for my actions was but no tickets are being sold doing it your way. My only comment here is no answers are being found as to where this body of people with serious medical problems came from. And that's what keeps driving me and I know keeps driving the Chairman and will keep driving this issue until we either fill the hall, as I can say proudly we did on the occasion of the concert, by solving the problem, or come up with an explanation that is so scientifically iron-clad, that everybody can buy it.

Saying that the explosions were all sonic booms and the alarms went off, all in malfunction or testing, and that all of the illness comes from some other source is simply not going to cut it in the reality of what we've got here, what we have to deal with. There is the reality of the people who have these problems and that reality is not going to go away.

Mr. DORN. Senator Bennett, I want to emphasize again that we are considering all the plausible possibilities, including the possibility of exposure to some type of chemical or biological agent.

Senator BENNETT. I'm delighted to have you say that last sentence because I had not heard it before now and I may have missed it. But I'm glad to hear it before I have to leave and I congratulate you for making that clear commitment, to consider this as a real possibility, in spite of the fact that there are no confirmations, in spite of the fact, et cetera.

That, I think, is a major commitment on behalf of the Defense Department.

The CHAIRMAN. Thank you very much, Senator Bennett.

I think logic, which is what Senator Bennett is trying to apply here, and properly so, is maybe the quickest way to an answer because of the problems that we've been discussing this morning.

I want to read into the record the chemical warfare agents which survived the Allied bombing—these are the chemical weapons that Saddam Hussein had squirrelled away and then they were picked up to be destroyed after the war by the inspectors that went in.

Now listen to this. This is just what we got after all the bombing. We went in and, as a priority target, tried to knock out a lot of these weapons storage places and weapons production places. So, presumably, we got rid of most of it in the bombing runs. But this was what was left after all the bombing.

Now just think about this and think about it logically—13,000 155-millimeter shells loaded with mustard gas; 6,200 rockets loaded with nerve agent; 800 nerve agent aerial bombs; 28 SCUD warheads loaded with Sarin; 75 tons of nerve agent Sarin; 60 to 70 tons of the nerve agent Tabun; and 250 tons of mustard gas and stocks of thiodiglycol, a precursor chemical for mustard gas.

Again, just think about this, we went in with these saturation bombing raids. We tried to hit their weapons production facilities and knock them out. Presumably, we did knock a lot of them out. A lot of what they had to start with presumably went up in smoke and, unfortunately, I think a lot of it drifted down over our people and that's part of why these alarms were going off.

According to the testimony here, if there were 14,000 going off 3 times a day, there's an awful lot of something going on. But this is what was left after the war that we managed to find.

Knowing Saddam Hussein, he may have more than this squirrelled away some other place we haven't even found. But leaving that aside, this is a tremendous stockpile of these kinds of weapons to have at the end of the war.

Now you have to say to yourself, and especially when we're dealing with sick veterans and so forth, who feel that they were exposed to these items, is it conceivable that Saddam Hussein, with all of this stockpile—I mean, he didn't have these things by accident, he built these with a very deliberate design to have all of these things—is it conceivable that in the course of the war, he or his field commanders, and I understand some of his front-line field commanders had authority to do certain things in the war, depending upon how the war went. Is it conceivable that not a single one of these shells or weapons was ever fired? Is that conceivable? Maybe it's conceivable. I think it's very, very unlikely. That leaves apart the question of blowing these things up with our own bombing raids and dispersing it in that fashion. And the fact that he had a history of doing it in the past.

But what's even more powerful, I think, when you apply the logic, if you take the symptoms, the health symptoms that would come, and this runs counter to something that was said earlier by one of the witnesses, we spent a lot of time overlaying symptoms to exposure to what kind of items could create these kinds of symptoms and what kinds of biological items and chemical weapons do we know that he had and was developing that could create, if a service person was exposed to them, a pattern of medical difficulty that would fit that kind of exposure.

We find a very high correlation between the kinds of sickness and medical symptoms and exposure to chemical and/or biological weapons. In fact, we can't find anything else that correlates highly. This is the one thing that fits.

And so, after a while, the pattern is so strong, that you look at it and you say, why is it that everybody else that's looking at this, including a lot of outside medical people who are trying to deal with sick veterans, can see these patterns and the Defense Department has this mental attitude that says, it couldn't be in this area and therefore, we don't really believe that's the problem because we can't verify it, so we're assuming the problem is somewhere outside those parameters.

Now, granted, you've just said in response to Senator Bennett at the end of a long morning that you're looking at the chemical and biological issues as well. But your whole statement is built around a central supposition and belief that there was no chemical and biological problem here.

Mr. DORN. No, sir.

The CHAIRMAN. It is not?

Mr. DORN. You asked what I thought was the Committee's interest in the Export Administration Act and the possibly related question of whether or not Saddam Hussein used materials provided under the old Export Administration Act against us. And my statement was that we find no evidence that the weapons were used.

I've said several times during this hearing that we are considering a wide range, all the possible explanations, including the possibility of some type of exposure to chemical agents. There are two issues here. One is what our adversary may have used. The other question is what may have been available or what may have been present in the theater for other reasons.

The CHAIRMAN. Isn't there a third category? Isn't there a potential, unintentional way in which it could be used if we went in and bombed these facilities and these got up into the air——

Mr. DORN. That has been looked at.

The CHAIRMAN. —At different levels of air currents and it came down over our troops. That would be a way in which he would not have made an offensive strike. We would clearly not have intended for that to happen. But isn't that another possibility?

Mr. DORN. That is clearly a possibility. May we speak briefly to that?

The CHAIRMAN. Yes, please. We have an extensive aspect of that in our report, as I'm sure you know. Go ahead.

Dr. KRIESE. I think one of the questions that comes up when you look at this as a potential cause for the illnesses is the question of where are the very sick people?

The high concentrations that would have resulted locally from attacking facilities, I think possibly could have caused very serious injuries near the places that were bombed.

The CHAIRMAN. You're talking now about the Iraqis themselves?

Dr. KRIESE. Yes, sir.

The CHAIRMAN. Do you trust their data?

Dr. KRIESE. We saw no evidence as we were reviewing all the imagery that we had available for bomb damage assessment of any local fatalities that we could attribute to release of chemicals or biological agents.

As we attacked facilities, sir, we went back and very carefully evaluated the amount of damage that we achieved with our attacks and have extensive imagery from gun cameras and other resources that we had in the area and we found no evidence of the deaths that you might anticipate from local releases of large amounts of material.

As the U.N. has inspected some of the areas that we bombed after the war and, again, this does not provide data on what was there at the time we bombed, but certainly later, some of the facilities turned out to be empty. The Iraqis dispersed a lot of their munitions. That's why it was recovered after the war. They were not necessarily in the places that we attacked.

As part of our planning, we did studies of impact of releases. We've gone back afterwards taking weather data from the Air Force and other meteorological conditions and have made estimates about how far plumes from released material might have impacted people. For the southern most facilities that we attacked, I believe that the plume extends out, at most, 10 or 12 kilometers for incapacitating roughly 5 percent of unprotected people.

And again——

The CHAIRMAN. See, the problem with that is when you say incapacitating unprotected people, first of all, we're talking about something that we don't have a lot of good research on, obviously.

But if you're getting these low-level exposures—let's say you're an American service person out there and you're getting these repeated low-level exposures and the alarms keep going off, going off all the time. And we're saying, well, that's just because they're faulty alarms.

It's even an embarrassing assertion because I think it's so incredible and unbelievable. But this stuff is wafting down through there and that's why the alarms are going off, and people are getting exposed to it.

Now, I don't know that we know enough today as to what kinds of exposure levels at lower levels, but on a chronic basis and over a period of time, are going to make somebody sick, make you sick, make your son sick. Maybe some person in the unit is going to get sicker a lot faster and more seriously than the next person in the unit who either has a different kind of a system or the exposure, for one reason or another, isn't quite as severe for that person.

But, again, I find this remarkable blind spot that's right in the center of the screen here where you've got all of the surrounding information, most significantly being all the sick veterans who keep coming forward.

I think until somebody—and maybe you've done this, I hope so and if you haven't, we're going to help you do it. You need to talk to some of the sick spouses, whose hair is falling out, who can't sleep, whose reproductive cycle is not working properly. They're showing a lot of the same physical symptoms that their husbands are showing, who were the veterans, although we have women veterans, too, who have these problems.

I don't know where the breakdown is coming from because we have this enlarging body of sick people out there who something happened to. They weren't sick before they went to the Gulf. Something happened to them there and now they're back and now they're sick. Can anybody tell me what happened to them? You're convinced, by and large, at least that's the testimony and that's the official Defense Department line, that it was not exposure to chemical and biological weapons.

I think part of it is due to that and we're putting a much stronger case on the table than you are. But if it isn't that, after all this period of time, and as important as this issue is, what is causing it?

Dr. KRIESE. Sir, if I can just comment for a minute?

I don't think the Defense Department is saying that it was not, the Gulf War Syndrome was not due to CW and BW.

The CHAIRMAN. Chemical Warfare and Biological Warfare agents.

Dr. KRIESE. Yes, sir. I think the Defense Department is not taking that stance.

The CHAIRMAN. So you're not saying that that's not the cause.

Dr. KRIESE. That's right.

The CHAIRMAN. That could be the cause.

Dr. KRIESE. Yes, sir. I think Dr. Dorn said that very, I hope, clearly earlier.

I think he came to people for advice on what might be causes as he ran down the list of the possibilities. He asked the Defense Intelligence Agency for our assessment of use of CW and BW.

As I heard him say, thank you very much, it's still on my list.

The CHAIRMAN. What do you think is causing it? What's causing all these veterans and their families to get sick? What's your best judgment?

Dr. KRIESE. Speaking totally as a nonexpert, I think that——

The CHAIRMAN. I hope you're an expert because the Defense Department shouldn't bring you up here if you're not something of an expert.

Mr. DORN. But not in health.

Dr. KRIESE. Sir, I'm not an expert on the whole range of medical issues that might be involved in this question.

The CHAIRMAN. Well, take us as far as your expertise can take us, then.

Dr. KRIESE. I think we're learning about dangers of a whole range of chemicals that exist in our environment. I think there's a lot that we have to learn.

The CHAIRMAN. You think this is part of the problem here? Everything you've seen, your own wisdom, logic, and common sense. Do you think that chemical and biological exposure may in fact be part of what's making these veterans sick?

Dr. KRIESE. I think there were a lot of chemicals that were in the atmosphere in the Gulf from a range of sources, whether oil fires, chemical weapons. You can make a list of things that I think that there's a real possibility that low-level chemicals, or a combination of low-level chemicals may be one of the contributors to this disease.

The CHAIRMAN. Do you believe that, too, Dr. Prociv?

Dr. PROCIV. I wouldn't discount it. Again, I'm not a medical type. My biggest dilemma is I don't understand how the chemicals would get there in sufficient quantity. If I understood that, I would believe that.

The CHAIRMAN. What do you believe, Mr. Dorn?

Mr. DORN. Senator, as I said, we're exploring a large range of possibilities, including the one that we've discussed extensively here today.

However, let me go back to something that I said in my statement. There are a large number of theories out there, each with a strong proponent, for multiple chemical sensitivity, for parasitic infections, for chemical agents, for other possible causes. We are trying to explore all the possibilities. I think it would be a mistake for us to focus on one possibility to the exclusion of all others.

I could get a great headline here if I were to point to a single cause. But that would be a disservice to this Committee and it certainly would be a disservice to the veterans to try to speculate about matters that we are still trying to study.

We do not understand it.

Senator, I have had the experience of being shuffled from physician to physician, trying to find the answer to a simple question. So I empathize with the frustration being experience by Col. Smith and other veterans.

I was not in the Persian Gulf, but I think many of us in this room have gone through that type of frustration. And as one goes from specialist to specialist, not getting answers, the fear and the frustration build. There were many, many times when I would have loved for someone to say, aha, I know exactly what the prob-

lem is. I will not try to offer veterans speculation when I think we need to——

The CHAIRMAN. They don't want speculation. I'm with you up to that point.

Mr. DORN. —Support clear research.

The CHAIRMAN. Now I think—respectfully, that veers off into something that doesn't really have a lot of relevance here.

The question is what can we offer them? Let me give you some specifics.

No. 1, to ones that are sick and can't work, they ought to have 100 percent disability. That you can offer them. That you can fight for and that you should get and we shouldn't wait another day to do it.

No. 2, if you've got family members that are sick, showing the same syndrome, they ought to get care from the Government. The Defense Department ought to be fighting to get the money for it. If you have to not build another battleship or something else in order to get the money to take care of the sick family members, you ought to stand up and say it. And so should the Secretary of Defense, because the veterans are a lot more important than the equipment.

[Applause.]

I think there should be an epidemiological study of every single Gulf War veteran to find out what's going on out there and if some are being affected now, there might be some that are going to be affected 3 or 4 years from now. We could learn something and do something about helping them at the present time.

I'm also concerned that there are a lot of other things that we haven't done here that we could have done with respect to getting to the bottom of these pretreatment items. I think we've got to streamline the appeals process within the Veterans' Administration. There are a whole host of things. I've spelled them out.

It would be very helpful that in the recommendations area, which is not designed to go to a single-cause issue, to go to the question of what do we do now to deal with the damage? It's very specific and it's very clear and I think it's sound. I think it's good national policy and I think the Defense Department today, the best thing it could do for itself as it's trying to figure out what happened is to go on an all points effort to deal with the aftermath of this problem and see to it that these veterans and their families are getting the full scope of care immediately that they need and not wait to find out exactly what happened in each and every instance but to get that job done.

I'll tell you very bluntly, that is not happening. And you can say this is way up on the priority list of the Secretary of Defense. But I've listened to the Secretary of Defense. I've listened to him on the radio. I've watched him on television. I've been waiting for him to talk about this problem. He can get a mike any time he wants it. He can step outside his office door and say, get the networks in here. I've got something to say on the Gulf War Syndrome issue. And you know what? They'll be there. They'll be happy to come. He can talk about this and he can deliver a message that's so powerful and so clear that shows where the priority is in treating these sick veterans and their families, that it's unmistakable.

The silence is deafening. That hasn't happened. And there's no excuse for it. I wouldn't have a Secretary of Defense that didn't do that, quite frankly, if I were running the show. It's not enough to do all the other things.

I'm making my statement, Mr. Dorn. You can make yours in a minute. I know you've got to defend the Department. That's your job. It doesn't happen to be my job. That's why we've got a balance of power difference in this Government of ours.

I think he's got an obligation to speak out and give some leadership on this issue. I think he's got to address Col. Smith's problem and these other veterans who are here in this room and there are thousands more that aren't here. And especially these spouses and these sick kids.

I've seen the sick kids. You ought to go see some of them. You ought to go talk with them. It will change your thinking about this problem, I guarantee it. It will make you a lot more passionate about it and a lot more determined to get to the bottom of it in terms of at least treatment for people, because we're not treating people today. Where does the spouse and the child go today? Can they go to the VA hospital? No, the VA hospital isn't geared to take them. It doesn't want them.

Mr. DORN. Senator, the law can be changed if you introduce the appropriate legislation.

The CHAIRMAN. That's exactly right. The law can be changed and there are a lot of ways that can change it.

It would certainly help if the Secretary of Defense, representing a continuum of decisionmakers, who organized this whole effort and sent everybody off to this war, would step up to the plate and say, look, we've got a problem that's a fall-out of this war. We don't fully understand it. Maybe we didn't do some things right. Maybe we had the wrong sensors. Maybe we didn't anticipate the problem. Maybe when we get to the bottom, somebody's reputation is going to get nailed. Maybe it turns out somebody somewhere along the line said, we don't have to worry about this problem. It turns out we did have to worry about the problem.

I've seen that happen before, too, and I'm sure you have.

We give you a very good-sized budget. I had to fight to get $5 million in the appropriation to do some medical research, which I did last fall on the Senate floor. It's been hard to get the money even spent, I might say, to hire the people to go out and do the work. That's another whole story. We won't get into that here today.

But it would be very refreshing if the Defense Secretary said, we've got a very tight budget and I know it's hard to pay for the medical care here, but we're going to set aside a half-billion dollars out of the Defense Department. That's like pocket change in terms of the totals, but it's significant pocket change to say, I want to make sure that those problems are taken care of. And I don't want any bureaucratic mumbo-jumbo that the Veterans' Affairs Department doesn't have the money that it needs or somebody else doesn't have the money that it needs.

This is a Defense Department operation. These people went to fight because we asked them to go. We're responsible for what happens to them at the end of the day. They're sick and this is an

anomaly and we want to get to the bottom of it. And while we're trying to do that, we want them treated. We'll pay the bill.

You know something? The people of the country would like to hear that because that's an acceptance of responsibility. That isn't to say that somebody did anything deliberately or anything of that sort. It's an acceptance of the responsibility after the fact of the human need that's there. That would be a wonderful gesture and it's what ought to be done.

Now I'll bet you that nobody's even thought about that at the Defense Department. Or if they have, they sure kept it a secret.

Mr. DORN. Mr. Chairman, I began my testimony by reading a letter to all Persian Gulf veterans from Chairman Shalikashvili and jointly signed by the Secretary of Defense. I will be pleased to read it again into the record.

I should point out, however, that that letter, which promises treatment, which encourages people to come forward, which tells people that there are no classification restrictions against what they may wish to say about their experiences, is the last of about a dozen messages that various people in the Defense Department have sent out within the past 8 to 10 months.

Now it is true that when we send out a message to veterans which says, we're treating you, we do not get quite the same amount of attention as we can get with a more sensational story.

However, we can discuss the resources being dedicated to this effort. I can assure you that a soldier who comes forward, or a family member who comes forward to a military medical facility will receive care. This information is often missed because it seems to be a positive reassurance which some people are not interested in hearing.

Let me say it again loudly. If a soldier comes to a military treatment facility, he or she will be treated. If that soldier brings a member of his family in, he or she will be treated. If there is anyone in this audience who feels that has not happened, I will take the names, I will make the calls, and it will happen.

The CHAIRMAN. Let's have order in the room.

You have some people here that feel that way who are standing. They feel that they have been given the brush-off in that area. So we'll see to it that you have their names.

Let me ask you this. When was this letter put out?

Mr. DORN. It's dated today.

The CHAIRMAN. So, in other words, the letter was put out today.

Mr. DORN. That is the last, as I said, of about a dozen messages coming out of DoD on this matter.

The CHAIRMAN. But this is the one you're citing because this is the one that's obviously directed to the veterans with the kind of focus that you've just described.

But again let's be honest with each other. There's no coincidence, is there, in timing, that the fact this letter is coming out today and we're having this hearing today.

Mr. DORN. Yes, Senator, it absolutely is a coincidence because that letter has been working its way through the system for some time.

I should mention that a week or so ago, a message came out from the Assistant Secretary of Health focusing on this. I will be glad

to provide you the list of a couple of dozen things that have gone out—either briefings or memoranda or messages—since the end of the Persian Gulf conflict.

I should also point out something else, Senator, because there is a great deal of discussion about delay and attention.

I am grateful that sometime late last spring or last summer, several Members of Congress, including Senator Shelby and Mr. Montgomery, began approaching the Defense Department, saying, "Hey, I keep getting groups of veterans from my constituency coming forward and they think they have a problem." Most of these veterans are in the reserves or National Guard units.

It is not fair to say that this is a problem that everyone has been aware of since the end of the Persian Gulf War and that we are only beginning to attend to. It is fair to say that it is a problem that has become apparent over time, it did not crystallize either in the Congress or in the Defense Department until less than a year ago.

We have, I believe, tried to attend to it since then. I think we can be faulted in any number of ways. You may be correct that, in spite of this letter and in spite of dozens of other attempts to communicate, we have not done as good a job of getting the word out as we should have.

I think you probably are also right that we had doctors in our military facilities and in VA facilities who, not having identified a pattern or syndrome, were not as sensitive to the matter as they might have been. There were also, as you know, up until just a few months ago, restrictions on treatment.

The CHAIRMAN. I don't want to stop you. If you'll permit me to interrupt just for a minute because I want to hear your full statement.

We have a vote that's on. The lights back there are on and I've got about 8 minutes to get to the floor. I want to make the vote. It's a cloture vote and my vote may decide the issue. I hesitate to interrupt this to do that.

I want to recess the Committee for that purpose and then I'll come back and I'll let you finish.

As nearly as I know, there has been no letter like this before today signed by the Chairman of the Joint Chiefs and the Secretary of Defense sent to all Gulf War veterans. Now, am I right in believing that?

Mr. DORN. That is correct.

The CHAIRMAN. Isn't this the first letter like this?

Mr. DORN. I think the previous correspondence has gone to people in the military chain of command for treatment instructions and to commanders.

The CHAIRMAN. OK. Let me let you check that while I'm gone.

Let me also ask you to do something else. You offered to talk to the veterans here who feel that they're not getting the response to their medical problems. That's not an unlikely situation. There are a lot of veterans who feel that way.

Mr. DORN. Absolutely.

The CHAIRMAN. You had some stand up over here. You've had three in uniform stand up over here. While I'm gone, I would ap-

preciate it because I'm going to come back and resume the hearing, if you could chat with some of them.

Mr. DORN. Absolutely.

The CHAIRMAN. I'd like it to be a civil conversation. I know everybody feels strongly about this. I'd ask everybody to conduct the discussion in an orderly manner here because I know this arouses a lot of tensions and feelings. But talk to Secretary Dorn while I'm out of the room. I'll vote. I'll come back and then we'll finish up this session.

The Committee stands in recess for a short period.

[Recess.]

The CHAIRMAN. Let me ask that everyone take a seat.

Secretary Dorn has to step out for a minute. Kelly, would you accompany Secretary Dorn just for a minute.

In any event, let us resume then, if you're ready to go.

I want to just make a clarification on the memorandum today from the Chairman of the Joint Chiefs and Secretary Perry that's gone out to the Persian Gulf veterans. Does the statement cover Reservists and their families, including those both still in the Reserves and those that may have left the Reserves since the War?

Mr. DORN. I think to the extent that the law permits, it does. I've got to check.

If you're saying does it allow Reservists and their families to receive medical care in regular military facilities, the answer is no, and that is a legal problem which we need to discuss with you and certainly need to discuss with the Committees on Armed Services and the Committees on Veterans' Affairs.

The CHAIRMAN. Let's get a clarification on that as quickly as possible. I would hope they would be included because obviously if they are out there part of the walking wounded, their problem is precisely the same as someone else.

Mr. DORN. Clearly, nothing in this changes existing law, and the existing law says active-duty personnel and their families get treated in military treatment facilities, that Reservists, under normal circumstances, would go into the VA system.

Now the law can be changed, but——

The CHAIRMAN. Here's what I'd like you to do. I'd like you to get together with the VA and let's resolve that we're covering everybody here. I don't want somebody that was out there and who's sick, operating side by side with somebody else who was out there and sick, and one person gets one kind of treatment and the other person either doesn't get treatment or gets a lesser kind of treatment.

We obviously don't want that, so I just want to make sure that that gets reconciled within 24 hours in some way so that the message that's going out is that anybody that suited up and went is going to get the same response that's being pledged here within this letter.

Mr. DORN. Again, within the constraints of the law. We need to work, as I said, on the law. We may need to work on those changes, to make that happen.

The CHAIRMAN. I'll tell you something. If we need to do that, I think I can make you a guarantee. If the Defense Department determines we need a change in the law in that area, let's get it

drafted. I'll offer it on the floor to the next bill through. I'll bet I can get close to 100 co-sponsors and we'll get it passed. There'll be no barrier, I don't believe, to getting that done if we need that, but I don't want that to become a Catch–22 either.

So——

Mr. DORN. And it clearly is a limitation because, under current law, Reservists' families cannot be treated, either by the regular military facilities or in VA facilities.

The CHAIRMAN. See, I don't know that we've had a situation quite like this one where we pressed so many Reservists into action quickly and so many of them are now sick. They were operating under color of the U.S. Government obviously in a war zone. So the last thing they deserve is an answer that says, sorry, we can't get to you because the law's that way.

Mr. DORN. I understand.

The CHAIRMAN. You know, we've got to fix that problem.

Mr. DORN. Mr. Chairman, may I say further in response to that, the discussions while you were voting were helpful. A couple of things are clear.

One is that we need to send a clearer, stronger message to the physicians who are responsible for treating folks regarding the need to take these illnesses very seriously and regarding the need to lay out a very strict protocol for them. Our expressions of good intention must be reflected where it matters, and that's in individual clinics around the Nation. We need to make sure it happens.

The CHAIRMAN. Let me cover another item with you right up front.

We have some service personnel in the room here other than the group that's accompanying you, and some have roles in the intelligence area and may have very important information, firsthand information that they gathered as part of their official duties, that they feel and know to be highly relevant to the inquiry we're doing. They've identified themselves. They want to convey that information, and they've been told by superiors not to do that. That they're not to give us classified information.

I mean, my blood pressure goes to 5000 when that happens because precisely what we need to have is all the information, and I would like an assurance from you now, provided you have the authority to give it, and if not, then I want you to go and get it from whoever you have to get it from, that present and former military personnel and Defense Department personnel are fully free and authorized to give us what information they have and not be in the situation where they're having a gun put to their head by the Defense Department that says, no, you can't tell what you know.

Mr. DORN. The Secretary and the Chairman say that people should be free to talk about their experiences, but let me clarify it further, addressing specifically that clause which says that this information is not classified.

The CHAIRMAN. See, I think all this information related to this topic should now be declassified. I think everybody in the public domain ought to have a right to see it, including the medical researchers and others. But very specifically, I don't want any of us who have proper congressional roles to play here to be denied ac-

cess to any of this information. That is absolutely unacceptable and I want to get that cleared up today.

Mr. DORN. Let me clarify further.

The CHAIRMAN. Now, earlier, you made a statement or a statement was made by one of the three of you that all of the chemical agents and related equipment that was discovered was found stored far from the Kuwait field of operations.

At An Nasiriyah, and we've got a map over here where bombings occurred and many chemical weapons were found, that area is only 125 miles from the Kuwait/Saudi border and it's well within SCUD missile range of most coalition deployments. Weren't U.S. forces located around this area?

Dr. PROCIV. Yes, they were.

I'll say frankly the word, far, got in the last draft of Dr. Dorn's testimony this morning. I thought we had that fixed to be stricken from the draft testimony that he was given.

It is not correct to say that all munitions were found far from the KTL, sir.

The CHAIRMAN. Well, that's an important clarification. So there were instances then where some of these munitions were found close to where we had troop deployments?

Dr. PROCIV. That's correct.

The CHAIRMAN. This would be one. Can you cite others?

Dr. PROCIV. Not off the top of my head. Just a second.

[Pause.]

I think the answer, sir, is that we attacked Talil but U.N. inspections show nothing in that after the War.

That's it.

The CHAIRMAN. But in terms of An Nasiriyah here, we did find them there. Do I assume that we continued to use our forces to secure that area as the War went along? We would not have just been in that area and then left, would we?

Dr. PROCIV. I don't know those details of how long we were in that area. My understanding is that munitions were found not at the site we bombed, but some 15 nautical miles away from where we attacked.

The CHAIRMAN. How close would U.S. forces have been stationed to that?

Dr. PROCIV. I think they were across the river. Not stationed but during the ground force phase of the campaign, that's as close as we got.

The CHAIRMAN. The river would be how wide, roughly? What are we talking about?

Dr. PROCIV. It's a desert area so I expect it's not very wide there.

The CHAIRMAN. So it's a pretty narrow river?

Dr. PROCIV. Right.

The CHAIRMAN. Our troops were right across this narrow river from where we found these things. Is that right?

Dr. PROCIV. They got that close but I don't know how long they were there.

The CHAIRMAN. We've got a lot of questions here. We've covered a lot of ground earlier with Senator Bennett, and I'm going to give you a number of questions for the record to ask you to respond to,

and to respond to fully. I know you will. I know it'll be your intention to do that.

I don't want to call you back to pick up the loose ends. I will do that if necessary, so I want to make sure that some staff aid doesn't put a lot of doubletalk in the answers. I want good, straight, pointed answers to the questions I'm going to give you for the record. I would ask to have them answered that way.

I want to make another suggestion to you, because when we started out on this way back when, it was to try to understand what the control regimes were that we had within our own Government that would have prevented Saddam Hussein from getting the things that he needed to make biological weapons or the things he needed to make chemical weapons.

It was really astonishing to find that our own Government had licensed a shipment of those very things to Saddam Hussein and many of them going directly to military units. There was no subterfuge, they were going to go right into his war production system. Then, of course, when we decided the necessity of going to war with Iraq, we had our own troops suddenly facing weapons that we had helped develop by providing critical items to them.

You're nodding in the affirmative. I don't want to put words in your mouth, but that's correct, is it not?

Mr. DORN. As my opening statement says, it appears that our export control regime was not effective.

The CHAIRMAN. Right. We helped him create these diabolical weapons by supplying a lot of the critical things he needed for them. We also knew that he had a history of using these weapons. He used them on his own people. He used them on the Kurds years earlier, gassed and killed a lot of people.

So when we went into the War, we must have anticipated a real problem here. I mean we just didn't send these chemical alarms out just to have something to do in all these MOPP 4 outfits. We sent them out there because we anticipated that there was a real threat, did we not?

Mr. DORN. That is true, sir.

The CHAIRMAN. We understood that he had this capability and that it posed a threat to our people and we took various steps. We had the pretreatment pills, we had training, we had chemical monitors out in the field, we had teams designed to do this. All of that certainly creates a very strong supposition that we were worried about what he might do. I don't think the Defense Department did this for an exercise. There was a real worry that he might use these chemical weapons or biological weapons, wasn't there?

Mr. DORN. There was.

The CHAIRMAN. There was that worry. So these precautions were taken.

Now, as it turns out, and this is where the firsthand statements of veterans I think are so important because they're the ones that were out there, we weren't, and they're the ones, in many cases, who are sick.

When these alarms go off, I must say to you, it's incredible and unbelievable and unsustainable and shouldn't, I don't think, be offered to come here today, any of you and say, look we had all these chemical alarms and they kept going off in various areas through

the War zone, but they were all misfires. It was all accidental alarms. It doesn't mean there were any chemicals in the area. There are no chemical incidents, and so forth and so on.

Even as Senator Bennett pointed out, going back to some of our firsthand accounts, that in many cases the gear was picked up afterward and who knows what happened to it. We've had lots and lots of other accounts on that.

These alarms went off for a reason, and I think it's clear, it's clear in my mind they went off because the things they were designed to detect came into that zone and set them off. I mean, they didn't go off ahead of time, they didn't go off afterward; they went off during the time that things were going on in the War zone that they were designed to detect.

I think it's very important that the Defense Department bring itself to face the reality that a lot of veterans were exposed to chemical agents during this war period. And whether they were fired in an offensive capacity in some instances, or delivered that way, as I also think they were, is really incidental here.

The question is, did people come into contact with these agents, and in all likelihood some biological agents as well, and in some mixture that we don't yet fully understand, is this the foundation for the sickness that a lot of them have? I think the facts now are essentially inescapable that that is a significant part of this problem.

If the Defense Department can't believe that or won't believe that, or if there are institutional reasons, or numerous other reasons that prevent that kind of acknowledgement, I think this problem's going to get a lot worse. In the end, the main losers are going to be the veterans and their families.

The second loser is going to be the Defense Department because you're going to end up with your reputation in ruins. I'm not exaggerating and so I don't want to be misunderstood when I say I'll bring veterans in here and have them, one after the other, and their family members, for days on end, I will do that if I have to, because I want this problem paid attention to. They don't want to come. I don't want to ask them, but we will ask them and they will come. That's not the way to solve this problem, but if there is no other way, then that's the way we will do it.

This is not a shot across the bow. This is about as direct as the communications get between the Legislative Branch and the Executive Branch.

I will fight to get you what you need. You want money to treat sick veterans and their families? I'll go to the floor. I'll get a coalition of Republicans and Democrats. I think you saw that here today. This is a bipartisan concern. If we need to change the laws, we'll get the laws changed.

What we won't do is allow this thing to be swept under the rug or covered up or fuzzed off in some way to say that it's not a big deal or it's not very serious, or something else.

So to the extent that there's a willingness to acknowledge this problem and deal with it directly and solve it, then you're going to find you've got a lot of friends here that will help you get that done.

Every additional minute that there's foot dragging, or Catch–22 logic or fine-shaving of statements and so forth, for whatever the

reasons, then you're going to have a war, and it won't be a war you win in the end, and it's one you shouldn't wage.

I'd like to have an understanding here that we solve this problem. These veterans, I've talked to hundreds of them now directly. These are not malingerers, these are not malcontents, these are not people who are having fantasies. These are sick people who, in every case, were well when they went to the War or they could not have even gone to the War. In many cases, they are people who were among the most fit. People that have gone through survival school, paratroop training, run marathons, and various other things. The fact that their health has been turned upside down is a genuine national tragedy. We can't hold back anything that they need to get to the bottom of this and fix their problems as best we can. I do want you to talk to some of these spouses and children because you're not going to appreciate this problem until you do.

When you talk to a veteran's wife whose hair is falling out and whose reproductive cycle has been knocked completely haywire who was healthy before her husband came back from the Gulf War, you're going to understand this problem in a way you can't understand it before that. You've got to put a real face, lots of real faces on this thing to understand the severity of it.

I think the Defense Secretary himself needs to do some of this, to make it real and tangible in terms of the urgency of this problem.

I'm going to expect a good faith response from everybody here. What we can't tolerate and what I won't tolerate is a situation where anybody's intimidated, anybody's called up and it is suggested to them that they give a programmed answer. Anybody told, don't come forward, or in some oblique way is urged not to come forward, I mean that's not tolerable.

I don't believe you would do that or countenance that and so I would ask you, as an agent for this Committee on this issue, pursuant to this discussion, to please go back to the hierarchy up and down the line and make sure the message is delivered as clearly as you are capable of doing it—and you are a very good communicator—that we've got to get to the bottom of this and we've got to do it as fast as we possibly can. And whatever it takes to do it, has to be done.

The old suppositions and the old ways of analyzing the problem I think have to be put aside to see if there isn't some new way to look at it.

Senator Bennett, whose father was a Senator before him, has a long record of support of defense issues. I think he gave you some very wise counsel and advice, and that is that this is a problem that may have to be looked at. You're not going to find the answer until you escape from a preconditioned way of looking at it, to look at it in a new way and in a fresh way.

I'm going to expect that done and I'd like to end on that kind of a note of constructive agreement that we will cooperate in achieving those goals. But I don't want there to be any illusion or misunderstanding. We have to get to the bottom of this, and if I'm not satisfied within a short period of time that we're really moving at top speed, and that we're escaping from all of the kind of doubletalk that's been associated with many cases up until now, I'm going

to start holding the hearings, and you know, I don't want to have to do it that way.

Mr. DORN. Mr. Chairman, I hear you clearly. I will try to respond.

Thank you.

The CHAIRMAN. We're going to give you questions for the record and we would appreciate, as I say, full responses to those and we'll look forward to getting those back.

The Committee stands in recess until our next hearing, which will start at 2:45 p.m.

[Whereupon, at 2:01 p.m., the Committee was recessed, to reconvene the same day, Wednesday, May 25, 1994, at 2:45 p.m., in the same place.]

AFTERNOON SESSION

The CHAIRMAN. [2:57 p.m.] The Committee will come to order.

Let me welcome all those in attendance. We're starting a little late because we ran so long this morning.

We're joined by Senator Kerry who has a very important interest in this matter and who's been out into this area. Let me call on Senator Kerry.

OPENING STATEMENT OF SENATOR JOHN F. KERRY

Senator KERRY. Mr. Chairman, thank you very much. First of all, I want to apologize to you. I had wanted to be here earlier, but unfortunately, the way the Senate works, as you well know, sometimes that's impossible. But I wanted to come here now to thank you for your tremendous leadership on this. I have really been impressed, as a veteran, particularly given my long involvement in the effort to get an Agent Orange presumption and a bill through here finally, I'm particularly sensitized to the stonewalling and reactions people will put in the path of those who put on the uniform.

I was quite surprised to find it, and I am personally extraordinarily gratified and impressed by your pursuit of this. You've been passionate on the floor, you've been dogged in the Committee and in private, and a lot of veterans around the country I think are deeply indebted to you for your concern that regrettably has not been as forthcoming as it should have been given the lessons we've learned from other entities that are responsible for behavior toward those who put on the uniform in this country.

There always ought to be a presumption, I believe, and that's something we argued about very hard on the Agent Orange issue, a presumption in favor of the veteran.

You shouldn't have to beat down the doors to get people to level with you and explain to you what may or may not be factual. You have a done a brilliant job of forcing some information out on this that lends a much clearer view about what the possibilities are and what may or may not have happened. So I want to thank you.

I also want to thank those who have suffered because of this exposure, whatever it may be, yet to be fully explained, but I really want to thank them for their pursuit of this and for their willingness to endure.

I always thought that after we won the Agent Orange victory, we had learned a lesson and there would not have to be another generation coming along and enduring. So I'm here expressing personal anger and frustration with the fact that it's been a real tug of war to get at this. I cannot underscore enough my own personal admiration and respect for your efforts to try to get at it, and I think a lot of veterans just feel gratified that this Committee is doing it, and I support you in those efforts.

The CHAIRMAN. Thank you very much, Senator Kerry. Those words mean something special to me, coming from you, given your history years ago as a Vietnam War veteran and since that time.

I think we've made some important progress with this work, with your help and the help of others, to get to the bottom of what has happened here and why we have so many sick veterans and increasingly so many sick veteran family members.

Spouses whose reproductive cycle is not working properly or suffering hair loss, a lot of the symptoms that the veterans themselves are experiencing and now increasingly their children. This was an unanticipated finding by us, as we got more deeply into this, but the numbers are growing in this area, and we're now pursuing that aspect of it.

But the question of exposure to chemical agents and to biological agents in this war zone and the implications for veterans and also a lot of active-duty personnel, there are a lot of active-duty personnel who are afraid now to come forward because there's a downsizing going on and they don't want to be invited to leave because they've been identified as having a medical problem.

Many of the veterans who were already out of the service tell us that if you don't get any real help out of the VA or in terms of a disability rating, and you're too sick to work, you're absolutely uninsurable, the insurance companies don't want to see you because you need the help and you need the coverage.

So there's a diabolical end-game situation facing more and more Desert Storm veterans. And when you think back to the parades, the deserved parades at the time as the war was ending and people were coming back, they don't mean much now if a veteran is sick or his family members are sick, and they need a response, they need a proper diagnosis, and they need proper care.

Even today with respect to the family members, we were able to get from the Defense Department this very day, coincidentally, a statement to all Gulf War veterans, signed by the Chairman of the Joint Chiefs and the Defense Secretary indicating that they are now being urged to come forward, and they will be given help. That is a constructive statement. Now we've got to see that statement fully implemented, and there are questions as to how it affects Reservists and others.

I've also made the pledge today, just for your own information, that if we don't get the response that is needed here, I'm quite prepared to conduct hearings where we have veterans come in endless numbers. I hate to go through the process of asking people to make that effort, but if it's needed in order to really force this issue to a proper conclusion, we'll do that, and we'll have hearings that go on as long as they need to go on, until the powers that be understand that this is not going to be an issue that's swept under the rug. We're not going to have a 20-year hiatus as we had with Agent Orange. We've had a lot of veterans from Desert Storm already die, who went over in perfect health.

Senator KERRY. Well, it's very curious, I must say. I mentioned a moment ago to the staff that I was in Kuwait about 2 days after the liberation as part of the observer group from the Senate, and apart from biological or chemical, I found that the acridity of the air and the thickness of the air just from the oil fires. I remember turning to one of the soldiers there in Kuwait and asking him whether the air he was breathing bothered him, and how he felt about being outdoors. In fact, several people there who were from Reserve units out of Massachusetts mentioned to me that they were very concerned about breathing the air.

I've got to tell you, for the 24 hours or whatever that I was there, I found a significant impact and discomfort from the air I was

breathing, not unlike Bangkok where you can go out and you can't run. In 15 minutes, you feel your lungs searing.

I certainly felt the effect of those fires and within miles around, when it rained buildings were covered, cars were covered. I mean, you had, as far away as in Rihad, you had buildings that turned black by virtue of the rain. You had black rain. So that means you have particles in the air, and if you have particles in the air, you are clearly breathing those particles. I don't know what the air quality was. I don't even know if we measured that air quality, but I remember distinctly feeling it and having concern expressed to me by people.

Now I'm told that that has not yet showed up or there isn't some indication of that, but I would personally be surprised if, for those who were there for some period of time, there isn't some kind of impact or potential for it.

Anyway, I think you're doing very important work here. I apologize to those who wish more of us were here and able to stay, but the Senate doesn't always allow that.

The CHAIRMAN. Thank you very much again, Senator Kerry.

Let me introduce our first witness this afternoon, Dr. Mitchell Wallerstein, who is the Deputy Assistant Secretary for Counterproliferation Policy, Department of Defense, and we're pleased to have you.

You've come in the trail of an earlier discussion this morning, as you know. Why don't you proceed and give us your statement at this point, and then we'll go from there.

OPENING STATEMENT OF DR. MITCHELL WALLERSTEIN, DEPUTY ASSISTANT SECRETARY FOR COUNTERPROLIFERATION POLICY, U.S. DEPARTMENT OF DEFENSE, WASHINGTON, DC

Dr. WALLERSTEIN. Thank you very much, Mr. Chairman.

My prepared remarks are really not so much a statement as a comment that is supplementary to the testimony given this morning by Under Secretary Dorn. And so I simply wanted to say that I'm pleased to be here this afternoon to answer any questions that you might have regarding export controls and DoD's counterproliferation policies, particularly in the areas of chemical and biological weapons proliferation. We obviously wish to be fully cooperative with your hearing, your investigation, and are prepared to do so.

As Under Secretary Dorn explained, the Department of Defense was a major contributor, in 1990, to the development of the Enhanced Proliferation Control Initiative, which expanded DoD's role in the review of export requests, and which promoted greater interagency cooperation through the establishment of interagency subgroups on export controls.

Let me underscore once again, however, the fact that DoD has never been in the business of export control licensing, either for dual-use items or for munitions.

We do, however, continue to be an active participant in the license review process, particularly and increasingly, in areas involving chemical and biological materials. These are coordinated multilaterally through the Australia group.

We will continue to play a leading role in the U.S. Government's efforts to counter the proliferation of chemical and biological weapons, but we do not license. We are simply a reviewer of licenses.

As you know, in the period immediately prior to the conflict in the Persian Gulf, DoD's role in the review of chemical and biological related dual-use export licenses for non-communist countries, such as Iraq, focused only on the assessment of risk of diversion of these dual-use items to the Soviet Union or to other CoCom proscribed destinations.

We had, at that time, no authority to review licenses destined for Iraq, per se, in terms of their risk of proliferation. Additionally, of the export licenses that we did review for Iraq, we are aware of none that supported Iraq's chemical or biological weapons efforts.

Since the revelations of the Persian Gulf War, law and regulations have been modified to permit us to be more aggressive with regard to the review of dual-use export licenses to proliferant states per se.

As you know, the Enhanced Proliferation Control Initiative was passed in November 1990, and, of course, Iraq today is subject to a total embargo on such items. We weigh in heavily now with recommendations against approval of cases where the end user is questionable, or where the items appear to have no legitimate defense or peaceful purpose.

As you also know, Mr. Chairman, the Administration's bill for the renewal of the Export Administration Act, which is now before your Committee, would give us the latitude to further review a large number of cases, and we could designate the categories that we wish to review.

In addition to these initiatives, we have now in prospect the multilateral support of 157 states, which have signed the Chemical Weapons Convention. When it is ratified, these states will undertake not to acquire, retain, or transfer chemical weapons or their precursors for the purposes prohibited under the CWC.

Finally, the President has directed that we pursue measures to strengthen the 1975 Biological Weapons Convention in order to enhance transparency and to promote increased verifiability of the use of these biological agents for peaceful and civilian activities.

Mr. Chairman, that concludes my comment. I'd be very happy to take your questions.

The CHAIRMAN. How long have you been in your present job?

Dr. WALLERSTEIN. Since July 1993, sir.

The CHAIRMAN. What did you do before that?

Dr. WALLERSTEIN. Before that, I was the Deputy Executive Officer of the National Academy of Sciences.

The CHAIRMAN. Did you have a position at any time in the Defense Department or anything related to it prior to that last assignment?

Dr. WALLERSTEIN. No, sir.

The CHAIRMAN. So you were not, in a sense, in the Government, you were not in the loop when the request was made for these export licenses on, say, the biological items that were sent over to Iraq?

Dr. WALLERSTEIN. That's correct, sir.

86-558 O - 95 - 3

The CHAIRMAN. You've reviewed all that carefully, however, in terms of what happened on somebody else's watch?

Dr. WALLERSTEIN. I have, yes.

The CHAIRMAN. Now, and I want you to think very carefully about this because I'm prepared to challenge your statement, and that doesn't mean your statement might not be right, but did I understand you to say that none of the items that were shipped over to Saddam Hussein ended up being used in his biological or chemical weapons capability, things that were licensed and shipped from the United States?

Dr. WALLERSTEIN. No, sir. What I said was that in none of the cases that DoD reviewed are we aware that those items wound up being used in chemical or biological weapons programs.

The CHAIRMAN. OK.

Dr. WALLERSTEIN. But again, let me repeat that we had only very limited review authority, because it was only the retransfer issue at that time. It was only the potential for retransfer of items to the Soviet Union or to other communist countries at that time were we authorized to review.

The CHAIRMAN. Then you would not have reviewed the requests that were made directly by the Iraqis that came into the research labs here for some of these very dangerous biological specimens which we, in fact, shipped to them. You would not have reviewed those?

Dr. WALLERSTEIN. Only if the case was referred to us by the Commerce Department and, again, they would not have been referring those cases unless they anticipated the possibility of retransfer.

The CHAIRMAN. In other words, those would not have been within the scope of your review?

Dr. WALLERSTEIN. Not as a general practice, that's right.

The CHAIRMAN. OK, so you can't assert, one way or the other, as to whether those items ended up in Saddam Hussein's war machine, the stuff that we know we sent him, not for transshipment to somebody else, but the end shipment to him.

Dr. WALLERSTEIN. That's correct.

The CHAIRMAN. OK. Because it's clear, when you go back and follow the pattern of what was being done here, that when they were requesting these biological specimens, they were being shipped over to, in some cases, the front operations within the Iraqi government, that were in fact part of their military apparatus. You are aware of that?

Dr. WALLERSTEIN. I have read information to that effect, yes, sir.

The CHAIRMAN. Did you happen by chance to see the letter, which had a little bit of a frantic tone to it, from Secretary Baker in the Bush Administration, as the war was getting ready to start, that we suddenly stopped the shipments to Iraq of these kinds of items, things that could be either used in chemical weapons or biological weapons or nuclear weapons. Are you aware of that letter that was sent around?

Dr. WALLERSTEIN. No, sir, I am not.

The CHAIRMAN. We ought to give you a copy of it, because it was a case of suddenly it dawned on people that we were going to have a real problem facing off against weapons that we had inadvert-

ently, one presumes, helped create. And that's part of our problem here, but your testimony is that you only looked at the things that were going to be transshipped to the so-called rogue regimes that were on the bad guy list at the time. Is that right?

Dr. WALLERSTEIN. To the countries that were proscribed by CoCom, which were the Soviet Union, China, and the other communist countries of the Warsaw Treaty Organization.

I might also mention, Mr. Chairman, that of course, these technologies are classically dual use in nature. They have both commercial and military applications. And so, in the period prior to the outbreak of the war, there was a legitimate commercial trade which may have contributed to the problem, but that is beyond the purview of the Department of Defense.

The CHAIRMAN. Are you in a position to tell us whether Iraq's biological warfare program was offensive in nature?

Dr. WALLERSTEIN. The indications certainly after the war were that, from the evidence obtained, they were making strong efforts to obtain an offensive capability. Whether they had actually achieved that or not, I do not know, personally.

The CHAIRMAN. Were they capable of incorporating those items into weapons systems?

Dr. WALLERSTEIN. In my judgment, they would have been capable of doing that, yes, sir.

The CHAIRMAN. You know, after the war, after even the bombing destroyed a lot of the weapons, we had taken into possession, very large quantities of chemical weapons. You are aware of that?

Dr. WALLERSTEIN. Yes, sir.

The CHAIRMAN. And in a deliverable form, a variety of deliverable forms.

What initiatives has the United States undertaken now to ensure an effective successor regime to CoCom?

Dr. WALLERSTEIN. That process is now fairly well advanced, and I am a major player in that process representing my Department. We are, as you know, negotiating not just with the original 17 CoCom member states, but with a larger group that includes many of the other advanced industrialized countries of Europe, such as Switzerland, Sweden, and Austria.

Agreement has been reached in principle for a regime that will have two pillars; a dual-use pillar similar to the old CoCom, as well as an armaments pillar. We hope very much that the arms pillar will focus particularly on these countries of greatest proliferation concern.

The final details of the regime are still being negotiated, but it is our expectation, and we have preliminary agreement among the participating states, that the new regime will begin operation in the latter part of this year, after October.

The CHAIRMAN. What kind of controls would you recommend that we have in place to prevent chemical and biological, and for that matter, nuclear materials getting to countries in situations such as we've now seen where Iraq exploited our openness to their advantage and then ultimately as a threat to us and to others? What kind of controls do we need to have in this area to avoid having another one of these situations arise?

Dr. WALLERSTEIN. Well, we do have in place the Enhanced Proliferation Control Initiative, which provides us with a safety net. Thus, in situations where an end user is considered to be questionable, where a company knows or has reason to know that an end user may not be intending to use the item in question for civilian application, it should be applying for an export license and the Government has the means to insist that they apply for such a validated license.

In addition, as I said, the new Export Administration Act will provide the necessary framework for the Department of Defense and for other national security-related agencies to request to review all broad categories of licenses related to chemical and biological precursors and other related items.

On the multilateral front, we have the Australia group operating today. As I noted in my comment, we hope very much that perhaps by early 1995, we will have a ratified Chemical Weapons Convention, which will then obligate the 157 signatory countries. This will include most, but I should say not "all" of the countries of concern, to a transparency regime where we and the multilateral authority, more importantly, would have the ability to inspect and to ensure that items were not being turned to military use.

I will add that the biological weapons problem is somewhat more difficult. It is, as I'm sure you know, much easier to conceal and it therefore presents us with a much greater challenge.

President Clinton, as part of his announcements last fall, has called for enhanced transparency measures to be developed in the Biological Weapons Convention. We are pursuing that and hope to be working with the other countries that are signatories to the Biological Weapons Convention to promote greater transparency there.

The CHAIRMAN. You know, as we started down the track of trying to determine what was causing the sickness of the Gulf War veterans and their family members, and taking the symptoms and trying to overlay on the symptoms what kinds of exposures could have caused those health effects and health symptoms, that by the process of elimination, we worked our way back to biological exposures.

It was out of that that we continued to work back on an investigative trail to find that the United States had authorized, at the highest levels of our Government, the shipment of these very kinds of biological items to Saddam Hussein going into his war-making machine. And so there's a very powerful case and logic and sequence of factual activity that would suggest that we had a big hand, presumably unwittingly, in helping him develop his biological warfare capability.

It's led me to believe that we ought to be very careful about who we're shipping these biological items to, and the fact that they are easier to conceal also should raise our alarm levels because I think you've got more and more of these regimes that are willing to go to any lengths in using these diabolical weapons even against their own people, which Saddam Hussein has a history of doing.

It seems to me we ought to be trying to strengthen the Biological Warfare Convention. I'm just wondering what you think we can do in that area, given the fact that it's in a sense more difficult to do the monitoring. How do we tighten this thing down so we don't end up having another situation like this arise in the future?

Dr. WALLERSTEIN. I think that the key, Senator, lies in transparency. Where countries are not prepared to be fully transparent in their dealings, which involves intrusive inspections.

I might note that that raises, in turn, the problem of proprietary information, because we have to bear in mind that it's the same technology that's used in pharmaceutical manufacturing, for example. And so just as we would have to prevail upon our pharmaceutical companies to be open to this kind of inspection, so would other countries. But it is only through intrusive inspection, and by countries agreeing to be open, that we can have any kind of confidence that these things are not being hidden.

I might also note, in response to your earlier comment, that the Defense Technology Security Administration, which is a part of the program elements that I am responsible for, has had an on-going program to identify the linkages between the front companies and the cutouts and the third party purchasers that are used, not just by Iraq, but by other proliferant countries, and we are pursuing this very aggressively. And, again, as we now assert the right to review these cases, we will be looking very carefully for these kinds of practices to prevent their recurrence in the future.

The CHAIRMAN. Let me ask you what role, if any, have you played in the Department of Defense's investigation into the Iraqi chemical and biological warfare programs and into the discovery of or use of unconventional weapons during the Persian Gulf War?

Dr. WALLERSTEIN. My office, which is newly reorganized as part of the Office of the Under Secretary of Defense for Policy, does play a direct role in support of UNSCOM and the IAEA. Indeed, one of my staff participated as the chief inspector on a recent mission to Iraq, where he directed the emplacement of chemical air samplers at strategic points around the country, to ensure that the Iraqi chemical capability is not reconstructed.

We have also been active in other aspects of ensuring that the thorough-going inspections that have been undertaken since the end of the war are completed. That is, we've been marshalling the capabilities of the laboratories and of other U.S. Government technical agencies to provide UNSCOM with the necessary technology that it needs to monitor on a long-term basis. And the same applies to the IAEA in the nuclear area.

The CHAIRMAN. How much knowledge do you have, as you sit here today, on the chemical and biological capability that Saddam Hussein had crafted for himself prior to the war?

Dr. WALLERSTEIN. Sir, I only know what I have read in the briefing papers. As we discussed earlier, I was not part of the U.S. Government at that time.

The CHAIRMAN. You have access to any and all records of that kind if you seek that access?

Dr. WALLERSTEIN. I believe I do, yes, sir.

The CHAIRMAN. I think it would probably be a smart thing for you to do. If you're going to figure out a way to make sure that we don't have a problem like this in the future, it's very important to do a careful reconstruction of what happened because I think the evidence now is so powerful, from so many different directions.

I don't know if you were here earlier, but we heard some information presented by the witnesses from the Defense Department,

an estimate of some 14,000 sensors, chemical agent sensors put out into the field, that might have been going off on the average 3 times a day, but they were all false alarms.

Dr. WALLERSTEIN. Yes, sir. I unfortunately was not present this morning for the testimony, but I have read that assertion.

I might just add that one of the other responsibilities of my office is to work with the Services and with the acquisition part of the Pentagon to develop new sensor capabilities. We are actively pursuing as a top priority the procurement of new battlefield sensors in both the biological and the chemical area. We very much hope that, when and if we have to put soldiers in harm's way again, we will have more accurate and more rapidly responsive capabilities.

The CHAIRMAN. Does that also include the development of new chemical agent detection alarms?

Dr. WALLERSTEIN. Yes, sir.

The CHAIRMAN. Are we still using the ones that we used in the Persian Gulf War? Are those still a standard issue item?

Dr. WALLERSTEIN. There has been no new technology introduced in that area to my knowledge, sir, at this point. But, there is substantial research going on.

The CHAIRMAN. You know, the amazing thing about that, I mean, it's so incredible that it's unbelievable but if you put those two arguments together, it would be that the alarms that we had that kept going off when they shouldn't have and therefore were not useful to us, we're still using.

I mean, it just——

Dr. WALLERSTEIN. It takes time to come up with a better technological solution, but as I said, it is one of the top priorities that have been identified. We've had a series of groups that have been working under the Under Secretary for Acquisition. That was formerly Dr. Deutch. Dr. Deutch is still overseeing this process. He is now the Deputy Secretary of Defense, and the chemical and biological sensor issue is one of the top priorities that have been identified for further work, and to field as rapidly as possible.

The CHAIRMAN. Do we have biological sensor capabilities that are now able to be deployed and give us real-time readings on biological exposures and biological weapons being used?

Dr. WALLERSTEIN. No, sir. There is no fielded biological sensor.

The CHAIRMAN. How close are we to having something in that area?

Dr. WALLERSTEIN. I believe that we expect that we may have something before the turn of the century. We would be able to have something fielded by then, sir.

The CHAIRMAN. Does North Korea have a chemical weapons capability?

Dr. WALLERSTEIN. I would defer that question if I may, please, to my colleague from the Central Intelligence Agency, who will be appearing as your next witness.

The CHAIRMAN. Do you know one way or the other?

Dr. WALLERSTEIN. I have seen some information, but I'm not in a position to reach a net judgment on that.

The CHAIRMAN. My understanding is that they apparently have both, chemical and biological. It's a very important question, as you know, because things are tense there and you've just indicated that

we do not have a biological weapon sensing capability that we can deploy at the present time. And we're still using the chemical sensors that the earlier witnesses told us don't work properly.

So it would seem to me that if you put all that together and if, in fact, the North Koreans have that kind of a capability, somebody would have to think an awfully long time before they order American troops into a combat situation where we can't be assured that they're going to have adequate protection against those two kinds of weapons systems. Isn't that right?

Dr. WALLERSTEIN. I know that General Luck, the Commander of U.S. Forces Korea, has given substantial attention to this problem. He has indicated that he is satisfied with the readiness of his forces to anticipate any scenario that might involve the use of weapons of mass destruction.

The CHAIRMAN. Well, I hope that's right.

When I went back, in an earlier staff review I asked the question of how many of the senior military officers that were directing the war were up in the area where the chemical alarms were going off. I found that very few, if any, were. They were much further back, and it didn't give me a very good feeling.

These folks think there are adequate protections, I kind of like the picture of the Civil War generals that got on the horses and got out in front, and I'd feel a little more comfortable and a little more confident in the judgments if I saw some of the major signal callers in the strategy right up in the front areas breathing the same air, working with the same chemical detectors, relying on their own advice in terms of putting their own health at risk. I have a bit of bitter feeling about it because I've seen so many sick veterans.

So I would hope that the people who have this level of confidence would, you know, we'd see them right up there, right up in the front when the going is unpleasant, and not back in some protected base area working out of a bunker.

I think that's all I have for you right now. I appreciate your coming. I'd urge you to stay with this. I think it's very important that we catch up to what the events are that are actually taking place in the world. I think we're behind in these areas.

Dr. WALLERSTEIN. Thank you, Senator.

The CHAIRMAN. Thank you.

Dr. Gordon Oehler, we'd like to invite you to come forward. You serve as the Director of the Nonproliferation Center at the Central Intelligence Agency.

We're pleased to have you here. I'd like to have you give us your statement at this time, and then we'll go to questions.

OPENING STATEMENT OF DR. GORDON C. OEHLER, DIRECTOR, NONPROLIFERATION CENTER, CENTRAL INTELLIGENCE AGENCY, WASHINGTON, DC

Dr. OEHLER. Thank you very much, Mr. Chairman.

I'm pleased to appear before you this afternoon to address our concerns about the proliferation of weapons of mass destruction. I'm specifically going to address Iraq's efforts to obtain critical technologies for its' weapons program in the years preceding the Per-

sian Gulf War. Finally, I'll close with some observations regarding the Export Administration Act.

First let me tell you briefly what we knew about Iraq's weapons of mass destruction programs prior to Desert Storm.

As we reported extensively, Iraq had aggressive CW and BW programs prior to Desert Storm. The Iraqis used nerve and blister agents during the war with Iran, and as you will recall, they also targeted their own Kurdish population with chemical weapons.

In mid-1990, Iraq had one primary site for chemical weapons production, Al Muthanna, located in Smarra, about 80 kilometers northwest of Baghdad.

By early 1990, we calculated that the Al Muthanna facility was capable of producing more than 2,000 tons annually of the blister agent mustard and the nerve agent Sarin. Iraq also had begun to build a complex of chemical production plants near Al Habbania, as well as additional CW storage sites.

U.N. inspectors have found more than 46,000 filled munitions, including 30 warheads for ballistic missiles, bombs filled with mustard gas, and nerve gas containers. Additional munitions remain buried today in bunkers attacked and damaged by coalition forces. The U.N. cannot remove them safely. The inspections have also revealed 5,000 tons of stockpiled chemical agents. The U.N. is only now completing the task of dismantling this massive program.

With regard to biological weapons, we estimated, prior to the start of the war, that Iraq had a stockpile of at least 1 metric ton of biological warfare agents, including anthrax and botulinum toxin.

Research reports released by the Iraqis to the first U.N. Biological Weapons Inspection Team showed highly focused research at Salman Pak on anthrax, botulinum toxin, and clostridium perfringens. U.N. inspectors believe that there was an advanced military biological research program which concentrated on these agents.

The Department of Defense reports that no chemical or biological warfare munitions were found stored or used in the areas occupied by coalition forces during Desert Storm. We do not have any intelligence information that would lead us to conclude otherwise.

The CHAIRMAN. Now let me just stop you right there.

First of all, everything you've said so far has been very helpful to us, and much of this is new information on the record in a declassified form for the first time, and I'm grateful for that. I think it advances the level of knowledge, and in the end, it will help us get to the bottom of some of these sickness problems with our veterans.

In the paragraph you've just read, that no chemical or biological warfare munitions were found stored or used in areas occupied by coalition forces during Desert Storm. Now that's a very carefully worded sentence. As I read that sentence and heard you speak that sentence, that does not cover, as I read it and that's why I want the clarification, a situation where chemical or biological agents might have gotten loose in some way and gotten into these zones.

In other words, you're saying you found no evidence that they were stored or used. Used to me conveys some effort to aim at our people and trigger their use in some fashion, but that sentence, as

it's written, would not, unless you specifically tell me otherwise, indicate that there were no occasions on which either chemical agents or biological agents, by one means or another, would have gotten into areas occupied by coalition forces.

Dr. OEHLER. What I'm saying very carefully here is that the Department of Defense reports that no chemical or biological warfare munitions were stored or used in areas occupied by coalition forces. This is a Department of Defense statement, because they had people on the ground and we didn't, for the most part.

The CHAIRMAN. Right.

Dr. OEHLER. What I'm trying to say is that we do not have any intelligence information that would lead us to conclude otherwise.

The CHAIRMAN. Yes. I understand the marriage of the two sentences and that we're working off a predicate of a Defense Department report. But I want to come back now to the chemical alarms that kept going off in various areas of the war zone, where we have all these firsthand accounts and we also have these descriptive accounts of people who were there who described symptoms, physical symptoms, blistering and other things that would correlate to an exposure to a chemical agent, say, at the very time the alarm was going off saying there was a chemical agent in the area.

The CIA is not saying here that there were not exposures of American service personnel. You're not making a categorical statement that there were not exposures of American service personnel to either chemical agents or biological agents? I take it you have no way of knowing on a firsthand fashion?

Dr. OEHLER. That's correct. The intelligence information we have does not suggest that they were exposed to chemical or biological agents.

The CHAIRMAN. But didn't I just hear you say that, for the most part, you didn't have your own people there?

Dr. OEHLER. That's right.

The CHAIRMAN. So you're relying on the Defense Department?

Dr. OEHLER. In terms of on-the-ground surveys.

We, of course, have intelligence sources that talked to people before and after the Gulf War about what they knew was happening, and we're basing our intelligence judgment on that plus technical, national technical means, et cetera.

The CHAIRMAN. Would the CIA have a theory on why these chemical alarms kept going off?

Dr. OEHLER. I'm certainly not an expert in these systems.

The CHAIRMAN. But don't you find it a little, I mean, we're all logical people and if these attacks were coming and explosions were taking place and the alarms were going off and people were told to put on their gear and so forth, and yet, after the fact, we say, well there were never any chemical agents in the area, how does one mesh these two things?

I understand you're saying you're relying essentially on Defense Department reports, but I'm looking for something different here. I'm looking for a categorical denial that American forces were exposed to chemical agents or biological agents. As nearly as I read this, the CIA is not able to come in here and give that categorical denial as you sit here at this moment. Now am I wrong in that?

Dr. OEHLER. What we're saying is that we have no evidence that they were, and it cannot be any stronger than that.

The CHAIRMAN. Do you have a theory as to what was going on then?

Dr. OEHLER. I don't know if my theory counts much. As a scientist, I know that trying to design sensors to detect specific chemicals and not others is a rather difficult job and false alarms are a way of business.

I'll also note that the battlefield is a pretty messy place with incoming rockets, which when they impact have unexpended rocket fuel that vaporizes, you have explosives that go off, you have solid fuel missiles going with pollutants in the air. There's an awful lot of what would be hard-to-identify chemicals in the atmosphere at any time.

The CHAIRMAN. So much of the Department of Defense reports now rest on the fact that the chemical alarms that they put out there that kept going off did not work right. Maybe they are right that they did not work, and they bought a lot of equipment that did not work right. But I do not find your answer satisfactory, quite frankly, and let me just be blunt about it. If you have got some information, classified or other, that will bear out what you are saying, I would like to see it. I would like to see it all.

Dr. OEHLER. I have no information to suggest, that leads us to the conclusion that any BW or CW agents were used against coalition forces.

The CHAIRMAN. Well, you see, again, that is a very—that is what we call in the business the use of a very carefully structured phrase. Let me give you an example. Suppose a bombing run hits a munitions facility and blows up into the air some of these agents, either gas agents or biological agents, and they are carried by the windstream down over our troops, and they are impacted by it. Is that a use?

Dr. OEHLER. Let me address those two specifically.

The CHAIRMAN. First of all, I would like a yes or a no—in terms of the way you are using the word "use." Is that a use or not a use?

Dr. OEHLER. I would call that exposure, certainly.

The CHAIRMAN. But is that a use within the way you are using it here?

Dr. OEHLER. No, but I would not sit here and try to use some legal definition to get around a problem like that. I do not have any intelligence information to suggest that coalition forces were exposed, whether it be by intentional use or by accidental discharge to BW/CW agents.

Let me address these two separately, because I think this is significant. The coalition forces did not find any CW agents stored in the Kuwaiti theater of operations, with the exception of some the U.N. found near An Nasiriyah.

The CHAIRMAN. Right. We talked about that earlier.

Dr. OEHLER. And, if in fact a munition blows up a chemical warhead storage site and chemical agents are released into the atmosphere, the modeling that has been done on this suggests that nothing is going to go further than maybe 10 miles. So if your American troops, if the coalition troops are much farther than that, they are not going to be exposed to chemical warfare.

Biological is a very different situation, because particularly if it is dispersed at a high altitude the biological agents can go very long distances. But there is no evidence that any of that was ever released.

The CHAIRMAN. Let me just read you one item here, because there are obviously some strong differences of opinion on this.

U.S. military doctrine warns that, according to its calculations, the use of a nerve agent against a target area of no more than a dozen hectares can, under certain weather conditions, create a hazard zone downwind of up to 100 kilometers in length. Within this downwind area, friendly military units would have to take protective measures.

That is from the United States Department of the Army Field Manual, 100–5.

Dr. OEHLER. Yes. The difference here is, I was speaking of a munitions storage facility on the ground, and what that refers to is a chemical attack where the release is at an optimal height to burst.

The CHAIRMAN. We were asking about An Nasiriyah earlier today and how close these were. The description we were finally given was that it was the width of a narrow river. Does that ring a bell with you?

Dr. OEHLER. The distance between?

The CHAIRMAN. The distance between where our troops were and where these items were stored was the distance of a narrow river.

Dr. OEHLER. The troops came into the Tahji Airfield area, which is, to my recollection, 10 to 15 kilometers from An Nasiriyah. The storage site that was declared to the U.N., where the U.N. found chemical weapons stored, is just slightly south of the 31st Parallel, which is a little bit south of An Nasiriyah and a little bit north of Tahji Airfield.

The CHAIRMAN. Well, you have just given us a different description than we got this morning, in terms of what the proximity was here.

I guess then what you are saying here is—I want to understand this right, because you know, the CIA has a little bit of a credibility problem itself these days related to other matters. So I want to make sure that I understand precisely what it is you are saying and not saying.

According to Central Intelligence information, the detections these chemical monitors that kept going off, were not going off for reasons of the fact that they were detecting gas agents, chemical agents, during the war. It was something else.

Dr. OEHLER. I am not making any such statement. What I am saying is——

The CHAIRMAN. You are not saying that?

Dr. OEHLER. No. What I am saying is——

The CHAIRMAN. So it could have been? It could have been?

Dr. OEHLER. We were not on the ground. We are taking the Department of Defense's word for that. We have no reason not to.

The CHAIRMAN. So we are back to the Department of Defense.

Dr. OEHLER. On the operation of the ground sensors, absolutely. The only thing I am competent to talk about——

The CHAIRMAN. I think you have just given me my answer. You are not in a position to give us an independent answer one way or the other.

Dr. OEHLER. The only part I can give you an answer on is, what is there in intelligence information that might suggest an exposure to these agents by coalition forces? I am telling you, in our intelligence holdings, we do not see anything.

There is some evidence that some chemical weapons were moved into the Kuwaiti theater of operations, but then withdrawn prior to the beginning of the air attacks, with the exception of the ones that were found still in An Nasiriyah.

The CHAIRMAN. They were moved in and taken out?

Dr. OEHLER. That is what some intelligence suggests.

The CHAIRMAN. Just one instance? Several instances?

Dr. OEHLER. No. There were a couple of instances in intelligence that suggest that. We do not know moved where or what.

The CHAIRMAN. What would be the caliber of the intelligence source that would give you that information?

Dr. OEHLER. That was a generally reliable source.

The CHAIRMAN. More reliable than these sensors?

[Laughter.]

Dr. OEHLER. But according to this fragmentary reporting, these were withdrawn prior to the start of the air attack.

The CHAIRMAN. Let me ask you a little different question. In terms of the qualitative ability of the CIA to do its own independent assessments, to really be cheek to jowl with this problem, on a scale of 1 to 10 in terms of a CIA presence in the area to really be able to monitor this and not have much of anything slip through, if a 10 were the complete ability to have that kind of a capability, and a 1 was the least that you could have, where would you say the CIA's capability was across this war theater at that time?

Dr. OEHLER. We were not in a position on the ground, nor tasked, to provide monitoring for BW/CW, because that was the responsibility of the Department of Defense. We had other things that we were trying to do at the time.

The CHAIRMAN. So it would have been where, at the level of maybe a 2?

Dr. OEHLER. We were not there basically at all. That was not our mission.

The CHAIRMAN. It was less than 2?

Dr. OEHLER. That is right.

The CHAIRMAN. Maybe 1 or between 0 and 1?

Dr. OEHLER. Now, I do not want to imply that the intelligence community does not have the capability to detect CW/BW agents.

The CHAIRMAN. But you were not tasked to do that in this situation?

Dr. OEHLER. That is correct. That is correct.

The CHAIRMAN. But that is what is so important, and it has taken us awhile to get to that, because in a sense you did not have your own ability to do that, you are relying in a sense on the Defense Department who did have that task of doing it.

Also, you are saying that, by the absence of any contradictory information to what they are saying, even though you had a very minor way of doing your own independent measurement, you are not in a position to, in effect, challenge their finding. That is what I hear you saying.

Dr. OEHLER. That is right. We have a lot of intelligence on the build-up of the chemical warfare capabilities, pipes, munitions, and so forth.

The CHAIRMAN. I can see that. I am impressed by what you have said up here in that area.

Dr. OEHLER. I am not trying to say that there was no information that the intelligence community was collecting at all. What I am trying to say is, out of all this stuff that we have gotten, there is not anything to suggest that coalition forces were exposed.

The CHAIRMAN. But, the big "but" that has to go with it was, the CIA was not in there doing the monitoring job on the ground.

Dr. OEHLER. Absolutely. That is correct.

The CHAIRMAN. If we were to try to measure that on a scale of 1 to 10, it was less than a 1. So, I mean, that is an honest answer.

Dr. OEHLER. Yes. That is right.

The CHAIRMAN. But what it does is, it cuts the guts right out of that paragraph that you just read.

Dr. OEHLER. Oh, I think it is——

The CHAIRMAN. Well, I know. It is a matter of opinion. You have an opinion you are bringing. I am just telling you what my opinion is after getting to that bottom line in laying that fact against that paragraph.

Dr. OEHLER. Fine.

The CHAIRMAN. Let us agree to disagree on that, and go on to the next paragraph.

Dr. OEHLER. OK.

At the same time Iraq was developing CW and BW agents, it was also developing the missile delivery capabilities. By the time of the invasion of Kuwait, Saddam could field up to 450 SCUD type surface-to-surface missiles. The Soviet-origin SCUD's originally had a range of 300 kilometers, but Iraq reconfigured them into a series of other missiles with ranges of up to 750 kilometers. Prior to the war, Saddam claimed to have developed and tested a missile with a range of 950 kilometers, which he called the Al-Abbas, but discontinued the system because of in-flight stability problems. With regard to Iraq's nuclear program, the bombing of those Iraq nuclear research reactors——

The CHAIRMAN. May I stop you one more time because you are going to go to another subject and it is almost better to take these as we go.

Dr. OEHLER. Sure. OK.

The CHAIRMAN. If you take the fact that he was lengthening the delivery capability of these SCUD's and had them apparently with some accuracy up to a range of 750 kilometers, I do not know if you have had a chance to review some of the first-person accounts that we have had of people, veterans out there who feel that they were in an area where a SCUD exploded where there were chemical agents, in their opinion, as part of that SCUD attack. I do not know if you have had a chance to read those.

Dr. OEHLER. I saw the press reports of that, sir.

The CHAIRMAN. All right. Jim, I am just wondering if you can tell us where those locations were. Whether the SCUD's would have come, could have come, and likely did come from a launching site

that would have been within that distance of 950 kilometers. I assume it would have.

Mr. TUITE. My understanding is that there were SCUD sites up in the area near the Euphrates north of Kuwait.

Dr. OEHLER. There were SCUD sites all the way into Baghdad.

Mr. TUITE. OK. But there were southerly deployed——

Dr. OEHLER. Southern launches as well, and western.

Mr. TUITE. —And those with 750-kilometers range would have reached well down into the Saudi peninsula, correct?

Dr. OEHLER. That is right. They had to launch them from fairly far south to reach down to coalition forces in Saudi Arabia. They had to launch them from pretty far west to reach Tel Aviv.

Mr. TUITE. To reach the border area where the disputed territories were, they could have actually been launched from quite a bit north?

Dr. OEHLER. From Baghdad.

Mr. TUITE. Yes.

The CHAIRMAN. Now, Jim, let me just ask here, with respect to the first-person accounts that we were discussing with Senator Bennett earlier today, with the belief on the part of some of the people in the area where the explosion happened, that a SCUD came in with this kind of a warhead, do you recall from memory where that location was where that SCUD attack occurred?

Mr. TUITE. There were a number of SCUD attacks in the report. But each and every attack, each and every event that is listed in the report is within SCUD range.

The CHAIRMAN. It is within the 750 in terms of the extended range.

Mr. TUITE. Yes.

The CHAIRMAN. Would it be within the 300 range which was the original range?

Dr. OEHLER. No. No, it would not.

The CHAIRMAN. OK. So the extended range that he was working on would have put him in a position, if somebody fired one of these, to at least get it to that site?

Dr. OEHLER. Yes.

The CHAIRMAN. All right. Why don't you go ahead then with the next part here?

Dr. OEHLER. OK.

With regard to Iraq's nuclear program, the bombing of this Iraq nuclear research reactor by the Israelis in 1981 drove Saddam to extreme lengths to cover diversity, and disperse his nuclear activities. IAEA inspection of declared nuclear materials continued on a regular basis, but the IAEA did not inspect any of the undeclared facilities associated with a weapons program.

We reported extensively on the existence of the nuclear weapons program, but post-war inspections added quite a number of details to our knowledge on that program.

I would like to now give you a sense of Iraq's procurement efforts and patterns. The Iraqi program was developed gradually over the course of the 1980's. By the time of the invasion it had become deeply entrenched, flexible, and well orchestrated.

Project managers for the weapons of mass destruction programs went directly to vended European suppliers for the majority of

their needs. Throughout the 1980's, German companies headed the list of preferred suppliers for machinery, technology, and chemical precursors.

German construction companies usually won the contracts to build the CW facilities in Iraq, and Iraqi procurement agents were sophisticated in exploiting inconsistencies in local export laws by targeting countries for substances and technologies that were not locally controlled.

In the pre-war years, the dual-use nature of many of these facilities made it easier for Iraq to claim that the chemical precursors, for example, were intended for agricultural industries. European firms, arguing that the facilities in Iraq were for production of pesticides, built a Sumara chemical plant, including six separate chemical weapons manufacturing lines between 1983 and 1986.

European middlemen brokered——

The CHAIRMAN. Now, may I ask just a question here?

Dr. OEHLER. Sure.

The CHAIRMAN. This is all extraordinarily important and valuable information. Am I to understand that the CIA would have had the knowledge of this going on contemporaneous when it was actually happening? In other words, this was not learned later, and this is not a retrospective construction? We were tracking this, or we had knowledge of this, and knowledge of this would have been at the other high levels of Government at the time it was occurring?

Dr. OEHLER. That is right. What I am running through here is what we knew at the time, and what we had reported to our customers at the time. We had been quite aware of Iraq's chemical weapons development program from its very early inception.

The CHAIRMAN. I take it the CIA must have had a concern about it to have kind of zeroed in on it to that degree?

Dr. OEHLER. Very much so. And that was reported to our customers, and our customers attempted to take actions.

The CHAIRMAN. It would have been reported also to the President, to the Secretary of Defense, the Secretary of State, I assume, as a matter of course?

Dr. OEHLER. Yes, sir. Those are our customers, sir.

The CHAIRMAN. All right.

Dr. OEHLER. Continuing on that: European middlemen brokered chemical precursor deals for Iraq under the pretext that the materials were intended for pesticide plants. A Dutch firm purchased supplies from major chemical firms around the world, supplying the Chemical Importation and Distribution State Enterprise in Baghdad in the 1970's, and in the 1980's supplying the Iraqi State Establishment for Pesticide Production, both cover names for the CW program.

The middlemen supplied dual-use chemical precursors including monochlorobenzine, ethyl alcohol, and thiodiclocol. When the Iraqis requested phosphorous oxychloride, a nerve agent precursor banned for export under Dutch law without explicit permission, the supplier balked, and drew this request to the attention of Dutch authorities. Subsequent Dutch investigations found that two other Dutch firms were involved in brokering purchases of chemical precursors.

Iraq exploited businessmen and consortia willing to violate the export laws of their own countries. As has been indicated in the press and television reports, the Consen Group, a consortium of European missile designers, engineers, and businessmen, established a network of front companies to cover its role as project director of an Argentine, Egyptian, Iraqi sponsored Condor II ballistic missile program.

Iraqi procurement officers, knowing full well the licensing thresholds, requested items that fell just under the denial thresholds, but nevertheless would suffice. Prior to Desert Storm, U.S. regulations on the export of these technologies were drafted to meet U.S. technical specifications and standards. Technologies of a lower standard worked just as well, and permitted Iraq to obtain the goods and technology consistent with Commerce Department regulations.

The CHAIRMAN. Let me just stop you again. This is again very valuable, and I appreciate your presenting it for us so we can have it on the record. Before we get too far past it, you made a reference to phosphorous oxychloride. What agent is this a precursor for?

Dr. OEHLER. Sarin [GF].

The CHAIRMAN. Also, well I have interrupted you here. This backs up even further, but when you acknowledged that Saddam Hussein had SCUD chemical warheads, where did he get those?

Dr. OEHLER. They made them themselves.

The CHAIRMAN. They made their own.

Dr. OEHLER. They had quite a missile refurbishment extension plant where they took the SCUD's and added in extra lengths and the fuel tanks, changed the warheads, and had a capability to make their own warheads.

The CHAIRMAN. Were the Russians helping them with this?

Dr. OEHLER. No. There is no evidence of any Russian involvement at all in this.

The CHAIRMAN. You see, part of the picture that emerges here—this is really an extraordinary story that you are sharing with us, because, according to your testimony, the CIA was tracking this in real time as it was happening, and had a great concern about it, and had figured out that this robust program on chemical weapons and these other areas was going forward.

Yet, as we get down further in time, we are going to find out that, as Saddam Hussein needed other items to go into his war machine, that he actually came and got some from us, particularly in the biological warfare area, that required licensing.

So you wonder how anybody in the licensing regime who was reading the CIA reports at the time and who could see this buildup of this kind of weapons potential, you would think that people would have been very, very reluctant to approve anything that could go into a weapons production system of this kind. You would think that this would have had everybody on full alert to be extremely careful about what is or is not licensed for shipment into this kind of a regime. Is not that the logic of learning this?

Dr. OEHLER. Well, what I would like to point out in the next section of this is that there really was not much involvement of U.S. firms, as we have seen. If I could go through that a little bit, and then we can stop and talk about the whole thing.

The CHAIRMAN. Right, right, right.

Dr. OEHLER. Continuing on: Regarding the involvement of United States firms, we were watching Iraq's programs very carefully, and it was clear that the major players assisting Saddam were not American firms. They were principally Europeans. We saw little involvement of U.S. firms in Saddam's weapons of mass destruction program.

In discussing this issue, we should remember that by law the CIA as a foreign intelligence agency, does not focus on U.S. persons, to include U.S. companies. By this definition, companies founded by foreign nationals and incorporated in the United States are treated as U.S. companies.

This is not to say that we did not occasionally come across information on a U.S. person that was collected incidentally to our foreign intelligence target overseas; we did. But when we did, and when there was a possibility of a violation of U.S. law, we were obligated to turn our information over to the Justice Department.

The CHAIRMAN. Now, does that mean then, going back to the prior paragraph, that there would have been companies founded by foreign nationals incorporated in the U.S. supplying some of these materials, but they would be outside the scope of what you could properly zero in on?

Dr. OEHLER. We are not permitted by law to target the domestic activities of those companies or individuals in those companies.

The CHAIRMAN. Right. So if you stumbled upon it some other way, that did not mean you were not entitled to know that fact, but you could not as a matter of investigative focus go after these foreign firms incorporated in the United States to really find out the degree to which they might be doing business with Saddam Hussein?

Dr. OEHLER. That is right to the extent that we cannot engage in law enforcement or target their activities in the United States.

The CHAIRMAN. Do we have any reason to believe or know that there were such firms founded by foreign nationals incorporated in the United States that, in fact, did ship items like this to Saddam Hussein?

Dr. OEHLER. As I say here, we did provide what we call alert memos to Commerce, Justice, Treasury, and the FBI on a number of possible questionable instances. It is not up to us to make the legal judgment, but to point out that there is information that they need to look at.

The CHAIRMAN. I see.

Dr. OEHLER. These memos resulted whenever this incidentally collected information indicated that U.S. firms had been targeted by foreign governments of concern, or were involved in possible violations of U.S. law.

Between 1984 and 1990, CIA's Office of Scientific and Weapons Research provided 5 memos covering Iraqis' dealings with United States firms on purchases, discussions, or visits that appear to be related to weapons of mass destruction programs.

The CHAIRMAN. Are those classified documents?

Dr. OEHLER. Yes, they are.

Can we go on to export controls?

The CHAIRMAN. Yes, please.

Dr. OEHLER. Continuing: Turning to export controls, the intelligence community was asked by the Department of Commerce during the 1980's to review export license applications primarily when the licenses had significance to intelligence collection equities.

Here the concern was not so much Iraq, but whether there was a possibility the equipment would be diverted to the Soviet Union or other communist countries, as you heard from Dr. Wallerstein a little earlier.

Prior to 1991, there were four instances in which the Department of Commerce sought information on Iraqi export license applications, all dated in 1986. These applications involved computer technologies and image processors.

For some of these, we reported no derogatory information on the end user. In one case, we referred the Department of Commerce to a classified intelligence report.

After evidence mounted in the mid-1980's about the use of chemical warfare in the Iran–Iraq war, the United States began to put into effect unilateral controls on exports of chemical precursors to Iraq and other countries suspected of having chemical warfare programs.

The United States and several other industrialized nations joined what is called the Australia Group to establish more uniform licensing controls for the export of several chemical weapons precursors. Since then, more nations have been brought into the Australia Group, and recently controls have been added for chemical equipment, certain pathogens, and biological equipment.

The CHAIRMAN. Let me again just stop you here because you are about to go to the next paragraph. You go "since the war," and you go on with some observations there.

My sense for it at this point is that the CIA had a pretty good fix on the biological, chemical, and nuclear weapons capability of Saddam Hussein. You were tracking it. You were watching these international firms. You had seen Saddam Hussein in a sense go underground with some of his activities after the Israelis came over and bombed some of his facilities in the early 1980's. And you were paying serious attention to it. You obviously saw it as a real problem, and you were on top of it.

Would it be fair for me to say that, before the outbreak of the war, the CIA was convinced, and had well-documented the fact, that Saddam Hussein had an advanced and dangerous chemical warfare, biological warfare capability underway?

Dr. OEHLER. Yes, sir. I do not think anyone will doubt that.

The CHAIRMAN. I think the record is clear on that. I think it is to the credit of the CIA that it saw that and knew that and was reporting that in real time.

It is my understand—and you may or may not know the answer to this, but if you do, I would like you to give it—that the Defense Intelligence Agency did not have either that assessment or the same assessment in terms of the capabilities of the Iraqis in that area?

Dr. OEHLER. No. The Defense Intelligence Agency was part of the intelligence community. I, at the time of the beginning of the Gulf War, was the National Intelligence Officer for Science, Technology, and Proliferation. So my job there was to pull together common

community positions on these matters. The Defense Intelligence Agency did not have any alternative views on this. Their estimate was that these programs were dangerous as well.

The CHAIRMAN. So from your knowledge, you are saying the DIA also felt this was a real threat. Was their level of knowledge up to yours, the CIA's?

Dr. OEHLER. Yes, sir. We do not hold any information from each other.

The CHAIRMAN. Now, in terms of war planning, if somebody is anticipating going in and shutting down Iraq, moving them out of Kuwait after they had moved into Kuwait, and then backing them up and shutting down most of their military capability in Iraq, would the Defense planning of that come off this combined assessment, your assessment, the CIA's, and the DIA's assessment?

Where would the Defense planners go to get the picture of what the troops might face to the extent we had to go in and liberate first Kuwait and then go into Iraq, in the way of biological and chemical weapons risk?

Dr. OEHLER. Of course, the planning is done by the Military Operations Forces. What information do they have? They have all of this information. Now, whether they are obligated to weigh the Defense Intelligence Agency's estimates over someone else's, I do not know. You will have to ask them. But I did not see any significance difference it would have made, any kind of a difference in the campaign.

The CHAIRMAN. So I guess you are saying to us then that the Defense planners that would have had to put together a war strategy had quite complete knowledge as to the biological and chemical weapons capability that he had been working on over a period of time and refining?

Dr. OEHLER. I do not think any Defense planner or any policymaker will say they have complete enough knowledge.

The CHAIRMAN. I understand.

Dr. OEHLER. There are certainly pieces of our knowledge that were missing. What was clear was the existence of the program and the extent.

The CHAIRMAN. Let me ask you this. Did the CIA for its part know ahead of the war that there were going to be the volume of these particular kinds of weapons systems that were found after the war that you cite in the early part of your testimony?

Was there a CIA estimate that would have said that, "Our expectation is that there would be at least 40,000 field munitions, including 30 warheads for ballistic missiles, bombs?" How discreet would your assessment of his capability have been before the war? Is there that kind of a document?

Dr. OEHLER. Our assessments were based primarily on the production capability, and on how much—as I mentioned, they could be producing 2,000 tons a year. And then, what would you do with that? We did not have it broken down by so many artillery shells and so forth.

The CHAIRMAN. Do you know if anybody would have had a mockup, if you will, of this kind of a deliverable weapons system capability that was found after the war, before the war?

Dr. OEHLER. A mockup?

The CHAIRMAN. In other words, some very smart person like yourself had been tracking this for a decade and looking at all the stuff that they were buying from the European suppliers, and with aerial photographs, surveillance, and onsite sources or whatever else we had, would have said, "They have been cranking out this kind of a warhead now over a period of time, and we think they do 3 a week, or 3 a month, and we now think they have in their stockpile the following."

So when a Defense planner turns to you and says, "Wait a minute. We are going to send all these troops in here. What are we likely to face in terms of their stockpile of chemical weapons and biological weapons?" How refined would the internal estimate have been based on all this other work, that would have said, "This is what we think he has got."

Dr. OEHLER. It was pretty good in terms of the capability. The reason was we watched Iraq use CW in its war with Iran. In the latter part of that war, in the Majnoon Islands at the very end of the campaign, they used a tremendous amount of agent. We could track that and we could see then how they could use that against coalition forces if they chose to do so.

The CHAIRMAN. Did they use biological weapons?

Dr. OEHLER. No, they did not. Let me put my same caveat on here. We have no evidence that they did. We have a lot of evidence on what they used, and we did not see any use of BW.

The CHAIRMAN. Is there any information to indicate that Iraq was coordinating research on genetically altered microorganisms? There is a concern because of the U.S. export of E-coli and other genetic materials.

Dr. OEHLER. We have not seen that as part of their BW research program. At least if they looked at it, it did not get very far along to our knowledge. They did those three agents that we talked about, and most of the production was—all the production we know of was in botulinum toxin and anthrax, which is bad enough, by the way.

The CHAIRMAN. No, I understand.

We are trying to push this envelope out as far as we can in terms of what was going on here, recognizing that our own Government is compartmentalized. You know a certain amount and you go up to a certain point. Then somebody else, in a sense, has a responsibility that bridges on from that point and goes on into another direction. For example, the CIA did not design the chemical sensors that did not work. Hopefully, the CIA, if it was designing a chemical sensor, would have designed one that, when it went off it was not a false alarm, but it was a real alarm.

Dr. OEHLER. I would just mention that we in the intelligence community have needs for CW and BW sensors as well, and have been a bit frustrated by our—I will include ourselves here—inability to develop the technology rapidly enough to satisfy our needs. That is the same as the Department of Defense has.

The CHAIRMAN. I think generally offensive weapons capability can move faster than defensive weapons capability, and especially if you have somebody that is diabolically minded enough, like Saddam Hussein, and who is organizing this very well-developed weapons development system.

You have described here already, in what you have said, a very sophisticated operation, where they knew what they were doing. They were working through these European suppliers. They were staying under the thresholds. They were figuring out how to put together what they wanted. They certainly were field-testing the weapons. They field-tested them on the Kurds, and apparently on some Iranians as well. They were lengthening their missile range.

This is a very sophisticated operation in this area. They had gone underground to do a certain amount of it through these front operations because they had gotten punished by the Israelis.

So if you again just apply the logic, you would imagine that any operation as sophisticated as this, doing this many things, probably mixing chemical and biological cocktails as well—this is my own theory—was probably out on the forefront of what they could develop with respect to their offensive capability.

I mean, I cannot imagine somebody this creative suddenly loses the creative spark when it comes to figuring out, how do we get more bang for the buck? Or how do we find a more powerful weapon, or a less expensive weapon, or one that is easier to deliver, or one that we can somehow disseminate in a way that maybe they will not even find out?

Dr. OEHLER. No. These are centrally-directed programs with the highest authority behind them.

The CHAIRMAN. But they seem to be very cleverly designed as well. I am not saying that they are as sophisticated as we might be, but I am struck by the sophistication of the system.

Dr. OEHLER. They learned this over a period of years in the 1980's, but they became masters at the procurement networks. Of course, there are companies that try to help them with that, too, because the profits were pretty large.

The CHAIRMAN. Well, you know I really get a bad case of heartburn when I find out that these export licenses, not long before we actually find ourselves in a war with these people, were being approved by our own Commerce Department.

We had a situation—I do not know if you are aware of this or not—but we had a hearing in the late fall of 1992. We were at that time looking at the shipment of devices that were incorporated into Iraq's nuclear weapons capability. We found that some licenses had been granted by our own Commerce Department to ship certain dual-use items over there. In fact, some of them had been shipped directly to Iraqi military installations, which should have been a warning sign that they were not designed for peaceful use by somebody who is a professor in agriculture over in a university somewhere.

When that document, because it is a written document, was sought by the Congress—the Senate, and the House—that particular document was altered. The exact text of the words on the document, which indicated that it was to be shipped to an Iraqi military unit, those words were deleted, and something else was put in its place to create a false picture. That document was sent up to the Congress as a deliberately misleading document.

Now, the person who was in charge of that area in the Commerce Department—this was late in 1992, there was a Presidential race

going on, so that heightened the sensitivity of all of this—was conveniently out of the country.

We tried to get hold of this person to bring them in as a witness to explain how this document had gotten altered to give a false appearance and impression. We could never get this person because the person was outside the country and hiding out somewhere. So the election came and went, and the Bush people departed town, so we never did talk to that particular witness.

I only cite that because we have had experiences, direct experiences, where official Government records were doctored and given to us to mislead us on shipments that were going into the center structure of Saddam Hussein's military operation.

I am not talking about distant history. I am talking about something that happened directly within the scope of what we are here talking about.

This was a pretty sophisticated operation. It seems to me that, if the CIA knew as much as it did, and everybody else did, it is hard for me to understand why we were aiding and abetting this guy and authorizing these shipments. Doesn't that seem a little strange?

Dr. OEHLER. Well, the only thing I can say is that, since the Gulf War there have been a lot of enhancements in the licensing process and in the export controls. I think everyone realizes the significance of the problem.

The CHAIRMAN. Why don't you go ahead? We are getting down near the end of your statement. Why don't I let you finish it?

Dr. OEHLER. All right. As I was saying: Since the Gulf War, U.S. export controls on CW/BW have been considerably strengthened. Enforcement mechanisms involving several Federal agencies have been put into place. The scope of the regulations have been broadened considerably.

In 1991, export controls were tightened to require validated licenses for all dual-use equipment being exported to end users of proliferation concern. Intelligence information is often the basis for this determination. This catch-all provision has served as a model for other countries interested in joining the U.S. Government's nonproliferation efforts.

The intelligence community has an expanded role in this strength and export control regime. We work with the Department of State-led interagency forums to control sensitive technologies and equipment.

Our analysis of international trade mechanisms used to transfer technologies from suppliers to consumers is provided to the U.S. policy, enforcement, and intelligence communities.

The Department of Commerce now brings the intelligence community into a large percentage of its license reviews.

Let me say a brief word about the control of missile and nuclear technologies. The Missile Technology Control Regime, the MTCR, went into effect in April 1987, with the participation of the United States, United Kingdom, Canada, Italy, France, Japan, and West Germany, all the leading suppliers of missile-related technologies.

Initially the MTCR controlled ballistic missiles and their components that are capable of delivering a 500-kilogram warhead to a range of 300 or more kilometers. In recent years, the scope of the

MTCR has been expanded to include any unmanned system, with any range or payload, if it is believed to be intended for use with weapons of mass destruction.

As you know, the Nuclear Nonproliferation Treaty, most often known by its initials, the NPT, provides the global framework to control the spread of nuclear weapons. Nations that have joined the NPT pledge not to transfer, seek access to, or assist the spread of nuclear weapons. The transfer of nuclear materials is covered by safeguards enforced by the International Atomic Energy Agency. Over the years, members of the NPT have developed lists of restricted items and technologies.

The United States adheres to these controls, and has introduced its own restrictions on the spread of fissile materials necessary for nuclear weapons: plutonium and enriched uranium.

The final issue I would like to address is the legislation affecting the export controls and other nonproliferation measures, specifically the provisions the intelligence community needs in such legislation.

The first thing I would say, Mr. Chairman, is that the bill you introduced at the request of the Administration incorporates provisions which address the intelligence community's concerns in the area of chemical, biological, and missile nonproliferation measures. We worked closely with the other agencies that developed this bill, and have endorsed the final result.

Accordingly, I would strongly urge that these provisions be retained in the final bill passed by the Senate. To aid the Committee's deliberations, I would like to outline the community's equities in this area.

In disseminating our intelligence, one of our primary responsibilities and duties is to protect the sources of the intelligence, whether human or technical, and the methods by which it was collected. Sources and methods are most at risk when intelligence information is directly or indirectly made public. The compromise of sources and methods inevitably results in a diminished capacity to collect intelligence for the future.

The most dramatic consequences of a compromise of intelligence information is the threat of the life of an asset, but there are other significant consequences. For example, if we have intelligence indicating that a particular overseas company is actually, say a Libyan front company, we can often watch that company to learn more about Libya's programs and its acquisition network.

The U.S. Government action that publicly identifies the company will often result in the company shutting down and reopening elsewhere under a different name. Identifying this new company can be difficult. But meanwhile, we have lost a window into the broader proliferation activity.

This is not to say that intelligence should never form the basis for overt U.S. Government action. To the contrary, it quite often does, and I feel strongly that providing this actionable intelligence is of the highest priority for the intelligence community.

What is needed, however, is the flexibility to take the action that will best achieve our nonproliferation objectives, which in some cases may mean holding off on overt U.S. Government actions to protect the nonproliferation sources and methods.

The first goal is to ensure the sanctions, regimes established to punish proliferators, permit the President sufficient discretion in the imposition of sanctions to protect intelligence sources and methods. The second goal is to ensure that the Executive Branch not be statutorily limited or required to publish lists of end users to whom exports of technologies and commodities are controlled. The third goal is to ensure that the Government maintains export control sufficient to ensure that exports of critical technologies are compatible with U.S. interests.

The Administration's proposals achieve the first goal by explicitly permitting the President to delay the imposition of sanctions where it is necessary to protect intelligence sources and methods. Let me emphasize that the intelligence community views this as an exceptional remedy that would have limited but critical application, and is necessary for further nonproliferation goals in the long run.

The second goal is met by not requiring the intelligence community to create lists or databases of end users to which exports of goods or technologies are controlled, but still ensuring that intelligence is appropriately made available to other agencies for the purpose of analyzing export license applications.

Finally, the Administration's bill would not relax or eliminate controls on key technologies, particularly encryption devices, which could be damaging to U.S. intelligence interests.

This is the basic outline of the issues we face. I would offer my center, the Nonproliferation Center, any assistance to you if they are helpful in your deliberations on these important issues.

Thank you.

The CHAIRMAN. Thank you very much.

I want to say, as we have gone back and forth here, I trust it has been constructive. I have meant for it to be, and I appreciate the professionalism and the work.

I want to say to you and through you to the CIA that I appreciate the detail in this testimony today. You have declassified a lot of information today at our request, and made it a matter of public record. It is very helpful to us to do that, in terms of both reconstructing what happened and laying the right predicate for getting the Export Control Act reauthorization through here.

Your recommendation on this one item that you mentioned at the end was not lost on me in terms of what we may be able to do between now and the time we act on it in the Senate as a whole.

We have just, as you know, reported that bill out of the Committee by unanimous vote of 19 to 0. We have achieved a good strong bipartisan consensus, a regime that we think deals with some of these problems. So I appreciate the fact that you have validated these concerns and given us very important historical reconstruction here today that is useful.

I will say at the same time that I think that there is this problem of where is the health difficulty coming from and how do we track it to its source so we have got a better way of knowing how to treat the veterans and try to heal them and protect their families—that I still see in the various Executive Branch participants, a problem where information leaves off at 1 point, and then it picks up at the next point. Things do not ever quite fully tie together.

I do not just put that on you when I say that. I am just saying I see that problem. It is not the first time I have seen it. I have seen it other times in my 28 years here on other problems and I am seeing it again here on this problem.

I would give you this message to take back if you would. That we have got to do some more work to find out why these veterans are sick. If we had half of the top tier of the CIA professionals sick today themselves from the same problem, we would have a much more ambitious effort underway to get to the answer, just as we would if we had the high command of the military sick today from these problems. It is just the nature of what gets the priority and what does not.

We have got to find out what happened here. We have got to find out because we have got a lot of sick veterans, many of whom are getting sicker, and their family members are getting sick in increasing numbers. We were not prepared for that finding. That finding presented itself to us as we were tracking back through this problem.

I have talked to enough wives of returning male Gulf War veterans, who are now quite sick, that I am deeply concerned about what is going on here. Something happened out there, or some combination of things happened. The degree to which it comes out of this military or biological weapons capability, hopefully time will give us all those answers if we are aggressive about pursuing it.

What is beyond dispute is the fact that we have got a lot of sick people who put on the uniform of this country, and on the basis of our best intelligence assessments and the belief that somebody in the command position was making wise decisions with their safety and well-being in mind, that they could go into a battle situation with the confidence that they were not going to be subjected to something that we did not anticipate, were not protecting them adequately against, or were not prepared to get to the bottom of if they came back with a health problem.

Many of them are deeply discouraged right now, because they really feel like the Government has walked away from them, and despite all the talk, which is cheap and by itself does not mean anything, that not enough has been done to really ratchet their problems up on the priority scale and get at them.

I agree with them. I think they are exactly right. I think it is shameful, the fact that we are in that situation. There is no excuse for it. I think every operational officer in the area of the Government that relates to these things, from the Director of the CIA to the Secretary of Defense, to the head of the DIA, to the President himself, to the head of the Veterans' Administration have an urgent task here to marshal the resources, marshal the knowledge, the professional focused effort, and figure out what happened here, and to try to get as much medical help to these veterans and their families as we can do, and not hold anything back.

And by the same token, learn from that before we suddenly find we have got a situation where the same thing happens again in some other theater of war. We have a terrible problem in this country—and I have seen it before—where, once somebody leaves active military service and becomes a veteran, they are in a different importance status as it relates to the Defense Department.

The Defense Department is looking ahead to the next war. The Veterans' Affairs Department is looking back at the veterans of the past wars, in effect. There is this dividing line.

Some of that may be necessary, but I think in this situation, the precautions taken were not adequate. I think there were some serious strategic errors made in putting people in harm's way. I think people are having a very hard time now who may have been part of that decision structure, facing it, acknowledging it, and dealing with it.

The body of information that we have, the number of veterans who keep coming forward, many still on active duty, many holding officer rank, who give us more and more information, tell me that we have got a problem here that the rest of the Government at the top is still reluctant, or unable, to fully see and deal with. That has got to change.

You have helped us today with respect to the report that you have given us from the CIA. We will give you some questions for the record and we will look forward to having you respond to those fully.

Thank you.

Dr. OEHLER. Thank you, Mr. Chairman.

The CHAIRMAN. The Committee stands in recess.

[Whereupon, at 4:32 p.m., the hearing was adjourned, subject to the call of the Chair.]

[Prepared statements, response to written questions, and additional material supplied for the record follow:]

PREPARED STATEMENT OF SENATOR ALFONSE M. D'AMATO

Mr. Chairman, let me begin today by expressing my gratitude and appreciation for your commitment to addressing the serious issue before us—that of whether exposure to chemical and biological agents during the Gulf War with Iraq are causes of what has come to be known as the Gulf War Syndrome.

Saddam Hussein has once again been talking about Kuwait "as the 19th province of Iraq." Thus, this hearing and our inquiries are not limited to just a historical focus and it is not limited to only the ailments of veterans of the Gulf War and their families. Pursuing necessary questions and getting good answers may prove vital to the safety and success of future U.S. military operations.

Today, thousands of Gulf War veterans across this country are experiencing illnesses that began after they returned from the Gulf War. Alarmingly, there appears to be growing evidence that the illness is spreading to the spouses and children of the affected veterans.

I believe, as you do, that it is the responsibility of all Government agencies, institutions, and the U.S. Congress to follow every available lead which might assist medical researchers in finding the answers to the causes of illnesses faced by our veterans.

Mr. Chairman, I know that you have been tireless in your efforts to get the Department of Defense and other Federal Government agencies to be forthcoming on this issue. Most, if not all, of the responses have been inadequate and sometimes even contradictory.

It is my understanding that the Department of Defense contends that it has no evidence that U.S. forces were exposed to chemical and biological agents while serving in the Persian Gulf. But, according to the Pentagon's official report to Congress on the Conduct of the Persian Gulf War, written in 1992: "By the time of the invasion of Kuwait, Iraq had developed biological weapons. Its advanced and aggressive biological warfare program was the most advanced in the Arab world. Large scale production of these agents began in 1989 in four facilities near Baghdad. Delivery means for biological agents ranged from simple aerial bombs and artillery rockets to surface to surface missiles."

With this report in hand, an acknowledgement that Saddam Hussein had the means to use such weapons, it is inconceivable that the Defense Department has no other information on the actual use or impact of such weapons on our veterans. Such information could prove vital to assisting medical research efforts necessary to define and treat Gulf War illnesses. The work of the Chairman alone on this issue, as indicated in the report released today, shows a growing link between the symptoms of the syndrome and the exposure of Gulf War veterans to chemical and biological warfare agents, pre-treatment drugs and other hazardous materials and substances.

It is outrageous and unjustifiable that this Nation's own Defense Department not cooperate. I believe it is their duty and responsibility to provide information that could help treat the illnesses being suffered by the very individuals who served their country bravely. These individuals survived the horrors of the battlefield only to return home and face the horrors of war on another front.

There is a critical need for immediate advanced medical research. A thorough and systematic review of all information and data from all sources, including our own Defense Department, could be critical to identifying the causes and treating the illnesses. I hope that the representatives of the Department here today are going to provide us with worthy information and not just more stonewalling.

Mr. Chairman, thank you again for your complete commitment to this critical issue. I join you in continuing the fight against what is probably considered the second war by many of our veterans.

CHRISTOPHER S. BOND
MISSOURI
COMMITTEES:
APPROPRIATIONS
BANKING, HOUSING AND URBAN AFFAIRS
SMALL BUSINESS
BUDGET

United States Senate
WASHINGTON, DC 20510-2603

May 25, 1994

Hearing on the Impact on the Health of Gulf War Veterans
Committee on Banking, Housing, and Urban Affairs
SD 106 Dirksen

Opening remarks:

Mr. Chairman, I thank you for calling this important hearin to investigate further the causes of the Persian Gulf War Syndrome from which so many U.S. veterans and their families are currently suffering. We owe it to our veterans to do everything we can to determine the causes of the Gulf War Syndrome, to develop and research cures for those veterans now affected, and to do whatever we can to prepare and protect our service personnel from illnesses associated with this syndrome in any future conflicts.

Thousands of American servicemen and women are reportedly suffering from symptoms and undiagnosable disorders consistent with exposure to biological or chemical toxins. Allied bombings of Iraqi nuclear, chemical, and biological facilities were reported to trigger daily chemical "false alarms" on the front lines. Reports were made by U.S. service personnel of direct biological or chemical weapons attack on the 17th and 20th of January, 1991 and that as many as five gas attack alerts in one day were issued. Iraq not only had a vast biological weapons capability, including artillery shells loaded with mustard gas, rockets loaded with nerve agent, nerve agent aerial bombs, and SCUD warheads loaded with Sarin, but Iraqi official radio addresses on the 17th and 20th of January, 1991, indicated that Iraqi forces had and would use all means at their disposal to fight the U.S. and that they would soon unleash a secret weapon that would release "an unusual force." Lastly, the report of a Czech chemical decontamination unit detected the chemical nerve agent Sarin in the air during the opening days of the war and some of its members are believed to be suffering illnesses similar to those of our veterans.

Collectively, these facts make it, at least, possible that Gulf War Veterans were exposed to chemical and/or biological toxins. I, therefore, fully support Public Law 103-210 which provides additional authority for the Secretary of Veterans

Affairs to provide priority health care to veterans of the Persian Gulf War who may have been exposed to toxic substances or environmental hazards during the Gulf War. However, in light of the above evidence, it is apparent that we must investigate fully whether or not biological or chemical weapons were used on our troops.

In the staff report to this committee on September 9, 1993 on the Gulf War Syndrome, it is stated that only the use of highly sophisticated, computer-enhanced electroencephalograms (EEGs) would be able to detect neurological disorders resulting from direct chemical or biological warfare, or chronic exposure to low levels of hazardous nerve agents. I believe it is imperative that we make such technology available to those veterans suffering from the Gulf War Syndrome to determine without a doubt whether biological and chemical toxins played a role in the health conditions of our veterans.

The top priority of this committee, I believe, must be to ensure that the veterans who have been affected are treated, not just adequately or minimally, but to the highest extent possible, and to support research for cures of the Gulf War Syndrome.

I do, however, have several other concerns that I feel must be addressed. First of all, I find it very disturbing that the Department of Defense has not been as forthcoming on this issue as I feel they must. It has been almost two and a half years since the Gulf War, and the Department of Defense has still not made it a priority to get to the bottom of the causes of the Gulf War Syndrome. While the Gulf War Syndrome may not be the result of chemical or biological warfare, the odds of this syndrome affecting future units in combat is grave enough to warrant full and speedy investigation.

Second, by not investigating the effects that possible biological attacks have had on our troops, the security of U.S. forces against such future attacks would be compromised. Data suggests that the M8A1 chemical agent detection alarm deployed during the war might not have been sensitive enough to detect consistent low levels of chemical agents. It would appear that a reevaluation of our defenses against biological and chemical warfare would be in order, especially as relations with North Korea continue to sour.

Lastly, I am concerned about the adverse side effects that veterans have suffered from the administration of nerve agent pre-treatment drugs and inoculations distributed to our armed forces. Patricia Axelrod, a research specialist whose study of the drug pyridostigmine, which our troops were ordered to take prior to the commencement of the ground war, stated that the drug was "unproven." I think more research on the side effects of this drug and the advisability of administering it to our troops in the future is warranted.

I thank the Chairman for this opportunity to address my concerns and look forward to reviewing the testimony of witnesses.

PREPARED STATEMENT OF SENATOR CAROL MOSELEY-BRAUN

I am pleased to submit this testimony for the record regarding those who have been afflicted with the Persian Gulf War Syndrome. While stories of mysterious ailments connected to service in the Persian Gulf have been around for the last several years it is only recently that the symptoms plaguing some of our Gulf War veterans and their families have been taken seriously.

Those who were forced to fight another battle with their health upon their return from the Gulf have been vindicated by an NIH technical panel held in April, that validated the service related claims of many of the victims. The panel found that the Desert Storm environment—biological, chemical, physical, and psychological—produced a range of illnesses for Desert Storm vets.

Today I met with a twenty-four year old Illinois constituent who came to my office with his story. I would like to share it with you, because it is representative of the experience of many of our Gulf veterans. My constituent, Tim Striley, left the Persian Gulf even before the war began due to unexplained symptoms including a rash, nausea, and fevers. Upon his return he completed his service commitment and began a private sector job. As his symptoms continued and worsened he received care from his local VA hospital. As is the custom of the VA, his bills were forwarded to his private insurer for payment. With no diagnosis, no treatments, and no cure, his medical bills soared and he missed time from work. He lost his job and was told by his insurer that they did not insure Gulf War vets.

To add to Tim's problems, not only is he the victim of this amorphous syndrome, but as we are hearing more often, his wife and young daughter appear to also be affected.

His illness has advanced to the point that he is now disabled and unable to work. Though he continues to receive care through the VA, he has been unable to access Social Security Disability Income because there is no diagnosis for his illness. His wife's employment provides the sole income for the family.

My understanding is that the story of Tim's family is far from uncommon. It is very clear that we must do more to aid those who fought in the Gulf War and are experiencing severe health problems because of it.

I support the NIH's recommendations to study the issue further, conduct a survey of Gulf War veterans, and to create a uniform protocol for evaluating Gulf War veterans in different treatment settings. In the meantime, however, we must assure that veterans suffering from Gulf related illnesses receive proper treatment and care not only for themselves but for their families.

It is important that we move forward to determine a cause for this illness because it is real and very much a public health problem. We are now hearing about mysterious bacterias and high incidence of cancer among Gulf War vets in their twenties.

These claims and other claims that families of vets are also somehow experiencing related health problems must be thoroughly examined as expeditiously as possible. We must ensure that these families receive adequate care and we must ensure that we take additional measures to protect the public health.

I plan to contact the Secretary of Health and Human Services to determine if there is a role for the Centers for Disease Control and Prevention regarding investigation of the syndrome or measures to protect the public health. I also plan to work with Senator Riegle to continue to bring attention to the plight of our vets who served their country heroically in the Gulf.

PREPARED STATEMENT OF SENATOR BEN NIGHTHORSE CAMPBELL

Mr. Chairman, I appreciate your work and your persistence in trying to answer questions about the Persian Gulf Syndrome.

Like most people, I don't have the answers about why so many veterans of the Gulf War face chronic and often disabling illnesses, many of them from my home State of Colorado.

My office has helped many Persian Gulf War veterans, but I want to tell you about one young man whose family lives close to my ranch in Colorado. I remember him as a strapping young high school student. He also served honorably in the Gulf War.

Since returning from the Gulf, he has lost 40 pounds, he has trouble remembering things, and he has to fight bouts of dizziness and depression. The situation got so bad that he couldn't even make line-up. Yet the doctors at his base couldn't find anything wrong with him. He needed medical treatment, but they told him that his

problem was mental, and refused to treat him. When will the United States Government believe them? At the funeral?

Only after I called the commander of Ft. Carson Army Base was he admitted to Walter Reed Army Medical Center for treatment. It shouldn't take a phone call from a Senator to help a veteran in need.

Currently, the Federal Government is engaged in at least 20 Persian Gulf related studies. They are investigating every possible cause or causes: multiple chemical exposures, leishmaniasis, oil well fires, microwave exposures, chemical and biological agents, vaccines and medications, and depleted uranium.

Last month the National Institutes of Health (NIH), along with the DoD, VA, HHS, and EPA, held the "NIH Technology Assessment Workshop on the Persian Gulf Experience and Health." After 2 days of presentations, the NIH adopted a written report which determined, among other things, that:

- There is "no single disease or syndrome apparent, but rather multiple illnesses with overlapping symptoms and causes."
- A "collaborative Government sponsored program has not been established" to evaluate undiagnosed illnesses.

Of course, we don't need to wait for studies to know that these veterans are sick. The question shouldn't be: "Are these veterans sick?" It should be: "How can we take care of these veterans quickly and equitably?"

Last year Congress passed authority for the VA to provide health care for all Persian Gulf veterans on a priority basis. I thought this would mean veterans would be taken care of, but today we find out that care is meted out stingily, with suspicion and reservation.

Without question, eligibility for benefits, access to health care and compensation have to be provided sooner, with less red tape. I will be working with Veterans' Affairs Committee Chairmen Rockefeller and Montgomery to provide a presumption of service-connection for sick Persian Gulf War veterans.

I hope that after these hearings, nobody argues with the need to carefully control potentially dangerous exports. Frankly, I'm a little tired of hearing U.S. companies complain about export controls in the name of profits, and then not wanting to take responsibility for the uses of these products.

This weekend, 50–75,000 veterans will visit the Wall—I would like to tell them that we are doing something, and that the U.S. is not dragging its feet.

As a Member of both this Committee and the Senate Veterans' Affairs Committee, I look forward to working with you and Chairman Rockefeller on these issues.

PREPARED STATEMENT OF HONORABLE EDWIN DORN

UNDER SECRETARY OF DEFENSE FOR PERSONNEL AND READINESS

U.S. DEPARTMENT OF DEFENSE

Mr. Chairman and Members of the Committee, I am pleased to provide information to support the Committee's review of how materials contributing to Iraq's chemical and biological warfare program were exported to Iraq from the United States. These are significant issues as you consider measures to strengthen the Export Administration Act.

Secretary Perry has asked me to be the focal point within DoD for issues related to service in the Persian Gulf during Operation Desert Shield and Desert Storm. I am here today in that capacity.

Senator, I know that you and your colleagues are very concerned about Persian Gulf veterans who have developed health problems. So are we in the Department of Defense. In recent weeks we have testified before the Armed Services Committees and the Veterans' Affairs Committees in both Houses, and I will be pleased to share with you the same information we have shared with them. Indeed, before we move on to discuss matters related to the Export Administration Act, I would like to offer a few points about our efforts on behalf of Persian Gulf veterans.

We take the position that the veterans who say they are sick should receive the best care we can provide. Three years ago, we trusted these men and women to make life-and-death decisions in the heat of battle. Today, we should believe them if they're sick. We are committed to treating the symptoms, to fashioning appropriate compensation for those who are disabled, and to identifying the causes of their illnesses. An interagency coordinating board ensures that the Defense Department's treatment and research programs complement related efforts by the Department of Veterans' Affairs and the Department of Health and Human Services. I should note here that Congress aided our ability to respond by authorizing VA to

provide priority care to Persian Gulf veterans for conditions that might possibly be related to their Gulf service.

We are especially concerned about those Desert Shield/Desert Storm veterans who, since the war, have developed symptoms whose causes we cannot identify. These veterans represent a small proportion of the nearly 700,000 U.S. military personnel who served in the Persian Gulf region during the conflict, and indeed they represent a small proportion of those who have been treated for illnesses or injuries suffered during the war. DoD and VA doctors have treated thousands of Persian Gulf veterans for readily identifiable illnesses and injuries; but we know of about 2,000 people for whom a clear diagnosis continues to elude physicians.

We are working very hard on this. There are lots of theories about causes. We have heard from people who are convinced that we will find the answer if we focus solely on parasitic diseases, or Kuwaiti oil fire smoke, or industrial pollutants, or the effects of inoculations, or stress, or multiple chemical sensitivity. We are trying to maintain a program that explores all the possibilities. In the course of our work, some possibilities have begun to appear less plausible than others.

One theory involves Iraq's chemical and biological warfare capability. That theory provides a connection between the health problems of Gulf War veterans and the Senate Banking Committee's review of the Export Administration Act.

At the time of its invasion of Kuwait in August of 1990, Iraq clearly represented a case in which past efforts to prevent the proliferation of weapons of mass destruction had not been effective. Many American policymakers and military commanders were greatly concerned, going into the war, that Iraq would use chemical and/or biological weapons. We knew they had used chemical weapons in the past and we had evidence that they had acquired a biological warfare capability as well.

Our concerns led us to take measures to protect our personnel against such weapons, through immunizations, special training, equipment, and detection. The tension surrounding the possible use of chemical or biological weapons was evident to every American who watched on television as journalists scrambled to put on protective masks in response to the SCUD-attack warning sirens in downtown Riyadh and other areas. There were many alarms, witnessed by U.S. and other coalition military personnel and by the civilian populations of Saudi Arabia, Kuwait, and Israel.

Following the war, we confirmed through the inspections conducted by the United Nations Special Commission that Iraq did have significant stocks of chemical agents and the weapons systems to deliver them, as well as equipment and materials suited for chemical agent production. All of these chemical agents and related equipment were found stored at locations a great distance from the Kuwait Theater of Operations. These materials have been undergoing destruction at a centralized location in Iraq under the supervision of the United Nations Special Commission since late 1992. U.S. military personnel have been present, on site in Iraq, and involved in each of the teams overseeing these destruction operations.

We have concluded that Iraq did not use chemical or biological weapons during the war. This conclusion is based on analysis of large amounts of detailed data gathered in the theater and reviewed after the war. First, throughout the operation, there was only one instance of a soldier who was treated for chemical burns that were initially attributed to mustard agent; but subsequent tests on the soldier and his clothing did not definitively support the initial finding. We know of no other reports of any U.S. military, coalition military, or civilians in the region having symptoms caused by exposure to chemical or biological warfare agents. The effects of chemical and biological weapons are acute and readily identifiable, and our personnel had been trained to look for the symptoms.

Second, our detectors were strategically located, and although many detectors alarmed, there were no confirmed detections of any chemical or biological agents at any time during the entire conflict. Third, no chemical or biological weapons were found in the Kuwait Theater of Operations—those portions of Southern Iraq and Kuwait that constituted the battlefield—among the tons of live and spent munitions recovered following the war. The international community agrees with these conclusions.

This is a complicated and contentious issue, however. To ensure that we have not overlooked or misinterpreted important information, we have asked an independent panel of experts, chaired by Nobel Laureate Joshua Lederberg, to review all the available evidence. We expect to receive the panel's report in June. We also remain eager to hear from Gulf War veterans who feel that they can shed light on the sources of the undiagnosed illnesses.

I understand the fear and the frustration many Persian Gulf veterans are experiencing: They are sick and their doctors can't offer definitive answers. To them, let me say: This Administration is committed to treating you fairly. You stood up for the Nation; the Nation will now stand up for you.

Now, let me turn to the Defense Department's role in the export licensing process. First, it should be noted that DoD is not a licensing agency. That responsibility falls on the Department of Commerce for dual-use items. The Department of Defense reviews and provides recommendations on export license applications when they are referred to Defense or to interagency groups in which Defense participates. Records on the ultimate disposition of dual-use, biological, chemical, nuclear, or missile technology-related licenses reside in the Commerce Department.

DoD is a member of the interagency Subgroup on Nuclear Export Controls which was in operation throughout the 1980's. This group reviews export requests for nuclear-related dual-use technology. In the missile area, Defense played a significant role in the establishment of the Missile Technology Control Regime in 1987, and subsequently helped set up an interagency license review group in 1990. In the chemical and biological area, Defense also plays an important role, as part of an interagency team, in reviewing export license requests for items controlled by the Australia Group.

The Department has taken and will continue to take its responsibility here very seriously. For example, DoD made an important contribution in halting export of the Argentine Condor Program that was aiding Iraq's Weapons of Mass Destruction Program and we spearheaded the effort to prevent Iraq from acquiring a more capable missile than the SCUD. Defense also played a leading role in developing the President's Enhanced Proliferation Control Initiative and most recently the comprehensive DoD Counterproliferation initiative. The Department of Defense continues to consider proliferation as a significant military threat.

The growing ability to produce and use chemical weapons is a great concern to DoD. We fully support any measures that will prevent or control this proliferation, which include strengthening the Export Administration Act. It is important to remember that all exports made to Iraq in the 1980's were completely consistent with the laws in effect at the time, and Iraq was not considered a hostile country. Defense's role in reviewing exports was greatly expanded in 1991—and would be further expanded through measures you are considering in this Committee.

I would now like to introduce the other members of the panel. Dr. Theodore Prociv is the Deputy Assistant to the Secretary of Defense for Chemical and Biological Matters. In that role, he oversees the Department's Chemical and Biological Defense Program; the Army program to destroy the U.S. stockpile of chemical weapons; and the implementation of bilateral and multilateral chemical weapons treaties, including the Chemical Weapons Convention which is being considered currently by the Senate for ratification. Additionally, his office has assisted the Defense Science Board Task Force examining the issue of Gulf War health, and has assisted my staff with technical support in the area of chemical and biological warfare defense. Dr. John T. Kriese is the Chief of the Office for Ground Forces at the Defense Intelligence Agency. He is responsible for the production of intelligence on foreign ground forces and associated weapons systems worldwide; and all aspects of foreign nuclear and chemical programs. Dr. Prociv and Dr. Kriese are with me here this morning. Dr. Mitchell Wallerstein, who will testify this afternoon, is an expert in Counterproliferation and Export Control for the Under Secretary of Defense for Policy in International Security Policy. He is the Deputy Assistant Secretary of Defense for Counterproliferation Policy.

Mr. Chairman, that concludes my opening statement. Before we turn to questions, I ask the Committee's indulgence while Dr. Prociv and Dr. Kriese describe their areas of expertise.

PREPARED STATEMENT OF DR. GORDON C. OEHLER

DIRECTOR, NONPROLIFERATION CENTER, CENTRAL INTELLIGENCE AGENCY

Mr. Chairman, Members of the Committee, I am pleased to appear before you this afternoon to address your concerns about the proliferation of weapons of mass destruction. I am specifically going to address three aspects of Iraq's efforts to obtain critical technologies for its weapons programs in the years preceding the Persian Gulf War.

- First, I will present a brief overview of the Intelligence Community's assessments of Iraqi chemical and biological warfare (that is CW and BW) capabilities prior to Desert Storm and subsequent discoveries based on post-war inspections. I will also touch lightly on our assessments of Iraq's missile and nuclear weapons programs.
- Second, my remarks will detail the means by which Iraq sought to procure items for its weapons of mass destruction programs.

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- Third, I will address the role that U.S. intelligence agencies played in support of efforts to restrict transfers to Iraq that would have been of use in its CW and BW programs.

Finally, I will close with some observations regarding the Export Administration Act. I will be as candid as possible in this open testimony. I'm sure you understand that further details could be addressed in closed session.

First, what did we know about Iraq's weapons of mass destruction programs. As we reported extensively, Iraq had aggressive CW and BW programs prior to Desert Storm, as well as programs for ballistic missile delivery systems. The Iraqis used nerve and blister agents during the war with Iran and, in 1988, increased their usage of nerve agent dramatically during their final offensive campaign. As you will recall, they also targeted their own Kurdish population with chemical weapons.

In mid-1990, Iraq's primary site for the production of chemical weapons was the Al Muthanna State Establishment located in Samarra, about 80 km northwest of Baghdad. In addition to that complex, the Iraqis had begun to build a complex of precursor production plants near Al Habbaniyah, as well as additional chemical weapon storage sites. By early 1990, we calculated that the Al Muthanna facility was capable of producing more than 2,000 tons annually of blister agents and nerve agents.

Although the Iraqis claimed after the war that their chemical weapons production was inept and poorly organized, U.N. inspections showed otherwise. Iraq originally declared only about 10,000 CW munitions and less than 1,000 tons of chemical agents. U.N. inspectors have found and destroyed more than 46,000 filled munitions including 30 warheads for ballistic missiles, bombs filled with mustard gas, and nerve gas containers. Additional munitions remain buried in bunkers attacked and damaged by coalition forces—the U.N. cannot remove them safely. The inspections have also revealed 5,000 tons of stockpiled chemical agents. The U.N. is only now completing the task of dismantling this massive program.

With regard to biological weapons, we estimated, prior to the start of the war, that Iraq had a stockpile of at least one metric ton of biological warfare agents, including anthrax and botulinum toxin. We reported that Salman Pak was the primary biological weapons facility. U.N. inspectors did not find any evidence of large-scale production or weaponization during post-war inspections, suggesting that the materials and equipment were removed and hidden prior to inspections. Research reports released by the Iraqis to the first U.N. biological weapons inspection team showed highly focused research at Salman Pak on anthrax, botulinum toxin, and clostridium perfringens. The Iraqis insisted, however, that their program did not proceed beyond basic research. U.N. inspectors believed that, contrary to Iraqi claims, there was an advanced military biological research program which concentrated on these agents.

The Department of Defense reports that no chemical or biological warfare munitions were found stored—or used—in areas occupied by Coalition forces during Desert Storm. We do not have any intelligence information that would lead us to conclude otherwise.

At the same time it was developing CW and BW agents, Iraq was also developing missile delivery capabilities. By the time of the invasion of Kuwait, Saddam could field up to 450 Scud-type surface-to-surface missiles. These Soviet-origin Scuds originally had a range of 300 kilometers, but Iraq reconfigured them into a series of other missiles with ranges up to 750 kilometers. Prior to the war, Saddam claimed to have developed and tested a missile with a range of 950 kilometers—which he called the Al-Abbas—but discontinued the system because of in-flight stability problems.

With regard to Iraq's nuclear program, the bombing of the Osirak nuclear research reactor by the Israelis in 1981 drove Saddam to extreme lengths to cover, diversify, and disperse his nuclear activities. IAEA inspections of *declared* nuclear materials continued on a regular basis, but the IAEA did not inspect any of the undeclared facilities associated with the weapons program. We reported extensively on the existence of the nuclear weapons program. Post-war inspections added a number of details.

I would like to give you a sense of Iraq's procurement efforts and patterns. The Iraqi program was developed gradually over the course of the 1980's. By the time of the invasion of Kuwait, it had become deeply entrenched, flexible, and well-orchestrated. Project managers for the weapons of mass destruction programs went directly to vetted European suppliers for the majority of their needs. Throughout the 1980's, German companies headed the list of preferred suppliers for machinery, technology, and chemical precursors. German construction companies usually won the contracts to build the CW facilities in Iraq. And Iraqi procurement agents were

sophisticated in exploiting inconsistencies in local export control laws by targeting countries for substances and technologies that were not locally controlled.

In the pre-war years, the dual-use nature of many of these facilities made it easier for Iraq to claim that chemical precursors, for example, were intended for agricultural industries. European firms, arguing that the facilities in Iraq were for the production of insecticides, built the Samarra chemical plant, including six separate chemical weapons manufacturing lines, between 1983–86.

European middlemen broke red chemical precursor deals for Iraq under the pretext that the materials were intended for pesticide plants. A Dutch firm purchased supplies from major chemical firms around the world, supplying the Chemical Importation and Distribution State Enterprise in Baghdad in the late 1970's, and in the 1980's supplying the Iraqi State Establishment for Pesticide Production—cover names for the CW program. The middleman supplied dual-use chemical precursors including monochlorobenzene, ethyl alcohol, and thiodiglycol. When the Iraqis requested phosphorus oxychloride—a nerve agent precursor banned for export under Dutch law without explicit permission—the supplier balked and drew this request to the attention of Dutch authorities. Subsequent Dutch investigations found that two other Dutch firms were involved in brokering purchases of chemical precursors.

Iraq exploited businessmen and consortia willing to violate the export laws of their own countries. As has been indicated in press and television reports, The Consen Group—a consortium of European missile engineers and businessmen established a network of front companies to cover its role as project director of an Argentine-Egyptian-Iraqi sponsored Condor II ballistic missile program.

Iraqi procurement officers, knowing full well the licensing thresholds, requested items that fell just under the denial thresholds—but nonetheless would suffice. Prior to Desert Storm, U.S. regulations on the export of these technologies were drafted to meet U.S. technical specifications and standards. Technologies of a lower standard worked just as well, and permitted Iraq to obtain the goods and technology consistent with Commerce Department regulations.

Let me turn to the question of the involvement of U.S. firms in Iraq's proliferation programs. We were watching these *programs* very carefully, and it was clear that the major players assisting Saddam's effort were not American firms—they were principally European. We saw little involvement of U.S. firms in Iraq's weapons of mass destruction programs.

In discussing this issue, we should remember that, by law, the CIA, as a foreign intelligence agency, does not focus on U.S. persons, to include U.S. companies. By this definition, companies founded by foreign nationals and incorporated in the U.S. are treated as U.S. companies.

This is not to say that we did not occasionally come across information on a U.S. person that was collected incidentally to our foreign intelligence target overseas—we did. But, when we did, and when there was a possibility of a violation of U.S. law, we were obligated to turn our information over to the Justice Department.

We provided what we called "alert memos" to the Departments of Commerce, Justice, Treasury, and to the FBI. These memos resulted whenever this incidentally-collected information indicated that U.S. firms had been targeted by foreign governments of concern, or were involved in possible violations of U.S. law. Between 1984 and 1990, CIA's Office of Scientific and Weapons Research provided five memos covering Iraqi dealings with U.S. firms on purchases, discussions, or visits that appeared to be related to weapons of mass destruction programs.

Turning now to export controls, the Intelligence Community was asked by the Department of Commerce during the 1980's to review export license applications primarily when the licenses had significance to Intelligence Collection equities. And here the concern was not so much Iraq, but whether there was a possibility the equipment would be diverted to the Soviet Union or other Communist countries.

Prior to 1991, there were four instances in which the Department of Commerce sought information on Iraqi export license applications—all dated in 1986. These applications involved computer technologies and image processors. For some of these, we reported no derogatory information on the end user. In one case, we referred Commerce to a classified intelligence report.

After evidence mounted in the mid-1980's about the use of chemical warfare in the Iran-Iraq war, the United States began to put into effect unilateral controls on exports of chemical precursors to Iraq and other countries suspected of having chemical warfare programs. The U.S. and several other industrialized nations joined what is called the Australia Group to establish more uniform licensing controls for the export of several chemical weapons precursors. Since then, more nations have been brought into the Australia Group, and recently, controls have been added for chemical equipment, certain pathogens, and biological equipment.

Since the Gulf War, U.S. export controls on CW/BW have been considerably strengthened. Enforcement mechanisms involving several Federal agencies have been put into place. The scope of the regulations has also been broadened considerably. In 1991, export controls were tightened to require validated licenses for all dual-use equipment being exported to end users of proliferation concern. Intelligence information is often the basis for this determination. This catch-all provision has served as a model for other countries interested in joining the U.S. Government's non-proliferation efforts.

The Intelligence Community has an expanded role in this strengthened export control regime. We work with Department of State-led interagency forums to control sensitive technologies and equipment. Our analysis of international trade mechanisms used to transfer technologies from suppliers to consumers is provided to the U.S. policy, enforcement, and intelligence communities. And the Department of Commerce now brings the Intelligence Community into a large percentage of its license reviews.

Let me say a brief word about the control of missile and nuclear technologies. The Missile Technology Control Regime (the MTCR) went into effect in April 1987, with the participation of the U.S., the UK, Canada, Italy, France, Japan, and West Germany, the leading suppliers of, missile-related technologies. Initially, the MTCR controlled ballistic missiles and their components that are capable of delivering a 500-kilogram warhead to a range of 300 or more kilometers. In recent years, the scope of the MTCR has been expanded to include any unmanned system, with any range or payload, if it is believed to be intended for use with weapons of mass destruction.

As you know, the Nuclear Nonproliferation Treaty—most often known by its initials—NPT—provides the global framework to control the spread of nuclear weapons. Nations that have joined the NPT pledge not to transfer, seek access to, or assist the spread of nuclear weapons. The transfer of nuclear materials is covered by safeguards enforced by the International Atomic Energy Agency. Over the years, members of the NPT have developed lists of restricted items and technologies. The U.S. adheres to all these controls and has introduced its own restrictions on the spread of the fissile materials necessary for weapons production—plutonium and uranium.

The final issue I would like to address is legislation affecting export controls and other nonproliferation measures, specifically the provisions the Intelligence Community needs in such legislation.

The first thing I would say, Mr. Chairman, is that the bill you introduced at the request of the Administration incorporates provisions which address the Intelligence Community's concerns in the area of chemical, biological, and missile nonproliferation measures. We worked closely with the other agencies that developed this bill, and have endorsed the final result. Accordingly, I would strongly urge that these provisions be retained in the final bill passed by the Senate.

To aid the Committee's deliberations, I would like to outline the Community's equities in this area. In disseminating our intelligence, one of our primary responsibilities and duties is to protect the sources of the intelligence, whether human or technical, and the methods by which it was collected. Sources and methods are most at risk when intelligence information is, directly or indirectly, made public. The compromise of sources and methods inevitably results in a diminished capacity to collect intelligence in the future.

The most dramatic consequence of a compromise of intelligence information is the threat of the life of an asset. But there are other significant consequences. For example, if we have intelligence indicating a particular overseas company is actually a Libyan front company, we can often watch that company to learn more about Libya's program and its acquisition network. U.S. Government action that publicly identifies the company will often result in the company shutting down and reopening elsewhere under a different name. Identifying this new company can be very difficult, and meanwhile we have lost our window into the broader proliferation activity. This is not to say intelligence should never form the basis for overt U.S. Government action. On the contrary, it quite often does and I feel strongly that providing "actionable intelligence" is of the highest priority. What is needed, however, is the flexibility to take the action that will best achieve our nonproliferation objectives—which in some cases may mean holding off on overt U.S. Government actions to protect nonproliferation sources and methods.

The first is to ensure that sanctions regimes established to punish proliferators permit the President sufficient discretion in the imposition of sanctions to protect intelligence sources and methods. The second goal is to ensure that the Executive Branch not be statutorily required to publish lists of all end-users to whom exports of technologies or commodities are controlled. The third goal is to ensure that the

Government maintains export controls sufficient to ensure that exports of critical technologies are compatible with U.S. interests.

The Administration proposals achieve the first goal by explicitly permitting the President to delay the imposition of sanctions where it is necessary to protect intelligence sources and methods. Let me emphasize that the Intelligence Community views this as an exceptional remedy that would have limited but critical application and is necessary to further nonproliferation goals in the long term. The second goal is met by not requiring the Intelligence Community to create lists or databases of end-users to which exports of goods or technologies are controlled, but still ensuring that intelligence is appropriately made available to other agencies for purposes of analyzing export license applications. Finally, the Administration's bill would not relax or eliminate controls on key technologies, particularly encryption devices, which could be damaging to U.S. interests.

This is the basic outline of the issues we face. I would offer any Nonproliferation Center assistance or resources which you or your staff would find helpful as you proceed in your deliberations on these important issues.

THE SECRETARY OF DEFENSE

WASHINGTON, THE DISTRICT OF COLUMBIA

25 MAY 1994

MEMORANDUM FOR PERSIAN GULF WAR VETERANS

SUBJECT: Persian Gulf War Health Issues

As you may know, there have been reports that some Persian Gulf War veterans are experiencing health problems that may be related to their service in the Gulf. We want to assure each of you that your health and well-being are top priorities for the Department of Defense.

There are many hazards of war, ranging from intense combat to environmental exposures. Anyone who has health problems resulting from those hazards is entitled to health care. If you are experiencing problems, please come in for a medical evaluation. Active duty personnel and their eligible family members should report to any military hospital and ask to be included in the Department's Persian Gulf War Veterans Health Surveillance System. You will receive a full medical evaluation and any medical care that you need. Reserve personnel may contact either a military hospital or their nearest Veterans Affairs Medical Center and ask to be included in the DoD Surveillance System or the VA's Persian Gulf War Health Registry. You will receive a full medical examination. Depending on the results of the evaluation and eligibility status, reserve personnel will receive medical care either from military facilities or from VA facilities.

There have been reports in the press of the possibility that some of you were exposed to chemical or biological weapons agents. There is no information, classified or unclassified, that indicates that chemical or biological weapons were used in the Persian Gulf. There have also been reports that some veterans believe there are restrictions on what they can say about potential exposures. Please be assured that you should not feel constrained in any way from discussing these issues.

We are indebted to each one of you for your service to your country during the Persian Gulf War and throughout your military careers. We also want to be sure that you receive any medical care you need.

Thank you for your service.

John M. Shalikashvili
Chairman
of the Joint Chiefs of Staff

William J. Perry
Secretary of Defense

THE SECRETARY OF DEFENSE

WASHINGTON, THE DISTRICT OF COLUMBIA

25 MAY 1994

MEMORANDUM FOR SECRETARIES OF THE MILITARY DEPARTMENTS

SUBJECT: Persian Gulf War Health Issues

Chairman Shalikashvili and I want to ensure that sick Persian Gulf veterans receive the best care available. The attached memorandum provides essential reassurances about that.

The memorandum makes the following points: veterans who believe they have health problems resulting from service in the Gulf should come forward for examination and treatment; our forces were not attacked by chemical or biological weapons; and, military personnel are not barred, by any classification restrictions, from discussing issues related to their health.

Please ensure that this memorandum is distributed through all the channels necessary to reach the men and women who served in Operations Desert Shield and Desert Storm. Edwin Dorn, Under Secretary of Defense for Personnel and Readiness, is coordinating the Department's efforts to deal with the health effects of Persian Gulf service.

William J. Perry

Attachment:
As stated

UNITED STATES CENTRAL COMMAND
7115 SOUTH BOUNDARY BOULEVARD
MACDILL AIR FORCE BASE, FLORIDA 33621-5101

13 NOV 1994

CCJ1

Subject: Freedom of Information Act (FOIA) Request 94-41

Mr. James Tuite
Committee on Banking, Housing, and Urban Affairs
Washington, DC 20510-6075

Dear Mr. Tuite:

This is in reply to a FOIA request from Senator Riegle dated 16 March 1994 and received within the US Central Command 5 October 1994, as a referral from the Defense Intelligence Agency (DIA). The DIA searched and forwarded nine documents responsive to your request for our review and release determination.

These documents were reviewed and determined to be properly classified and should not be reclassified at this time. They will be returned to the Secretary of the Senate, Office of Security, U.S. Capitol S-407, Washington, DC to Mr. Michael DiSilvestro's attention.

If you have additional questions regarding your request, Major Blaisdell or Senior Master Sergeant Skinner are the command's FOIA Officers and stand ready to assist you. You may reach them at (813) 828-6679/6685. When calling, please refer to FOIA number 94-41.

Sincerely,

Robert J. Martinelli
Colonel, United States Air Force
Director of Manpower, Personnel
and Administration

Enclosures

UNDER SECRETARY OF DEFENSE
4000 DEFENSE PENTAGON
WASHINGTON, D.C. 20301-4000

PERSONNEL AND READINESS

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Jim T.

NOV 2 1994

Honorable Donald W. Riegle, Jr.
Chairman
Committee on Banking, Housing, and Urban Affairs
United States Senate
Washington, DC 20510

Dear Mr. Chairman:

Thank you for your letter of July 29, requesting information to questions from the May 25 Hearing on U.S. Dual Use Exports to Iraq and their Impact on the Health of Gulf War Veterans. An interim response was sent on August 31. The unclassified responses are enclosed. They also are being provided to Ms. Kelly Cordes as requested. The classified responses have been forwarded under separate correspondence in accordance with the appropriate security procedures.

I want to thank you for your concern and interest. Please be assured that we are deeply committed to the health and well being of our current and former Service members and it remains a top priority within the Department.

Sincerely,

Edwin Dorn

Enclosure:
As stated

cc:
Honorable Alfonse D'Amato
Ranking Republican

Ms. Kelly Cordes
Chief Clerk

Department of Veterans' Affairs
Gulf War Syndrome Registry

BREAKDOWN BY STATE OF RESIDENCE OF THE 12,774 VETERANS WHO HAVE TAKEN THE GULF WAR REGISTRY EXAM THROUGH MARCH 1994.

State of Residence	Frequency	Percent of Total
Alabama	979	7.7
Arizona	258	2.0
Arkansas	253	2.0
California	439	3.4
Colorado	161	1.3
Connecticut	37	0.3
Delaware	88	0.7
District of Columbia	62	0.5
Florida	612	4.8
Georgia	923	7.2
Hawaii	35	0.3
Idaho	26	0.2
Illinois	317	2.5
Indiana	356	2.8
Iowa	196	1.5
Kansas	152	1.2
Kentucky	352	2.8
Louisiana	184	1.4
Maine	146	1.1
Maryland	145	1.1
Massachusetts	149	1.2
Michigan	277	2.2
Minnesota	205	1.6
Mississippi	233	1.8
Missouri	319	2.5
Montana	76	0.6
Nebraska	140	1.1
Nevada	27	0.2
New Hampshire	162	1.3

State of Residence	Frequency	Percent of Total
New Jersey	119	0.9
New Mexico	150	1.2
New York	509	4.0
North Carolina	827	6.5
North Dakota	82	0.6
Ohio	269	2.1
Oklahoma	191	1.5
Oregon	185	1.4
Pennsylvania	589	4.6
Puerto Rico	48	0.4
Rhode Island	34	0.3
South Carolina	238	1.9
South Dakota	61	0.5
Tennessee	410	3.2
Texas	630	4.9
Utah	10	0.1
Vermont	85	0.7
Virginia	248	1.9
Washington	66	0.5
West Virginia	69	0.5
Wisconsin	630	4.9
Wyoming	13	0.1

QUESTIONS SUBMITTED BY
HONORABLE DONALD W. RIEGLE, Jr., CHAIRMAN
COMMITTEE ON BANKING, HOUSING, AND URBAN AFFAIRS

U.S. DUAL USE EXPORTS TO IRAQ AND THEIR IMPACT
ON THE HEALTH OF GULF WAR VETERANS

MAY 25, 1994

QUESTIONS FOR HONORABLE EDWIN DORN,
UNDERSECRETARY OF DEFENSE FOR
PERSONNEL AND READINESS
[Senator Riegle letter of July 29, 1994]

Questions from Chairman Riegle

Q.1. Was the Department of Defense intelligence apparatus aware of the items exported to Iraq by the United States which were converted to use in the Iraqi chemical, biological, and nuclear programs prior to the Persian Gulf War? Provide specific details.

A.1. During the earlier years associated with Iraq's build-up of its scientific, industrial and military capabilities, Iraq was neither a proscribed nation to be denied military critical technology, nor an enemy. The U.S. intelligence community is forbidden from monitoring the activities of U.S. citizens and U.S. companies. Consequently, very little was known by the Intelligence Community about U.S. exports of technology with military potential, particularly to a non-proscribed non-enemy nation, unless it was informed of such exports by the Department of Commerce. During 1980-1994, the Department of Commerce requested that DoD review only 16 dual-use export cases. Of these, only two were forwarded to the DIA for technical review. They involved computers and signal processing equipment. DIA recommended denial in both cases. DIA was aware of the illegal export of thiodiglycol to Iraq by the Baltimore company Alcolac. DIA assisted customs and the FBI in their investigation and successful prosecution of that company.

Q.2. Were Iraqi chemical and biological facilities among the priority targets hit by Coalition bombers during the first days of the air war?

A.2. Yes. Some Iraqi chemical and biological (CB) facilities were priority targets and were among the first attacked on and around the first days of the air war. However, not every CB target was attacked during the first days. CB targets were themselves prioritized, generally by the intelligence community, then more specifically by the

CENTCOM operators and were attacked accordingly. Generally speaking, CB targets were attacked at the very beginning of the air war and throughout the air campaign.

Q.3. Were U.S. national laboratories contacted prior to the war and requested to assess the danger from the fallout of bombing Iraqi chemical, biological, and nuclear facilities? What was their advice?

A.3. Yes. The Defense Nuclear Agency (DNA) was tasked to assess the danger of fallout from bombed Iraqi facilities. An example of the analysis conducted by the DNA to assess the effects of bombing Nuclear, Biological and Chemical (NBC) facilities is at Attachment A. DNA developed the Army's Automated NBC Information System (ANBACIS II) to analyze the impact of NBC contamination on military operations. Downwind hazard modeling of the southern-most storage facilities showed that chemical contamination would not occur beyond 11.1 kilometers downwind from the target. The closest U.S. or coalition forces to the Ash Shuyabah chemical storage area, the southern-most storage facility, was 150 kilometers. It is for this reason that reports of detections associated with downwind drift from bombed chemical facilities are discounted.

The ability to quickly communicate with DNA analysts was available to commanders in the Gulf theater. Twenty-one sets of ANBACIS II equipment, which provided direct communications between the units and DNA stateside, were distributed in theater. Over 600 plots were run by DNA at the request of deployed units conducting vulnerability analysis. A complete description of the ANBACIS system and how it functioned during the war is at Attachment A.

Q.4. Did the automatic chemical agent detection alarms begin to sound more often with the initiation of the Coalition bombings? If so, why?

A.4. Yes, because more alarms (M8A1 and M43A1) were placed into operation after the bombing started to prepare for any Iraqi retaliation. The M8A1 alarm is activated during normal preventive maintenance checks and services (see Attachment B). The M43A1 (the detector component of the M8A1 system) will alarm when exposed to heavy concentrations of rocket propellant smoke, screening smoke, signaling smoke, when engine exhaust is present or when a nuclear explosion occurs. Additionally, the alarm will sound in response to a heavy concentration of tobacco smoke, burning rubber, insecticides, low battery indicator, or strong percussion such as proximity to heavy vehicles or incoming artillery. There were approximately 13,200 M8A1 detectors in theater.

Q.5. Was the M8A1 automatic chemical agent detection alarm deployed during the Persian Gulf War sufficiently sensitive to detect chronic harmful exposure levels of chemical nerve agents?

A.5. Yes, for levels known to be harmful. The M8A1 G and VX agent sensitivity of 0.1-0.2 mg-min/m3 is more than adequate to warn ground troops against known effects of chemical warfare nerve agents. The only known effect of nerve agents at this level of concentration is pinpointed pupils.

Q.6. Was the M256 or M256A1 chemical agent kit sufficiently sensitive to detect harmful exposure levels of chemical blister agents that could pose a chronic exposure hazard to U.S. troops?

A.6. The M256A1 sensitivity to blister agents is as follows, and is more than adequate to warn ground troops against blister agent vapors: H - 2mg-min/m3; L - 9mg-min/m3; and CX - 3mg-min/m3. Normally, the first indication of exposure to blister agent vapors is eye injury, which occurs at concentrations of 100-200 Ct(mg-min/m3). Incapacitating blisters occur at 2,000 Ct(mg-min/m3), death through respiratory inhalation at 1,500 Ct(mg-min/m3).

Q.7. Were positive readings ever obtained with the M256 or M256A1 test kits? Include in your answer positive results obtained even though another tests may have been conducted with negative results? How long does it take to conduct an M256A1 kit reading?

A.7. The records reviewed to date have not revealed any positive readings. M256A1 response time for G,V,H,L,CX, and CK is 15 minutes and 25 minutes for AC.

G - non-persistent nerve agent
V - persistent nerve agent
H - mustard or blister agent
L - lewisite or blister agent
CX - choking agent
CK - blood agent
AC - blood agent

Q.8. Does the M17 gas mask provide sufficient protection against chronic exposures to chemical nerve agents? If so, why is it not recommended for use in chronic exposures in U.S. Army material safety data sheets?

A.8. Yes. Material safety data sheets provide information on safe storage, handling, and disposal of all types of chemical and hazardous materials throughout the civilian, military, and industrial communities. The particular material safety data sheets contained in the Senate Banking Committee Report of May 25, 1994, for example, refer to

protective measures required by personnel working in production, depot storage, and transportation of chemical material. The possible exposure to very high concentrations of chemicals and hazardous materials in these circumstances requires levels of protection that far exceed tactical military requirements. Soldiers require protection from field concentrations of chemical agents and therefore, soldier protective equipment must be more rugged, have greater wear time, require less logistic support, and be light weight equipment available for non-tactical applications. For example, the soldier's field mask must allow for weapons sighting, be worn in extreme hot and extreme cold, and be strong enough to survive infantry operations.

Q.9. Did the U.S. have field automatic biological detection monitors deployed during the Persian Gulf War? What type? Are they currently deployed with U.S. field units?

A.9. Automatic biological detection monitors did not exist during the Gulf War. All biological detectors were manually operated. Biological agent detection units are deployed based upon theater requirements. If a biological detection requirement is identified in the force structure, a chemical corps units will be deployed for that purpose. See response to Question #14 for additional information.

Q.10. Are all biological agents lethal? Isn't it true that one biological warfare strategy is to debilitate your adversary's capabilities and another is to overload his medical facilities?

A.10. No. Not all biological warfare agents are lethal; some are only lethal if untreated, while others are almost always lethal, even with medical treatment. Incapacitating BW agents could be used to debilitate an adversary's capabilities and to overload his medical facilities. Bacillus anthracis, botulinum toxin, francisella, tularensis, and yersinia pestis are examples of lethal agents; VEE virus, Q fever, and staph enterotoxin B are examples of incapacitating agents. The BW strategy statement is true for chemical, biological, nuclear, unconventional and conventional warfare strategy.

Q.11. Are the presence of sick or dead animals and birds one of the indicators U.S. forces are trained to look for as a warning of biological warfare agent use?

A.11. Yes. The BW usage indicators are:

- o Occurrence of acutely ill military and civilian patients
- o Illness reflects an unusual or impossible agent for the geographical area
- o Unusual distribution of disease
- o Unexplained number of dead animals
- o Direct evidence - discovery of munitions with BW agents.

Q.12. Might widespread flu-like symptoms also be an indicator of biological warfare use?

A.12. Possibly. Some infectious agents known to be potential biological warfare agents can have flu-like symptoms as part of an early infection. Examples would be Q-fever, anthrax, tularemia, and plague. Flu-like symptoms including fever, sore throat, cough, loss of appetite, and muscle and joint aches are very non-specific and are generally the first signs of any infectious disease, many of which are not known to be biological warfare threats.

Q.13. Were there outbreaks of antibiotic resistant strains of E. Coli and Shigella among U.S. forces during Operations Desert Shield or Desert Storm? How were the bacteria identified? Given the nature of the U.S. exports to the Iraq Atomic Energy Commission, were full DNA polymerase chain reaction studies conducted on these bacteria to determine if they were genetically modified?

A.13. Approximately 40-60% of enterotoxigenic E. Coli and 20-80% of Shigella spp. isolated from cases of acute diarrhea among Desert Shield troops were resistant to standard antibiotics used to treat diarrhea (trimethoprim-sulfamethoxazole, tetracycline, and ampicillin). Resistance was determined using standard laboratory methods. It was also found that no single strain of bacterial enteropathogen was the cause of antibiotic resistant diarrhea. Enteric bacterial pathogens resistance to commonly used antibiotics were expected at the beginning of Operation Desert Shield because resistant organisms are now found throughout the world, particularly in developing and tropical countries. Antibiotic resistant enteric disease pathogens can be obtained easily in nearly all tropical/developing countries by using simple, standard laboratory techniques; genetic modification is not necessary. Full DNA PCR analysis was not performed because there was nothing unusual or unexpected about the resistant, bacterial, enteropathogens identified in the Gulf.

Q.14. What procedures did the U.S. follow to determine whether U.S. forces were exposed to biological agents? What was tested for? What were the results of those tests?

A.14. Several years before the Gulf War, U.S. Army scientists and engineers crafted a contingency plan to address the threat of biological agents. A monoclonal antibody technology detector test was developed. When intelligence sources assessed Iraq as having a potential anthrax and botulinum toxin offensive capability, ten thousand anthrax and ten thousand botulinum toxin test kits were distributed throughout the Desert Storm theater of action. No biological warfare agents were identified during Operation Desert Shield/Storm.

Fifteen teams from the 9th Chemical Company were deployed by the U.S. Army to collect and analyze samples using the XM-2, a high volume air sampler, which operates by collecting aerosolized material into a liquid solution. That solution can be analyzed to determine the presence of biological warfare materials.

The Naval Medical Research and Development Command deployed the Navy Forward Laboratory (NFL) to perform the biological warfare (BW) analysis mission. Other NFL missions during Operation Desert Shield/Storm were:

- o Laboratory diagnosis of clinical cases of infectious diseases
- o Threat assessment of infectious diseases of military importance
- o Detection capability for potential BW agents
- o Public health assistance to the local population and to the Coalition Forces.

The NFL consisted of four microbiologists, two infectious disease specialists, and two advanced lab technologists. The laboratory had the capability to test for the following agents: salmonella, shigella, vibrio cholera, V. parhemonlyticus, escherichia coli, salmonella typi, s. partyphi, yersinia enterocolitica, cryptosporidium, rotavirus, legionella pneumophila, yersina pestis, francisilla tularensis, neiserra meningitidis, N. gonorrhoeae, straphylococcus, streptococcus, hepatitis A,B, hantaan virus, chlamydia, intestinal ova and parasites, malaria parasites, sandfly fever (Naples and Sicilian), West Nile fever, Rift Valley Fever, Crimean-Congo Hemorrhagic fever, sindbis, dengue, Q fever, murine typhus, Mediterranean spotted fever, mycoplasma pneumoniae, adenovirus, parainfluenza virus 1,2,3, influenza virus A&B, respiratory syncitial virus, steptococcus pyogenes, neisseria meningitidis, and streptococcus pneumoniae.

The NFL could perform specific BW agent identification by performing bacterial culture and antibiotic sensitivities, indirect fluorescent antibody assay, antigen capture ELISA, IgM and IgG capture ELISA, and polymerase chain reaction assay. The labs conducted analysis of dead animals, verified air samples collected by the biological sampling teams, tested water and soil for agents and toxins, and analyzed the rapid field assays.

In addition, U.S. Army specialists provided BW consultation and hands-on assistance to allies in the British, Canadian, and French armies. Great Britain and Canada developed and deployed reconnaissance vehicles, each of which included an air sampler, a particle sizer and various antibody-based tests (immunoassays). The French also deployed antibody-based tests for BW agents with assistance from U.S. Army specialists from Fort Detrick and Edgewood Arsenal.

Q.15. Were any biological agents or materials capable of being used to cause disease or other illnesses discovered by the U.S. or any other Coalition forces in Iraq, Kuwait, or Saudi Arabia? What were those materials?

A.15. No such materials were found by U.S. or Coalition forces.

Q.16. Were any Iraqi vaccines discovered or did interviews of enemy prisoners of war, or others, reveal what biological warfare-related materials the Iraqis had defended against?

A.16. No.

Q17. Did Iraq have a biological warfare program that appeared to be offensive in nature?

A17. Yes. The classified package provides additional information and is being addressed by separate correspondence.

Q.18. In the spring of 1993, the United Nations Special Commission on Iraq sent a biological warfare inspection team to Iraq under the leadership of U.S. Army Colonel David Franz (USAMRIID). One of the sites visited was a facility of the Iraqi Atomic Energy Commission which also does biological research. Was Colonel Franz briefed on the nature of the materials shipped by the United States to Iraq prior to the war to alert him that genetic research may have been being conducted.

A.18. Prior to his leading the UNSCOM BW inspection team in March 1993, COL Franz was briefed on the major microbial strains which the Iraqis had obtained from the ATCC before the war. Observation and questions regarding genetic research are part of the biological inspection modus operandi, with or without a prebrief on the subject. Mr. Jim Tuite showed COL Franz a list in the spring of 1994 that included genetic constructs and vectors. During COL Franz's visits to Tuwaitha in March 1993 and May/June 1994, he found no evidence of prohibited research, genetic or classical, ongoing, planned or having been conducted at Tuwaitha.

Q.19. Were chemical munitions or binary precursor materials capable of being used in chemical warfare discovered in any area of Iraq, Kuwait, or Saudi Arabia before, during, or after the war by U.S. forces, U.S. civilian personnel, or other coalition participants?

A.19. *Classified response received from the Department of Defense [deleted]. Response archived in U.S. Senate Committee on Banking, Housing, and Urban Affairs files.*

Q.20. What evidence, if any, is there concerning the forward deployment of chemical and biological warfare agents or weapons prior to or during the Persian Gulf conflict? What evedence, if any, is there of Iraqi attempts to avoid destruction of chemical or biological warfare agents or weapons by coalition bombings? For example, transshipment activity just prior to the initiation of the air war from chemical production facilities such as Samarra, Al Muthanna, Habbaniyah, or others?

A.20. *Classified response received from the Department of Defense [deleted]. Response archived in U.S. Senate Committee on Banking, Housing, and Urban Affairs files.*

Q.21. What evidence, if any, exists of Iraqi chemical and biological warfare defensive measures during or prior to the Persian Gulf War?

A.21. Iraq claims it did not have a dedicated BW defensive program. Iraq distributed drugs for the treatment of nerve and mustard exposure to at least some of its Republican Guard Divisions. There was an effort to outfit their troops with chemical protective gear; this usually consisted of a gas mask, gloves, boots, simple poncho, and individual chemical agent antidote kits. Additionally, decontamination stations were established throughout Iraq.

Q.22. What evidence, if any, exists of Iraqi command instructions to use chemical weapons prior to or during the war?

A.22. *Classified response received from the Department of Defense [deleted]. Response archived in U.S. Senate Committee on Banking, Housing, and Urban Affairs files.*

Q.23. Were any Iraqi chemical units in Iraq or Kuwait located or reported on by U.S. or coalition sources during Operation Desert Shield or Desert Storm? Explain?

A.23. *Classified response received from the Department of Defense [deleted]. response archived in U.S. Senate Committee on Banking, Housing, and Urban Affairs files.*

Q.24. In the Department of Defense's final report to Congress on the Conduct of the Persian Gulf War, it was reported that 88 Scud launches were detected. Saddam Hussein has claimed to have launched at least 93 Scuds. Can you explain the discrepancy? Were any Scud missiles launched by Iraq against Turkey or any other location other than Israel or Saudi Arabia? Were U.S. forces and dependent personnel in Turkey ever ordered into MOPP gear?

A.24. The Department records indicate a total of 88 SCUD launches against Israeli and Saudi Arabian targets only. Iraq only launched SCUD missiles against Israel and Saudi Arabia. We cannot explain the discrepancy between Saddam's claim to have launched at least 93 SCUDs. All units, which were in a SCUD missile threat area, responded with chemical defense standard operating procedures. Commanders at the lowest level of command determined the appropriate level of chemical defense for their units. No specific records were maintained at the unit level to indicate the use of MOPP gear. The Department is not aware of any personnel in Turkey being ordered into MOPP gear.

Q.25. What targets were Spirit 1, Spirit 2, and Spirit 3 (U.S. Air Force AC-130 Spectre gunships) directed against on January 31, 1991? Were any of the targets of their mission -- in which one of these aircraft was shot down in the battle for Khafji -- suspected of being chemical, biological, or nuclear weapons? What were the results of those missions?

A.25. Spirits 01, 02, and 03 (three AC-130H aircraft) were launched sequentially to provide close air support to U.S. ground forces engaged in and around the town of Khafji. Spirits 01 and 02 attacked the following targets: a truck park, a border post, a radio station and antenna, and a radar site with associated Armored Personnel Carriers (APCs) and personnel. Spirit 03 attacked similar targets; however, the specific targets cannot be determined because the aircraft was shot down during the mission. Spirit 03 was attacking a free rocket over ground (FROG) missile site just before it was shot down. None of the targets were NBC. The results of the attacks indicate minimal damage inflicted on the truck park, border post, and radio station. Three APCs were destroyed around and near the radar site.

Q.26. Did Iraq conduct test firings of Scuds or other short or medium range ballistic missiles during Operation Desert Shield? What was the assessed purpose for these tests since Iraq already had extensive knowledge of the capabilities of Scud missiles?

A.26. *Classified response received from the Department of Defense [deleted]. Response archived in U.S. Senate Committee on Banking, Housing, and Urban Affairs files.*

Q.27. Did Iraq have the capability to deliver biological weapons via ground-based aerosol generators, aircraft, helicopters, or FAW missiles? Do they have any other means of delivering biological weapons?

A.27. *Classified response received from the Department of Defense [deleted]. Response archived in U.S. Senate Committee on Banking, Housing, and Urban Affairs files.*

Q.28. What was the Defense Intelligence Agency evaluation of Iraq's chemical and biological weapons programs and delivery means prior to, during, and after the Persian Gulf War? What delivery means were within range of coalition forces at the beginning of the air war and by the end of the ground war?

A.28. *Classified response received from the Department of Defense [deleted]. Response archived in U.S. Senate Committee on Banking, Housing, and Urban Affairs files.*

Q.28. Did any Iraqi aircraft, helicopter, or FAW ground-to-ground missile ever penetrate Saudi airspace or areas over U.S. naval forces in the Persian Gulf? Include in your answer any areas where chemical and biological materials could have been distributed to contaminate U.S. forces even if not directly over Saudi Arabia.

A.28. The Iraqi Scud attacks on Saudi Arabia, Bahrain and Israel were highly publicized. The Iraqi offensive air capability was destroyed the first day of the ground war. There was no release of chemical or biological materials.

Q.30. Describe the evolution of Iraq's battlefield employment of chemical weapons during the Iran-Iraq war, did Iraq's ability to use these weapons improve over the course of the war?

A.30. *Classified response received from the Department of Defense [deleted]. Response archived in U.S. Senate Committee on Banking, Housing, and Urban Affairs files.*

Q.31. What chemical and biological agents were assessed to be in the Iraqi operational inventories and test inventories prior to the Persian Gulf War?

A.31. *Classified response received from the Department of Defense [deleted]. Response archived in U.S. Senate Committee on Banking, Housing, and Urban Affairs files.*

Q.32. Were U.S. or NATO chemical protective overgarments or masks vulnerable to specific types of chemical or biological agents in the Iraqi inventory?

A. 32. There were no equipment vulnerabilities specific to the Iraqi chemical agent inventory. No biological warfare agents were identified during Operation Desert Shield/Storm.

Q. 33. Was U.S. and NATO detection equipment capable of detecting Iraqi biological agents? Explain.

A.33. Yes, although U.S. Forces did not deploy any NATO biological detection equipment to Southwest Asia . See Response to Question #14 for information on U.S. equipment.

Q.34. What evidence exists, if any, to indicate that Iraq deployed chemical mines in the Kuwaiti theater of operations?

A.34. There is no evidence that Iraq deployed chemical mines in the KTO. In fact, over 350,000 Iraqi mines have been found and removed from Kuwait, none of which were chemical mines.

Q.35. Did Iraq deploy any chemical units or establish any chemical decontamination sites in the Kuwaiti or Iraqi theater of operations -- or in the disputed territories?

A.35. *Classified response received from the Department of Defense [deleted]. Response archived in U.S. Senate Committee on Banking, Housing, and Affairs files.*

Q.36. Which country provided the chemical Scud warheads to Iraq that were later located by the UN inspections? If by another country, how many of these warheads were initially provided? Did Iraq also manufacture its own?

A.36. *Classified response received from the Department of Defense [deleted]. Response archived in U.S. Senate Committee on Banking, Housing, and Affairs files.*

Q.37. Was the former Soviet Union ever suspected of providing chemical or biological warfare training to Iraqi officers either in Iraq, the Soviet Union, or any other country? Explain.

A.37. *Classified response received from the Department of Defense [deleted]. Response archived in U.S. Senate Committee on Banking, Housing, and Affairs files].*

Q.38. Is the Department of Defense aware of any Soviet assistance to the Iraqis in setting up any chemical training center or production facility in Iraq? Explain.

A.38. *Classified response received from the Department of Defense [deleted]. Response archived in U.S. Senate Committee on Banking, Housing, and Affairs files.*

Q.39. Did the United States ever provide chemical or biological warfare training to Iraqi officers either in Iraq, the United States, or any other country. Explain.

A.39. At one time the United States and Iraq had friendly relationships, to include military exchange programs. Iraqi officers attended the U.S. Army Chemical School until the 1978-1979 timeframe.

Q.40. Is there any classified or unclassified information that would indicate any exposures to or detections of chemical or biological agents?

A.40. Other than the Czech detections in January of 1991, which have been discussed at length during testimony and other questions for the record, there is no information, classified or unclassified, which would indicate any exposures to or valid confirmed detections of chemical or biological agents. There were many, probably thousands, of false chemical alarms experienced by the Coalition; however, no alarm ever was verified using follow-up confirmation procedures. This includes the French reports, the FOX vehicle moving into Kuwait, and the bunker incident after the war.

As with the alleged CW detections, there are some unsubstantiated reports that allege exposure to BW agents. However, despite concerted efforts, Coalition assets were not able to confirm any of these reports.

Q.41. Is there any classified or unclassified information that would indicate the discovery of any chemical, biological, radiological or nuclear warfare related materials by U.S. or Coalition forces before, during, or after the Persian Gulf War?

A.41. There is no information, classified or unclassified, that would indicate the discovery of any chemical, biological, radiological or nuclear warfare related materials by the US or Coalition forces before, during or after the Persian Gulf War. After the war, Iraq declared and turned over nuclear, biological, and chemical (NBC) related material to the UN inspection teams. None of the material which Iraq turned over to the UN teams originated within the KTO. The Department is not aware of any information derived from the UN inspections that supports any allegation that Iraqi NBC programs are responsible for the Gulf War Syndrome, either directly or indirectly. See classified package for additional information.

Q.42. In February 1994, the Defense Science Advisory Board contacted the Banking Committee and asked for a list of witnesses to what may have been direct Iraqi attacks. A representative list of at least one person from each event noted was sent to the Department of Defense. It has been reported back to my office by a number of those interviewed by the DoD that rather than ask substantive questions about the events and to locate other witnesses, high-ranking military officers called these individuals to inform them that they were mistaken and to tell them that Iraq had did not have the ability to initiate these types of attacks -- which, of course, is false.

Under whose personal direction are these officers operating -- and if operating without direction, what corrective or disciplinary steps will DoD take to ensure that in the future, Department representatives ask for information, rather than try to convince these veterans that they didn't see what they reported?

A.42. In support of the Defense Science Board on Gulf War Health Effects charter, the Department interviewed several Persian Gulf veterans, including witnesses who related their Persian Gulf experiences to the staff members for the Committee on Banking, Housing, and Urban Affairs. The majority of the individuals, who were interviewed, expressed their appreciation that the DoD was taking an interest in them and answering their questions concerning Operation Desert Storm chemical and biological issues. No disciplinary action is planned.

Q.43. What is the role of your office in the investigation into the exposure of U.S. forces to chemical and/or biological materials during Operation Desert Shield and Desert Storm?

A. 43. The Office of the Secretary of Defense (Health Affairs), OASD(HA) is responsible for all Persian Gulf health-related issues. The Office of the Assistant to the Secretary of Defense (Atomic Energy), OASTD(AE), provided administrative support and researched material for the Defense Science Board Task on Gulf War Health Effects. OATSD(AE) has also reviewed records, collected information and interviewed personnel with knowledge of chemical/biological operations related to the Gulf War and provided information to a variety of individuals and agencies. OATSD(AE) is assisting OASD(HA) in implementing a Desert Storm records research and declassification effort.

Q.44. What role, if any did the Defense Nuclear Agency play in the destruction of hazardous materials during or after the Persian Gulf War?

A.44. DNA did not have a role in the destruction of hazardous materials during or after the Persian Gulf War. DNA personnel did participate in identification of stocks and their location, and identification of nuclear production facilities.

Follow Up (Q.45). Did any personnel from the Defense Nuclear Agency or working under the direction of the Defense Nuclear Agency or any other Department of Defense element participate in the destruction of chemical, biological or nuclear materials before, during, or after the war. If so, what materials were destroyed?

A.45. No DNA personnel or anyone working under the direction of DNA participated in the destruction of chemical, biological or nuclear materials before, during or after the war.

In June 1991, a Destruction Advisory Panel was established to assist and advise the United Nations Special Commission (UNSCOM) on the safe destruction of Iraq's chemical weapons. The multi-national Chemical Destruction Group, which supports UNSCOM missions, oversees the chemical warfare munitions destruction in Iraq. Members of the U.S. Army Chemical Material Destruction Agency and the U.S. Army Technical Escort Unit have provided support to UNSCOM in this munitions destruction.

Q.46. What is the role of the Defense Intelligence Agency in the investigation into the exposure of U.S. forces to chemical, biological or radiological materials during Operation Desert Shield and Desert Storm?

A.46. DIA's role, as always, has been to provide intelligence to the Department of Defense. DIA has been deeply involved with the investigation into alleged exposure of U.S. forces to chemical, biological or radiological materials during Operation Desert Shield and Desert Storm since the investigation began in early summer 1993. DIA has reviewed every aspect of its assessment of Iraqi chemical, biological and nuclear weapons programs, the possibility of their use against Coalition troops, and the possibility of accidental release from bombed Iraqi targets. DIA has spearheaded the investigation into the alleged Czech detections, making the assessment that the Czech detections were likely valid but that they are unable to confirm the detections. DIA traveled to Saudi Arabia, Kuwait, Israel, Czech Republic, France and England to further investigate the issue. Through the Defense Attache system, DIA requested information and assessments regarding the issue from other Coalition members and allies. To date, all of DIAs efforts and contacts point to the unanimous conclusion that Coalition troops were not exposed to chemical or biological agents, either accidently (as a result of downwind exposure from bombed Iraqi facilities) or purposely (from direct Iraqi use).

Q.47. Is it true that North Korea is reported to possess both chemical and biological weapons capability?

A.47. *Classified response received from the Department of Defense [deleted]. Response archived in U.S. Senate Committee on Banking, Housing, and Affairs files.*

Follow Up (Q.48.): There has been much discussion of the possibility that the crisis over the North Korean nuclear weapons program could develop into a major war involving a Desert Storm-sized force on the Korean Peninsula. If such a conflict were to occur, are you concerned that the North Koreans might use chemical and biological weapons against U.S. forces?

A.48. *Classified response received from the Department of Defense [deleted]. Response archived in U.S. Senate Committee on Banking, Housing, and Affairs files.*

Questions from Senator D'Amato

Follow Up (Q.49). What steps are you taking to ensure that the medical capabilities of U.S. forces are improved so that they could deal with mass casualty events involving chemical and biological weapons? Since the Korean crisis could come to a head in the very near future, measures that will take more than a year to be effective will be too late to do any good.

A.49. The Department is aggressively pursuing full FDA approval and licensure of all drugs and vaccines used as prophylaxsis or treatment against chemical/biological warfare agents wherever possible. The Department is assuring that training in the prevention and treatment of chemical/biological warfare casualties is a priority and will be a part of the Department's Medical Readiness Strategic Plan.

Q.50. Hypothetically, assume that the thesis of the report that is being issued today is correct, that U.S. forces in Southwest Asia during Desert Storm were exposed to a mixture of chemical and biological warfare agents. Isn't it strongly in the Department's interest to understand the nature and effects of such exposure, in order to protect U.S. forces better in the future? Why has the Department seemed so resistant to a full, comprehensive review of this issue?

A.50. Under the auspices of the Office of the Under Secretary of Defense for Acquisition and Technology, a Defense Science Board Task Force on Persian Gulf War Health Effects conducted a comprehensive review of the use of chemical and biological weapons in the Gulf War. Their report was published June 1994 and concluded, "The Task Force found no evidence that either chemical or biological warfare was deployed at any level against us, or that there were any exposures of US service members to chemical or biological warfare agents in Kuwait or Saudi Arabia. We are aware of one soldier who was blistered, plausibly from mustard gas, after entering a bunker in Iraq during the post-war period."

The suggestion that US forces were exposed to a mixture of chemical and biological warfare agents is, indeed, a hypothetical thesis. The illnesses suffered by some of our veterans at this time are not hypothetical, the illnesses are real. Time, resources, and effort should be expended towards identifying the causative factors of our veterans' illnesses. Scientific evidence, operational analysis and common sense have eliminated chemical and biological warfare agents as a causative factor of the illnesses. U.S. forces can best be protected in the future by identifying the causes of the Gulf War veterans' illnesses and identifying methods to neutralize and/or eliminate these causative factors.

Q.51. There are extensive published reports that Saddam Hussein has not abandoned his ambitions to conquer Kuwait and make it the "19th Province of Iraq". Indeed, he appears to be able to maintain his military power and his political base in Iraq, and appears to be working hard to undermine both the sanctions regime against him and the United Nations inspection regime. This leads me to conclude that we may again face Iraq on the battlefield. Do you agree that Iraq remains a threat to Kuwait and Saudi Arabia, among others in the Middle East?

A.51. Yes, the Department agrees that Iraq remains a threat to Kuwait and Saudi Arabia, among others in the Middle East. Iraq is still reeling from its thrashing at the hands of the Coalition, as well as UN inspections and sanctions. However, Iraq remains a viable regional force which no Persian Gulf ally could defeat, much less defend against, without US assistance.

Follow Up (Q.52). If Iraq remains a threat, and there is a possibility that our defense arrangements with our Desert Storm allies may again become the basis for direct U.S. involvement in armed conflict with Iraq, doesn't it make very good sense to press ahead with all possible speed to unravel and understand the causes and treatments of Persian Gulf Syndrome? Do you agree that this is not merely an illness affecting veterans of the past wars, but a threat to U.S. forces who may be engaged in a future war against the same enemy in much the same place.

A.52. We agree that we must proceed with our efforts to unravel and understand the causes and treatments of these illnesses.

Q53. Can you assure this Committee that all drugs and vaccines used on U.S. troops deployed to Southwest Asia had successfully completed the full FDA review and approval process?

A.53. Two drugs, Pyridostigmine and Butulinum toxoid, were used under an Investigational New Drug (IND) authorization from the FDA. With the exception of Pyridostigmine and Botulinum toxoid, any drug or vaccine administered to U.S. personnel would have been fully approved and licensed by the FDA, and listed within DOD medical formularies.

Follow Up (Q.54). Please list all drugs and vaccines used on U.S. troops and their FDA approval dates. If a drug or vaccine did not receive FDA approval, please list its status in the approval process when it was administered to U.S. troops. And, its status today.

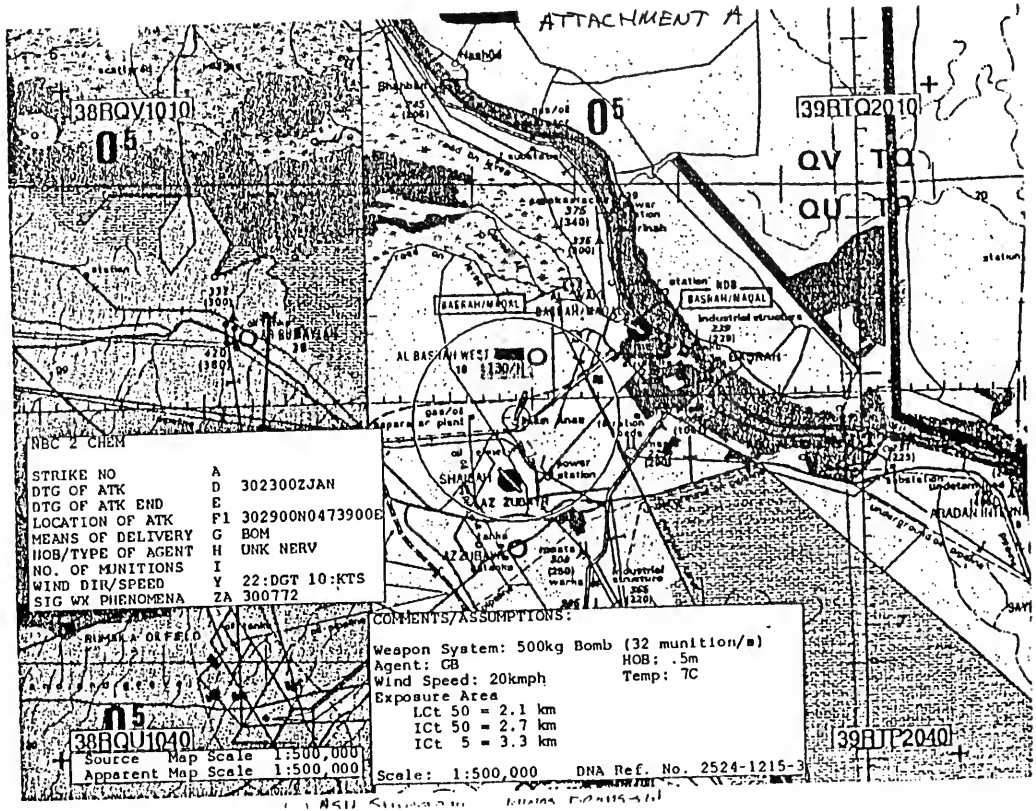
A.54. With the exception of Pyridostigmine and Botulinum toxoid, any drug or vaccine administered to U.S. personnel would have been fully approved and licensed by the FDA, and listed within DOD medical formularies. Pyridostigmine is a drug approved by the FDA since 1955 for use in the treatment of myasthenia gravis (MG), a neuromuscular disease. Botulinum toxoid has been in use more than 20 years, and has been sponsored by the Centers for Disease Control and Prevention (CDC) for important public health situations. During the Gulf War both drugs were considered "investigational" in accordance with FDA regulations and used only after careful review by the FDA under the auspices of a treatment protocol against biological and chemical warfare agents. The Department is pursuing action to have both drugs licensed and approved by the FDA for their intended military purpose. Attachment C is a list of all FDA approved drugs that were available for use in the "Medical Customer Shopping Guide for Saudi Arabia" and also those drugs which were taken to the field by medical units as noted in the "Defense Medical Standardization Board".

Q.55. Did the development process for the medical procedures involving these drugs and vaccines fully take into account possible synergistic reactions with other chemical and biological warfare agents?

A.55. No, not fully. The synergistic interaction of multiple drugs, vaccines, chemicals, thermal stressors and other environmental exposures with chemical and biological warfare agents is not a well defined area of medical knowledge. As a result of the Gulf War experience, the Department recognizes the need to increase its understanding of the physiologic effects of preventive measures within the context of co-existing exposures to environmental hazards and chemical and biological threats.

Follow Up (Q.56). What level of risk did you determine was acceptable in administering the drugs and vaccines?

A.56. Both Pyridostigmine and Botulinum toxoid have been used for many years by the medical profession without any evidence of adverse long term health effects. DoD and FDA shared the opinion that the risks from potential exposure to Iraqi biological or chemical warfare agents and the lack of any alternative therapy was significantly greater than any risks associated with the administration of these drugs to protect U.S. forces.


ATTACHMENT A
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39RTP2040
BASRAH/MAQAL
AL BASRAH WEST
SHAIBAH
AZ ZUBAYR
RUMAILA OILFIELD
NBC 2 CHEM
STRIKE NO A
DTG OF ATK D 302300ZJAN
DTG OF ATK END E
LOCATION OF ATK F1 302900N0473900E
MEANS OF DELIVERY G BOM
HOB/TYPE OF AGENT H UNK NERV
NO. OF MUNITIONS I
WIND DIR/SPEED Y 22:DGT 10:KTS
SIG WX PHENOMENA ZA 300772
COMMENTS/ASSUMPTIONS:
Weapon System: 500kg Bomb (32 munition/a)
Agent: GB HOB: .5m
Wind Speed: 20kmph Temp: 7C
Exposure Area
LCt 50 = 2.1 km
ICt 50 = 2.7 km
ICt 5 = 3.3 km
Source Map Scale 1:500,000
Apparent Map Scale 1:500,000
Scale: 1:500,000 DNA Ref. No. 2524-1215-3

38SMA5070
38SNA3070
38RMA5000
38RNA3000
STRIKE NO A
DTG OF ATK D 250200ZJAN
DTG OF ATK END E
LOCATION OF ATK F1 315800N0445400E
MEANS OF DELIVERY G BOM
HOB/TYPE OF AGENT H UNK NERV/NP
NO. OF MINITIONS I
WIND DIR/SPEED Y 155:DGT 10:KTS
SIG WX PHENOMENA ZA 3007-2
Source Map Scale 1:500,000
Apparent Map Scale 1:500,000
COMMENTS/ASSUMPTIONS:
Weapon System: 500kg Bomb (32 munition/a)
Agent: GB HOB: .5m
Wind Speed: 20kmph Temp: 7C
Exposure Area
LCt 50 = 2.1 km
ICt 50 = 2.7 km
ICt 5 = 3.3 km
Scale: 1:500,000 DNA Ref. No. 2540-1231-3
NBC 2 CHEM
46E
05
MA
MV

86-558 O - 95 - 5

An Improved Chemical and Biological Downwind Hazard Prediction System

By

Colonel Joseph P. Phillip, USA
Lieutenant Colonel Ben E. Moberley, USA
Captain David L. De Vries, USA

Defense Nuclear Agency

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ABSTRACT

It is essential that combat commanders have clear, timely, and definitive information and advice on the potential effects of chemical and biological (CB) weapons for decisions affecting troop safety and operational mobility. However, current prediction methods generate broad outlines of total expected areas of potential hazards. Even where automated and enhanced, because of necessary allowances for statistical variability of weather, these methods show hazard areas encompassing even larger portions of terrain without any better appreciation for the significance of the true hazard. Capitalizing on expertise in nuclear effects modeling, the Defense Nuclear Agency in January 1991 rapidly conducted work to provide an improved CB downwind hazard prediction system for Operation Desert Storm.

The project was undertaken in direct response to concerns over the CB warfare threat in the Persian Gulf conflict. The system, called ANBACIS II for beneficial association with the Army's Automated Nuclear, Biological And Chemical Information System, provides for greater definition of potential hazard areas by drawing map overlay contours of different dosage intensity according to specific, detailed weapons intelligence information. ANBACIS II packages detailed weapons effects models together with real-time weather input and digital raster maps; all within a user friendly, interactive graphical interface. The result is dramatic visualization capability coupled with substantial computer power. The benefit to the combat commander is a more discrete prediction of the probable extent of serious contamination from cloud travel, greatly enhancing the understanding of impact on mission accomplishment. (See Output Comparison, Figure 1).

The concept for the ANBACIS II system was developed and coordinated in November and December, 1990. Work effectively started the first of January, 1991 and was completed within 45 days. The system became fully operational on 30 January and served the United States Central Command (CENTCOM) throughout Desert Storm. As finally configured, strike and exercise reports from field commands were telephoned into the Defense Nuclear Agency's Operations Center. There, system operators used the interactive ANBACIS II system to access a pre-computed database of over 11,000 contour "footprints" for various weapons, agents, and weather conditions. The system and its operators were challenged by over 600 test exercise and strike message requests called into the Continental United States (CONUS) operations center from U.S. forces elements within the Kuwaiti Theater of Operations. Responses were provided within 10 minutes by facsimile transmission over secure telephone lines. The replies, in the form of map contour overlays of different chemical and biological dosage limits of significance, allowed for scenario analysis and better advice to commanders.

ANBACIS II shows great promise as a modular improvement to automated NBC warning and reporting systems. Additionally, the graphical interface proves

that common handling and display of various effects base models is possible, not only in warfare but also in evaporation models for accidents and spills. Rapid development and improvement in weather and terrain accommodation are also possible, to include three dimensional resolution. The software is readily adaptable to common user type equipment and small, notebook-size commercial personal computer platforms. In synergy with detection capability, ANBACIS II is a significant advance in contamination avoidance capability, thereby promoting success on the contaminated battlefield.

1. INTRODUCTION

1.1 Purpose

The Automated Nuclear, Biological and Chemical Information System II (ANBACIS II) was developed to provide a more realistic, real-time chemical and biological (CB) downwind hazard prediction capability for United States and coalition forces to evaluate potential hazards to forces and availability of terrain for maneuver. The effort focused on improving the existing Allied Technical Publication No. 45 (ATP-45) system which provides a very large, safe-sided hazard area estimate containing more than 99% of chemical and/or biological agents. The final user products are prediction contour plots that are of tactical significance. (See Output Comparison, Figure 1)

1.2 Current Service Capabilities

Throughout the services, there is limited capability for CB hazard prediction. The doctrinal standard, Vol II, ATP-45, allows for changing wind directions, but this only makes a larger, more conservative fan. It also is not an automated process. The Air Force continues to rely on existing manual method of ATP-45.

The Army ANBACIS I system automates ATP-45 on DOS personal computers. It provides significantly faster computations, but still gives a large fan and has limited biological capability. The Chemical Research, Development and Engineering Center (CRDEC) developed the basic defensive research weapons models (called NUSSE-4 and PARACOMPT) which have been incorporated into ANBACIS II.

The U.S. Marines acquired a handheld ZENBC system recently developed by the United Kingdom. It also automates ATP-45 and is ruggedized and portable but provides less capability than ANBACIS I. It has no biological hazard prediction capability.

The U.S. Navy developed VLSTRACK for chemical hazard prediction. It has a similar capability as the basic weapons models incorporated into ANBACIS II but is able to use varying winds. It was not fully developed nor evaluated before Desert Storm. The Naval Surface Warfare Center (NSWC) developed a biological "Plume" model which provides more intuitive, realistic looking plots using varying weather conditions. Plume is now incorporated into ANBACIS II.

2. BACKGROUND

2.1 Concept Initiation

During the buildup of Operation Desert Shield, there was great concern over the CB warfare threat in the Persian Gulf. In November 1990, the Director of DNA, Major General Gerald G. Watson, viewed a computer visualization demonstration of a three dimensional transport and diffusion model incorporating local wind and terrain data. From this, he conceived the idea

of including such a model in the Army ANBACIS program which was already deployed to Army commands in Saudi Arabia. He then formed a team of chemical experts to review and survey existing models that could be used to develop an improved CB hazard prediction visualization product for CENTCOM commanders.

2.2 Model Evaluation

At the time, there were no operational models available which incorporated both weather and terrain data. Several research and development models were reviewed for feasibility and operational use. The team evaluated a model by the U.S. Army Atmospheric Sciences Laboratories (ASL) which incorporated weather and terrain inputs but was not sufficiently developed for immediate operational use. The United States Army Nuclear and Chemical Agency (USANCA)-funded Los Alamos National Laboratory (LANL) model - HOTMAC/RAPTAD - was also reviewed but it was not able to handle bursting munition data. Therefore, the team initially settled on using NUSSE-4/PARACOMPT for chemical prediction and GAPCAP/VAMTECAP for biological. These models, developed by CRDEC for single and multiple munitions scenarios respectively, contain essential munitions data but only basic single vector winds for weather input.

2.3 Justification for DNA Lead

DNA's past work on nuclear, dust and smoke transport modeling provided the necessary technical and experience base to develop and integrate such an ambitious project. DNA also supported the Army's development of the ANBACIS I program which automated the safe-sided prediction of ATP-45. Because of its mission, DNA also had a core of chemical officers already assigned who became the nucleus of the modeling and validation.

2.4 Coordination

Coordination in initiating the project and to keep it on track was constant and very thorough. Technical experts from within DNA initially visited the U.S. Army Chemical School, Ft McClellan, AL and ASL at White Sands Missile Range, NM. As the initial concept came to life, several discussions pertaining to modeling, and its various factors, were discussed with ASL, LANL and CRDEC. The operational concept was coordinated with Offices of the Secretary of Defense (OSD), Joint Staff, Department of the Army Deputy Chief of Staff for Operations (DCSOPS), the Defense and Central Intelligence Agencies, CRDEC, the U.S. Army Chemical School, and CENTCOM.

2.5 Schedule

From the onset and throughout the active project, a schedule was developed and continually modified according to the circumstances. As work transpired, the actual accomplishments were:

Item	Date
Initiated Project	1 November 1990
Concept Briefings	November 1990 - January 1991
Support Contract Awarded	24 December 1990
Concept Message (J-3 CENTCOM)	28 December 1990
System Functional	11 January 1991
Install Equipment in Theater	22 - 30 January 1991
System Operational	30 January 1991

Item	Date
24 Hour Operations Stopped	4 March 1991
Operations Terminated	11 March 1991

3. ACTIONS PRECEDING CONFLICT (Desert Shield)

3.1 Project Team

As the various input models were being gathered and assimilated, Applied Computing Systems, Inc. was contracted to integrate the models into an operational system and provide for an enhanced visual output. Selected personnel from other government and contractor organizations (Air Force Systems Command, LANL, CRDEC, SAIC, MITRE, JAYCOR) were also brought in to further develop, evaluate, and operate the working models. A representative from Air Force Global Weather Center (AFGWC) also joined the project and assisted in establishing on-line weather support and an operational weather analysis cell. He installed the Automated Weather Network (AWN) in the DNA Operations Center which provided the hourly surface weather observations used to continually update weather forecasts for the Kuwaiti Theater of Operations. The AFGWC also provided three military weather forecasters which gave a round-the-clock weather analysis capability.

3.2 Model Selection

The CRDEC-developed NUSSE-4 and PARACOMPT models were selected for chemical predictions and the GAPCAP and VAMTECAP models were initially used for biological predictions. A limitation of these models was that they only accepted single vector winds in their calculations. This was not considered a serious deficiency for the chemical predictions since the significant level of contamination from hazardous clouds usually lasted only 1 to 3 hours and traveled only a relatively few tens of kilometers downwind. The large numbers of fielded chemical detectors able to alarm on actual contamination offset micro-climate capabilities. Biological agents, however, could drift downwind 8 to 12 hours and possibly extend several hundred kilometers while still remaining virulent. For this reason, the NSWC biological Plume model, which accounted for varying meteorological conditions (wind speed, direction, and stability category) and varying biological decay rates (in the night/day transition), was finally selected to be the primary biological prediction model.

The NUSSE-4 and Plume models were written in a combination of FORTRAN and C programming language, for use in a Unix operating environment. These models did not have user friendly input interfaces nor operating routines. Consequently, operators made numerous errors and spent much time entering data and calculating responses to message reports because lengthy path and file names were required. To correct this, ACS developed a user friendly, menu driven interface so anyone with minimal training could perform special chemical or biological calculations. This interface proved invaluable and allowed for continued use of these models by non-modeling or computer experts.

3.3 Operation and Methodology

The Sun SPARC 2 workstation was the primary operational platform used to do the hazard predictions. As fast as this computer is, it still often took 15-20 minutes to perform some calculations and was not sufficient to meet the operational turn around time goal of 10 minutes (from receipt of a strike report from the field to faxing back a contour prediction plot). This

prompted a decision to create a database of pre-computed chemical footprints based on suspected Iraqi munitions and agents and various preselected meteorological conditions. The ANBACIS II system has the capability to interact directly with supporting technical models for special computations, or to access a precomputed chemical database in normal use. (See the System Design, Figure 2) To help create the database rapidly, modelers and operators ran the various prediction problems remotely on the DNA Cray computer located at LANL. In the end, more than 11,000 pre-computed footprints were established for the database. At one time, four Cray computers were linked together to perform spray system calculations quickly. While the Crays were necessary, the reason was solely to accomplish a large volume of calculations in a short time. With a less stressful schedule, lesser platforms can adequately perform all necessary calculations. On the workstations, biological footprints remain processed on subordinate windows using interactive screens which drive the model and allow input of forecast and changes in weather data. The Plume model within ANBACIS II runs quickly (only about 5 more minutes for a 15 minute turn around time). Biological requests can be updated with weather changes until actual weather reports signify a completed pattern. (See Examples of Input Screen and Overlay Output, Figure 3)

3.4 Product for the Field

The team also decided that rather than deploy computer equipment to CENTCOM for a centralized in-theater hazard prediction focal point, it would be less burdensome and more efficient to have all the calculations and analyses performed in the United States. To get the necessary information back and forth quickly (strike reports from CENTCOM units and hazard prediction plots returned to CENTCOM), the Director, DNA offered to provide and install classified facsimile machines and STU-III secure telephones. In all, 21 sets of equipment were deployed according to a CENTCOM distribution plan. There were several factors influencing the numbers of systems - overall cost and availability as well as the number of reasonable command nodes requiring assistance, yet able to collate and manage the NBC Warning and Reporting System (NBCWRS).

4. ACTIONS DURING CONFLICT (Desert Storm: Air & Ground Campaign)

4.1 Deployment and System Operation

Shortly after the air war of Desert Storm began, DNA sent four officers to Saudi Arabia with secure facsimile machines and STU-III telephones. The equipment was installed at 15 locations as directed by CENTCOM. By 30 January, all the equipment was in place, many pre-computed footprints were already developed, and the operating crews were trained. The DNA Operations Center became fully operational on a 24 hour basis. Three shifts, each with an operations cell (military personnel from within DNA), a modeling cell, and a weather cell conducted round-the-clock operations.

The modeling cell consisted of computer and chemical experts from LANL, SAIC, MITRE, and JAYCOR. This cell, via a highspeed computer network link to the DNA Cray computer at LANL, created the footprint database and ran special calculations as requested by CENTCOM units. The Central Intelligence Agency (CIA) also used the ANBACIS II products for their own analysis. Once completed, all footprints and other calculation results were stored on a local computer at DNA. This information was then available for all operators to use as an immediate response to a chemical or biological strike or test exercise report.

The weather cell consisted of trained military weather analysts and forecasters from the U.S. Air Force Air Weather Service. Normally, one non-

commissioned officer was assigned to a particular shift. He was responsible for validating the significant weather entries on the NBC-2 reports or predicting weather forecasts for special exercise missions.

4.2 Scheme of Operations

The general scheme of operations was:

1) Units would telephone in NBC-2 reports to the Operations Center. The NBC-2 report would be completed IAW standard doctrine; each report would have a unique strike serial number and the local weather data.
2) Concurrent with a weather check, one of the computer operators would input the NBC-2 report data into the Sun workstation and call up the correct pre-computed footprint. He would then scale it to the user requested map scale and print it.
3) The printed hazard prediction, containing remarks blocks with the original NBC-2 report and essential text data supporting the contour plots, was reviewed for accuracy by the Chemical and Shift Officer-in-Charge.
4) Once approved, the Communications Officer dispatched the prediction plot to the originating unit via secure facsimile.

All of this was accomplished within 10 minutes. To allow for receipt of multiple strike reports from different units at the same time, six computer operators were always available to conduct simultaneous, multi-tasking calculations from any of the six networked workstations if necessary.

4.3 System Usage

When Desert Storm first began, a series of bunker problems were calculated to estimate the effects of coalition bombing of suspected CB production and storage facilities in Iraq. Weapons storage quantities were based on estimates provided by personnel from the United States Army Armament Munitions and Chemical Command (AMCCOM). The resultant downwind hazard prediction plots were provided to Joint and Service staffs and to the National Military Command Center (NMCC) to assist in overall battle damage assessment. Special calculations were conducted at the request of several agencies. These included assessing potential hazards resulting from intercepts of Scud missiles and the extent of effects of possible chemical or biological attacks on population centers.

An important part of the ANBACIS II system was the integration of Defense Mapping Agency (DMA) ARC Digitized Raster Graphics (ADRG) maps on compact disc read-only-memory (CD-ROM) optical disks. DMA provided CD-ROM maps in scales of 1:250,000, 1:500,000, 1:1,000,000, and 1:2,000,000 for each area of interest in a most timely manner. Since CD-ROM maps were not available in 1:50,000 scale, DMA provided paper maps for those areas surrounding the major CENTCOM air bases of interests. These were then digitally scanned at DNA, logically linked together and added to the map database on the system server. All hazard prediction plots could then be printed (in black and white or in color) with a map background if requested. Usually, the map background was not provided because of the additional time in printing the complete map and plot, and in transmitting that detail of information over a 2400 bits per second, analog voice circuit with the facsimile. Map backgrounds were routinely provided in CONUS when the plots were to be presented during command and staff briefings. Overlay plots were routinely sent for CENTCOM for posting on operations maps.

4.4 Coordination and Briefings

Continuous coordination was made with the Army Chemical School, CRDEC, Surgeon

General's Office (for agent toxicological data), and numerous intelligence agencies to refine the weapons and chemical/biological agent database to ensure that the footprints produced would be according to the best, most accurate data available. At one point, when new and additional weapons and fuzing information was received, an entirely new footprint database was generated and each entry was individually validated.

Throughout the operation, numerous briefings and demonstrations were given to high level officials to acquaint them with this new, significant contribution to the war effort and need for continued work.

While there were no actual chemical or biological strikes during the war, continuous exercise strikes were generated to ensure that CENTCOM units and DNA operations personnel remained proficient. In all, more than 600 plots were calculated and dispatched to units in Saudi Arabia. The Army Division and Corps NBC staffs requested numerous specific plots so they could perform vulnerability analysis to visually show commanders the results of potential enemy CB attacks. These plots were used in daily briefings as Commanders planned their defensive and offensive operations. A tabular summary is included in figure 4.

5. ACTIONS AFTER CONFLICT

Since the cessation of conflict, the majority of the effort has centered on cleaning up the software code, writing the documentation, and developing a transition plan to ensure that this landmark contribution is properly carried forth for continued development by the Services.

Several briefings and demonstrations have also been conducted to create a greater understanding and awareness of the enhanced and improved hazard prediction capabilities that are possible now. As a result of demonstrating the system at the various conferences, there has been a great demand for a DOS version of a database of pre-computed footprints. This capability has been developed using a notebook size PC. An effort is underway to demonstrate a full system capability on either a common user or other commercial platforms. ANBACIS II fulfilled an immediate requirement for an improved prediction capability, better training tools, improved advice to commanders and system adaptability to smaller computers. Figure 5 details future system enhancements and goals.

6. LESSONS LEARNED

Improved prediction capabilities are available now with existing technology; more is needed to make the system faster, more accurate, and more user friendly.

As models are enhanced to allow for changing meteorological conditions, timely and accurate weather information becomes critical. Automatic infusion of weather data, such as from the Army's Integrated Meteorological System (IMETS), is needed to drive the models. Combinations of weather sensors and reporting stations proliferated throughout the area of operation, or by satellite with lookdown capability for micro-meteorological conditions, will provide real-time data feed for systems such as ANBACIS II.

Sufficient intelligence data must be made more available. A common, standardized database of threat weapons, agents, fill weights and other weapon parameters, as well as weather parametric data, is required to establish footprints for various regional threat scenarios.

Commercial communications systems proved adequate and practical for this particular situation for training and wargaming. Large scale use of CB would

have overloaded the ability to report or respond immediately. There is an urgent need either to construct data distribution systems that span both strategic and tactical communications networks and is capable of transmitting large amounts of data (images, files or packets), or to downsize and distribute a direct ANBACIS II system capability within units.

There has been no centralized DoD level focus on model development or NBC battlefield automation techniques. Each service has established their own separate methods of performing hazard calculations and transmitting NBC reports. In a Joint Task Force Operation, such as Operation Desert Storm and as will always be in future conflicts, all should be operating from a standardized system. A DoD level agency should be designated to ensure a standardized capability is established.

7. RECOMMENDATIONS

The ANBACIS II effort proved the utility of a common, user friendly interface for many purposes. Development should continue with system transition as a joint Service project. Specifically, development should:

1. provide for a DOD level focus for NBC battlefield automation.

2. establish a DoD standardized NBC hazard prediction model interface incorporating automated real-time weather and digital terrain data on common user equipment.

3. add a nuclear fallout and smoke assessment system and accident/incident/environmental modules to make improved downwind hazard prediction systems for all nuclear, biological, chemical, and other hazardous materials situations. FAS HOTMAC/RAPTAD

4. incorporate ANBACIS II into the U.S. ANBACIS and NATO ATP-45 as an improvement to the current NBC-3 report.

5. downsize and proliferate ANBACIS II software to operate on common user platforms.

6. assign development and operations centers to build and use general and theater specific databases of footprints.

7. create unclassified databases for use in classroom training and field exercise situations.

8. maintain a network for exchange of data and to conduct regular test exercises among all elements.

ATTACHMENT B

Table 2-1. Preventive Maintenance Checks and Services

B - Before Operation D - During Operation

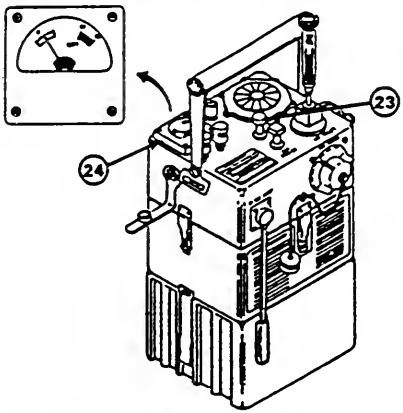
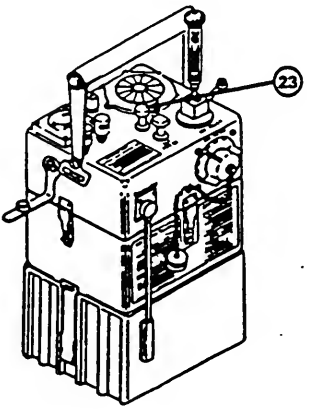
Item No.	Interval B	Interval D	Item to be Inspected/Procedure	Equipment is Not Ready/Available if:
			M43A1 DETECTOR	
6			Operational Check.	
			NOTE If alarm sounds when battery is connected, allow the alarm to sound at least five times. Then press BATTERY TEST AND RESET PRESS button. The above procedure may have to be repeated several times.	
				
	●	●	Press and hold BATTERY TEST AND RESET PRESS button (23). Read detector meter (24). Detector meter should read in black band. Release BATTERY TEST AND RESET PRESS button.	Detector meter does not read in black band.

Table 2-1. Preventive Maintenance Checks and Services

B - Before Operation D - During Operation

Item No.	Interval B	Interval D	Item to be Inspected/Procedure	Equipment Is Not Ready/Available if:
			M43A1 DETECTOR	
6			Operational Check.	
	●	●	Press and release BATTERY TEST AND RESET PRESS button (23). Within 2 minutes alarm should sound.	Detector does not alarm within two minutes.
			NOTE If alarm does not sound within 2 minutes repeat test once more with a new test paddle. Discard old test paddle.	



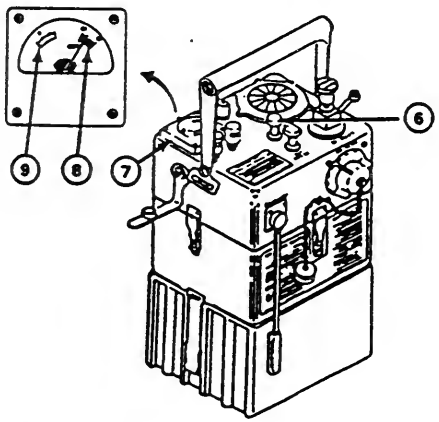
2-10 OPERATING PROCEDURES.

b. Fixed Emplacement.

(1) M43A1 Detector and BA3517/U Battery.

NOTE

Notify personnel within audible range that an alarm may sound. If alarm sounds when power is connected, allow the alarm to sound at least five times. Then press BATTERY TEST AND RESET PRESS button. The above procedure may have to be repeated several times.



(d) Connect battery cable (5) into 24 VDC INPUT on detector.

(e) Press BATTERY TEST & RESET PRESS button (6). Detector meter (7) indicates battery voltage and should be in black band (8). Release.

(f) Observe meter (7) until needle returns to green band (9).

NOTE

If detector has not been in use for a long time, it may take 15 minutes for meter to reach green band.

Your equipment is now operating.

Section IV. OPERATION UNDER UNUSUAL CONDITIONS

2-13 OPERATION UNDER UNUSUAL OR SEVERE CONDITIONS.

This section tells you how to use the detector under unusual or severe operating conditions. Unusual operating conditions are:

a. Operational Alert.

b. Air temperature below 20°F (-7°C).

c. Blowing dust or sand.

d. Rain, sleet, or snow.

e. Fording.

f. Emergency operation with broken controls or indicators.

2-14 OPERATIONAL ALERT.

NOTE

The M43A1 Detector will sound the alarm when heavy concentrations of rocket propellant smoke, screening smoke, signaling smoke, or engine exhaust are present or when a nuclear explosion occurs.

a. When the alarm system signals that chemical agents are present, perform steps (b) through (k) below.

b. Immediately take the protective measures described in FM 3-100.

c. Give local alert according to local Standard Operating Procedures (SOP).

2-16 OPERATION IN BLOWING SAND OR DUST.

If the M43A1 Detector is to be used in blowing sand or dust the air filter must be replaced at more frequent intervals than normal. Refer to table 2-2.

Table 2-2. Air Filter Replacement Interval

Sand or Dust Concentration	Typical Conditions	Air Filter Replacement Interval (hrs)
Minimum	a. Light or medium vehicle traffic on paved surface. b. Planes taking off from clean runway. c. Infantry movement on grassy or paved surface.	24
Moderate	a. Light or medium truck traffic on sandy surface. b. Heavy tank traffic on paved surface. c. Heavy infantry movement on sandy or dusty surface.	12
High	a. Light truck traffic on dusty surface on windy day. b. Medium or heavy truck traffic on dusty surface. c. Light tank traffic on dusty surface on calm day.	6
Extreme	a. Heavy truck traffic on dusty surface on windy day. b. Light tank traffic on dusty surface on windy day. c. Medium or heavy tank traffic on dusty surface. d. Follow 2 1/2 ton truck on dusty surface.	1

ATTACHMENT C

DEFENSE MEDICAL STANDARDIZATION BOARD

'87 Vs '90

REPORT: DEPMEDS Compare by NSN
DATE: 10 Apr 90
POC: DmsB/17
EXT: 7107

DMSB
BUILDING 1423
FORT DETRICK
FREDERICK, MD.
21701-5013

ENCLOSURE (9)

STOCK NUMBER / DASB CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
	<402> F87= F90=1 <404> F87= F90=1			
6240-00-143-3071	LAMP INCANDESCENT	EA	0.23	D
	<305> F87=6 F90=6 <307> F87=6 F90=6 <433> F87=6 F90=			
6240-00-155-7786	LAMP INCANDESCENT 2.38V 1.190 WATTS .5 AMPS 15 HOUR LIFE WHITE	EA	0.13	D
	<315> F87=2 F90=2			
6240-00-155-7898	LAMP INCANDESCENT	EA	0.71	D
	<308> F87=1 F90= <309> F87=1 F90= <380> F87=1 F90=4 <381> F87=1 F90=3 <382> F87=2 F90=3 <384> F87=4 F90=10 <385> F87=3 F90=19 <386> F87=7 F90=35 <483> F87=2 F90=3 <484> F87=1 F90=5 <485> F87=3 F90=9 <488> F87= F90=1 <489> F87= F90=1 <490> F87= F90=1			
6240-00-319-4549	LAMP FLUORESCENT D27 T BULB STYLE 6"LENGTH 4WATTS 6000 HOUR LIFE	EA	1.99	D
	<315> F87=1 F90=1			
6240-00-449-0003	LAMP INCANDESCENT 150 WATTS B34 MR STYLE 21 VOLTS 40 HOUR LIFE	EA	5.58	D
	<413> F87=2 F90=2			
6240-00-552-9672	LAMP INCANDESCENT B25 T BULB STYLE 2.5V FROSTED WHITE LIGHT USE WITH:6515-00-656-0474/6515-01-124-9806/6515-01-125-6615	EA	1.38	D
	<488> F87=1 F90= <489> F87=1 F90= <490> F87=1 F90=			
6240-00-617-1740	LAMP INCANDESCENT B1 A BULB STYLE 60 WATTS 120V 2500 HOUR LIFE	EA	0.25	D
	<315> F87=1 F90=1			
6240-00-797-0420	LAMP INCANDESCENT D25 I STYLE WHITE LIGHT .280 AMPERES USE WITH: 6515-00-913-4607 AND 6515-00-955-8865	EA	1.32	D
	<301> F87=1 F90= <380> F87=2 F90=3 <381> F87=2 F90=3 <382> F87=4 F90=4 <384> F87=10 F90=11 <385> F87=8 F90=17 <386> F87=17 F90=36 <483> F87=5 F90=4 <484> F87=8 F90=18 <485> F87=17 F90=36 <488> F87=1 F90=1 <489> F87=1 F90=1 <490> F87=1 F90=1			
6240-00-797-2650	LAMP INCANDESCENT 89 G BULB STYLE 2.47 VOLTS 15 HOUR LIFE	EA	0.06	D
	<315> F87=1 F90=1			
6240-00-797-4325	LAMPS,ELECTRIC,INCANDESCENT	EA	1.90	K
	<315> F87=1 F90=1 <319> F87=1 F90=1 <419> F87=1 F90=1			

STOCK NUMBER / UMSB CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6240-00-797-0945	LAMP,INCANDESCENT,822,S BULB STYLE 25WATT,115VOLT,500 HOUR LIFE	EA	1.69	D
	<304> F87=2 F90=2 <404> F87= F90=2			
6240-00-797-9250	LAMP INLANDESCENT 115/125 VOLTS 50 WATTS 825 T STYLE 50HR LIFE	EA	2.54	D
	<315> F87=2 F90=2			
6240-01-004-7042	LAMP INCANDESCENT 834 MR BULB STYLE 150W 21V 25 HOUR LIFE	EA	15.28	D
	<301> F87=1 F90= <419> F87=1 F90= <488> F87=1 F90=			
6240-01-117-7150 1-0360-F	LAMP,INCANDESCENT,A65A MINIATURE TWO PIN BASE 20WATTS 6VOLTS	EA	3.00	D
	<303> F87=6 F90=6			
6240-01-146-6245 2-0885-A	LAMP INCANDESCENT B19 PS BULB STYLE 15WATT 125VOLT CLEAR 3/PG	PG	17.10	L
	<315> F87=8 F90=8			
6240-01-147-2063 2-0855-A	LAMP INCANDESCENT B9 G BULB STYLE 27WATT 6VOLT 5AMPS	EA	15.39	L
	<315> F87=2 F90=2			
6260-00-161-4296	CANDLE,ILLUMINATING CYLINDRICAL SHAPE WHITE 8-HOUR BURNING TIME	EA	0.25	G
	<403> F87= F90=1 <483> F87= F90=1			
6505-00-022-1326	CHLORPROMAZINE HYDROCHLORIDE TABLETS USP 25MG 1000S TEE CO CHGD 9/86	BT	260.14	L
	<306> F87= F90=1 <310> F87=1 F90= <311> F87=1 F90= <381> F87=1 F90=			
	<382> F87=1 F90= <384> F87=1 F90=1 <483> F87=1 F90= <484> F87=1 F90=			
6505-00-050-4567	PSYLLIUM HYDROPHILIC MUCILLOID WITH DEXTROSE 14 OZ	CO	1.58	D
	<306> F87= F90=1 <309> F87=1 F90= <310> F87=1 F90= <311> F87=1 F90=			
	<380> F87=1 F90= <381> F87=3 F90=1 <382> F87=5 F90=1 <384> F87=16 F90=13			
	<385> F87=2 F90=3 <386> F87=3 F90=6 <483> F87=1 F90=1 <484> F87=1 F90=1			
	<485> F87=3 F90=5 <487> F87= F90=1 <489> F87= F90=1 <490> F87= F90=1			
6505-00-051-9050 1-0602	AMPICILLIN CAPSULES USP 250MG 500 CAPSULES PER PACKAGE	BT	16.09	D
	<306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<311> F87=1 F90= <316> F87=1 F90= <380> F87=1 F90= <381> F87=1 F90=			
	<382> F87=2 F90=1 <384> F87=4 F90=4 <385> F87=1 F90= <386> F87=1 F90=1			
	<483> F87=1 F90=1 <484> F87=5 F90=1 <485> F87=11 F90=4 <487> F87=1 F90=1			
	<488> F87=1 F90= <489> F87=1 F90= <490> F87=1 F90=1			

STOCK NUMBER / DMSB CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-00-052-1367	HYDROXYZINE HYDROCHLORIDE INJECTION USP 50 MG PER ML 10 ML	VI	0.64	0
	<306> F87= F90=12 <308> F87=1 F90=1 <309> F87=2 F90=1 <310> F87=1 F90=			
	<380> F87=24 F90=13 <381> F87=37 F90=20 <382> F87=75 F90=30 <384> F87=220 F90=213			
	<385> F87=147 F90=266 <386> F87=333 F90=587 <483> F87=86 F90=60 <484> F87=294 F90=268			
	<485> F87=643 F90=555 <487> F87=1 F90=1 <488> F87=1 F90= <489> F87=1 F90=2			
	<490> F87=1 F90=11			
6505-00-055-1472	SODIUM POLYSTYRENE SULFONATE USP 1 LB (453.6 GM) SERVICES APPROVED DELETION 0-DAY 1-4-90	BT	52.68	0
	<309> F87=1 F90= <380> F87=1 F90= <381> F87=1 F90= <382> F87=1 F90=			
	<384> F87=1 F90= <385> F87=1 F90= <386> F87=1 F90= <483> F87=1 F90=			
6505-00-059-9017	CHLORDIAZEPOXIDE HYDROCHLORIDE CAPSULES USP 10MG 500S	BT	4.24	0
	<306> F87= F90=1 <311> F87=1 F90= <381> F87=1 F90= <382> F87=1 F90=1			
	<384> F87=2 F90=5 <483> F87=1 F90=1 <484> F87=1 F90= <485> F87= F90=1			
6505-00-062-3336	FUROSEMIDE TABLETS USP 40 MG 100S	BT	1.34	0
	<306> F87= F90=1 <309> F87=1 F90= <310> F87=1 F90= <313> F87=1 F90=			
	<380> F87=1 F90= <381> F87=1 F90= <382> F87=1 F90= <384> F87=1 F90=			
	<385> F87=1 F90= <386> F87=1 F90= <483> F87=1 F90= <484> F87=1 F90=			
	<485> F87=1 F90= <488> F87=1 F90= <489> F87=1 F90= <490> F87=1 F90=			
6505-00-063-6197	LIDOCAINE HYDROCHLORIDE TOPICAL SOLUTION USP VISCOUS 2% 100 ML	BT	1.03	0
	<306> F87= F90=1 <310> F87=1 F90= <320> F87=1 F90=2 <381> F87=1 F90=			
	<382> F87=1 F90=2 <384> F87=1 F90= <385> F87=1 F90=11 <386> F87=1 F90=30			
	<483> F87=1 F90=2 <484> F87= F90=13 <485> F87= F90=29 <488> F87=1 F90=			
	<489> F87=1 F90= <490> F87=2 F90=			
6505-00-074-4702	DIPHENOXYLATE HYDROCHLORIDE & ATROPINE SULFATE TABLETS USP 500S	BT	2.79	0
	<306> F87= F90=1 <309> F87=1 F90= <310> F87=1 F90= <311> F87=1 F90=			
	<380> F87=1 F90= <381> F87=1 F90= <382> F87=1 F90= <384> F87=1 F90=1			
	<385> F87=1 F90= <386> F87=1 F90= <483> F87=1 F90= <484> F87=1 F90=			
	<485> F87=1 F90= <487> F87= F90=1 <489> F87=1 F90= <490> F87=1 F90=			
6505-00-074-9912	CLIOQUINOL AND HYDROCORTISONE CREAM 20GM NDA'S TO BE WITHDRAWN, OPSC NOTIFIED (2/88)	TU	0.66	0
	<488> F87=1 F90= <489> F87=1 F90= <490> F87=1 F90=			
6505-00-079-6759	TYPHOID VACCINE USP 50 DOSES WITH 25ML DILUENT SUBI NOT TESTED FOR ANTI A & B SUBSTANCES	PG	13.21	0
	<306> F87=3 F90=3			

STOCK NUMBER / DMSB CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-00-079-7867	HALOXONE HYDROCHLORIDE INJECTION USP 0.4MG/ML 1ML AMPUL 10/BX	BX	6.40 D	
	SL CHG'D TO 40			
	<301> F87=3 F90=3 <306> F87= F90=11 <308> F87=1 F90=1 <309> F87=1 F90=1			
	<310> F87=1 F90= <311> F87=1 F90= <313> F87=1 F90= <380> F87=19 F90=16			
	<381> F87=24 F90=22 <382> F87=49 F90=37 <384> F87=186 F90=169 <385> F87=82 F90=103			
	<386> F87=178 F90=621 <483> F87=48 F90=64 <484> F87=124 F90=286 <485> F87=269 F90=826			
	<488> F87=3 F90= <489> F87=2 F90=2 <490> F87=2 F90=11			
6505-00-082-2659	AMITRIPTYLINE HYDROCHLORIDE TABLETS USP 25MG 100S	BT	0.86 D	
	<306> F87= F90=1 <311> F87=1 F90= <381> F87=1 F90= <382> F87=1 F90=			
	<384> F87=1 F90=2 <483> F87=1 F90= <484> F87=1 F90=			
6505-00-083-6537	RINGER'S INJECTION LACTATED USP 1000ML PLASTIC BAG 12 BAGS/BX	BX	10.95 D	
	<301> F87=11 F90=9 <308> F87=18 F90=16 <309> F87=6 F90=6 <310> F87=3 F90=3			
	<380> F87=217 F90=163 <381> F87=279 F90=174 <382> F87=575 F90=220 <384> F87=1870 F90=1918			
	<385> F87=1165 F90=2084 <386> F87=2477 F90=4469 <417> F87=1 F90= <483> F87=699 F90=221			
	<484> F87=789 F90=1141 <485> F87=1481 F90=2366 <488> F87=22 F90=19 <489> F87=22 F90=35			
	<490> F87=27 F90=55			
6505-00-083-6538	DEXTROSE INJECTION USP 5% 1000ML BAG 12 BAGS PER BOX	PG	10.40 D	
	<313> F87= F90=1 <489> F87=1 F90= <490> F87=1 F90=			
6505-00-083-6544	SODIUM CHLORIDE INJECTION USP .9% 1000ML SINGLE DOSE 12S	BX	10.84 D	
	<301> F87=4 F90=1 <303> F87=1 F90=1 <306> F87= F90=4 <307> F87=1 F90=1			
	<309> F87=1 F90= <310> F87=1 F90= <313> F87= F90=1 <343> F87= F90=10			
	<380> F87=31 F90=20 <381> F87=32 F90=19 <382> F87=65 F90=31 <384> F87=142 F90=192			
	<385> F87=133 F90=375 <386> F87=283 F90=783 <403> F87=1 F90=1 <483> F87=84 F90=11			
	<484> F87=13 F90=74 <485> F87=30 F90=152 <487> F87= F90=1 <488> F87=1 F90=			
	<489> F87=1 F90= <490> F87=1 F90=2			
6505-00-097-8134	CALCIUM GLUCONATE INJECTION USP 10% IGM 10 ML 25S	PG	6.76 L	
	<304> F87= F90=20 <483> F87= F90=6 <484> F87= F90=61 <485> F87= F90=126			
6505-00-100-2470	ACETIC ACID GLACIAL USP 1 LO	BT	1.85 D	
	<303> F87=1 F90=1 <380> F87=1 F90= <381> F87=1 F90= <382> F87=1 F90=			
	<384> F87=1 F90=1 <385> F87=1 F90=1 <386> F87=1 F90=1 <438> F87=1 F90=1			
	<483> F87=1 F90= <488> F87=1 F90=1 <489> F87=1 F90=1 <490> F87=1 F90=1			

STOCK NUMBER / UNSU CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-00-100-9985	ASPIRIN TABLETS USP 0.324GM 100S	BT	0.38	0
	<306> F87= F90=8 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=1			
	<311> F87=2 F90=1 <313> F87=1 F90=1 <370> F87= F90=1 <380> F87=1 F90=			
	<381> F87=19 F90=6 <382> F87=38 F90=15 <384> F87=120 F90=164 <385> F87=10 F90=45			
	<386> F87=18 F90=98 <483> F87=2 F90=36 <484> F87=104 F90=137 <485> F87=2224 F90=269			
	<487> F87=1 F90=2 <488> F87=2 F90= <489> F87=2 F90=5 <490> F87=3 F90=13			
6505-00-104-8061	ALUMINUM ACETATE AND ACETIC ACID SOLUTION 2% AQUEOUS 60CC	BT	1.64	0
	<306> F87= F90=1 <308> F87=1 F90= <320> F87= F90=1 <380> F87=1 F90=			
	<381> F87=1 F90= <382> F87=1 F90= <384> F87=1 F90= <385> F87=1 F90=			
	<386> F87=1 F90= <483> F87=1 F90= <487> F87= F90=1			
6505-00-104-9000	ALCOHOL USP 5 GALLONS	DR	16.40	0
	<384> F87=1 F90= <403> F87= F90=1 <436> F87=3 F90=3 <483> F87=1 F90=1			
	<484> F87=1 F90= <489> F87=1 F90= <490> F87=1 F90=			
6505-00-104-9320	PHENYLEPHRINE HYDROCHLORIDE INJECTION USP 1% 1 ML 25S	BX	57.72	0
	<309> F87=1 F90= <380> F87=1 F90= <381> F87=1 F90= <382> F87=1 F90=			
	<384> F87=1 F90= <385> F87=1 F90= <386> F87=1 F90= <483> F87=1 F90=			
6505-00-105-0000	ALCOHOL DENATURED USP 1 PT (473.ML)	BT	0.65	0
	<301> F87=1 F90= <303> F87=1 F90=1 <306> F87= F90=1 <308> F87=1 F90=			
	<313> F87=1 F90= <380> F87=1 F90= <381> F87=1 F90= <382> F87=1 F90=			
	<384> F87=1 F90=1 <385> F87=1 F90=1 <386> F87=2 F90=2 <436> F87=60 F90=60			
	<483> F87=1 F90= <487> F87= F90=1			
6505-00-105-0109	HALOTHANE USP 250ML BOTTLE	BT	14.78	0
	SERVICES APPROVED DELETION 0-DAY 1-4-90			
	<301> F87=2 F90= <380> F87=17 F90= <381> F87=17 F90= <382> F87=36 F90=			
	<384> F87=92 F90= <385> F87=73 F90= <386> F87=163 F90= <483> F87=46 F90=			
	<484> F87=49 F90= <485> F87=112 F90=			
6505-00-105-9500	AMINOPHYLLINE INJECTION USP 25MG PER ML 10ML AMPUL 25 PER PUX	BX	6.40	0
	<306> F87= F90=16 <308> F87=1 F90=1 <309> F87=1 F90= <310> F87=1 F90=			
	<311> F87=5 F90= <313> F87=2 F90= <380> F87=14 F90=1 <381> F87=72 F90=12			
	<382> F87=148 F90=28 <384> F87=389 F90=17 <385> F87=43 F90=1 <386> F87=85 F90=36			
	<483> F87=11 F90=20 <485> F87=5 F90=16 <487> F87= F90=1 <489> F87=1 F90=8			
	<490> F87=1 F90=24			

STOCK NUMBER / UNSB CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-00-106-0875	AMMONIA INHALANT SOLUTION AROMATIC 0.333CC AMPUL 10 PER PACKAGE	PG	1.79 D	
	<304> F87=2 F90=2 <312> F87=5 F90=5 <370> F87=1 F90= <374> F87= F90=1			
	<381> F87=3 F90=1 <382> F87=3 F90=1 <384> F87=57 F90=2 <385> F87=3 F90=1			
	<386> F87=3 F90=1 <404> F87= F90=2 <483> F87=9 F90=1 <484> F87=57 F90=1			
	<485> F87= F90=1 <487> F87= F90=1 <489> F87= F90=1 <490> F87= F90=1			
6505-00-106-7394	PROPRANOLOL HYDROCHLORIDE INJECTION USP 1MG/ML 1ML AMPUL 10/BX	BX	8.78 D	
	<306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90=1 <313> F87=1 F90=			
	<380> F87=1 F90= <381> F87=1 F90= <382> F87=1 F90= <384> F87=1 F90=			
	<385> F87=1 F90= <386> F87=1 F90= <483> F87=1 F90= <484> F87=1 F90=			
	<485> F87=1 F90= <488> F87=1 F90= <489> F87=1 F90= <490> F87=1 F90=			
6505-00-106-7399	PROPRANOLOL HYDROCHLORIDE TABLETS USP 40MG 100 TABLETS/BOTTLE	BT	1.56 D	
	<306> F87= F90=1 <309> F87=1 F90= <310> F87=1 F90= <313> F87=1 F90=			
	<380> F87=1 F90= <381> F87=1 F90= <382> F87=1 F90= <384> F87=1 F90=			
	<385> F87=1 F90= <386> F87=1 F90= <483> F87=1 F90= <484> F87=1 F90=			
	<485> F87=1 F90= <489> F87=1 F90= <490> F87=1 F90=			
6505-00-111-7029	LUBRICANT SURGICAL 5 GRAM 144S	BX	4.21 D	
	NOTHING LISTED IN FDA GWQA			
	<306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<311> F87=1 F90= <313> F87=1 F90= <380> F87=4 F90= <381> F87=5 F90=1			
	<382> F87=10 F90=1 <384> F87=26 F90=1 <385> F87=15 F90= <386> F87=32 F90=1			
	<483> F87=9 F90=1 <484> F87=1 F90= <485> F87=20 F90= <487> F87=1 F90=1			
	<488> F87=1 F90= <489> F87=1 F90=1 <490> F87=1 F90=1			
6505-00-115-0000	CULLODION FLEXIBLE USP 1OZ	BT	1.20 D	
	<436> F87=32 F90=32 <488> F87=2 F90= <489> F87=2 F90= <490> F87=3 F90=			
6505-00-116-0922	DEXTROSE INJECTION USP 5% 250ML BAG 12 BAGS PER BOX	BX	11.57 Y	
	<485> F87=2 F90=			
6505-00-116-1376	OXYTOCIN INJECTION USP 1ML AMPUL 20 AMPULS PER BOX	BX	6.62 D	
	<301> F87=1 F90= <306> F87= F90=1 <309> F87=1 F90= <380> F87=1 F90=			
	<381> F87=1 F90= <382> F87=1 F90= <384> F87=1 F90= <385> F87=1 F90=			
	<306> F87=1 F90= <483> F87=1 F90=			
6505-00-116-1495	CUPRIC SULFATE USP CRYSTAL OR POWDER FORM 37GM BOTTLE	BT	0.81 D	
	FOR USE WITH BOTTLE 6530-00-149-0093			
	<306> F87=12 F90=12			

STOCK NUMBER / DISC CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-00-116-7750	DIGOXIN TABLETS USP .25MG ORAL NONCHEWABLE BOTTLE OF 100S	BT	6.68	D
	<306> F87= F90=1 <309> F87=1 F90= <310> F87=1 F90= <313> F87=1 F90=			
	<380> F87=1 F90= <381> F87=1 F90= <382> F87=1 F90= <384> F87=1 F90=			
	<385> F87=1 F90= <386> F87=1 F90= <483> F87=1 F90= <484> F87=1 F90=			
	<485> F87=1 F90= <489> F87=1 F90= <490> F87=1 F90=			
6505-00-116-8350	DIPHENHYDRAMINE HYDROCHLORIDE CAPSULES USP 50MG 100S	BT	1.12	D
	<306> F87= F90=1 <310> F87=1 F90= <381> F87=1 F90= <382> F87=1 F90=			
	<384> F87=1 F90= <385> F87=1 F90= <386> F87=1 F90= <483> F87=1 F90=			
	<488> F87=1 F90= <489> F87=1 F90= <490> F87=1 F90=			
6505-00-117-6450	CHLOROQUINE PHOSPHATE TABLETS USP 0.3GM 500 TABLETS PER BOTTLE	BT	148.44	D
	<306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<311> F87=1 F90= <380> F87=1 F90= <381> F87=1 F90= <382> F87=2 F90=			
	<384> F87=5 F90= <385> F87=1 F90= <386> F87=1 F90= <483> F87=1 F90=			
	<484> F87=6 F90= <485> F87=13 F90= <487> F87= F90=1			
6505-00-117-8579	PENICILLIN V POTASSIUM TABLETS USP 400000 UNITS 40 TABS/BOTTLE	BT	1.66	D
	<306> F87= F90=3 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<311> F87=1 F90= <370> F87= F90=1 <380> F87=1 F90= <381> F87=1 F90=3			
	<382> F87=2 F90=5 <384> F87=4 F90=82 <385> F87=1 F90=20 <386> F87=1 F90=21			
	<483> F87=1 F90=13 <484> F87=5 F90=29 <485> F87=11 F90=48 <487> F87=1 F90=3			
	<488> F87=1 F90= <489> F87=1 F90=3 <490> F87=1 F90=6			
6505-00-118-2132	CODEINE SULFATE TABLETS USP 30 MG 100S	BT	6.84	D
	REMOVED FROM D-DAY LIST 9-85(DEPMEDS REPL 6505-00-400-2054)			
	<407> F87=1 F90= <488> F87=2 F90= <489> F87=2 F90= <490> F87=2 F90=			
6505-00-126-5100	MAGNESIUM SULFATE INJECTION USP 2ML AMPUL 12 AMPULS/PACKAGE	PG	7.66	V
	TERMINAL STATUS 06-19-89 USE SUB # 6505-01-301-8175 1:2 RATIO			
	<306> F87= F90=4 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<380> F87=2 F90=1 <381> F87=9 F90=3 <382> F87=18 F90=6 <384> F87=40 F90=70			
	<385> F87=32 F90=61 <386> F87=72 F90=117 <483> F87=23 F90=29 <484> F87=84 F90=176			
	<485> F87=171 F90=384 <488> F87=9 F90= <489> F87=9 F90=1 <490> F87=12 F90=4			
6505-00-127-2923	DOPAMINE HYDROCHLORIDE INJECTION 40MG PER ML 5ML	AM	0.52	D
	<306> F87= F90=1 <308> F87=2 F90= <309> F87=2 F90=1 <313> F87=4 F90=			
	<380> F87=1 F90= <381> F87=1 F90= <382> F87=1 F90= <384> F87=1 F90=			
	<385> F87=1 F90= <386> F87=1 F90= <483> F87=1 F90= <488> F87=4 F90=			

STOCK NUMBER / OMSB CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-00-129-6709	CHLORPROMAZINE HYDROCHLORIDE INJECTION USP 25MG/ML 2ML AMPUL 10S PG		3.95 D	
	<306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<380> F87=1 F90= <381> F87=1 F90= <382> F87=1 F90= <384> F87=1 F90=1			
	<385> F87=1 F90=1 <386> F87=1 F90=5 <483> F87=1 F90= <484> F87=1 F90=1			
	<485> F87= F90=4			
6505-00-130-1920	NITROUS OXIDE USP SIZE D CYLINDER 250GL	EA	19.12 D	
	<301> F87=4 F90=			
6505-00-130-1940	NITROUS OXIDE USP SIZE M CYLINDER 2000GL	EA	52.18 D	
	<301> F87=1 F90= <380> F87=6 F90= <381> F87=6 F90= <382> F87=12 F90=			
	<384> F87=31 F90= <385> F87=24 F90= <386> F87=54 F90= <483> F87=15 F90=			
	<484> F87=16 F90= <488> F87=1 F90= <489> F87=1 F90= <490> F87=1 F90=			
6505-00-132-5181	OXYGEN USP 99% CYLINDER TYPE D 95GL	EA	38.94 D	
	REV: WT=14/CU=0.167			
	<301> F87=4 F90=4 <308> F87=4 F90=2 <309> F87=2 F90=10 <310> F87=1 F90=1			
	<376> F87=2 F90= <380> F87= F90=113 <381> F87= F90=100 <382> F87= F90=124			
	<384> F87= F90=1073 <385> F87= F90=1952 <386> F87= F90=4020 <483> F87= F90=96			
	<484> F87= F90=944 <485> F87= F90=1768 <488> F87= F90=10 <489> F87= F90=28			
	<490> F87= F90=47			
6505-00-132-5199	OXYGEN USP 99% CYLINDER TYPE H 1650 GALLON	EA	133.10 D	
	REV: WT=148/CU=2.6			
	<301> F87=1 F90=1 <308> F87=1 F90=10 <309> F87=12 F90=11 <310> F87=3 F90=			
	<380> F87=160 F90=146 <381> F87=197 F90=131 <382> F87=406 F90=144 <384> F87=1030 F90=545			
	<385> F87=849 F90=1731 <386> F87=1781 F90=3645 <483> F87=504 F90=95 <484> F87=342 F90=813			
	<485> F87=712 F90=1648 <488> F87=31 F90=14 <489> F87=32 F90=34 <490> F87=41 F90=55			
6505-00-132-6904	ISONIAZID TABLETS USP 300 MG 100S	DT	1.22 D	
	<306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<311> F87=1 F90= <380> F87=1 F90= <381> F87=1 F90= <382> F87=1 F90=			
	<384> F87=1 F90=1 <385> F87=1 F90= <386> F87=1 F90= <483> F87=1 F90=			
	<484> F87=1 F90= <485> F87=3 F90= <487> F87= F90=1 <489> F87=1 F90=			
	<490> F87=1 F90=			
6505-00-133-0070	PEPPERMINT OIL NF 1 OZ (28.35 GRAM)	DT	1.97 D	
	SERVICES APPROVED D-DAY 1-4-90			
	<376> F87= F90=1 <381> F87= F90=1 <382> F87= F90=1 <384> F87= F90=1			
	<385> F87= F90=1 <386> F87= F90=1 <483> F87= F90=1 <484> F87= F90=1			
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STOCK NUMBER / DMSB CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-00-133-4447	PENICILLIN G BENZATHINE SUSP STERILE USP 600000 UNITS/ML 2ML IOS DX		22.46	D
	<301> F87=1 F90= <306> F87= F90=2 <308> F87=1 F90= <309> F87=1 F90=			
	<310> F87=1 F90= <313> F87=1 F90= <380> F87=2 F90=1 <381> F87=3 F90=1			
	<382> F87=5 F90=2 <384> F87=17 F90=17 <385> F87=11 F90=22 <386> F87=23 F90=50			
	<483> F87=6 F90=6 <484> F87=15 F90=30 <485> F87=32 F90=64 <489> F87=1 F90=			
	<490> F87=1 F90=1			
6505-00-133-4449	EPINEPHRINE INJECTION USP AQUEOUS CARTRIDGE NEEDLE UNIT 1ML IOS PG		11.27	D
	<306> F87= F90=14 <308> F87=1 F90= <309> F87=1 F90=5 <310> F87=1 F90=6			
	<311> F87=5 F90= <313> F87=1 F90= <380> F87=14 F90=49 <381> F87=69 F90=101			
	<382> F87=143 F90=168 <384> F87=389 F90=111 <385> F87=39 F90=17 <386> F87=82 F90=110			
	<483> F87=3 F90=23 <484> F87= F90=1 <485> F87=5 F90=48 <487> F87= F90=6			
	<488> F87=1 F90=23 <489> F87= F90=94 <490> F87= F90=166			
6505-00-133-5214	PROCHLORPERAZINE SUPPOSITORIES USP 25MG ADULT RECTAL I.S. 12S	BX	13.97	D
	<306> F87= F90=3 <309> F87=1 F90= <310> F87=1 F90= <311> F87=1 F90=			
	<380> F87=1 F90= <381> F87=11 F90=2 <382> F87=22 F90=6 <384> F87=97 F90=81			
	<385> F87=7 F90=17 <386> F87=13 F90=37 <483> F87=4 F90=9 <484> F87=27 F90=35			
	<485> F87=56 F90=78 <487> F87= F90=1 <489> F87= F90=2 <490> F87= F90=5			
6505-00-133-5843	PREDNISOLONE ACETATE OPHTHALMIC SUSPENSION 1% 5 ML	BT	0.80	D
	<306> F87= F90=2 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<311> F87=1 F90= <319> F87=1 F90=1 <380> F87=1 F90= <381> F87=1 F90=			
	<382> F87=3 F90=1 <384> F87=10 F90=18 <385> F87=4 F90=10 <386> F87=8 F90=21			
	<419> F87=1 F90= <483> F87=2 F90=4 <484> F87=15 F90=9 <485> F87=35 F90=29			
	<487> F87= F90=1 <490> F87= F90=1			
6505-00-133-6000	MINERAL OIL USP 1QT OR 946ML	CO	2.05	D
	<302> F87=3 F90=3 <303> F87=1 F90= <402> F87= F90=3 <403> F87= F90=1			
6505-00-133-8025	PETROLATUM WHITE USP 1 LB (453.6 GM) REV WGT 1.50 CU 0.0710	CO	1.19	D
	<306> F87= F90=1 <308> F87=1 F90= <320> F87= F90=1 <374> F87= F90=1			
	<380> F87=1 F90= <381> F87=1 F90= <382> F87=1 F90= <384> F87=1 F90=			
	<385> F87=1 F90= <386> F87=1 F90= <473> F87=1 F90=1 <483> F87=1 F90=			
	<487> F87= F90=1			
6505-00-133-9920	PHENOL USP CRYSTAL OR MASS 1LB OR 453.600 GRAMS	BT	2.96	D
	<304> F87=1 F90= <403> F87= F90=1 <483> F87=1 F90=1 <484> F87=1 F90=			
	<489> F87=1 F90= <490> F87=1 F90=			

STOCK NUMBER / DMSB CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-00-135-2604	HYPERALIMENTATION KIT 3 KITS PER PACKAGE 8.5% CRYSTALLINE AMINO ACID & DEX 50% WATER	PG	24.57	D
	<309> F07=1 F90= <310> F07=1 F90= <380> F07=2 F90= <381> F07=10 F90= <382> F07=20 F90= <384> F07=46 F90= <385> F07=37 F90= <386> F07=82 F90= <483> F07=26 F90= <484> F07=71 F90= <485> F07=145 F90= <488> F07=34 F90= <489> F07=34 F90= <490> F07=48 F90=			
6505-00-135-2081	CHARCOAL ACTIVATED USP POWDER 15GM	BT	0.78	D
	<306> F07= F90=1 <308> F07=6 F90=6			
6505-00-136-7000	POTASSIUM IODIDE USP 1 LB (453.6 GRAM)	BT	10.62	D
	<303> F07=1 F90=1			
6505-00-137-5091	DIAZEPAM INJECTION USP 5MG/ML 2ML SYRINGE WITH NEEDLE 10/PACKAGE	PG	16.05	D
	<301> F07=1 F90=1 <306> F07= F90=11 <308> F07=1 F90=1 <309> F07=1 F90=1 <310> F07=1 F90=1 <380> F07=27 F90=14 <381> F07=38 F90=16 <382> F07=32 F90=18 <384> F07=235 F90=150 <385> F07=155 F90=192 <386> F07=334 F90=423 <483> F07=91 F90=48 <484> F07=211 F90=198 <485> F07=457 F90=417 <487> F07= F90=1 <488> F07=1 F90= <489> F07=1 F90= <490> F07=1 F90=5			
6505-00-138-7400	QUINIDINE SULFATE TABLETS USP 0.2 GM 100S	BT	4.32	D
	<306> F07= F90=1 <309> F07=1 F90= <310> F07=1 F90= <313> F07=1 F90= <380> F07=1 F90= <381> F07=1 F90= <382> F07=1 F90= <384> F07=1 F90= <385> F07=1 F90= <386> F07=1 F90= <483> F07=1 F90= <484> F07=1 F90= <485> F07=1 F90=			
6505-00-138-0461	PHENAZOPYRIDINE HYDROCHLORIDE TABLETS,USP,100MG 100 TABLETS/BT	BT	1.47	D
	<306> F07= F90=1 <316> F07=1 F90= <381> F07= F90=1 <382> F07= F90=1 <384> F07= F90=1 <385> F07= F90=1 <386> F07= F90=1 <489> F07= F90=1 <490> F07= F90=1			
6505-00-139-4340	PHENYTOIN SODIUM INJECTION USP 50MG/ML 5ML AMPUL 10 AMPULS/PG	PG	9.02	D
	<306> F07= F90=18 <308> F07=2 F90= <309> F07=3 F90=1 <310> F07=2 F90= <313> F07=1 F90= <380> F07=41 F90=3 <381> F07=61 F90=14 <382> F07=126 F90=29 <384> F07=367 F90=145 <385> F07=246 F90=294 <386> F07=555 F90=565 <483> F07=144 F90=77 <484> F07=490 F90=255 <485> F07=1071 F90=568 <488> F07=2 F90= <489> F07=1 F90=4 <490> F07=1 F90=18			

STOCK NUMBER / ONSO CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-00-139-4460	DEXTROSE INJECTION USP 50% 50ML CARTRIDGE 10 PER BOX	PG	23.98	0
	<306> F87= F90=5 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<380> F87=10 F90=1 <381> F87=15 F90=3 <382> F87=32 F90=7 <384> F87=92 F90=36			
	<385> F87=62 F90=73 <386> F87=139 F90=142 <483> F87=36 F90=19 <484> F87=122 F90=63			
	<485> F87=268 F90=141 <488> F87=1 F90= <489> F87= F90=1 <490> F87= F90=4			
6505-00-139-4512	LIDOCAINE HYDROCHLORIDE INJECTION USP 2% 5ML BOTTLE 10/PACKAGE	PG	9.42	0
	<306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90= <380> F87=1 F90=			
	<381> F87=1 F90= <382> F87=1 F90= <384> F87=3 F90=2 <385> F87=2 F90=1			
	<386> F87=2 F90=1 <483> F87=1 F90= <484> F87=1 F90= <485> F87=1 F90=			
6505-00-139-4548	CALCIUM CHLORIDE INJECTION USP 10% 10CC NEEDLE W/SYRINGE 10S	BX	14.68	0
	<301> F87=1 F90=1 <306> F87= F90=4 <308> F87=1 F90= <309> F87=1 F90=			
	<310> F87=1 F90= <313> F87=1 F90= <380> F87=6 F90=4 <381> F87=6 F90=4			
	<382> F87=13 F90=8 <384> F87=29 F90=33 <385> F87=27 F90=58 <386> F87=58 F90=125			
	<483> F87=17 F90=7 <484> F87=10 F90=50 <485> F87=22 F90=104 <488> F87=1 F90=			
	<489> F87=1 F90= <490> F87=1 F90=			
6505-00-146-0505	SUCROSE NF 1/4 LO (113.4 GRAM) SERVICES APPROVED 0-DAY 1-4-90	BT	2.01	0
	<384> F87= F90=1 <403> F87= F90=1 <483> F87= F90=1 <484> F87= F90=1			
	<485> F87= F90=3			
6505-00-146-4425	SULFISOXAZOLE TABLETS USP 0.500GM 1000 TABLETS PER BOTTLE	BT	20.15	0
	<480> F87=1 F90= <489> F87=1 F90= <490> F87=1 F90=			
6505-00-147-2610	THIAMINE HYDROCHLORIDE TABLETS USP 50MG 100 TABLETS PER BOTTLE	BT	0.93	0
	<306> F87= F90=1 <310> F87=1 F90= <311> F87=1 F90= <381> F87=1 F90=			
	<382> F87=1 F90=1 <384> F87=2 F90=5 <385> F87=1 F90= <386> F87=1 F90=1			
	<403> F87=1 F90=1 <484> F87=1 F90= <485> F87=1 F90=2 <490> F87= F90=1			
6505-00-148-7096	PUVIDONE-IODINE OINT USP 10% 1/8OZ (3.54 GRAM) I.S. 144S	PG	8.66	0
	<301> F87=1 F90= <306> F87= F90=6 <308> F87=2 F90=2 <309> F87=1 F90=			
	<310> F87=1 F90= <311> F87=1 F90= <313> F87=1 F90=1 <380> F87=10 F90=9			
	<381> F87=16 F90=9 <382> F87=33 F90=12 <384> F87=91 F90=77 <385> F87=65 F90=107			
	<386> F87=135 F90=230 <483> F87=38 F90=25 <484> F87=47 F90=137 <485> F87=99 F90=286			
	<487> F87= F90=1 <488> F87=3 F90= <489> F87=1 F90= <490> F87=1 F90=1			

STOCK NUMBER / UNSB CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-00-148-7177	DIPHENHYDRAMINE HCL INJECTION USP 50MG PER CC SYR-NUL 1ML 10/BX	BX	10.15	D
	<301> F87=1 F90=1 <306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90=1			
	<310> F87=1 F90= <380> F87=2 F90=1 <381> F87=2 F90=1 <382> F87=3 F90=1			
	<384> F87=7 F90=4 <385> F87=7 F90=12 <386> F87=14 F90=28 <433> F87=2 F90=			
	<483> F87=4 F90=1 <484> F87=2 F90=10 <485> F87=5 F90=24 <488> F87=1 F90=			
	<489> F87=1 F90= <490> F87=1 F90=			
6505-00-148-7263	MILK OF MAGNESIA USP 12 FL OZ (355 ML)	BT	0.84	D
	<306> F87= F90=3 <310> F87=1 F90=1 <381> F87=1 F90=1 <382> F87=1 F90=3			
	<384> F87=1 F90=44 <385> F87=1 F90=9 <386> F87=2 F90=20 <403> F87=1 F90=4			
	<484> F87=1 F90=3 <485> F87=3 F90=19 <487> F87= F90=1 <489> F87= F90=1			
	<490> F87= F90=3			
6505-00-149-0108	PANCURONIUM BROMIDE INJECTION 2MG/ML 5ML AMPUL 25 AMPULS PER BOX SERVICES APPROVED DELETION 0-DAY 1-4-90	BX	193.09	D
	<301> F87=1 F90= <380> F87=1 F90= <381> F87=1 F90= <382> F87=2 F90=			
	<384> F87=4 F90= <385> F87=3 F90= <386> F87=7 F90= <483> F87=2 F90=			
	<484> F87=3 F90= <485> F87=7 F90= <488> F87=1 F90= <489> F87=1 F90=			
	<490> F87=1 F90=			
6505-00-149-0160	FLUOCINONIDE CREAM USP 0.05% 15GM TUBE	TU	1.27	D
	<306> F87=6 F90=10 <384> F87= F90=27 <487> F87= F90=1 <490> F87= F90=2			
6505-00-149-0247	ALUMINUM HYDROXIDE GEL MAGNESIUM HYDROXIDSIMETH SUSP 5OZ BOTTLE48	BX	13.86	D
	<306> F87= F90=1 <309> F87=1 F90= <310> F87=1 F90=1 <311> F87=1 F90=			
	<380> F87=1 F90= <381> F87=2 F90= <382> F87=3 F90=1 <384> F87=11 F90=11			
	<385> F87=1 F90=1 <386> F87=2 F90=4 <483> F87=1 F90=1 <484> F87=1 F90=4			
	<485> F87=2 F90=7 <487> F87= F90=1 <488> F87=1 F90= <489> F87=1 F90=			
	<490> F87=1 F90=1			
6505-00-149-0746	HEXACHLOROPHENE CLEANSING EMULSION USP 5 FL OZ (148 ML) 48S	PG	162.93	D
	<306> F87= F90=1 <483> F87= F90=1 <484> F87= F90=2 <485> F87= F90=3			
	<488> F87=1 F90= <489> F87=1 F90= <490> F87=1 F90=			
6505-00-150-1000	ZINC OXIDE USP 1 LB (453.6 GM)	BT	2.19	D
	<306> F87= F90=2 <310> F87= F90=1 <320> F87=1 F90=1 <382> F87=1 F90=1			
	<384> F87=1 F90=10 <385> F87=1 F90= <386> F87=1 F90= <483> F87=1 F90=1			
	<487> F87= F90=1 <488> F87=1 F90= <489> F87=1 F90=1 <490> F87=1 F90=2			

STOCK NUMBER / UMSB CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-00-150-7622	LUBRICANT OPHTHALMIC TOPICAL 1/8OZ OR 3.5GM W/.5% CHLRBTNL	TU	0.50	D
	<301> F87=3 F90=3 <306> F87= F90=3 <308> F87=1 F90= <309> F87=1 F90=3			
	<310> F87=1 F90= <311> F87=1 F90= <319> F87=1 F90=1 <380> F87=21 F90=21			
	<381> F87=23 F90=25 <382> F87=47 F90=40 <384> F87=126 F90=97 <385> F87=97 F90=200			
	<386> F87=209 F90=420 <419> F87=1 F90= <483> F87=57 F90=60 <484> F87=97 F90=200			
	<485> F87=207 F90=400 <487> F87= F90=1 <488> F87=2 F90=2 <489> F87=1 F90=2			
	<490> F87=2 F90=5			
6505-00-153-8220	GLYCERIN USP 1 LB (453.6 GRAM)	BT	1.70	D
	<306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<311> F87=1 F90= <319> F87=1 F90=1 <380> F87=1 F90= <381> F87=1 F90=			
	<382> F87=1 F90= <384> F87=1 F90= <385> F87=1 F90= <386> F87=1 F90=			
	<419> F87=1 F90= <483> F87=1 F90= <484> F87=1 F90= <485> F87=1 F90=			
	<487> F87= F90=1 <488> F87=1 F90= <489> F87=1 F90= <490> F87=1 F90=			
6505-00-153-8278	GLUCULIN IMMUNE USP 10 ML	VI	2.32	D
	<306> F87=4 F90=4			
6505-00-153-8379	EUGENOL USP BOTTLE 1OZ OR 29.35GM	BT	0.85	D
	<320> F87=1 F90=1 <370> F87=1 F90= <374> F87= F90=1 <381> F87=1 F90=1			
	<382> F87=2 F90=1 <384> F87=20 F90=1 <385> F87=2 F90=2 <386> F87=2 F90=2			
	<483> F87=4 F90=2 <484> F87=19 F90=2 <485> F87= F90=2 <487> F87= F90=1			
	<488> F87=1 F90= <489> F87=1 F90=1 <490> F87=1 F90=1			
6505-00-153-8480	HYDROGEN PEROXIDE TOPICAL SOLUTION USP 1PINT (473 ML)	BT	0.24	D
	<302> F87=12 F90=12 <306> F87= F90=7 <308> F87= F90=4 <309> F87=1 F90=			
	<310> F87=1 F90=1 <311> F87=1 F90=1 <312> F87=1 F90= <320> F87=1 F90=2			
	<370> F87=1 F90=1 <380> F87=2 F90=7 <381> F87=8 F90=11 <382> F87=15 F90=19			
	<384> F87=56 F90=101 <385> F87=23 F90=134 <386> F87=44 F90=299 <402> F87= F90=12			
	<403> F87=1 F90=1 <412> F87=1 F90= <476> F87= F90=1 <483> F87=19 F90=46			
	<484> F87=813 F90=329 <485> F87=1722 F90=696 <487> F87= F90=1 <488> F87=1 F90=			
	<489> F87=1 F90=1 <490> F87=2 F90=5			
6505-00-153-8708	SODIUM CHLORIDE TABLETS USP 2.25 GRAM 100S RECLASSIFY TO IS REPLACE WITH 6505-01-249-2134 <302> F87=40 F90=	BT	1.86	V
6505-00-153-8809	LUBRICANT SURGICAL 4 OZ (113.4 GM) NOT LISTED IN GWOA	TU	0.47	D
	<301> F87=1 F90= <306> F87= F90=3 <307> F87=1 F90=1 <308> F87=1 F90=5			
	<309> F87= F90=1 <310> F87= F90=1 <313> F87=7 F90=3 <320> F87=1 F90=			
	<380> F87=6 F90=14 <381> F87=16 F90=22 <382> F87=34 F90=25 <384> F87=51 F90=130			
	<385> F87=46 F90=177 <386> F87=88 F90=349 <483> F87=28 F90=15 <484> F87=1 F90=70			
	<485> F87=1 F90=147 <487> F87= F90=2 <488> F87=2 F90= <489> F87=1 F90=2			

STOCK NUMBER / DISP CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
	<490> F87=1 F90=3			
6505-00-153-9740	HEPARIN SODIUM INJECTION USP 1000 UNITS PER ML 10 ML	VI	0.51	D
	<301> F87=5 F90= <306> F87= F90=10 <308> F87=1 F90= <309> F87=1 F90=1			
	<310> F87=1 F90=1 <320> F87=2 F90= <343> F87= F90=50 <380> F87=43 F90=124			
	<381> F87=47 F90=133 <382> F87=111 F90=204 <384> F87=297 F90=1241 <385> F87=239 F90=2219			
	<386> F87=526 F90=4763 <483> F87=138 F90=429 <484> F87=995 F90=1786 <485> F87=1428 F90=3988			
	<488> F87=46 F90=6 <489> F87=45 F90=16 <490> F87=63 F90=37			
6505-00-159-4892	CLINDAMYCIN HYDROCHLORIDE CAPSULES USP EQUIVALENT TO 150MG 100S	BT	60.81	D
	SERVICES APPROVED 0-DAY 1-4-90			
	<306> F87= F90=1 <487> F87= F90=1			
6505-00-159-6625	BACITRACIN OINTMENT USP 7100 UNITS TOPICAL 14.2GM 12S	PG	3.73	D
	<306> F87= F90=2 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=1			
	<311> F87=1 F90=1 <312> F87=1 F90= <318> F87=1 F90= <320> F87=1 F90=1			
	<370> F87=1 F90= <374> F87= F90=1 <380> F87=3 F90=2 <381> F87=9 F90=2			
	<382> F87=19 F90=3 <384> F87=269 F90=166 <385> F87=24 F90=36 <386> F87=43 F90=34			
	<412> F87=1 F90= <483> F87=26 F90=10 <484> F87=87 F90=94 <485> F87=65 F90=151			
	<487> F87= F90=2 <488> F87=1 F90= <489> F87=1 F90=1 <490> F87=1 F90=2			
6505-00-160-1500	CHOLERA VACCINE USP 20ML BOTTLE	BT	2.07	D
	<306> F87=2 F90=2			
6505-00-161-2950	THROMBIN USP 5000 UNITS THROMBIN & 5ML ISOTONIC SODIUM CHLORIDE	PG	5.51	D
	<318> F87=46 F90=33 <320> F87=1 F90=1 <382> F87=127 F90=67 <384> F87=269 F90=			
	<385> F87=279 F90=2 <386> F87=565 F90=5 <483> F87=165 F90=5 <484> F87=14 F90=31			
	<485> F87=32 F90=70 <488> F87=1 F90= <489> F87=1 F90= <490> F87=1 F90=			
6505-00-162-1520	YELLOW FEVER VACCINE USP 10ML PACKAGE 20 DOSES	PG	20.24	D
	<306> F87=1 F90=1			
6505-00-165-6545	CEPHALEXIN CAPSULES USP EQUIVALENT TO 250MG 100 PER BOTTLE	BT	9.31	D
	<306> F87= F90=2 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<311> F87=1 F90= <380> F87=1 F90= <381> F87=9 F90=1 <382> F87=19 F90=3			
	<384> F87=37 F90=24 <385> F87=3 F90=1 <386> F87=6 F90=7 <483> F87=1 F90=3			
	<484> F87=48 F90=9 <485> F87=106 F90=24 <487> F87=1 F90=1 <488> F87=1 F90=			
	<489> F87=1 F90=1 <490> F87=1 F90=3			

STOCK NUMBER / OMSB CONTROL NU	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-00-165-6575	RIFAMPIN CAPSULES USP 300MG 100 CAPSULES PER BOTTLE	BT	21.46	D
	<306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<311> F87=1 F90= <380> F87=1 F90= <381> F87=1 F90= <382> F87=1 F90=			
	<384> F87=1 F90= <385> F87=1 F90= <386> F87=1 F90= <483> F87=1 F90=			
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	<490> F87=1 F90=			
6505-00-173-6538 8-0425	MINERAL OIL LIGHT NF 30 ML BOTTLES 25S REPLACES 01-136-1720	PG	30.45	L
	<306> F87= F90=1 <320> F87= F90=1 <485> F87=1 F90=			
6505-00-181-6279 3-0862-P	EDROPHONIUM CHLORIDE INJECTION USP 10MG 1ML AMPUL 10 AMPULS/PG	PG	16.53	D
	<306> F87= F90=1 <309> F87=1 F90= <380> F87=1 F90= <381> F87=1 F90=			
	<382> F87=1 F90= <384> F87=1 F90= <385> F87=1 F90= <386> F87=1 F90=			
	<403> F87=1 F90= <488> F87=2 F90= <489> F87=1 F90= <490> F87=2 F90=			
6505-00-181-7180	GENTAMICIN SULFATE INJ USP EQUIV TO 40MG GENTAMICIN PER ML 2 ML REPLACED BY 01-213-9514 ON 0-DAY/DEPMEDS (1 NEW : 25 OLD)	BT	0.26	Y
	<487> F87=2 F90= <488> F87=113 F90= <489> F87=112 F90= <490> F87=140 F90=			
6505-00-183-9419	SULFACETAMIDE SOD OPHTHALMIC OINTMENT USP 10% 1/8 OZ (3.5 GM)	TU	0.46	O
	<306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<311> F87=1 F90= <319> F87=12 F90=1 <380> F87=1 F90= <381> F87=4 F90=			
	<382> F87=10 F90= <384> F87=36 F90=8 <385> F87=14 F90=4 <386> F87=28 F90=5			
	<419> F87=1 F90= <483> F87=7 F90=1 <484> F87=54 F90=4 <485> F87=126 F90=12			
	<487> F87= F90=1			
6505-00-216-5370	SODIUM BICARBONATE INJ USP 8.4% SYRINGE-NEEDLE UNIT 50ML 10S ADOPTION OF VA NSN	PG	34.70	D
	<301> F87=1 F90=1 <306> F87= F90=3 <308> F87=1 F90= <309> F87=1 F90=1			
	<310> F87=1 F90= <380> F87=9 F90=4 <381> F87=9 F90=4 <382> F87=18 F90=8			
	<384> F87=42 F90=47 <385> F87=38 F90=88 <386> F87=82 F90=185 <483> F87=24 F90=9			
	<484> F87=14 F90=68 <485> F87=31 F90=141 <488> F87=2 F90= <489> F87=1 F90=			
	<490> F87=1 F90=			
6505-00-232-5046	CARBAMAZEPINE TABLETS USP 200MG 100S	BT	4.33	O
	<306> F87= F90=1 <309> F87=1 F90= <310> F87=1 F90= <311> F87=1 F90=			
	<380> F87=1 F90=1 <381> F87=1 F90=1 <382> F87=1 F90=1 <384> F87=5 F90=11			
	<385> F87=1 F90=7 <386> F87=1 F90=18 <483> F87=1 F90=5 <484> F87=3 F90=28			
	<485> F87=6 F90=63 <487> F87= F90=1 <488> F87=1 F90= <489> F87=1 F90=			
	<490> F87=1 F90=			

STOCK NUMBER / ONSU CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-00-261-7256	ISOPROPYL ALCOHOL USP 1 QT (946 ML)	CN	1.26 D	
	<301> F87=1 F90=4 <303> F87=2 F90=2 <306> F87=3 F90=0 <308> F87=1 F90=1			
	<309> F87= F90=1 <310> F87= F90=1 <311> F87= F90=1 <312> F87=8 F90=8			
	<318> F87=1 F90= <370> F87=1 F90= <380> F87=6 F90=18 <381> F87=6 F90=19			
	<382> F87=14 F90=30 <384> F87=77 F90=172 <385> F87=28 F90=236 <386> F87=55 F90=500			
	<417> F87=2 F90= <419> F87=1 F90= <476> F87=1 F90=1 <483> F87=34 F90=53			
	<484> F87=56 F90=258 <485> F87=80 F90=566 <487> F87= F90=1 <490> F87= F90=2			
6505-00-261-7257	BENZOIN TINCTURE COMPOUND USP 1 PINT OR 473 MILLILITERS TOPICAL	CN	3.02 D	
	<301> F87=1 F90=1 <306> F87= F90=4 <308> F87=1 F90= <309> F87= F90=1			
	<310> F87= F90=1 <312> F87=1 F90=1 <318> F87=1 F90= <380> F87=1 F90=6			
	<381> F87=1 F90=6 <382> F87=3 F90=9 <384> F87=11 F90=42 <385> F87=6 F90=66			
	<386> F87=11 F90=146 <417> F87=1 F90= <419> F87=1 F90= <483> F87=6 F90=12			
	<484> F87=7 F90=78 <485> F87=15 F90=162 <488> F87=1 F90= <489> F87=1 F90=			
	<490> F87=1 F90=			
6505-00-268-8530 2-0108	HALOPERIDOL INJECTION USP 5MG/ML 1ML AMPUL 10 AMPULES/PACKAGE	PG	9.54 D	
	<306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<380> F87=1 F90= <381> F87=1 F90= <382> F87=2 F90=1 <384> F87=2 F90=4			
	<385> F87=1 F90=8 <386> F87=1 F90=16 <483> F87=1 F90=2 <484> F87=1 F90=7			
	<485> F87= F90=16 <490> F87= F90=1			
6505-00-268-8574	LINDANE SHAMPOO USP 1% 2 FL OZ OR 59ML BOTTLE SERVICES APPROVED 0-0AY 1-4-90	BT	1.04 D	
	<306> F87= F90=20 <381> F87= F90=2 <382> F87= F90=2 <384> F87= F90=7			
	<385> F87= F90=1 <386> F87= F90=1 <489> F87= F90=1 <490> F87= F90=1			
6505-00-299-3095	ISOPROPYL ALCOHOL USP 5 GALLONS OR 946ML	OR	14.33 D	
	<302> F87=1 F90=1 <402> F87= F90=1			
6505-00-299-8179	ALBUMIN HUMAN USP 25% 100ML	CN	59.48 D	
	<301> F87=10 F90=5 <306> F87= F90=2 <380> F87=72 F90=21 <381> F87=72 F90=21			
	<382> F87=148 F90=32 <384> F87=381 F90=145 <385> F87=306 F90=234 <386> F87=678 F90=507			
	<483> F87=191 F90=39 <484> F87=205 F90=237 <485> F87=466 F90=513 <488> F87=1 F90=1			
	<489> F87=1 F90=1 <490> F87=1 F90=3			
6505-00-299-8273	PRIMAQUINE PHOSPHATE TABLETS USP 26.3 MG 1000S	BT	97.06 D	
	<306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<311> F87=1 F90= <380> F87=1 F90= <381> F87=1 F90= <382> F87=1 F90=			
	<384> F87=1 F90= <385> F87=1 F90= <386> F87=1 F90= <483> F87=1 F90=			
	<484> F87=1 F90= <485> F87=1 F90= <487> F87= F90=1			

STOCK NUMBER / DMSB CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-00-299-8296	TETANUS AND DIPHTHERIA TOXOIDS FOR ADULT USE ADSORBED USP .5ML	BT	1.86	D
	<306> F87=2 F90=2			
6505-00-299-8598	SULFACETAMIDE SULFABENZAMIDE SULFATHIAZOLE&UREA CREAM 2.75OZ	PG	1.91	D
	<306> F87= F90=2 <311> F87=3 F90= <316> F87=1 F90= <381> F87=21 F90=1			
	<392> F87=44 F90=5 <384> F87=110 F90=110 <483> F87=1 F90= <487> F87= F90=3			
	<489> F87= F90=2 <490> F87= F90=4			
6505-00-299-8610	CHLORPHENIRAMINE MALEATE TABLETS USP 4MG 1000 TABLETS PER BOTTLE	BT	1.84	D
	<306> F87= F90=1 <310> F87=1 F90= <311> F87=1 F90= <381> F87=1 F90=			
	<382> F87=1 F90= <384> F87=1 F90= <385> F87=1 F90= <386> F87=1 F90=			
	<483> F87=1 F90= <487> F87= F90=1			
6505-00-299-8614	PROCAINAMIDE HYDROCHLORIDE INJECTION USP 100 MG PER ML 10 ML	BT	1.26	D
	<306> F87= F90=1 <308> F87=2 F90= <309> F87=2 F90= <313> F87=4 F90=			
	<380> F87=1 F90= <381> F87=1 F90= <382> F87=1 F90= <384> F87=2 F90=1			
	<385> F87=1 F90=1 <386> F87=1 F90=1 <483> F87=1 F90= <484> F87=1 F90=			
	<485> F87=1 F90= <486> F87=2 F90= <489> F87=1 F90= <490> F87=1 F90=			
6505-00-299-8740	NEOMYCIN SULFATE AND BACITRACIN OINTMENT USP .50UZ OR 14.2GM	TU	0.50	D
	<488> F87=5 F90= <489> F87=4 F90= <490> F87=6 F90=			
6505-00-299-9666 2-0600	CYCLUPENTOLATE HYDROCHLORIDE OPHTHALMIC SOLUTION USP 1% 15ML ITEM STANDARDIZED IN JAN 83	BT	1.93	D
	<306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<311> F87=1 F90= <319> F87=1 F90=1 <380> F87=1 F90= <381> F87=1 F90=			
	<382> F87=1 F90= <384> F87=2 F90=2 <385> F87=1 F90=1 <386> F87=1 F90=2			
	<419> F87=1 F90= <483> F87=1 F90= <484> F87=2 F90=1 <485> F87=6 F90=3			
	<487> F87= F90=1			
6505-00-299-9667	PROTAMINE SULFATE INJECTION USP 10MG/ML 5ML AMPUL 6 AMPULS/BX	PG	6.98	D
	<301> F87=1 F90= <306> F87= F90=3 <309> F87=1 F90= <320> F87=1 F90=			
	<380> F87=5 F90=5 <381> F87=4 F90=5 <382> F87=12 F90=9 <384> F87=30 F90=31			
	<385> F87=26 F90=50 <386> F87=60 F90=119 <483> F87=15 F90= <489> F87=1 F90=			
	<490> F87=1 F90=			
6505-00-299-9672	SILVER NITRATE APPLICATORS 6 INCH 100S	CO	3.14	D
	<301> F87=1 F90= <306> F87= F90=1 <308> F87=1 F90= <313> F87=1 F90=			
	<320> F87=1 F90=1 <380> F87=1 F90= <381> F87=1 F90=2 <382> F87=1 F90=1			
	<384> F87=1 F90=6 <385> F87=1 F90=10 <386> F87=1 F90=21 <483> F87=1 F90=			
	<485> F87= F90=1 <487> F87= F90=1 <488> F87=1 F90= <489> F87=1 F90=			
	<490> F87=1 F90=			

STOCK NUMBER / DMSB CONTROL NU	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-00-299-9673	ATROPINE SULFATE INJECTION USP 2ML PER CC 25ML	BT	0.80	D
	<308> F87=6 F90= <489> F87=1 F90= <490> F87=1 F90=			
6505-00-300-4657	LIDOCAINE HCL INJ USP 40MG PER ML 25ML VIAL FOR CONT IV INFUSION PG		1.06	D
	<301> F87=3 F90=3 <306> F87= F90=4 <308> F87=1 F90= <309> F87=1 F90=			
	<380> F87=21 F90=14 <381> F87=21 F90=14 <382> F87=44 F90=22 <384> F87=124 F90=135			
	<385> F87=94 F90=208 <386> F87=185 F90=414 <483> F87=50 F90=27 <484> F87=91 F90=160			
	<485> F87=184 F90=349 <488> F87=2 F90= <489> F87=1 F90= <490> F87=2 F90=1			
6505-00-388-8772	ALUMINUM HYDROXIDE GEL DRIED MAGNESIUM HYDROXGSIMETHICONE 1.5-60 BX		1.31	D
	<306> F87= F90=1 <309> F87=1 F90= <310> F87=1 F90=1 <311> F87=1 F90=1			
	<380> F87=1 F90= <381> F87=2 F90= <382> F87=3 F90=1 <384> F87=11 F90=10			
	<385> F87=1 F90=1 <386> F87=2 F90=3 <483> F87=1 F90=1 <484> F87=1 F90=1			
	<485> F87=2 F90=3 <487> F87= F90=1 <488> F87=1 F90= <489> F87=1 F90=			
	<490> F87=1 F90=1			
6505-00-400-2054 2-0879	CODEINE PHOSPHATE AND ACETAMINOPHEN TABLETS USP 100 TABLETS/BT AVAIL 3/84	BT	2.73	D
	<306> F87= F90=4 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=1			
	<311> F87=2 F90= <374> F87= F90=1 <380> F87=1 F90= <381> F87=27 F90=2			
	<382> F87=56 F90=8 <384> F87=182 F90=144 <385> F87=15 F90=23 <386> F87=27 F90=49			
	<483> F87=4 F90=26 <484> F87=173 F90=130 <485> F87=347 F90=275 <487> F87= F90=2			
	<489> F87= F90=4 <490> F87= F90=8			
6505-00-400-7294	FLURAZEPAM HYDROCHLORIDE CAPSULES USP 30 MG 500S	BT	14.06	D
	<306> F87= F90=1 <311> F87=1 F90= <381> F87=1 F90= <382> F87=1 F90=			
	<384> F87=1 F90=1 <483> F87=1 F90= <484> F87=1 F90= <489> F87=1 F90=			
	<490> F87=1 F90=			
6505-00-408-8935	DOXEPIN HYDROCHLORIDE CAPSULES USP 25MG EQUIVALENT 100 CAPS/BT	BT	3.45	D
	<306> F87= F90=1 <309> F87=1 F90=			
6505-00-420-7715	NITROFURANTOIN CAPSULES HARD MACRONIZED CRYSTALS 100MG 1000 P/BT DUE TO BULAR PROTECTED 60 MO DATING, WILL DROP TO 36 & DUE LONGER 112	DT	495.74	D
	<306> F87= F90=1 <316> F87=1 F90= <381> F87= F90=1 <382> F87= F90=1			
	<384> F87= F90=1 <385> F87= F90=1 <386> F87= F90=1 <489> F87= F90=1			
	<490> F87= F90=1			
6505-00-432-7047	KETAMINE HCL INJ USP EQUIV TO 50 MG KETAMINE BASE PER ML 10 ML	BT	5.61	D
	<301> F87=1 F90=5 <306> F87= F90=1 <380> F87=1 F90=1 <381> F87=1 F90=1			
	<382> F87=2 F90=1 <384> F87=4 F90=3 <385> F87=3 F90=5 <386> F87=7 F90=12			
	<483> F87=2 F90=1 <484> F87=3 F90=5 <485> F87=7 F90=13 <488> F87=5 F90=			
	<489> F87=5 F90= <490> F87=6 F90=			

STOCK NUMBER / DMSB CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-00-435-0377	FUROSEMIDE INJECTION USP 10 MG PER ML 2 ML 5S	PG	2.29	O
	<306> F87= F90=6 <308> F87=1 F90=2 <309> F87=1 F90=1 <313> F87=1 F90=			
	<380> F87=1 F90=4 <381> F87=1 F90=6 <382> F87=1 F90=12 <384> F87=1 F90=49			
	<385> F87=1 F90=88 <386> F87=1 F90=180 <483> F87=1 F90=20 <484> F87= F90=82			
	<485> F87= F90=182 <488> F87=1 F90= <490> F87= F90=3			
6505-00-491-7557	POVIDONE-IODINE CLEANSING SOLUTION USP 7.5% 4 FL OUNCES OR 118ML BT		0.39	D
	<301> F87=31 F90=29 <303> F87=2 F90=2 <306> F87= F90=14 <308> F87=1 F90=			
	<309> F87=1 F90=3 <310> F87=1 F90= <313> F87=16 F90= <316> F87=2 F90=			
	<370> F87=3 F90= <374> F87= F90=1 <380> F87=236 F90=148 <381> F87=270 F90=156			
	<382> F87=561 F90=226 <384> F87=1725 F90=1349 <385> F87=1089 F90=2308 <386> F87=2256 F90=4685			
	<417> F87=12 F90= <419> F87=1 F90= <436> F87=32 F90=32 <476> F87=4 F90=4			
	<483> F87=793 F90=409 <484> F87=1193 F90=2809 <485> F87=2966 F90=5826 <487> F87=1 F90=3			
	<488> F87=29 F90=5 <489> F87=37 F90=19 <490> F87=44 F90=43			
6505-00-527-6885	PROBENECID TABLETS USP 0.5 GRAM 100S	BT	3.20	O
	<306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<311> F87=1 F90= <316> F87=1 F90= <380> F87=1 F90= <381> F87=1 F90=			
	<382> F87=1 F90= <384> F87=1 F90= <385> F87=1 F90= <386> F87=1 F90=			
	<483> F87=1 F90= <484> F87=1 F90= <485> F87=1 F90= <487> F87= F90=1			
6505-00-530-6470	PREDNISONE TABLETS USP 5 MG 1000S	BT	6.84	O
	<306> F87= F90=1 <309> F87=1 F90= <310> F87=1 F90= <311> F87=1 F90=			
	<380> F87=1 F90= <381> F87=1 F90= <382> F87=1 F90= <384> F87=1 F90=1			
	<385> F87=1 F90=1 <386> F87=1 F90=1 <483> F87=1 F90= <484> F87=1 F90=2			
	<485> F87=1 F90=7 <487> F87= F90=2 <488> F87=1 F90= <489> F87=1 F90=			
	<490> F87=1 F90=			
6505-00-531-7761	DIGOXIN INJECTION USP .25 MG 2 MILLILITERS AMPUL 10 PER PG	PG	3.45	D
	<306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90= <313> F87=1 F90=			
	<380> F87=1 F90= <381> F87=1 F90= <382> F87=1 F90= <384> F87=1 F90=1			
	<385> F87=1 F90=1 <386> F87=1 F90=5 <483> F87=1 F90= <484> F87=1 F90=1			
	<485> F87=1 F90=4 <488> F87=1 F90= <489> F87=1 F90= <490> F87=1 F90=			
6505-00-543-4048	WATER FOR INJECTION STERILE USP 5ML AMPUL 25 AMPULS PER BOX	BX	4.69	O
	6505-00-090-1090 IS NOT CONTRACTABLE RECOMMEND DELETION NOV 88			
	<301> F87=1 F90=1 <306> F87= F90=12 <308> F87=1 F90=1 <309> F87=1 F90=1			
	<310> F87=1 F90= <380> F87=20 F90=12 <381> F87=31 F90=19 <382> F87=64 F90=31			
	<384> F87=176 F90=186 <385> F87=133 F90=273 <386> F87=279 F90=600 <483> F87=78 F90=77			
	<484> F87=181 F90=368 <485> F87=389 F90=780 <489> F87= F90=1 <490> F87= F90=10			

STOCK NUMBER / DMSO CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-00-550-6650	PUMICE USP POWDER FORM FLOUR 1LB	CO	1.34	0
	<370> F87= F90=1 <373> F87=1 F90=			
6505-00-559-6734	PREDNISOLONE TABLETS USP 5 MG 1000S	BT	19.71	Y
	ID			
	<308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90= <311> F87=1 F90=			
	<380> F87=1 F90= <381> F87=1 F90= <382> F87=1 F90= <384> F87=1 F90=			
	<385> F87=1 F90= <386> F87=1 F90= <483> F87=1 F90= <485> F87=1 F90=			
6505-00-559-8456	SODIUM CHLORIDE INJECTION USP .9% 5ML 25 PER BOX	BX	4.23	0
	<306> F87= F90=1 <309> F87=1 F90=1 <310> F87=1 F90= <380> F87=1 F90=			
	<381> F87=1 F90= <382> F87=1 F90=1 <384> F87=2 F90=4 <385> F87=1 F90=3			
	<386> F87=1 F90=7 <483> F87=1 F90=16 <484> F87=36 F90=61 <485> F87=50 F90=139			
	<488> F87=13 F90= <489> F87=12 F90= <490> F87=17 F90=1			
6505-00-559-9811	SUCCINYLCHOLINE CHLORIDE INJECTION USP 20MG/ML 10ML VIAL	VI	0.48	0
	<301> F87=15 F90=21 <306> F87= F90=2 <380> F87=111 F90=85 <381> F87=111 F90=85			
	<382> F87=228 F90=120 <384> F87=582 F90=581 <385> F87=473 F90=943 <386> F87=1019 F90=2035			
	<483> F87=288 F90=157 <484> F87=474 F90=953 <485> F87=1029 F90=2057 <488> F87=9 F90=7			
	<489> F87=9 F90=7 <490> F87=11 F90=16			
6505-00-560-7331	SULFADIAZINE SILVER CREAM 1% TOPICAL 400GM JAR	JR	11.35	0
	<306> F87= F90=3 <308> F87=1 F90=1 <309> F87=1 F90=1 <310> F87=1 F90=1			
	<311> F87=1 F90=1 <312> F87=11 F90=2 <380> F87=3 F90=1 <381> F87=9 F90=1			
	<382> F87=19 F90=2 <384> F87=352 F90=467 <385> F87=20 F90=40 <386> F87=42 F90=86			
	<412> F87=2 F90= <483> F87=26 F90=14 <484> F87=63 F90=167 <485> F87=79 F90=217			
	<487> F87=1 F90=3 <488> F87=1 F90= <489> F87=1 F90=1 <490> F87=1 F90=2			
6505-00-576-9120	SULFACETAMIDE SODIUM OPHTHALMIC SOLUTION MODIFIED 15% 15ML	BT	0.61	0
	<306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<311> F87=1 F90= <319> F87=1 F90=1 <380> F87=1 F90= <381> F87=1 F90=			
	<382> F87=1 F90= <384> F87=2 F90=4 <385> F87=1 F90=1 <386> F87=1 F90=4			
	<419> F87=1 F90= <483> F87=1 F90=1 <484> F87=2 F90=1 <485> F87=6 F90=6			
	<487> F87= F90=1			
6505-00-579-8432	HEPARIN SODIUM INJECTION USP 20000 UNITS PER ML 2ML VIAL 12/PG	PG	16.81	0
	<306> F87= F90=5 <309> F87= F90=1 <380> F87= F90=10 <381> F87= F90=11			
	<382> F87= F90=14 <384> F87= F90=154 <385> F87= F90=183 <386> F87= F90=390			
	<483> F87= F90=29 <484> F87=1 F90=131 <485> F87=194 F90=268 <489> F87= F90=1			
	<490> F87= F90=4			

STOCK NUMBER / DNSB CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-00-579-3717	HYDROXYZINE HYDROCHLORIDE TABLETS USP 25MG 500 TABLETS/BOTTLE	DT	3.83 D	
	<306> F87= F90=1 <309> F87=1 F90= <310> F87=1 F90= <311> F87=1 F90=			
	<380> F87=1 F90= <381> F87=1 F90= <382> F87=1 F90= <384> F87=2 F90=1			
	<385> F87=1 F90= <386> F87=1 F90= <483> F87=1 F90= <484> F87=1 F90=			
	<485> F87=2 F90=1 <487> F87= F90=1 <488> F87=1 F90= <489> F87=1 F90=			
	<490> F87=1 F90=			
6505-00-582-4190 1-1227	BACITRACIN OPHTHALMIC OINTMENT USP 500 UNITS .125 OUNCES AVAL 11/85	TU	0.57 D	
	<306> F87= F90=3 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<311> F87=1 F90= <319> F87=1 F90=1 <380> F87=1 F90= <381> F87=3 F90=1			
	<382> F87=7 F90=4 <384> F87=25 F90=48 <385> F87=10 F90=29 <386> F87=20 F90=57			
	<419> F87=1 F90= <483> F87=5 F90=19 <484> F87=54 F90=58 <485> F87=128 F90=156			
	<487> F87= F90=1 <489> F87= F90=1 <490> F87= F90=2			
6505-00-582-4679	PILOCARPINE HYDROCHLORIDE OPHTHALMIC SOLUTION USP 2% 15 ML	BT	0.83 D	
	<306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<311> F87=1 F90= <319> F87=1 F90=1 <380> F87=1 F90= <381> F87=1 F90=			
	<382> F87=1 F90= <384> F87=1 F90=1 <385> F87=1 F90= <386> F87=1 F90=1			
	<419> F87=1 F90= <483> F87=1 F90= <484> F87=1 F90= <485> F87=3 F90=1			
	<487> F87= F90=1			
6505-00-582-4735	ATROPINE SULFATE OPHTHALMIC SOLUTION USP 1% 15ML	BT	1.50 D	
	<306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<311> F87=1 F90= <319> F87=1 F90=1 <380> F87=1 F90= <381> F87=1 F90=			
	<382> F87=1 F90= <384> F87=3 F90=6 <385> F87=1 F90=3 <386> F87=3 F90=6			
	<419> F87=1 F90= <483> F87=1 F90=1 <484> F87=5 F90=2 <485> F87=12 F90=9			
	<487> F87= F90=1			
6505-00-582-4737	TETRACAINE HYDROCHLORIDE OPHTHALMIC SOLUTION 0.5% 15 ML	BT	0.69 D	
	<306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<311> F87=1 F90= <315> F87= F90=2 <319> F87=1 F90=1 <380> F87=1 F90=			
	<381> F87=1 F90= <382> F87=2 F90=1 <384> F87=5 F90=4 <385> F87=3 F90=1			
	<386> F87=6 F90=4 <419> F87=1 F90= <483> F87=3 F90=3 <484> F87=7 F90=8			
	<485> F87=10 F90=24 <487> F87= F90=1			
6505-00-582-5182	LIDOCAINE HCL & EPINEPHRINE INJ USP 1% 20ML 5S	BX	2.03 D	
	<301> F87=1 F90=1 <306> F87= F90=1 <308> F87=1 F90=1 <311> F87=1 F90=			
	<318> F87=1 F90=1 <320> F87=1 F90=1 <380> F87=1 F90=1 <381> F87=1 F90=1			
	<382> F87=1 F90= <384> F87=3 F90=1 <385> F87=1 F90=1 <386> F87=1 F90=2			
	<417> F87=1 F90= <483> F87=1 F90= <484> F87=3 F90=5 <485> F87=9 F90=15			
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STOCK NUMBER / UNSB CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-00-502-5370	PROCAINAMIDE HYDROCHLORIDE CAPSULES USP 250MG 100S	OT	1.59	D
	<306> F87= F90=1 <309> F87=1 F90= <310> F87=1 F90= <313> F87=1 F90=			
	<380> F87=1 F90= <381> F87=1 F90= <382> F87=1 F90= <384> F87=1 F90=			
	<385> F87=1 F90= <386> F87=1 F90= <483> F87=1 F90= <484> F87=1 F90=			
	<485> F87=1 F90=			
6505-00-504-0413	ESTROGENS CONJUGATED TABLETS USP 0.625MG 100 TABLETS PER BOTTLE	OT	3.65	D
	<306> F87= F90=1 <316> F87=2 F90= <381> F87= F90=1 <382> F87= F90=1			
	<384> F87= F90=1 <385> F87= F90=1 <386> F87= F90=1 <489> F87= F90=1			
	<490> F87= F90=1			
6505-00-504-2339	PHENYTOIN SODIUM CAPSULES EXTENDED USP 100 MG 1000S	BT	15.33	D
	<306> F87= F90=1 <309> F87=1 F90= <310> F87=1 F90= <311> F87=1 F90=			
	<380> F87=1 F90= <381> F87=1 F90= <382> F87=1 F90= <384> F87=2 F90=3			
	<385> F87=1 F90=1 <386> F87=1 F90=5 <483> F87=1 F90=1 <484> F87=1 F90=8			
	<485> F87=2 F90=20 <487> F87=1 F90=1 <488> F87=1 F90= <489> F87=1 F90=			
	<490> F87=1 F90=			
6505-00-504-2895	HYDRALAZINE HYDROCHLORIDE TABLETS USP 25 MG 1000S	BT	5.36	D
	<306> F87= F90=1 <309> F87=1 F90= <310> F87=1 F90= <313> F87=1 F90=			
	<380> F87=1 F90= <381> F87=1 F90= <382> F87=1 F90= <384> F87=1 F90=			
	<385> F87=1 F90= <386> F87=1 F90= <483> F87=1 F90= <484> F87=1 F90=			
	<485> F87=1 F90=			
6505-00-598-5830	ANTIPYRINE AND BENZOCAINE OTIC SOLUTION USP 10ML	BT	1.52	D
	PEP ACTION CHANGE TO 10 ML - AUG 88			
	<306> F87= F90=1 <308> F87=1 F90= <320> F87= F90=1 <380> F87=1 F90=			
	<381> F87=1 F90= <382> F87=1 F90= <384> F87=1 F90= <385> F87=1 F90=			
	<386> F87=1 F90= <483> F87=1 F90= <487> F87= F90=1			
6505-00-598-6116	LIDOCAINE HYDROCHLORIDE INJECTION USP 10MG PER ML 50ML	BT	0.43	D
	<301> F87=1 F90=1 <306> F87= F90=6 <308> F87=3 F90=6 <309> F87=1 F90=1			
	<310> F87=1 F90= <311> F87=1 F90= <313> F87=1 F90=1 <318> F87=1 F90=1			
	<320> F87=1 F90=1 <380> F87=12 F90=27 <381> F87=12 F90=25 <382> F87=26 F90=31			
	<384> F87=77 F90=211 <385> F87=53 F90=283 <386> F87=105 F90=587 <417> F87=1 F90=			
	<483> F87=33 F90=47 <484> F87=77 F90=440 <485> F87=165 F90=1039 <487> F87=1 F90=1			
	<488> F87=2 F90= <489> F87=1 F90= <490> F87=2 F90=3			
6505-00-616-7478	IUPANUIC ACID TABLETS USP 0.5GM INDIVIDUALLY SEALED 150	TABS/BX BX	54.33	D
	<305> F87=1 F90=1 <307> F87=1 F90=1 <380> F87=1 F90= <381> F87=1 F90=			
	<382> F87=1 F90= <384> F87=1 F90=2 <385> F87=1 F90=1 <386> F87=1 F90=1			
	<483> F87=1 F90= <487> F87= F90=1 <489> F87= F90=1 <490> F87= F90=1			

STOCK NUMBER / OMSB CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-00-619-9215	SODIUM PHOSPHATES ENEMA USP DISP ENEMA UNIT 4-1/2 FL OZ (133 ML) BT	BT	0.41	D
	<301> F87=1 F90= <306> F87= F90=2 <308> F87=1 F90= <309> F87=1 F90=			
	<310> F87=1 F90= <313> F87=30 F90=12 <380> F87=7 F90=1 <381> F87=47 F90=28			
	<382> F87=96 F90=29 <384> F87=135 F90=135 <385> F87=108 F90=212 <386> F87=208 F90=413			
	<483> F87=60 F90= <484> F87=1 F90=2 <485> F87=1 F90=2 <487> F87= F90=6			
	<489> F87= F90=5 <490> F87= F90=5			
6505-00-655-8355	TETRACYCLINE HYDROCHLORIDE CAPSULES USP 250MG 100 CAPSULES/BT SHOULD BE 120 MONTHS SL	BT	2.50	D
	<306> F87= F90=2 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<311> F87=1 F90= <374> F87= F90=1 <380> F87=1 F90= <381> F87=4 F90=2			
	<382> F87=8 F90=4 <384> F87=17 F90=22 <385> F87=1 F90=2 <386> F87=3 F90=7			
	<483> F87=1 F90=4 <484> F87=22 F90=9 <485> F87=48 F90=22 <487> F87=1 F90=2			
	<488> F87=1 F90= <489> F87=1 F90=2 <490> F87=1 F90=4			
6505-00-660-1664	CHLORPROMAZINE HYDROCHLORIDE SOLUTION 30MG/ML 4OZ OR 118ML	PG	2.46	D
	<306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<380> F87=1 F90= <381> F87=1 F90= <382> F87=1 F90= <384> F87=1 F90=1			
	<385> F87=1 F90=1 <386> F87=1 F90=3 <483> F87=1 F90= <484> F87=1 F90=1			
	<485> F87= F90=3			
6505-00-664-0857	ACETAZOLAMIDE TABLETS USP 250 MG 100S	BT	2.96	D
	<306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<311> F87=1 F90= <319> F87=1 F90=1 <380> F87=1 F90= <381> F87=1 F90=			
	<382> F87=1 F90= <384> F87=1 F90= <385> F87=1 F90= <386> F87=1 F90=			
	<419> F87=1 F90= <483> F87=1 F90= <484> F87=1 F90= <485> F87=1 F90=			
	<487> F87= F90=1			
6505-00-680-1907	BENZTROPINE MESYLATE TABLETS USP 2 MG 100S SERVICES APPROVED DELETION D-DAY 1-4-90	BT	17.52	Y
	<311> F87=1 F90= <381> F87=1 F90= <382> F87=1 F90= <384> F87=2 F90=			
	<483> F87=1 F90= <484> F87=1 F90=			
6505-00-680-7352	PROMETHAZINE HYDROCHLORIDE INJECTION USP 25MG/ML 1ML AMPUL 25/BX BX	BX	6.29	D
	<306> F87= F90=8 <308> F87=1 F90=1 <309> F87=1 F90=1 <310> F87=1 F90=			
	<380> F87=8 F90=7 <381> F87=13 F90=9 <382> F87=26 F90=13 <384> F87=81 F90=85			
	<385> F87=52 F90=105 <386> F87=110 F90=236 <483> F87=31 F90=25 <484> F87=48 F90=107			
	<485> F87=100 F90=222 <487> F87=1 F90=1 <488> F87=1 F90= <489> F87=1 F90=			
	<490> F87=1 F90=3			

STOCK NUMBER DMSB CONTROL NO	NOMENCLATURE COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-00-682-0194	TRIAMCINOLONE ACETONIDE CREAM USP TOPICAL 0.1% 15 GM	TU	0.42	D
	<306> F87= F90=4 <311> F87=1 F90= <301> F87=1 F90=1 <382> F87=1 F90=6			
	<384> F87=1 F90=33 <386> F87= F90=2 <483> F87=1 F90= <487> F87= F90=2			
	<489> F87=1 F90=3 <490> F87=1 F90=8			
6505-00-685-5109 S-0304	TETANUS TOXOID ADSORBED USP 5ML VIAL	VI	2.20	D
	REPLACES 6505-00-680-2433 ON 0-DAY			
	<306> F87= F90=1 <308> F87=1 F90=8 <380> F87=2 F90=15 <381> F87=2 F90=15			
	<382> F87=3 F90=15 <384> F87=9 F90=125 <385> F87=6 F90=175 <386> F87=13 F90=361			
	<483> F87=4 F90= <488> F87= F90=1 <489> F87= F90=1 <490> F87=1 F90=1			
6505-00-685-5425	HYDRALAZINE HYDROCHLORIDE INJECTION USP 20 MG 1 ML 5S	BX	4.33	D
	<306> F87= F90=1 <309> F87=1 F90= <380> F87=1 F90= <381> F87=1 F90=			
	<382> F87=1 F90= <384> F87=1 F90= <385> F87=1 F90= <386> F87=1 F90=			
	<483> F87=1 F90=			
6505-00-687-4049	CYANOCOBALAMIN INJECTION USP 1000 MICROGRAMS PER ML 10 ML	VI	0.57	D
	<306> F87= F90=1 <309> F87=1 F90= <310> F87=1 F90= <380> F87=1 F90=			
	<381> F87=1 F90= <382> F87=1 F90= <384> F87=1 F90=2 <385> F87=2 F90=			
	<386> F87=3 F90= <483> F87=1 F90= <484> F87=5 F90=6 <485> F87=10 F90=14			
	<488> F87=11 F90= <489> F87=10 F90= <490> F87=14 F90=			
6505-00-687-4535	CALAMINE LOTION PHENOLATED USP 4 FL OZ (118 ML)	BT	0.31	D
	<489> F87=1 F90= <490> F87=1 F90=			
6505-00-689-5532 2-0189	HOMATROPINE HYDROBROMIDE OPHTHALMIC SOLUTION USP 5% 15ML BOTTLE	BT	0.99	D
	<306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<311> F87=1 F90= <319> F87=1 F90=1 <380> F87=1 F90= <381> F87=1 F90=			
	<382> F87=1 F90= <384> F87=2 F90=4 <385> F87=1 F90=1 <386> F87=2 F90=4			
	<419> F87=1 F90= <483> F87=1 F90=1 <484> F87=4 F90=1 <485> F87=9 F90=6			
	<487> F87= F90=1			
6505-00-720-2626	FLURANDRENOLIDE OINTMENT USP 0.05% 15 GRAM	TU	6.00	D
	<306> F87= F90=4 <320> F87=1 F90=1 <381> F87= F90=1 <382> F87=1 F90=7			
	<384> F87=1 F90=33 <385> F87=1 F90=4 <386> F87=1 F90=18 <483> F87=1 F90=5			
	<484> F87= F90=6 <485> F87= F90=19 <487> F87= F90=1 <488> F87=1 F90=			
	<489> F87=1 F90=3 <490> F87=1 F90=8			

STOCK NUMBER / OMSB CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-00-753-5042	STREPTOMYCIN SULFATE STERILE USP POWDER FORM 1GM BOTTLE REMOVED FROM D-DAY LIST 9/85WITHOUT REPLACEMENT	BT	0.88 D	
	<488> F87=1 F90= <489> F87=1 F90= <490> F87=1 F90=			
6505-00-753-7902	PROPARACAINE HYDROCHLORIDE OPHTHALMIC SOLUTION USP 0.5% 15 ML	BT	0.82 D	
	<315> F87=2 F90=			
6505-00-754-0280	CHLORAMPHENICOL SODIUM SUCCINATE STERILE USP 1 GRAM VIAL 10/BOX	BX	11.44 D	
	<301> F87=1 F90= <306> F87= F90=8 <308> F87=1 F90= <309> F87=1 F90=1			
	<310> F87=1 F90= <380> F87=8 F90=7 <381> F87=13 F90=9 <382> F87=27 F90=14			
	<384> F87=73 F90=78 <385> F87=55 F90=113 <386> F87=116 F90=252 <483> F87=32 F90=33			
	<484> F87=76 F90=154 <485> F87=162 F90=326 <487> F87=1 F90= <488> F87=2 F90=			
	<489> F87=1 F90= <490> F87=2 F90=3			
6505-00-754-0374	POVIDONE-IODINE TOPICAL SOLUTION USP 1GL (3.780 LITER)	BT	5.64 D	
	<301> F87=1 F90=1 <306> F87= F90=2 <308> F87=1 F90=2 <309> F87=1 F90=1			
	<310> F87=1 F90= <311> F87=1 F90=1 <312> F87=17 F90=2 <318> F87=1 F90=			
	<320> F87= F90=1 <380> F87=8 F90=11 <381> F87=9 F90=11 <382> F87=19 F90=13			
	<384> F87=239 F90=244 <385> F87=34 F90=116 <386> F87=70 F90=242 <412> F87=1 F90=			
	<483> F87=30 F90=18 <484> F87=58 F90=106 <485> F87=109 F90=209 <487> F87=1 F90=2			
	<488> F87=3 F90= <489> F87=3 F90=2 <490> F87=3 F90=4			
6505-00-754-2547	ATROPINE SULFATE INJECTION USP 0.4 MG PER ML 20 ML	VI	0.40 D	
	<301> F87=4 F90=5 <306> F87= F90=2 <308> F87=1 F90= <309> F87=6 F90=5			
	<313> F87=2 F90= <380> F87=28 F90= <381> F87=28 F90=1 <382> F87=57 F90=12			
	<384> F87=145 F90=145 <385> F87=118 F90=234 <386> F87=255 F90=508 <483> F87=72 F90=39			
	<484> F87=119 F90=237 <485> F87=237 F90=513 <488> F87=3 F90=1 <489> F87=1 F90=1			
	<490> F87=1 F90=3			
6505-00-754-2797	SULFASALAZINE TABLETS USP 0.500GM 500 TABLETS PER BOTTLE	BT	18.34 D	
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	<384> F87=1 F90= <385> F87=1 F90= <386> F87=1 F90= <483> F87=1 F90=			
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6505-00-761-1506	ISOSORBIDE DINITRATE TABLETS MODIFIED 10MG 500 TABLETS/BOTTLE	BT	2.01 D	
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	<380> F87=1 F90= <381> F87=1 F90= <382> F87=1 F90= <384> F87=1 F90=			
	<385> F87=1 F90= <386> F87=1 F90= <483> F87=1 F90= <484> F87=1 F90=			
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STOCK NUMBER / DNSB CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-00-763-6821	IODOXURIDINE OPHTHALMIC SOLUTION USP 0.1% 15 ML DROPPER BOTTLE	BT	11.37	L
	<306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<311> F87=1 F90= <319> F87=1 F90=1 <380> F87=1 F90= <381> F87=1 F90=			
	<382> F87=1 F90= <384> F87=1 F90= <385> F87=1 F90= <386> F87=1 F90=			
	<419> F87=1 F90= <483> F87=1 F90= <484> F87=1 F90= <485> F87=1 F90=			
	<487> F87= F90=1			
6505-00-764-3313	CHLORZOXAZONE AND ACETAMINOPHEN TABLETS USP 500S	BT	16.75	Y
	<309> F87=1 F90= <310> F87=1 F90= <311> F87=1 F90= <380> F87=1 F90=			
	<381> F87=1 F90= <382> F87=1 F90= <384> F87=6 F90= <385> F87=1 F90=			
	<386> F87=1 F90= <483> F87=1 F90= <484> F87=3 F90= <485> F87=6 F90=			
6505-00-782-6484	SODA LIME NF POWDER CARTRIDGE DISP 2.5LB GRNDLR SZ BET 468 MESH	EA	5.37	D
	<301> F87=5 F90=8 <380> F87=36 F90=34 <381> F87=36 F90=34 <382> F87=74 F90=5C			
	<384> F87=191 F90=196 <385> F87=153 F90=314 <386> F87=339 F90=690 <483> F87=95 F90=39			
	<484> F87=103 F90=216 <485> F87=233 F90=467 <488> F87=4 F90=4 <489> F87=3 F90=4			
	<490> F87=4 F90=7			
6505-00-783-7218	DIAZEPAM TABLETS USP 5MG 500S	BT	3.73	D
	SHOULD BE AAC Q			
	<306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<311> F87=1 F90= <374> F87= F90=1 <380> F87=1 F90= <381> F87=1 F90=1			
	<382> F87=1 F90=1 <384> F87=5 F90=2 <385> F87=1 F90=1 <386> F87=1 F90=2			
	<403> F87=1 F90=2 <484> F87=4 F90=4 <485> F87=8 F90=10 <487> F87= F90=2			
	<488> F87=1 F90= <489> F87=1 F90=1 <490> F87=1 F90=1			
6505-00-785-0307 4-0830	BENZTROPINE MESYLATE INJECTION USP 1MG/ML 2ML AMPUL 6 AMPULES/PG	PG	11.49	L
	NOT LISTED IN GWOA			
	<306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<380> F87=1 F90= <381> F87=1 F90=1 <382> F87=2 F90=1 <384> F87=2 F90=4			
	<385> F87=1 F90=9 <386> F87=1 F90=18 <483> F87=1 F90=2 <484> F87=1 F90=8			
	<485> F87= F90=18 <490> F87= F90=1			
6505-00-785-4357	LIDOCAINE OINTMENT USP 5% 35 GM	TU	0.77	D
	<301> F87=2 F90=2 <306> F87= F90=4 <308> F87=1 F90= <320> F87=1 F90=1			
	<380> F87=12 F90=10 <381> F87=12 F90=10 <382> F87=25 F90=16 <384> F87=58 F90=59			
	<385> F87=52 F90=104 <386> F87=107 F90=219 <483> F87=32 F90=11 <484> F87=32 F90=68			
	<485> F87=69 F90=145 <488> F87=1 F90= <489> F87=1 F90= <490> F87=1 F90=1			
6505-00-809-0241	DOCUSATE SODIUM CAPSULES USP 100 MG 1000S	BT	6.51	D
	<306> F87= F90=1 <309> F87=1 F90= <310> F87=1 F90= <311> F87=1 F90=			
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	<490> F87=1 F90=			

STOCK NUMBER / DMSH CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-00-812-2556	PHENOBARBITAL SODIUM INJ USP 130MG PER ML CART-NDL 1 ML 10S WAIT FOR CHGE IN HOLDER W/ BROADENED COMPETITION	BX	12.35	D
	<306> F87= F90=5 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=1 <380> F87=10 F90=1 <381> F87=15 F90=3 <382> F87=31 F90=7 <384> F87=92 F90=36 <385> F87=61 F90=72 <386> F87=139 F90=140 <483> F87=36 F90=19 <484> F87=122 F90=63 <485> F87=268 F90=141 <488> F87=1 F90= <489> F87=1 F90=1 <490> F87=1 F90=4			
6505-00-812-2576 3-2515	MORPHINE SULFATE INJECTION USP 10MG/ML 1ML AMPUL 25 PER PACKAGE SHELF LIFE ENHANCEMENT PROGRAM, SL NOW 96MOS (R241500Z SEP 87)	PG	5.69	D
	<301> F87= F90=1 <306> F87= F90=12 <308> F87=6 F90=3 <309> F87=8 F90=4 <310> F87=6 F90=1 <380> F87=132 F90=41 <381> F87=204 F90=52 <382> F87=419 F90=73 <384> F87=1324 F90=557 <385> F87=852 F90=708 <386> F87=1794 F90=1523 <483> F87=497 F90=133 <484> F87=772 F90=704 <485> F87=1631 F90=1448 <487> F87=1 F90=1 <488> F87=3 F90= <489> F87=2 F90=11 <490> F87=3 F90=25			
6505-00-853-4797	IMIPRAMINE HYDROCHLORIDE TABLETS USP 25MG 100 TABLETS PER BOTTLE	BT	1.10	D
	<306> F87= F90=1 <311> F87=1 F90= <381> F87=1 F90= <382> F87=1 F90= <384> F87=1 F90=2 <483> F87=1 F90= <484> F87=1 F90=			
6505-00-854-2499	PHYTONADIONE INJECTION 10 MG 1ML 6S	BX	18.56	D
	<306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90= <380> F87=1 F90= <381> F87=1 F90= <382> F87=1 F90= <384> F87=1 F90=4 <385> F87=1 F90= <386> F87=1 F90= <483> F87=1 F90=1 <484> F87=8 F90=11 <485> F87=17 F90=25 <488> F87=1 F90= <489> F87=1 F90= <490> F87=1 F90=			
6505-00-854-2504	HALOTHANE USP 125 ML SERVICES APPROVED FOR 0-DAY 1-4-90	BT	9.20	D
	<301> F87= F90=3 <380> F87= F90=13 <381> F87= F90=13 <382> F87= F90=20 <384> F87= F90=75 <385> F87= F90=121 <386> F87= F90=265 <483> F87= F90=15 <484> F87= F90=83 <485> F87= F90=180 <488> F87= F90=1 <489> F87= F90=1 <490> F87= F90=3			
6505-00-855-6984	MEPERIDINE HYDROCHLORIDE INJECTION USP 100MG/ML 1ML UNIT 10/80X WAIT FOR CHGE IN HOLDER	0X	3.74	0
	<301> F87= F90=1 <306> F87= F90=16 <308> F87=2 F90=3 <309> F87=3 F90=3 <310> F87=2 F90=1 <380> F87=51 F90=46 <381> F87=78 F90=55 <382> F87=161 F90=77 <384> F87=509 F90=546 <385> F87=328 F90=693 <386> F87=690 F90=1502 <483> F87=191 F90=133 <484> F87=297 F90=686 <485> F87=627 F90=1413 <487> F87=1 F90=1 <488> F87=30 F90= <489> F87=30 F90=9 <490> F87=39 F90=25			
6505-00-865-2401	CALCIUM CHLORIDE INJECTION USP 10% 10ML AMPUL AVAL 4/86	PG	9.86	D
	<301> F87=1 F90= <306> F87= F90=1 <309> F87=1 F90= <310> F87=1 F90= <380> F87=10 F90= <381> F87=14 F90= <382> F87=28 F90= <384> F87=56 F90= <385> F87=56 F90= <386> F87=116 F90= <483> F87=37 F90= <484> F87=593 F90= <485> F87=1207 F90= <488> F87=5 F90= <489> F87=5 F90= <490> F87=6 F90=			

STOCK NUMBER / UNSB CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-00-889-7927	HYDROCHLOROTHIAZIDE TABLETS USP 50 MG 1000S	BT	3.56	D
	<306> F87= F90=1 <309> F87=1 F90= <310> F87=1 F90= <313> F87=1 F90=			
	<380> F87=1 F90= <381> F87=1 F90= <382> F87=1 F90= <384> F87=1 F90=			
	<385> F87=1 F90= <386> F87=1 F90= <483> F87=1 F90= <484> F87=1 F90=			
	<485> F87=1 F90=			
6505-00-889-9033	BISACODYL SUPPOSITORIES USP 10MG ADULT RECTAL I.S.50 PER PACKAGE PG		1.63	D
	<306> F87= F90=1 <309> F87=1 F90= <310> F87=1 F90=1 <311> F87=1 F90=			
	<380> F87=1 F90= <381> F87=1 F90= <382> F87=2 F90= <384> F87=5 F90=4			
	<385> F87=1 F90= <386> F87=1 F90=1 <483> F87=1 F90= <484> F87=1 F90=			
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6505-00-889-9034	BISACODYL TABLETS USP 5MG FILM ENTERIC 1000 TABLETS PER BOTTLE	BT	4.92	D
	<306> F87= F90=1 <309> F87=1 F90= <310> F87=1 F90= <311> F87=1 F90=			
	<380> F87=1 F90= <381> F87=1 F90= <382> F87=1 F90= <384> F87=1 F90=			
	<385> F87=1 F90= <386> F87=1 F90= <483> F87=1 F90= <484> F87=1 F90=			
	<485> F87=1 F90= <487> F87= F90=1			
6505-00-890-1355	MEDROXYPROGESTERONE ACETATE TABLETS USP 10MG 100 TABLETS/BOTTLE	BT	8.57	D
	<306> F87= F90=1 <316> F87=1 F90= <381> F87= F90=1 <382> F87= F90=1			
	<384> F87= F90=1 <385> F87= F90=1 <386> F87= F90=1 <484> F87= F90=1			
	<490> F87= F90=1			
6505-00-890-1496	PREDNISOLONE SODIUM PHOSPHATE INJECTION USP 20 MG PER ML 5 ML	BT	11.45	D
	<484> F87=1 F90= <490> F87=1 F90=			
6505-00-890-1633	ALUMINUM ACETATE SOLUTION TABLETS EFFERVESCENT I.S. 100 TABS/PG	PG	9.42	D
	<306> F87= F90=1 <308> F87=1 F90= <310> F87=1 F90= <311> F87=1 F90=			
	<320> F87= F90=1 <380> F87=1 F90= <381> F87=2 F90= <382> F87=3 F90=			
	<384> F87=2 F90= <385> F87=1 F90= <386> F87=1 F90= <483> F87=1 F90=			
	<437> F87= F90=1 <484> F87=1 F90= <490> F87=1 F90=			
6505-00-890-1657	KAOLIN & PECTIN MIXTURE DEHYDRATED 53.2GM BOTTLE POWDER	BT	1.24	D
	TERMINAL STATUS NOV 89 - SWITCHED TO KAOPECTATE TABLETS			
	<306> F87= F90=11 <309> F87=1 F90= <310> F87=1 F90= <311> F87=2 F90=1			
	<380> F87=2 F90= <381> F87=33 F90=6 <382> F87=67 F90=21 <384> F87=211 F90=216			
	<385> F87=23 F90=39 <386> F87=35 F90=86 <483> F87=16 F90=21 <484> F87=19 F90=21			
	<485> F87=37 F90=67 <487> F87= F90=4 <489> F87=1 F90=7 <490> F87=1 F90=19			

STOCK NUMBER / OMSU CONTROL NU	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-00-890-1764	PLASMA PROTEIN FRACTION USP HEAT-TREATED 5% SOLUTION 250 ML	PG	29.19	D
	<306> F87=12 F90=12			
6505-00-890-1840	METRONIDAZOLE TABLETS USP 250MG 250 TABLETS PER BOTTLE	BT	1.28	D
	<306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<311> F87=1 F90= <316> F87=4 F90= <380> F87=1 F90= <381> F87=1 F90=			
	<382> F87=1 F90= <384> F87=3 F90=2 <385> F87=1 F90= <386> F87=1 F90=			
	<403> F87=1 F90= <484> F87=2 F90= <485> F87=5 F90=1 <487> F87= F90=1			
6505-00-890-1856	METHYLDOPA TABLETS USP 250MG 100 TABLETS PER BOTTLE	BT	3.97	D
	<306> F87= F90=1 <309> F87=1 F90= <310> F87=1 F90= <313> F87=1 F90=			
	<380> F87=1 F90= <381> F87=1 F90= <382> F87=1 F90= <384> F87=1 F90=			
	<385> F87=1 F90= <386> F87=1 F90= <403> F87=1 F90= <484> F87=1 F90=			
	<485> F87=1 F90=			
6505-00-890-1975	GLOBULIN TETANUS IMMUNE USP 250 UNITS	VI	3.72	D
	<306> F87=6 F90=8 <308> F87=1 F90=1 <380> F87=1 F90= <381> F87=1 F90=			
	<382> F87=1 F90= <384> F87=3 F90=19 <385> F87=2 F90=23 <386> F87=4 F90=60			
	<403> F87=1 F90=			
6505-00-890-2172	PENICILLIN G POTASSIUM STERILE USP 20000000 UNITS	BT	4.38	D
	<301> F87=1 F90= <306> F87= F90=17 <308> F87=2 F90=5 <309> F87=4 F90=5			
	<310> F87=3 F90=2 <380> F87=67 F90=71 <381> F87=103 F90=85 <382> F87=213 F90=116			
	<384> F87=587 F90=767 <385> F87=442 F90=1144 <386> F87=931 F90=2458 <403> F87=259 F90=282			
	<484> F87=605 F90=1526 <485> F87=1298 F90=3224 <487> F87=1 F90= <488> F87=9 F90=			
	<489> F87=8 F90=15 <490> F87=11 F90=36			
6505-00-900-0354	OXACILLIN SODIUM F/INJECTION USP EQUIV TO 1GM OXACILLIN REPLACE WITH 01-259-1745 (1 FOR 10)	VI	1.41	D
	<301> F87=12 F90= <308> F87=37 F90= <309> F87=60 F90= <310> F87=45 F90=			
	<380> F87=999 F90= <381> F87=1550 F90= <382> F87=3191 F90= <384> F87=8809 F90=			
	<385> F87=6632 F90= <386> F87=13960 F90= <403> F87=3885 F90= <484> F87=9074 F90=			
	<485> F87=19471 F90= <487> F87=4 F90= <488> F87=253 F90= <489> F87=252 F90=			
	<490> F87=315 F90=			
6505-00-904-0119	BARIUM SULFATE FOR SUSPENSION USP POWDER 25LB OR 11.340KG	PG	58.03	D
	<307> F87=1 F90=1 <380> F87=1 F90= <381> F87=1 F90= <382> F87=1 F90=			
	<384> F87=1 F90=1 <385> F87=3 F90=1 <386> F87=1 F90=2 <403> F87=1 F90=			
	<487> F87= F90=1 <488> F87=1 F90= <489> F87=1 F90=1 <490> F87=1 F90=1			

STOCK NUMBER / ONSU CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-00-914-1742	MEPIVACAINE HYDROCHLORIDE INJECTION USP 1.5MG PER ML 30ML	BT	4.44 D	
	<301> F87=2 F90= <306> F87= F90=1 <380> F87=12 F90= <381> F87=12 F90=			
	<382> F87=26 F90= <384> F87=134 F90=4 <385> F87=58 F90=2 <386> F87=104 F90=6			
	<483> F87=34 F90=1 <484> F87=77 F90=4 <485> F87=169 F90=10 <488> F87=4 F90=			
	<489> F87=4 F90= <490> F87=4 F90=			
6505-00-914-3593	POVIDONE-IODINE TOPICAL SOL USP 10% 1/2 FL OZ (14.8 ML) SOS	BX	7.40 D	
	<301> F87=1 F90= <306> F87= F90=4 <308> F87=1 F90= <309> F87=1 F90=			
	<310> F87=1 F90= <311> F87=1 F90= <312> F87=3 F90= <313> F87=1 F90=			
	<314> F87=1 F90=1 <380> F87=8 F90=3 <381> F87=11 F90=5 <382> F87=23 F90=9			
	<384> F87=74 F90=73 <385> F87=37 F90=63 <386> F87=78 F90=143 <412> F87=1 F90=			
	<417> F87=1 F90= <483> F87=34 F90=20 <484> F87=55 F90=135 <485> F87=118 F90=314			
	<487> F87=1 F90=1 <488> F87=1 F90= <489> F87=1 F90=1 <490> F87=1 F90=2			
6505-00-914-5297	HEMORRHOIDAL SUPP W/HYDROCORTISONE ACETATE ADULT RECTAL 12S	PG	1.89 L	
	ITEM DELETED/ONLY FOR RECORD PURPOSE FOR 87 DEPMEOS			
	<309> F87=1 F90= <310> F87=1 F90= <311> F87=1 F90= <380> F87=1 F90=			
	<381> F87=8 F90= <382> F87=17 F90= <384> F87=53 F90= <385> F87=6 F90=			
	<386> F87=9 F90= <483> F87=4 F90= <484> F87=5 F90= <485> F87=9 F90=			
6505-00-917-3709	DOXAPRAM HYDROCHLORIDE INJECTION USP 20MG/CC 20ML BOTTLE	BT	10.40 D	
	<306> F87=1 F90=1			
6505-00-926-2095	HYDROCORTISONE CREAM USP 1% 1 OZ (28.35 GM)	TU	0.62 D	
	<306> F87= F90=2 <310> F87=1 F90=1 <311> F87=1 F90=1 <381> F87=1 F90=1			
	<382> F87=1 F90=2 <384> F87=1 F90=12 <385> F87=1 F90= <386> F87=1 F90=1			
	<483> F87=1 F90= <487> F87= F90=1 <489> F87=1 F90=1 <490> F87=1 F90=4			
6505-00-926-2241	TOLNAFTATE TOPICAL SOLUTION USP 1% 10 ML	BT	0.28 D	
	<306> F87= F90=50 <380> F87= F90=180 <381> F87= F90=180 <382> F87= F90=180			
	<385> F87= F90=180 <386> F87= F90=180 <483> F87= F90=180 <484> F87= F90=180			
	<485> F87= F90=180 <487> F87= F90=180 <488> F87= F90=180 <489> F87=1 F90=180			
	<490> F87=1 F90=180			
6505-00-926-8905	DEXTROMETHORPHAN HYDROBROMIDE&GUAIFENESIN SYRUP 4OZ OR 118ML	BT	0.53 D	
	<306> F87= F90=20 <310> F87=1 F90=4 <311> F87=1 F90=1 <381> F87=16 F90=42			
	<382> F87=32 F90=112 <384> F87=78 F90=165 <385> F87=5 F90=13 <386> F87=11 F90=137			
	<483> F87=1 F90= <487> F87= F90=16 <488> F87= F90=28 <489> F87= F90=121			
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STOCK NUMBER / DMSB CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-00-926-9083	ATROPINE INJECTION AQUEOUS TYPE 0.7ML SYRINGE WITH NEEDLE	EA	3.57	A
	<306> F87=24 F90=24			
6505-00-926-9197	IPECAL SYRUP USP 7% 30ML	BT	0.51	D
	<308> F87=4 F90=4			
6505-00-929-8057 3-1073-P	ASPIRIN SUPPOSITORIES USP 600MG ADULT RECTAL L.S. 12S	PG	0.82	D
	<306> F87= F90=8 <308> F87=1 F90= <309> F87=1 F90=1 <310> F87=1 F90=1			
	<311> F87=1 F90= <313> F87=1 F90= <380> F87=1 F90= <381> F87=10 F90=5			
	<382> F87=20 F90=14 <384> F87=43 F90=22 <385> F87=3 F90=3 <386> F87=7 F90=21			
	<483> F87=1 F90=11 <484> F87= F90=1 <485> F87= F90=7 <487> F87= F90=1			
	<488> F87=1 F90= <489> F87=2 F90=5 <490> F87=2 F90=13			
6505-00-932-0602	IDOXURIDINE OPHTHALMIC OINTMENT MODIFIED 0.5% 4GM TUBE	TU	8.00	D
	<306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<311> F87=1 F90= <319> F87=1 F90=1 <380> F87=1 F90= <381> F87=1 F90=			
	<382> F87=1 F90= <384> F87=1 F90=1 <385> F87=1 F90= <386> F87=1 F90=			
	<419> F87=1 F90= <483> F87=1 F90= <484> F87=1 F90= <485> F87=2 F90=			
	<487> F87= F90=1			
6505-00-933-0965	PHENOBARBITAL TABLETS USP 30MG INDIVIDUALLY SEALED 25 TABLETS/BX 8X NON-CONTRACTIBLE PEP TO 6505-01-302-2669 L.S. 250'S 8-3-89		1.14	V
	<308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90= <380> F87=4 F90=			
	<381> F87=6 F90= <382> F87=13 F90= <384> F87=37 F90= <385> F87=25 F90=			
	<386> F87=56 F90= <483> F87=14 F90= <484> F87=49 F90= <485> F87=107 F90=			
	<488> F87=1 F90= <489> F87=1 F90= <490> F87=1 F90=			
6505-00-935-1000	THIAMINE HYDROCHLORIDE INJECTION USP 100 MG PER ML 10 ML	VI	2.39	D
	<306> F87= F90=7 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<380> F87=11 F90=1 <381> F87=26 F90=6 <382> F87=54 F90=12 <384> F87=118 F90=58			
	<385> F87=74 F90=118 <386> F87=157 F90=226 <483> F87=43 F90=31 <484> F87=127 F90=102			
	<485> F87=270 F90=229 <489> F87= F90=2 <490> F87= F90=7			
6505-00-935-1128	PLAGUE VACCINE USP 20ML BOTTLE	BT	16.56	D
	<305> F87=2 F90=2			
6505-00-951-5533	HYDROCORTISONE SODIUM SUCCINATE FOR INJECTION USP 250 MG	VI	1.19	D
	<306> F87= F90=7 <308> F87=1 F90=1 <309> F87=1 F90=1 <310> F87=1 F90=2			
	<311> F87=1 F90= <380> F87=1 F90=17 <381> F87=1 F90=36 <382> F87=1 F90=60			
	<384> F87=1 F90=67 <385> F87=1 F90=51 <386> F87=1 F90=135 <483> F87=1 F90=19			
	<484> F87= F90=56 <485> F87=1 F90=137 <487> F87= F90=2 <488> F87= F90=8			
	<489> F87= F90=31 <490> F87= F90=56			

STOCK NUMBER / ONSO CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-00-958-2366	PSEUDOEPHEDRINE HYDROCHLORIDE TABLETS USP 60MG 1000 TABLETS/BT	BT	10.81-D	
	<306> F87= F90=1 <310> F87=1 F90= <311> F87=1 F90= <381> F87=1 F90=			
	<382> F87=1 F90= <384> F87=1 F90= <385> F87=1 F90= <386> F87=1 F90=			
	<483> F87=1 F90= <487> F87= F90=1			
6505-00-958-6325	NEOSTIGMINE METHYLSULFATE INJECTION USP 10ML MULTIPLE DOSE VIAL	VI	2.26 L	
	OPSC FAX OF 4-28-89 REVEALS EFFORTS TO L TO O RUNEW			
	<301> F87=8 F90=10 <306> F87= F90=3 <308> F87=2 F90= <380> F87=55 F90=42			
	<381> F87=55 F90=42 <382> F87=114 F90=65 <384> F87=291 F90=291 <385> F87=236 F90=470			
	<386> F87=509 F90=1017 <483> F87=144 F90=78 <484> F87=237 F90=476 <485> F87=515 F90=1028			
	<488> F87= F90=2 <489> F87= F90=2 <490> F87= F90=7			
6505-00-961-5508 3-0153	DEXAMETHASONE SODIUM PHOSPHATE OPHTHALMIC OINTMENT USP .125OZ	TU	0.75 O	
	<488> F87=2 F90= <489> F87=2 F90= <490> F87=3 F90=			
6505-00-961-7406	POLYVINYL ALCOHOL OPHTHALMIC SOLUTION 1.4% 15ML	BT	0.50 O	
	<306> F87= F90=2 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<311> F87=1 F90= <319> F87=1 F90=1 <380> F87=1 F90=1 <381> F87=2 F90=1			
	<382> F87=5 F90=1 <384> F87=13 F90=49 <385> F87=8 F90=36 <386> F87=18 F90=92			
	<419> F87=1 F90= <483> F87=4 F90=3 <484> F87=8 F90=6 <485> F87=19 F90=17			
	<487> F87= F90=1 <488> F87=1 F90= <489> F87=1 F90= <490> F87=1 F90=1			
6505-00-963-5355	DEXAMETHASONE SODIUM PHOSPHATE INJECTION USP 5CC	VI	0.44 O	
	<306> F87= F90=1 <309> F87=1 F90=1 <310> F87=1 F90= <380> F87=1 F90=			
	<381> F87=1 F90= <382> F87=2 F90= <384> F87=13 F90=6 <385> F87=7 F90=8			
	<385> F87=10 F90=11 <483> F87=2 F90=			
6505-00-965-2439	OXYGEN USP 99% 24GL DISPOSABLE STEEL CYLINDER WITH FACE MASK	PG	41.57 O	
	<308> F87= F90=1 <309> F87=1 F90= <374> F87= F90=2 <380> F87=1 F90=1			
	<381> F87=1 F90=1 <382> F87=2 F90=1 <384> F87=5 F90=5 <385> F87=5 F90=10			
	<386> F87=10 F90=21 <483> F87=3 F90= <488> F87= F90=1 <489> F87= F90=1			
	<490> F87= F90=1			
6505-00-982-4229	WARFARIN SODIUM TABLETS USP 5 MG 100S	BT	2.08 O	
	<306> F87= F90=2 <309> F87=1 F90= <310> F87=1 F90= <313> F87=1 F90=			
	<380> F87=1 F90=1 <381> F87=1 F90=1 <382> F87=1 F90=1 <384> F87=1 F90=17			
	<385> F87=1 F90=15 <386> F87=1 F90=39 <483> F87=1 F90=5 <484> F87=1 F90=21			
	<485> F87=2015 F90=48 <489> F87=1 F90= <490> F87=1 F90=			

STOCK NUMBER / DMSB CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-00-902-7301	MEPIVACAINE HYDROCHLORIDE INJECTION USP 3% 1.8 ML 50S	PG	9.26	Y
	REPLACE WITH 6505-01-242-9149			
	<320> F87=1 F90= <370> F87=1 F90= <381> F87=2 F90= <382> F87=3 F90=			
	<384> F87=39 F90= <385> F87=3 F90= <386> F87=3 F90= <483> F87=7 F90=			
	<484> F87=38 F90= <488> F87=1 F90= <489> F87=1 F90= <490> F87=1 F90=			
6505-00-982-9069	TOLBUTAMIDE TABLETS USP 0.5GM 200 TABLETS PER BOTTLE	BT	2.72 D	
	<306> F87= F90=1 <309> F87=1 F90= <310> F87=1 F90= <380> F87=1 F90=			
	<381> F87=1 F90= <382> F87=1 F90= <384> F87=1 F90= <385> F87=1 F90=			
	<386> F87=1 F90= <483> F87=1 F90= <484> F87=1 F90= <485> F87=1 F90=			
6505-00-985-7301	ACETAMINOPHEN TABLETS USP 0.325GM 1000S	BT	3.94 D	
	<306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<311> F87=1 F90=1 <313> F87=1 F90=1 <374> F87= F90=1 <380> F87=1 F90=			
	<381> F87=2 F90=2 <382> F87=5 F90=2 <384> F87=16 F90=18 <385> F87=2 F90=4			
	<386> F87=5 F90=11 <483> F87=1 F90=4 <484> F87=10 F90=11 <485> F87=21 F90=22			
	<487> F87=1 F90=2 <488> F87=1 F90= <489> F87=1 F90=2 <490> F87=1 F90=3			
6505-00-993-3518	AMPICILLIN SODIUM STERILE USP POWDER FORM 1GM BOTTLE	BT	0.51 D	
	<301> F87=6 F90= <306> F87= F90=13 <308> F87=18 F90=34 <309> F87=30 F90=35			
	<310> F87=23 F90=16 <380> F87=499 F90=452 <381> F87=775 F90=516 <382> F87=1596 F90=667			
	<384> F87=4404 F90=4589 <385> F87=3316 F90=6896 <386> F87=6980 F90=14656 <483> F87=1942 F90=1612			
	<484> F87=4537 F90=9154 <485> F87=9735 F90=19298 <488> F87=1 F90=40 <489> F87=1 F90=126			
	<490> F87=1 F90=214			
6505-00-994-7224	POVIDONE-IODINE CLEANSING SOLUTION USP 7.5% 1GL OR 3.780LI	BT	7.83 D	
	SERVICES APPROVED O-DAY 1-4-90			
	<301> F87= F90=1 <306> F87= F90=2 <308> F87= F90=1 <309> F87= F90=1			
	<310> F87= F90=1 <311> F87= F90=1 <314> F87= F90=1 <380> F87= F90=3			
	<381> F87= F90=4 <382> F87= F90=8 <384> F87= F90=57 <385> F87= F90=44			
	<386> F87= F90=134 <483> F87= F90=15 <484> F87= F90=82 <485> F87= F90=179			
	<487> F87= F90=1 <490> F87= F90=1			
6505-01-NNO-0403 CN90-0403-P	SALINE, PHOSPHATE BUFFERED	BT	7.00 L	
	RECOMMENDED BY AMS COMBAT DEVELOPMENT			
	<403> F87= F90=10			
6505-01-NNO-0405 CN90-0405-P	SODIUM DEOXYCHOLATE	BT	5.00 L	
	RECOMMENDED BY AMS COMBAT DEVELOPMENT			
	<403> F87= F90=10			

STOCK NUMBER / UMSB CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-01-003-2415	HALUPERIDOL TABLETS USP 1MG 1000 TABLETS PER BOTTLE	BT	5.19	D
	<306> F87= F90=1 <311> F87=1 F90= <381> F87=1 F90= <382> F87=1 F90=			
	<384> F87=1 F90= <483> F87=1 F90= <484> F87=1 F90=			
6505-01-003-5341	HALUPERIDOL ORAL SOLUTION USP 2MG/ML 120ML BOTTLE	PG	1.80	D
	<306> F87= F90=1 <311> F87=1 F90= <381> F87=1 F90=1 <382> F87=1 F90=2			
	<304> F87=4 F90=11 <483> F87=1 F90=3 <484> F87=1 F90=1 <485> F87= F90=5			
	<490> F87= F90=1			
6505-01-003-5343	THIOPENTAL SODIUM FOR INJECTION USP 5GM BOTTLE 25 PER BOX	BX	309.94	D
	<301> F87=1 F90=1 <306> F87= F90=2 <380> F87=7 F90=5 <381> F87=7 F90=5			
	<382> F87=15 F90=9 <384> F87=39 F90=38 <385> F87=32 F90=61 <386> F87=68 F90=134			
	<403> F87=19 F90=10 <484> F87=32 F90=62 <485> F87=69 F90=136 <488> F87=1 F90=			
	<489> F87=1 F90= <490> F87=1 F90=1			
6505-01-008-3054	UNDECYLENIC ACID AND ZINC UNDECYLENATE POWDER 45GM	CO	0.35	D
	<306> F87= F90=50 <489> F87=1 F90= <490> F87=1 F90=			
6505-01-008-3401	NITROGLYCERIN OINTMENT 2% 60GM COLLAPSIBLE TUBE	TU	1.26	D
	<306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<313> F87=2 F90= <380> F87=1 F90= <381> F87=1 F90= <382> F87=1 F90=			
	<384> F87=1 F90= <385> F87=1 F90= <386> F87=1 F90= <483> F87=1 F90=			
	<484> F87=1 F90= <485> F87=1 F90= <488> F87=2 F90=			
6505-01-009-5019	SODIUM NITROPRUSSIDE STERILE USP 50 MG	BT	1.04	D
	<306> F87= F90=3 <309> F87=1 F90= <380> F87=1 F90=3 <381> F87=1 F90=3			
	<382> F87=1 F90=6 <384> F87=1 F90=19 <385> F87=1 F90=28 <386> F87=1 F90=66			
	<483> F87=1 F90=4 <404> F87= F90=30 <485> F87= F90=67			
6505-01-010-0832	CEFAZOLIN SODIUM STERILE USP EQUIVALENT TO 1GM CEFAZOLIN1GM VIAL BT		2.05	D
	TO REPLACE 01-053-2514 ON 0-DAY LIST(10:1)			
	<306> F87= F90=11 <308> F87= F90=86 <309> F87= F90=89 <310> F87= F90=41			
	<380> F87= F90=1136 <381> F87= F90=1290 <382> F87= F90=1661 <384> F87= F90=11472			
	<385> F87= F90=17248 <386> F87= F90=36617 <403> F87= F90=4008 <484> F87= F90=22885			
	<485> F87= F90=48234 <488> F87= F90=117 <489> F87= F90=322 <490> F87= F90=534			
6505-01-010-4170	FENTANYL CITRATE INJ USP .05MG EQUIV INTRAVENOUS 2ML AMPUL 10S	PG	2.42	D
	<301> F87=16 F90=26 <306> F87= F90=1 <380> F87=115 F90=105 <381> F87=115 F90=105			
	<382> F87=237 F90=158 <384> F87=610 F90=623 <385> F87=489 F90=1000 <386> F87=1085 F90=2203			
	<403> F87=305 F90=124 <484> F87=320 F90=686 <485> F87=746 F90=1491 <488> F87=10 F90=10			
	<489> F87=10 F90=10 <490> F87=11 F90=21			

STOCK NUMBER / ONSB CONTROL NU	NOMENCLATURE / COMMENTS	UNIT	ISSUE UNIT PRICE	AAC
6505-01-013-9941	TERBUTALINE SULFATE INJECTION USP 1MG/ML 1ML AMPUL 10/PACKAGE	PG	4.65	D
	<306> F87=1 F90=8 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<311> F87=1 F90= <380> F87=1 F90= <381> F87=5 F90=6 <382> F87=10 F90=13			
	<384> F87=26 F90=8 <385> F87=3 F90= <386> F87=5 F90=15 <483> F87=1 F90=9			
	<485> F87=1 F90=6 <487> F87= F90=1 <489> F87= F90=4 <490> F87= F90=12			
6505-01-014-1576	NITROGLYCERIN TABLETS USP0.3MG25TABLETS/BOTTLE 48BOTTLES/BOX=100S	PG	4.06	D
	<306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<313> F87=2 F90= <380> F87=1 F90= <381> F87=1 F90= <382> F87=1 F90=			
	<384> F87=1 F90= <385> F87=1 F90= <306> F87=1 F90= <483> F87=1 F90=			
	<484> F87=1 F90= <485> F87=1 F90= <480> F87=1 F90= <489> F87=1 F90=			
	<490> F87=1 F90=			
6505-01-016-1470	SULFAMETHUXAZULE AND TRIMETHOPRIM TABLETS USP 100 TABLETS/BOTTLE DUUULE STRENGTH	BT	5.96	D
	<306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<311> F87=1 F90= <380> F87=1 F90= <381> F87=1 F90=1 <382> F87=1 F90=3			
	<384> F87=2 F90=12 <385> F87=1 F90=1 <386> F87=1 F90=4 <483> F87=1 F90=2			
	<484> F87=2 F90=4 <485> F87=5 F90=12 <487> F87=1 F90=1 <488> F87=1 F90=			
	<489> F87=1 F90=1 <490> F87=1 F90=2			
6505-01-019-7627	GLYCOPYRROLATE INJECTION USP 0.2 MG PER ML 20 ML DATING APPROVED 6/86	BT	1.80	D
	<306> F87= F90=1 <309> F87=1 F90= <380> F87=1 F90= <381> F87=1 F90=			
	<382> F87=1 F90= <384> F87=1 F90= <385> F87=1 F90= <386> F87=1 F90=			
	<483> F87=1 F90= <488> F87=1 F90= <489> F87=1 F90= <490> F87=1 F90=			
6505-01-022-2402	EPINEPHRINE SUSPENSION STERILE 5MG/ML 5ML BOTTLE	BT	14.09	L
	<301> F87=1 F90= <306> F87= F90=1 <308> F87=1 F90=1 <313> F87=1 F90=			
	<380> F87=1 F90= <381> F87=1 F90=1 <382> F87=2 F90=1 <384> F87=3 F90=3			
	<385> F87=3 F90=4 <386> F87=5 F90=9 <483> F87=2 F90= <487> F87= F90=1			
6505-01-022-2646	GENTAMICIN SULF OPHTH SOL USP EQUIV 3.0MG GENTAMICIN PER ML 5ML	BT	0.70	D
	<306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<311> F87=1 F90= <319> F87=1 F90=1 <320> F87= F90=1 <380> F87=1 F90=			
	<381> F87=1 F90= <382> F87=1 F90= <384> F87=5 F90=9 <385> F87=2 F90=5			
	<386> F87=4 F90=11 <419> F87=1 F90= <483> F87=1 F90=2 <484> F87=8 F90=4			
	<485> F87=10 F90=14 <487> F87= F90=1 <490> F87= F90=1			
6505-01-023-5011	CLOTRIMAZOLE CREAM USP TOPICAL 1% 15GM D-DAY SUB ITEM	TU	0.46	D
	<306> F87= F90=2 <310> F87=1 F90= <311> F87=1 F90= <381> F87=10 F90=1			
	<382> F87=21 F90=3 <384> F87=10 F90=21 <385> F87=1 F90= <386> F87=1 F90=			
	<483> F87=1 F90= <487> F87= F90=1 <489> F87=1 F90=2 <490> F87=1 F90=4			

STOCK NUMBER / UNSO CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-01-024-0335	DICLUXACILLIN SODIUM CAPSULES USP 250MG 500 CAPSULES PER BOTTLE	BT	25.67	D
	<306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<311> F87=1 F90= <380> F87=1 F90= <381> F87=1 F90= <382> F87=1 F90=			
	<384> F87=2 F90=2 <385> F87=1 F90= <386> F87=1 F90= <483> F87=1 F90=			
	<484> F87=2 F90= <485> F87=5 F90=1 <487> F87=1 F90=1 <488> F87=1 F90=			
	<489> F87=1 F90= <490> F87=1 F90=			
6505-01-026-0403	PHYSUSTIGMINE SALICYLATE INJ USP 1MG PER ML 2 ML 12S	BX	23.35	D
	<306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<380> F87=1 F90= <381> F87=1 F90= <382> F87=1 F90= <384> F87=1 F90=1			
	<385> F87=1 F90=1 <386> F87=1 F90=3 <483> F87=1 F90= <484> F87=1 F90=1			
	<485> F87= F90=3 <488> F87=1 F90= <489> F87=1 F90= <490> F87=1 F90=			
6505-01-028-2260	SUCCINYLCHOLINE CHLORIDE STERILE USP 1GM CONTAINER 12 PER BOX	BX	79.54	D
	<301> F87=1 F90=1 <306> F87= F90=1 <380> F87=5 F90=4 <381> F87=5 F90=4			
	<382> F87=10 F90=6 <384> F87=25 F90=25 <385> F87=20 F90=40 <386> F87=45 F90=91			
	<483> F87=13 F90=4 <484> F87=14 F90=27 <485> F87=31 F90=61 <490> F87= F90=1			
6505-01-028-9707	DECLOMETHASONE DIPROPIONATE INHALATION AEROSOL 10MG 16.8GM 200 REPLACE WITH 6505-01-240-0587 OR 0588	PG	4.33	Y
	<489> F87=1 F90= <490> F87=1 F90=			
6505-01-030-7982	GRISEOFULVIN TABLETS ULTRAMICROSIZE USP 125 MG 500S	BT	36.13	D
	<306> F87= F90=1 <310> F87=1 F90= <311> F87=1 F90= <381> F87=1 F90=			
	<382> F87=1 F90= <384> F87=1 F90= <385> F87=1 F90= <386> F87=1 F90=			
	<483> F87=1 F90= <487> F87= F90=1 <489> F87=1 F90= <490> F87=1 F90=			
6505-01-038-4918 3-1150-P	AMINO ACID INJECTION 500 ML BOTTLE 12 PER PACKAGE	PG	98.79	L
	<309> F87=1 F90= <380> F87=1 F90= <381> F87=1 F90= <382> F87=1 F90=			
	<384> F87=2 F90=10 <385> F87=2 F90= <386> F87=4 F90= <483> F87=1 F90=14			
	<484> F87=25 F90=134 <485> F87=50 F90=283 <488> F87=9 F90= <489> F87=9 F90=			
	<490> F87=12 F90=			
6505-01-039-2808	TERBUTALINE SULFATE TABLETS USP 5MG 100 TABLETS PER BOTTLE	BT	4.29	D
	<306> F87= F90=3 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<311> F87=1 F90= <380> F87=1 F90= <381> F87=2 F90=2 <382> F87=4 F90=5			
	<384> F87=10 F90=3 <385> F87=1 F90= <386> F87=2 F90=6 <483> F87=1 F90=4			
	<485> F87=1 F90=2 <487> F87= F90=1 <489> F87= F90=1 <490> F87= F90=4			

STOCK NUMBER / DMSB CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-01-043-0230	NEOMYCIN&POLYMYXIN B SULFATES&HYDROCORTISONE OTIC SUSP USP 10ML	PG	0.93	D
	<306> F87= F90=1 <308> F87=1 F90= <311> F87=1 F90= <320> F87= F90=1			
	<380> F87=1 F90= <381> F87=2 F90=1 <382> F87=5 F90=2 <384> F87=2 F90=1			
	<385> F87=1 F90= <386> F87=1 F90= <483> F87=1 F90=1 <484> F87= F90=1			
	<485> F87=1 F90=4 <487> F87= F90=1 <488> F87=1 F90= <489> F87=1 F90=			
	<490> F87=1 F90=1			
6505-01-044-1959 J-0699	POTASSIUM ACETATE INJ USP 2MEQ PER ML 20ML VIAL 50S PEP TO 01-202-7998, 25S (2:1)D-DAY DELETED 1-4-90	PG	17.17	V
	<309> F87=1 F90= <310> F87=1 F90= <380> F87=1 F90= <381> F87=1 F90=			
	<382> F87=1 F90= <386> F87=1 F90= <385> F87=1 F90= <386> F87=1 F90=			
	<483> F87=1 F90= <484> F87=1 F90= <485> F87=2 F90= <488> F87=2 F90=			
	<489> F87=1 F90= <490> F87=2 F90=			
6505-01-045-3255	DETERGENT SURGICAL 4% CHLORHEXIDINE GLUCONATE 32FL OZ	BT	3.66	D
	<306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90=1 <310> F87=1 F90=			
	<311> F87=1 F90= <312> F87=6 F90= <374> F87= F90=1 <380> F87=2 F90=1			
	<381> F87=5 F90=1 <382> F87=10 F90=1 <384> F87=188 F90=130 <385> F87=11 F90=12			
	<386> F87=23 F90=25 <412> F87=1 F90= <483> F87=16 F90=5 <484> F87=35 F90=49			
	<485> F87=50 F90=76 <487> F87= F90=1 <489> F87= F90=1 <490> F87= F90=1			
6505-01-046-1894 5-0570	ISOPROTERENOL HYDROCHLORIDE INJECTION USP 10ML SYRINGE 10/PG	PG	36.07	L
	<306> F87= F90=1			
6505-01-049-0881	MICONAZOLE NITRATE CREAM USP 45 GM TUBE W/VAGINAL APPLICATOR REPLACE WITH 6505-01-106-7281	PG	4.93	D
	<311> F87=1 F90= <316> F87=30 F90= <381> F87=1 F90= <382> F87=3 F90=			
	<384> F87=6 F90= <483> F87=1 F90=			
6505-01-050-3547	CIMETIDINE TABLETS USP 300MG 100S	BT	29.66	D
	<306> F87= F90=1 <309> F87=1 F90= <310> F87=1 F90= <311> F87=1 F90=			
	<313> F87=1 F90= <380> F87=1 F90= <381> F87=3 F90=1 <382> F87=6 F90=2			
	<384> F87=19 F90=20 <385> F87=2 F90=4 <386> F87=3 F90=8 <483> F87=1 F90=2			
	<484> F87=2 F90=2 <485> F87=4 F90=6 <487> F87= F90=1 <489> F87=1 F90=1			
	<490> F87=1 F90=2			
6505-01-052-6862	GLOBULIN HEPATITIS B IMMUNE USP 5 ML	BT	150.10	L
	<489> F87=1 F90= <490> F87=1 F90=			

STOCK NUMBER / DMSB CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-01-053-2514	CEPHAPIRIN SODIUM-STERILE USP POWDER FORM IGM VIAL 10-VIALS/BX	PG	13.97	D
	REPLACED BY 01-010-0832 (10:1)			
	<301> F87=1 F90= <306> F87= F90=1 <308> F87=4 F90= <309> F87=7 F90=			
	<310> F87=5 F90= <380> F87=117 F90=1 <381> F87=181 F90=1 <382> F87=371 F90=1			
	<384> F87=1029 F90=1 <385> F87=774 F90=1 <386> F87=1630 F90=2 <483> F87=453 F90=			
	<484> F87=1059 F90= <485> F87=2272 F90= <487> F87=1 F90= <488> F87=23 F90=			
	<489> F87=22 F90= <490> F87=28 F90=			
6505-01-053-2634	SODIUM BICARBONATE INJECTION USP 75 MG PER ML 50 ML 25S	BX	12.34	D
	FOA TESTING--AF TEST, 0702			
	<306> F87= F90=1 <308> F87=1 F90=1 <386> F87= F90=1			
6505-01-055-3085	LACTOSE USP POWDER 100 GRAMS	BT	1.90	L
	SERVICES APPROVED 0-DAY 1-4-90			
	<403> F87= F90=1 <483> F87= F90=1 <484> F87= F90=1 <485> F87= F90=1			
6505-01-057-6540	OINTMENT BASE 1 LB(453.6 GRAM)	JR	3.78	L
	<489> F87=1 F90= <490> F87=1 F90=			
6505-01-060-2393	MULTIVITAMIN TABLETS 100S	BT	1.00	D
	<306> F87= F90=1 <310> F87=1 F90= <311> F87=1 F90= <381> F87=1 F90=			
	<382> F87=2 F90=1 <384> F87=1 F90=1 <385> F87=1 F90=1 <386> F87=2 F90=3			
	<483> F87=1 F90=1 <484> F87=1 F90= <485> F87=1 F90= <489> F87=1 F90=			
	<490> F87=1 F90=1			
6505-01-062-0904	OXYMETAZOLINE HYDROCHLORIDE NASAL SOLUTION USP3ML SPRAY BOTTLE25	BX	11.06	D
	<306> F87= F90=1 <308> F87=1 F90= <320> F87= F90=1 <374> F87= F90=1			
	<380> F87=1 F90= <381> F87=1 F90=1 <382> F87=1 F90=1 <384> F87=1 F90=1			
	<385> F87=1 F90=1 <386> F87=1 F90=1 <483> F87=1 F90=1 <484> F87= F90=1			
	<485> F87= F90=1 <487> F87= F90=2 <489> F87= F90=1 <490> F87= F90=1			
6505-01-064-5770	BENZOCAINE ORAL TOPICAL SOLUTION 20% PINA COLADA 1FL OZ	BT	4.41	D
	CALL TO DPSC-ROAA REVEALS ITEMS STILL ACC L 0 MAR 89 RONEW			
	<370> F87= F90=1 <381> F87= F90=1 <382> F87= F90=1 <384> F87= F90=8			
	<385> F87= F90=3 <386> F87= F90=3 <483> F87= F90=1 <484> F87= F90=3			
	<485> F87= F90=3 <487> F87= F90=1 <489> F87= F90=1 <490> F87= F90=1			
6505-01-064-9555	THEOPHYLLINE CAPSULES MODIFIED 250MG 100 CAPSULES PER BOTTLE	BT	2.47	Y
	REPLACE ON 0-DAY LIST WITH 6505-01-208-7344			
	<489> F87=1 F90= <490> F87=1 F90=			

STOCK NUMBER / DMSB CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-01-067-1633	MULTIVITAMIN SOLUTION FOR INJECTION CONCENTRATED 5 ML 100S	BX	36.60	Y
	REPLACE ON 0-0AY WITH 6505-01-204-9753 4:1(NEW:OLD)			
	<485> F87=1 F90= <488> F87=1 F90= <489> F87=1 F90= <490> F87=1 F90=			
6505-01-067-3977	BACITRACIN STERILE USP 50000 UNITS PER BOTTLE	BT	2.65	D
	<301> F87=4 F90=5 <306> F87= F90=3 <320> F87=2 F90= <380> F87=31 F90=25			
	<381> F87=27 F90=25 <382> F87=70 F90=39 <384> F87=177 F90=178 <385> F87=155 F90=308			
	<386> F87=358 F90=716 <483> F87=89 F90= <488> F87= F90=1 <489> F87= F90=1			
	<490> F87= F90=4			
6505-01-069-1661 2-0190	CIMETIDINE HYDROCHLORIDE INJECTION 8ML VIAL 10 VIALS PER PG	PG	68.70	D
	<306> F87= F90=1 <309> F87=10 F90= <313> F87=1 F90= <380> F87=1 F90=			
	<381> F87=1 F90= <382> F87=1 F90= <384> F87=2 F90=1 <385> F87=4 F90=1			
	<386> F87=1 F90= <483> F87=1 F90= <488> F87=1 F90= <489> F87=1 F90=			
	<490> F87=1 F90=			
6505-01-070-5807 1-0901	ISOETHARINE INHALATION SOLUTION USP 1% 10ML AVAILAULE	BT	1.91	D
	<489> F87=1 F90= <490> F87=1 F90=			
6505-01-071-2822	PUMICE USP POWDER FORM COARSE 4LB	CN	2.63	D
	<373> F87=1 F90= <473> F87= F90=1			
6505-01-075-0678	SODIUM CHLORIDE IRRIGATION USP 0.9% 1000ML BOTTLE 12 PER BOX	BX	9.48	D
	<301> F87=16 F90=35 <308> F87=3 F90=4 <309> F87=2 F90=1 <310> F87=1 F90=1			
	<311> F87=1 F90= <312> F87=1 F90= <316> F87=1 F90= <318> F87=7 F90=			
	<319> F87=1 F90= <320> F87=1 F90= <380> F87=153 F90=168 <381> F87=152 F90=167			
	<382> F87=345 F90=240 <384> F87=1119 F90=1257 <385> F87=721 F90=1944 <386> F87=1496 F90=4035			
	<412> F87=1 F90= <417> F87=14 F90= <419> F87=1 F90= <483> F87=547 F90=331			
	<484> F87=628 F90=1665 <485> F87=1363 F90=3614 <487> F87=2 F90=1 <488> F87=17 F90=19			
	<489> F87=16 F90=23 <490> F87=21 F90=42			
6505-01-075-0679	WATER FOR IRRIGATION STERILE USP 1000ML CONTAINER 12 PER BOX	PG	9.31	D
	<301> F87=1 F90= <303> F87=2 F90= <308> F87=1 F90= <309> F87=1 F90=			
	<310> F87=1 F90= <311> F87=1 F90= <312> F87=1 F90= <320> F87=1 F90=			
	<374> F87= F90=1 <380> F87=14 F90=17 <381> F87=14 F90=17 <382> F87=30 F90=19			
	<384> F87=75 F90=70 <385> F87=65 F90=107 <386> F87=136 F90=219 <403> F87= F90=2			
	<412> F87=1 F90= <483> F87=38 F90=26 <484> F87=142 F90=131 <485> F87=312 F90=267			
	<487> F87=1 F90=2 <488> F87=7 F90=2 <489> F87=7 F90=7 <490> F87=9 F90=11			

STOCK NUMBER / UMSB CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-01-078-3717	CHLOROQUINE HYDROCHLORIDE INJECTION USP 50MG/CC 5ML AMPUL 5/BOX	BX	21.50	D
	D-DAY SUO ITEM			
	<306> F87= F90=10 <310> F87=5 F90= <381> F87= F90=1 <382> F87= F90=2			
	<384> F87= F90=5 <385> F87= F90=5 <386> F87= F90=10 <483> F87= F90=5			
	<484> F87= F90=5 <485> F87= F90=10			
6505-01-079-6651	PHENYLEPHRINE HCL NASAL SOLUTION USP 1 FL OZ	PG	0.86	D
	<306> F87= F90=5 <308> F87=1 F90= <310> F87=1 F90= <311> F87=1 F90=			
	<320> F87=12 F90=1 <380> F87=1 F90= <381> F87=4 F90=1 <382> F87=9 F90=7			
	<384> F87=21 F90=11 <385> F87=1 F90= <386> F87=3 F90=13 <483> F87=1 F90=6			
	<485> F87= F90=6 <487> F87= F90=1 <489> F87= F90=7 <490> F87= F90=15			
6505-01-080-1986	PRALIDOXINE CHLORIDE STERILE USP 1 GM 6S	BX	29.50	D
	<306> F87=6 F90=6			
6505-01-080-1987	POTASSIUM CHLORIDE INJECTION USP 20 MEQ 10 ML 25S	PG	14.03	D
	<485> F87=1 F90=			
6505-01-080-1988	POTASSIUM CHLORIDE INJECTION USP 20 ML 25S FOR IV AFTER DILUTION	PG	13.14	D
	<306> F87= F90=8 <309> F87=1 F90=1 <310> F87=1 F90=1 <380> F87=1 F90=7			
	<381> F87=4 F90=9 <382> F87=8 F90=15 <384> F87=19 F90=83 <385> F87=16 F90=112			
	<386> F87=34 F90=254 <483> F87=11 F90=37 <484> F87=65 F90=227 <485> F87=131 F90=472			
	<488> F87=4 F90= <489> F87=4 F90= <490> F87=5 F90=5			
6505-01-082-9980	PENICILLIN G PROCAINE FOR SUSP STERILE USP 1500000UN BOTTLE 100S	BX	157.03	D
	<301> F87=1 F90= <306> F87= F90=2 <308> F87=1 F90= <309> F87=1 F90=			
	<310> F87=1 F90= <316> F87=3 F90= <380> F87=5 F90=1 <381> F87=8 F90=2			
	<382> F87=16 F90=3 <384> F87=44 F90=16 <385> F87=33 F90=22 <386> F87=70 F90=50			
	<483> F87=19 F90=6 <484> F87=45 F90=30 <485> F87=97 F90=64 <490> F87= F90=1			
6505-01-083-7833	FUROSEMIDE INJECTION USP 10MG 4ML SYRINGE WITH NEEDLE 5 PER BOX	BX	5.90	D
	SERVICES APPROVED DELETION 1-4-90			
	<308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90= <380> F87=8 F90=			
	<381> F87=12 F90= <382> F87=25 F90= <384> F87=73 F90= <385> F87=49 F90=			
	<386> F87=111 F90= <483> F87=29 F90= <484> F87=98 F90= <485> F87=214 F90=			
6505-01-084-9453	AMPHOTERICIN B FOR INJECTION USP 50MG BOTTLE	BT	13.88	L
	UMSD REQUESTED OPSC CHANGED ACC CODE L TO D 1-27-89 RONEN			
	<301> F87=1 F90= <306> F87= F90=8 <308> F87=1 F90= <309> F87=1 F90=			
	<310> F87=1 F90= <380> F87=8 F90=7 <381> F87=13 F90=9 <382> F87=27 F90=14			
	<384> F87=73 F90=78 <385> F87=55 F90=113 <386> F87=116 F90=252 <483> F87=32 F90=33			
	<484> F87=76 F90=154 <485> F87=162 F90=326 <490> F87= F90=3			

STOCK NUMBER / UMSO CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-01-006-3925 2-0013	ERGOTAMINE TARTRATE AND CAFFEINE TABLETS USP 2505	BT	77.02	D
	<306> F07= F90=1	<308> F87=1 F90=	<309> F87=1 F90=	<311> F87=1 F90=
	<380> F87=1 F90=	<381> F87=1 F90=	<382> F87=1 F90=	<384> F87=11 F90=6
	<385> F87=1 F90=	<386> F87=1 F90=2	<483> F87=1 F90=1	<484> F87=6 F90=6
	<485> F87=12 F90=14	<487> F87= F90=1		
6505-01-091-1739 7-0083	DEXTROSE INJECTION USP 50% 500 ML 12S	PG	58.00	D
	50% CONCENTRATION PARTIAL FILL SERVICES APPROVED 0-DAY 1-4-90			
	<384> F87= F90=20	<483> F87= F90=13	<484> F87= F90=127	<485> F87= F90=267
6505-01-091-6063	RABIES VACCINE HUMAN DIPLOID CELL STRAIN 1 DOSE	PG	41.06	D
	<306> F87= F90=1	<382> F87= F90=1	<487> F87= F90=1	<490> F87= F90=1
6505-01-092-0415	AMINOPHYLLINE INJECTION USP 25MG/ML 10ML BOTTLE 10 PER BOX	BX	23.65	D
	<306> F87=3 F90=4	<308> F87=1 F90=1	<309> F87=1 F90=	<380> F87=1 F90=
	<381> F87=1 F90=3	<382> F87=1 F90=7	<384> F87=1 F90=5	<385> F87=1 F90=1
	<386> F07=1 F90=11	<483> F87=1 F90=5	<484> F87=1 F90=	<485> F87=1 F90=4
	<487> F87= F90=1	<489> F87= F90=2	<490> F87= F90=6	
6505-01-092-0416	DIPHENHYDRAMIDE HYDROCHLORIDE INJECTION USP 5ML BOTTLE 10/BOX	BX	56.34	D
	<306> F87=10 F90=8	<308> F87=1 F90=	<309> F87=1 F90=	<380> F87=1 F90=
	<381> F87=1 F90=4	<382> F87=1 F90=14	<384> F87=1 F90=16	<385> F87=1 F90=1
	<386> F87=1 F90=23	<483> F87=1 F90=11	<484> F87=1 F90=1	<485> F87=1 F90=10
	<487> F07= F90=1	<489> F87= F90=9	<490> F87= F90=19	
6505-01-092-0417	LIDOCAINE HCL INJ USP 20% SYRINGE-NEEDLE UNIT 10ML 10S	PG	30.00	D
	<306> F87= F90=1	<308> F87=1 F90=	<309> F87=1 F90=	<313> F87=1 F90=
	<380> F87=1 F90=1	<381> F07=1 F90=1	<382> F87=1 F90=1	<384> F87=1 F90=1
	<385> F87=1 F90=1	<386> F87=1 F90=1	<483> F07=1 F90=1	<484> F87=1 F90=1
	<485> F87=1 F90=1	<487> F87= F90=1	<488> F87=1 F90=1	<489> F87= F90=1
	<490> F07= F90=1			
6505-01-092-0418	METARAMINOL BITARTRATE INJECTION USP 10MG/ML 10ML BOTTLE 10/BOX	BX	92.90	L
	SERVICES APPROVED 0-DAY DELETION 1-4-90			
	<308> F87=1 F90=	<309> F87=1 F90=	<380> F87=1 F90=	<381> F87=1 F90=
	<382> F87=1 F90=	<384> F87=1 F90=	<385> F87=1 F90=	<386> F87=1 F90=
	<483> F07=1 F90=	<484> F87=1 F90=	<485> F87=1 F90=	<488> F87=1 F90=
	<489> F87=1 F90=	<490> F87=1 F90=		

STOCK NUMBER / DMSB CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-01-092-0419	EPHEDRINE SULFATE INJECTION USP 5MG/ML 10ML SYRINGE 10 PER BOX	BX	89.13	L
	REMOVED FROM 0-DAY LIST 9-85			
	<306> F87= F90=1 <485> F87=1 F90=			
6505-01-092-0420	SODIUM BICARBONATE INJECTION USP 4.2% 10ML 10 DISP SYR-NDL UNITS	BX	15.66	D
	<306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90= <380> F87=1 F90=1			
	<381> F87=1 F90=1 <382> F87=1 F90=2 <384> F87=3 F90=6 <385> F87=3 F90=3			
	<386> F87=6 F90=6 <483> F87=2 F90=1 <484> F87=1 F90=6 <485> F87=2 F90=6			
	<487> F87= F90=1 <488> F87= F90=1 <489> F87= F90=1 <490> F87= F90=1			
6505-01-092-0421	DEXAMETHASONE SODIUM PHOSPHATE INJECTION USP 5ML 10 PER PACKAGE	BX	99.59	D
	<306> F87= F90=11 <308> F87=1 F90=1 <309> F87=2 F90= <310> F87=1 F90=			
	<380> F87=25 F90=1 <381> F87=37 F90=8 <382> F87=76 F90=17 <384> F87=221 F90=88			
	<385> F87=148 F90=179 <386> F87=334 F90=345 <483> F87=86 F90=46 <484> F87=294 F90=153			
	<485> F87=643 F90=342 <488> F87=1 F90= <489> F87=1 F90=2 <490> F87=1 F90=11			
6505-01-092-0422 2-0527	TIMOLOL MALEATE OPHTHALMIC SOLUTION USP 10ML	BT	21.20	D
	DMSB REQUESTED DPSC TO CHANGED ACC CODE L TO D 1-20-89 REW			
	<306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<311> F87=1 F90= <319> F87=1 F90=1 <380> F87=1 F90= <381> F87=1 F90=			
	<382> F87=1 F90= <384> F87=1 F90=1 <385> F87=1 F90= <386> F87=1 F90=			
	<419> F87=1 F90= <483> F87=1 F90= <484> F87=1 F90= <485> F87=2 F90=			
	<487> F87= F90=1			
6505-01-093-2382	LIDOCAINE HYDROCHLORIDE INJ USP 1% SYRINGE-NEEDLE UNIT 10ML 10S	BX	28.36	D
	<306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90= <380> F87=1 F90=			
	<381> F87=1 F90= <382> F87=1 F90= <384> F87=3 F90=4 <385> F87=2 F90=8			
	<386> F87=4 F90=17 <483> F87=1 F90= <484> F87=1 F90= <485> F87=2 F90=2			
	<488> F87=8 F90=			
6505-01-093-2384	EPINEPHRINE INJECTION USP0.1MG PER ML SYRINGE-NEEDLE UNIT10ML10S PG		13.14	D
	<301> F87=1 F90=1 <306> F87= F90=2 <308> F87=1 F90= <309> F87=1 F90=			
	<380> F87=2 F90= <381> F87=2 F90= <382> F87=4 F90=1 <384> F87=10 F90=14			
	<385> F87=8 F90=25 <386> F87=17 F90=53 <483> F87=5 F90=1 <484> F87=5 F90=9			
	<485> F87=12 F90=22 <488> F87=1 F90= <489> F87=1 F90= <490> F87=1 F90=			
6505-01-093-7115	EPHEDRINE SULFATE INJECTION USP 25MG/ML 1ML 6 PER PACKAGE	BX	6.03	D
	<301> F87=1 F90= <306> F87= F90=1 <309> F87=1 F90= <380> F87=2 F90=2			
	<381> F87=2 F90=2 <382> F87=3 F90=3 <384> F87=9 F90=9 <385> F87=7 F90=13			
	<386> F87=15 F90=30 <483> F87=4 F90=2 <484> F87=7 F90=14 <485> F87=15 F90=30			
	<488> F87=1 F90= <489> F87=1 F90= <490> F87=1 F90=			

STOCK NUMBER / DMSB CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-01-094-6196	ATROPINE SULFATE INJECTION USP 0.1MG/CC 10ML BOTTLE 10 PER BOX	BX	11.88	D
	<306> F87=2 F90=1 <308> F87=1 F90= <309> F87=1 F90= <380> F87=1 F90=			
	<381> F87=1 F90= <382> F87=1 F90= <384> F87=1 F90=6 <385> F87=1 F90=11			
	<386> F87=2 F90=24 <483> F87=1 F90= <484> F87=1 F90=1 <485> F87=1 F90=3			
6505-01-098-0247 2-0053	IBUPROFEN TABLETS USP 600MG 500 TABLETS PER BOTTLE NEW SHELF LIFE 06/08/89	BT	9.60	D
	<306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<311> F87=1 F90= <374> F87= F90=1 <380> F87=1 F90= <381> F87=1 F90=1			
	<382> F87=1 F90=1 <384> F87=4 F90=5 <385> F87=1 F90=1 <386> F87=1 F90=1			
	<483> F87=1 F90=1 <484> F87=3 F90=3 <485> F87=7 F90=6 <487> F87= F90=2			
	<489> F87= F90=1 <490> F87= F90=1			
6505-01-100-7983	BELLADONNA ALKALOIDS WITH PHENOBARBITAL TABLETS 1000S	BT	4.37	D
	<306> F87= F90=1 <487> F87= F90=1			
6505-01-100-7984	IOTHALAMATE MEGLUMINE INJECTION USP 60% 30ML VIAL 50 VIALS/PG	PG	134.68	D
	<301> F87=1 F90= <305> F87= F90=1 <306> F87= F90=1 <307> F87=7 F90=1			
	<308> F87=1 F90= <320> F87=1 F90= <380> F87=3 F90= <381> F87=4 F90=			
	<382> F87=4 F90= <384> F87=17 F90=17 <385> F87=11 F90=30 <386> F87=16 F90=61			
	<483> F87=13 F90=1 <484> F87=2 F90=4 <485> F87=26 F90=11 <487> F87= F90=1			
	<488> F87=1 F90= <489> F87=1 F90= <490> F87=1 F90=			
6505-01-104-0399	DROPERIDOL INJECTION USP 2.5MG/ML 2ML AMPUL 10 AMPULS/PACKAGE	PG	6.46	D
	<306> F87= F90=1 <309> F87=1 F90= <380> F87=1 F90= <381> F87=1 F90=1			
	<382> F87=1 F90=1 <384> F87=1 F90=8 <385> F87=1 F90=5 <386> F87=1 F90=11			
	<483> F87=1 F90=3 <484> F87= F90=5 <485> F87= F90=14 <488> F87=1 F90=			
	<489> F87=1 F90= <490> F87=1 F90=1			
6505-01-106-7281	CLOTRIMAZOLE VAGINAL CREAM USP 1% 45GM TUBE WITH APPLICATOR REPLACES 6505-01-049-8881 AND 00-616-9128 ON 0-DAY LIST	PG	1.97	D
	<306> F87= F90=1 <381> F87= F90=1 <382> F87= F90=1 <384> F87= F90=8			
	<487> F87= F90=1 <489> F87= F90=1 <490> F87= F90=1			
6505-01-107-1480 1-0012	MEFLOQUINE HYDROCHLORIDE TABLETS 250MG I.S. 100 TABLETS/PACKAGE	PG	48.19	A
	<306> F87= F90=1 <380> F87= F90=1 <381> F87= F90=1 <382> F87= F90=1			
	<384> F87= F90=1 <385> F87= F90=1 <386> F87= F90=1 <483> F87= F90=1			
	<484> F87= F90=1 <485> F87= F90=1 <487> F87= F90=1 <488> F87= F90=1			
	<489> F87= F90=1 <490> F87= F90=1			

STOCK NUMBER / UNSD CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-01-100-0808	METHYLPREDNISOLONE SODIUM SUCCINATE FOR INJECTION USP 1000MG	CO	6.46 D	
2-0505	AVAIL 10/83			
	<306> F07= F90=1 <308> F87=1 F90= <380> F87=1 F90= <381> F87=1 F90=			
	<382> F07=1 F90= <384> F87=1 F90= <385> F87=1 F90= <386> F87=1 F90=			
	<483> F07=1 F90=			
6505-01-100-0809	METHYLPREDNISOLONE SODIUM SUCCINATE FOR INJECTION USP 125MG	CO	0.99 D	
2-0507	FDA AUTHORIZES 36 MONTH DATING - UPJOHN QA ONLY APPROVE 24 -2/89			
	<306> F87= F90=9 <308> F87=1 F90= <309> F87=1 F90=1 <310> F87=1 F90=2			
	<311> F07=1 F90= <313> F87=1 F90= <380> F87=1 F90=19 <381> F87=1 F90=35			
	<382> F07=1 F90=57 <384> F87=1 F90=36 <385> F87=1 F90=2 <386> F87=1 F90=38			
	<483> F07=2 F90=10 <485> F87=1 F90=13 <487> F87= F90=2 <488> F87= F90=4			
	<489> F87=1 F90=29 <490> F87=1 F90=54			
6505-01-100-2215	DEXTROSE INJECTION USP 5% 50ML BAG 48 BAGS PER PACKAGE	PG	32.85 D	
1-0049				
	<301> F07= F90=1 <306> F87=2 F90=2 <308> F87=1 F90=1 <309> F87=1 F90=1			
	<310> F87= F90=1 <313> F87=1 F90= <484> F87=14 F90= <485> F87=29 F90=			
	<488> F87=1 F90= <489> F87=1 F90= <490> F87=1 F90=			
6505-01-100-2217	SODIUM CHLORIDE INJECTION USP 50ML PLASTIC BAG 48 BAGS/PACKAGE	PG	32.85 D	
1-0047				
	<301> F87=1 F90= <306> F87=6 F90=11 <308> F87=1 F90=2 <309> F87=1 F90=2			
	<310> F87=1 F90=1 <313> F87=1 F90= <380> F87=17 F90=23 <381> F87=27 F90=27			
	<382> F87=55 F90=38 <384> F87=153 F90=275 <385> F87=115 F90=416 <386> F87=242 F90=904			
	<483> F07=67 F90=95 <484> F87=157 F90=504 <485> F87=337 F90=1106 <487> F87= F90=1			
	<489> F87= F90=1 <490> F87= F90=7			
6505-01-100-2218	SODIUM CHLORIDE INJECTION USP 100 ML PLASTIC BAG 48 PER PKG	PG	32.85 D	
1-0048				
	<301> F87= F90=1 <306> F87= F90=4 <309> F87= F90=1 <380> F87= F90=2			
	<381> F07= F90=3 <382> F87= F90=5 <384> F87= F90=30 <385> F87= F90=44			
	<386> F87= F90=100 <483> F87= F90=13 <484> F87= F90=54 <485> F87= F90=120			
	<490> F87= F90=1			
6505-01-113-4758	ERYTHROMYCIN TABLETS USP 250MG 40S	BT	1.51 D	
1-0267				
	<306> F87= F90=3 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<311> F87=1 F90= <370> F87= F90=1 <380> F07=1 F90= <381> F87=5 F90=2			
	<382> F07=9 F90=4 <384> F87=19 F90=41 <385> F87=2 F90=5 <386> F87=3 F90=12			
	<483> F07=1 F90=5 <484> F87=24 F90=14 <485> F87=53 F90=33 <487> F87=1 F90=2			
	<488> F87=1 F90= <489> F87=1 F90=2 <490> F07=1 F90=5			
6505-01-116-9245	ALBUTEROL INHALATION AEROSOL 17GM CONTAINER 200 METERED SPRAYS	PG	4.21 D	
2-0298				
	<306> F07= F90=8 <308> F87=1 F90= <309> F07=2 F90=9 <310> F87=2 F90=11			
	<311> F07=8 F90= <380> F87=23 F90=91 <381> F87=116 F90=170 <382> F87=238 F90=234			
	<384> F87=648 F90=181 <385> F87=66 F90=33 <386> F07=136 F90=163 <483> F87=5 F90=18			
	<484> F07= F90=2 <485> F87=9 F90=69 <487> F87= F90=10 <488> F87= F90=49			
	<489> F87=1 F90=161 <490> F87=1 F90=273			

STOCK NUMBER / UNSB CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-01-117-1996	ISOPROTERENOL HYDROCHLORIDE INJECTION USP 0.200MG/ML 1ML AMPUL25	PG	57.74	D
	<306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90= <313> F87=1 F90=			
	<380> F87=1 F90=1 <381> F87=1 F90=1 <382> F87=1 F90=2 <384> F87=1 F90=9			
	<385> F87=1 F90=13 <386> F87=1 F90=28 <483> F87=1 F90=2 <484> F87=1 F90=12			
	<485> F87=1 F90=27 <488> F87=1 F90= <489> F87=1 F90= <490> F87=1 F90=			
6505-01-117-9832 1-0010	ISOFLURANE USP 100ML	BT	66.92	D
	<488> F87=4 F90= <489> F87=4 F90= <490> F87=5 F90=			
6505-01-119-7694 1-0611-F	OPHTHALMIC IRRIGATING SOLUTION 500ML BOTTLE W/HANGING DEVICE 6S	PG	43.69	D
	<306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<311> F87=1 F90= <319> F87=1 F90=1 <380> F87=1 F90= <381> F87=5 F90=			
	<382> F87=13 F90=2 <384> F87=45 F90=7 <385> F87=19 F90=4 <386> F87=37 F90=9			
	<419> F87=1 F90= <483> F87=12 F90=4 <484> F87=67 F90=12 <485> F87=157 F90=34			
	<487> F87= F90=1			
6505-01-121-2336 1-0739	SUNSCREEN PREPARATION SPF FACTOR 15 4OZ BOTTLE	BT	1.46	D
	<306> F87=12 F90=12			
6505-01-123-1060 3-1276	DOPAMINE HYDROCHLORIDE INJECTION USP 40MG/ML 10ML UNIT 10/PG	PG	18.96	D
	<306> F87=3 F90=1			
6505-01-123-2457 3-0164	METRONIDAZOLE INJECTION USP 5MG/ML 100ML VIAL AVAIL 6/84	VI	1.22	L
	<489> F87=1 F90= <490> F87=1 F90=			
6505-01-124-6752 3-1043-P	MINERAL INJECTION TRACE ELEMENTS 5ML VIAL 25 VIALS PER PACKAGE RECLASSIFY TO TS 4/87, USE 01-169-0281	PG	49.29	V
	<309> F87=1 F90= <380> F87=1 F90= <381> F87=1 F90= <382> F87=1 F90=			
	<384> F87=1 F90= <385> F87=1 F90= <386> F87=2 F90= <483> F87=1 F90=			
	<484> F87=12 F90= <485> F87=24 F90= <488> F87=5 F90= <489> F87=4 F90=			
	<490> F87=6 F90=			
6505-01-125-3240 1-0931	PRALIDOXIME CHLORIDE INJECTION 300MG/ML 2ML AUTOMATIC INJECTOR	EA	7.37	A
	<306> F87=24 F90=24			
6505-01-125-3253 1-1017	MANNITOL INJECTION USP 25% 50ML SINGLE DOSE VIALS 25 VIALS/PG REPLACES 6505-00-889-6653 (1 NEW : 25 OLD)	PG	20.53	D
	<306> F87= F90=8 <308> F87=1 F90=1 <309> F87=1 F90=1 <310> F87=1 F90=1			
	<311> F87=1 F90= <319> F87=1 F90=1 <380> F87=5 F90=12 <381> F87=7 F90=22			
	<382> F87=15 F90=35 <384> F87=44 F90=206 <385> F87=30 F90=431 <386> F87=67 F90=793			
	<419> F87=1 F90= <483> F87=17 F90=90 <484> F87=59 F90=369 <485> F87=129 F90=810			
	<487> F87= F90=1 <488> F87=1 F90= <489> F87=1 F90=12 <490> F87=1 F90=24			

STOCK NUMBER / UMSB CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-01-126-3842 2-0510	NIFEDIPINE CAPSULES USP 10MG 100 CAPSULES PER BOTTLE	BT	24.10	O
	<306> F87= F90=1 <309> F87=1 F90= <310> F87=1 F90= <313> F87=1 F90=			
	<380> F87=1 F90= <381> F87=1 F90= <382> F87=1 F90= <384> F87=1 F90=			
	<385> F87=1 F90= <386> F87=1 F90= <483> F87=1 F90= <484> F87=1 F90=			
	<485> F87=1 F90= <489> F87=1 F90= <490> F87=1 F90=			
6505-01-127-7946	BUPIVACAINE HYDROCHLORIDE INJECTION USP .50% 30ML VIAL 10S	PG	15.60	O
	<301> F87=1 F90= <306> F87= F90=1 <308> F87=1 F90= <318> F87=1 F90=1			
	<320> F87=1 F90=1 <380> F87=1 F90= <381> F87=1 F90= <382> F87=1 F90=			
	<384> F87=3 F90=3 <385> F87=1 F90=1 <386> F87=2 F90=4 <417> F87=1 F90=			
	<483> F87=1 F90=1 <484> F87=2 F90=2 <485> F87=5 F90=7 <488> F87=1 F90=			
	<489> F87=1 F90= <490> F87=1 F90=			
6505-01-127-7947	BUPIVACAINE HYDROCHLORIDE&EPINEPHRINE INJECTION USP 30ML VIAL10S	PG	19.25	O
	<480> F87=1 F90= <489> F87=1 F90= <490> F87=1 F90=			
6505-01-132-0257 2-0101	SULFADOXINE AND PYRIMETHAMINE TABLETS U.S. 25 TABLETS/PACKAGE	PG	46.83	O
	<306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<311> F87=1 F90= <380> F87=1 F90= <381> F87=2 F90=1 <382> F87=5 F90=2			
	<384> F87=9 F90=12 <385> F87=1 F90=1 <386> F87=2 F90=4 <483> F87=1 F90=2			
	<484> F87=12 F90=4 <489> F87=27 F90=12 <487> F87= F90=1 <489> F87= F90=1			
	<490> F87= F90=2			
6505-01-134-3199	METHOXYFLURANE USP 125ML BOTTLE 4 BOTTLES PER PACKAGE	PG	706.50	L
	<488> F87=1 F90= <489> F87=1 F90= <490> F87=1 F90=			
6505-01-137-8451 2-0201	ACYCLOVIR OINTMENT 5% 15GM COLLAPSIBLE TUBE AVAIL 3/84 SERVICES APPROVED O-DAY 1-4-90	TU	20.53	O
	<306> F87= F90=1 <384> F87= F90=1 <487> F87= F90=1			
6505-01-139-5000 2-0489	HEPATITIS B VIRUS VACCINE INACTIVATED USP 3ML VIAL DELETED - SEE SUBSTITUTE 6505-01-266-3780 1:1 FEB 90	VI	64.38	A
	<306> F87=12 F90=12			
6505-01-139-7477	SHEEP BLOOD DEFIBRINATED 100 ML SERVICES APPROVED O-DAY 1-4-90	BT	17.06	L
	<384> F87= F90=50 <403> F87= F90=1 <483> F87= F90=5 <484> F87= F90=139			
	<485> F87= F90=319			

STOCK NUMBER / UNSB CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-01-141-9463 2-0699	INSULIN ISOPHANE SUSPENSION USP 100 USP UNITS PER ML 10ML BOTTLE	BT	5.37	0
	<306> F87= F90=1 <309> F87=1 F90= <310> F87=1 F90= <380> F87=1 F90=			
	<381> F87=1 F90= <382> F87=1 F90= <384> F87=1 F90= <385> F87=1 F90=			
	<386> F87=1 F90= <483> F87=1 F90= <484> F87=1 F90= <485> F87=1 F90=			
6505-01-141-9464 2-0698	INSULIN INJECTION USP 100 USP UNITS PER ML 10ML	BT	5.37	0
	<306> F87= F90=1 <309> F87=1 F90= <310> F87=1 F90= <380> F87=1 F90=			
	<381> F87=1 F90= <382> F87=1 F90= <384> F87=1 F90=20 <385> F87=1 F90=			
	<386> F87=3 F90= <483> F87=1 F90=15 <484> F87=20 F90=150 <485> F87=40 F90=315			
	<488> F87=11 F90= <489> F87=10 F90= <490> F87=14 F90=			
6505-01-142-5596 2-0586	METHYLENE BLUE INJECTION USP 1% 10ML AMPUL 25 PER PACKAGE AVAIL 7/84	PG	31.17	0
	<301> F87=1 F90= <306> F87= F90=1 <380> F87=1 F90= <381> F87=1 F90=			
	<382> F87=2 F90= <384> F87=3 F90=3 <385> F87=4 F90=7 <386> F87=6 F90=11			
	<483> F87=3 F90=			
6505-01-142-9876 5-0707	NIFEDIPINE CAPSULES USP 10 MG I.S. 100S	PG	39.44	0
	<306> F87= F90=1			
6505-01-143-4643 2-0617	NEOMYCIN&POLYMYXIN B SULFATES&GRAMICIDIN OPHTHALMIC SOL USP 10ML AVAIL 12/83	BT	0.63	0
	<306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<311> F87=1 F90= <319> F87=1 F90=1 <380> F87=1 F90= <381> F87=1 F90=			
	<382> F87=1 F90= <384> F87=4 F90=7 <385> F87=2 F90=3 <386> F87=3 F90=8			
	<419> F87=1 F90= <483> F87=1 F90=1 <484> F87=6 F90=3 <485> F87=13 F90=10			
	<487> F87= F90=1			
6505-01-143-4644 2-0616	NEOMYCIN&POLYMYXIN B SULFATES&BACITRACIN ZINC OPHTH OINT3.5GM12S SERVICES APPROVED 0-DAY DELETION 1-4-90	PG	6.30	0
	<488> F87=1 F90= <489> F87=1 F90= <490> F87=1 F90=			
6505-01-145-0513	WATER FOR INJECTION STERILE USP 50ML VIAL 100 VIALS PER PACKAGE	PG	49.34	L
	<301> F87=1 F90= <308> F87=3 F90= <309> F87=4 F90= <310> F87=3 F90=			
	<380> F87=69 F90= <381> F87=108 F90= <382> F87=222 F90= <384> F87=612 F90=			
	<385> F87=461 F90= <386> F87=970 F90= <483> F87=270 F90= <484> F87=631 F90=			
	<485> F87=1353 F90=			
6505-01-145-5217 3-0224	PODOPHYLLUM RESIN USP POWDER FORM 25 TO 30GM BOTTLE AVAIL 2/84	BT	11.59	L
	<306> F87= F90=1			

STOCK NUMBER / UMSB CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-01-145-5220	FORMALDEHYDE AND CRESOL SOLUTION 1FL OZ BOTTLE	BT	8.00	L
	APPROVED SUBSTITUTE ITEM,BUCKLEY'CREOSOL AWAITING STNORZATION			
	<370> F87=1 F90= <374> F87= F90=1 <381> F87=1 F90= <382> F87=1 F90=			
	<384> F87=19 F90= <385> F87=1 F90= <306> F87=1 F90= <483> F87=3 F90=			
	<404> F87=19 F90=			
6505-01-145-6758 3-0405	VERAPAMIL HYDROCHLORIDE INJECTION 2.5MG/ML 2ML UNIT 10/PACKAGE	PG	7.66	D
	AVAIL 0/84			
	<306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90= <380> F87=1 F90=			
	<381> F87=1 F90= <382> F87=1 F90= <304> F87=3 F90=2 <385> F87=2 F90=1			
	<386> F87=2 F90=1 <483> F87=1 F90= <484> F87=1 F90= <485> F87=1 F90=			
	<488> F07=1 F90= <489> F87=1 F90= <490> F87=1 F90=			
6505-01-146-1139	LIDOCAINE HYDROCHLORIDE AND EPINEPHRINE INJECTION USP1.8ML 100S	PG	8.10	D
	AVAIL 10/83			
	<301> F87=1 F90= <306> F87= F90=1 <308> F87=1 F90= <318> F87=1 F90=1			
	<320> F87=1 F90=1 <370> F87=2 F90=1 <380> F87=1 F90= <381> F87=4 F90=1			
	<382> F87=4 F90=1 <384> F87=77 F90=11 <385> F87=4 F90=4 <386> F87=4 F90=6			
	<417> F87=1 F90= <483> F87=13 F90=2 <484> F87=77 F90=4 <485> F87=1 F90=6			
	<487> F87= F90=1 <488> F87=1 F90= <489> F87=1 F90=1 <490> F87=1 F90=1			
6505-01-147-9542 3-0177	NORGESTREL AND ETHINYL ESTRADIOL TAB USP 168S	PG	7.23	D
	AVAIL 2/84, ADDED PER REQ CRG			
	<316> F87= F90=40 <381> F07= F90=3 <382> F87= F90=3 <384> F87= F90=10			
	<385> F87= F90=1 <386> F87= F90=1 <489> F87= F90=2 <490> F87= F90=2			
6505-01-150-7041 3-0296	NORGESTREL AND ETHINYL ESTRADIOL TABLETS USP 168S	PG	7.23	D
	AVAIL 3/84,ADDED PER REQ CRG			
	<316> F87= F90=20 <381> F87= F90=1 <382> F87= F90=1 <384> F87= F90=5			
	<385> F87= F90=1 <386> F87= F90=1 <489> F87= F90=1 <490> F87= F90=1			
6505-01-153-1756 3-0436	PERITONEAL DIALYSIS SOLUTION 2000ML 6 PG	PG	23.92	V
	SERVICES DELETED D-DAY 1-4-90			
	<484> F87=5 F90= <485> F87=13 F90=			
6505-01-153-3015 3-0551	TETRACAINE HYDROCHLORIDE STERILE USP 20MG AMPUL 100 AMPULS/PG	PG	439.09	D
	AVAIL 7/84			
	<301> F87=1 F90= <306> F87= F90=1 <380> F87=1 F90= <381> F87=1 F90=			
	<382> F87=1 F90= <384> F87=3 F90=2 <385> F87=1 F90=1 <386> F87=2 F90=3			
	<483> F87=1 F90=1 <484> F87=2 F90=1 <485> F87=3 F90=5			
6505-01-153-3375	DEXTROSE USP ANHYDROUS 1 LB	BT	4.58	K
	SERVICES APPROVED D-DAY 1-4-90			
	<384> F87= F90=1 <403> F87= F90=1 <483> F07= F90=1 <484> F87= F90=1			
	<485> F87= F90=1			

STOCK NUMBER / UNSB CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-01-153-3457 3-1030-P	PERITONEAL DIALYSIS SOLUTION 2000ML 6S SERVICES DELETED 0-DAY 1-4-90 <404> F87=2 F90= <485> F87=5 F90=	PG	40.65 D	
6505-01-153-4303 3-1809	COCAINE HYDROCHLORIDE TABLETS FOR TOPICAL SOL USP 135MG 100S <320> F87=1 F90=1 <382> F87=1 F90= <384> F87=1 F90= <385> F87=1 F90=1 <386> F87=1 F90=1 <483> F87=1 F90=	BT	192.38 D	
6505-01-153-4335 3-1813	DOXYCYCLINE HYCLATE TABLETS USP 100MG 500 TABLETS PER BOTTLE AVAL 4/05 <306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90= <311> F87=1 F90= <316> F87=1 F90= <380> F87=1 F90= <381> F87=1 F90= <382> F87=1 F90= <384> F87=1 F90= <385> F87=1 F90= <386> F87=1 F90= <483> F87=1 F90= <484> F87=1 F90= <485> F87=1 F90= <487> F87= F90=1	BT	23.28 D	
6505-01-153-4431 90-0008	CLEANSER HAND GERMICIDAL RINSE 4 OZ SERVICES APPROVED 0-DAY 1-4-90 CN 90-0088 <303> F87= F90=2 <305> F87= F90=3 <306> F87= F90=2 <308> F87= F90=12 <309> F87= F90=12 <310> F87= F90=12 <311> F87= F90=12	BT	1.28 L	
6505-01-154-2160	SODIUM CHLORIDE INJECTION 100 MEQ 40ML 50S AVAIL 6/84 <384> F87= F90=6 <483> F87= F90=3 <484> F87= F90=30 <485> F87= F90=64	PG	70.46 D	
6505-01-154-9918	DEXTROSE INJECTION USP5% 500ML 18S D-DAY SUB FOR 01-182-8009 SERVICES APPROVED 0-DAY 1-4-90 <306> F87= F90=1 <381> F87= F90=1 <382> F87= F90=1 <384> F87= F90=4 <385> F87= F90=6 <386> F87= F90=14 <483> F87= F90=2 <484> F87= F90=7 <485> F87= F90=17	PG	13.77 D	
6505-01-154-9922 3-0154	RINGER'S INJECTION LACTATED USP 500ML PLASTIC BAG 18 BAGS/PG AVAIL 10/84 <306> F87= F90=1	PG	11.99 D	
6505-01-156-0701	KETOCONAZOLE TABLETS 200 MG 100S AVAIL 6/04 <306> F87= F90=1 <487> F87= F90=1	BT	104.16 D	
6505-01-156-1720	MINERAL OIL LIGHT NF 30ML 25S REPLACED BY 00-173-6538 SERVICES APPROVED 0-DAY DELETE 1-4-90 <301> F87=1 F90= <320> F87=1 F90= <380> F87=1 F90= <381> F87=1 F90= <382> F87=1 F90= <384> F87=1 F90= <385> F87=1 F90= <386> F87=1 F90= <417> F87=1 F90= <483> F87=1 F90= <484> F87=1 F90=	PG	19.95 L	

STOCK NUMBER / OHSB CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-01-156-2171 7-0084	WATER FOR INJECTION STERILE USP 1000 ML 12S	PG	14.06	D
	<483> F87= F90=1 <484> F87= F90=1 <485> F87= F90=3			
6505-01-159-1493	FLUORESCEIN SODIUM OPHTHALMIC STRIPS MODIFIED 300S	PG	14.99	D
	<306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<311> F87=1 F90= <315> F87=1 F90=1 <319> F87=1 F90=1 <380> F87=1 F90=			
	<381> F87=1 F90= <382> F87=1 F90= <384> F87=2 F90=2 <385> F87=1 F90=1			
	<386> F87=1 F90=2 <419> F87=1 F90= <483> F87=1 F90= <484> F87=2 F90=1			
	<485> F87=6 F90=3 <487> F87= F90=1 <488> F87=1 F90= <489> F87=1 F90=			
	<490> F87=1 F90=			
6505-01-162-4449 3-1221-P	POTASSIUM PHOSPHATES INJ USP 5 ML 50S AVAIL 3/85	PG	21.35	D
	<309> F87=1 F90= <310> F87=1 F90= <380> F87=1 F90= <381> F87=1 F90=			
	<382> F87=1 F90= <384> F87=3 F90=2 <385> F87=2 F90= <386> F87=5 F90=			
	<483> F87=2 F90=1 <484> F87=6 F90=9 <485> F87=12 F90=19 <488> F87=2 F90=			
	<489> F87=1 F90= <490> F87=2 F90=			
6505-01-162-4455 3-1039-P	SODIUM ACETATE INJ USP 2MEQ PER ML 20 ML 25S	PG	15.00	D
	<309> F87=1 F90= <310> F87=1 F90= <380> F87=1 F90= <381> F87=1 F90=			
	<382> F87=1 F90= <384> F87=2 F90=2 <385> F87=1 F90= <386> F87=3 F90=			
	<403> F87=1 F90=1 <484> F87=2 F90=6 <485> F87=4 F90=13 <488> F87=2 F90=			
	<489> F87=3 F90= <490> F87=4 F90=			
6505-01-163-6333 3-1157-P	GLYCERIN OPHTHALMIC SOLUTION USP 7.50 ML	BT	5.72	D
	<305> F87= F90=2 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<311> F87=1 F90= <319> F87=1 F90=1 <380> F87=1 F90= <381> F87=2 F90=			
	<382> F87=4 F90=1 <384> F87=12 F90=23 <385> F87=5 F90=13 <386> F87=10 F90=28			
	<419> F87=1 F90= <483> F87=3 F90=5 <484> F87=19 F90=12 <485> F87=44 F90=37			
	<487> F87= F90=1 <490> F87= F90=1			
6505-01-163-8006 3-1219-P	DEXTROSE INJECTION USP 50% 500ML BOTTLE 6 BOTTLES PER PACKAGE GLASS, PARTIAL FILL IN 1000 ML BOTTLE DELETED 0-DAY 1-4-90	PG	11.99	D
	<309> F87=1 F90= <380> F87=1 F90= <381> F87=1 F90= <382> F87=2 F90=			
	<384> F87=3 F90= <385> F87=4 F90= <386> F87=7 F90= <483> F87=2 F90=			
	<484> F87=49 F90= <485> F87=100 F90= <488> F87=17 F90= <489> F87=17 F90=			
	<490> F87=24 F90=			
6505-01-169-0281 6-0677	MINERAL INJECTION TRACE ELEMENTS 10ML VIAL 25 VIALS PER PACKAGE REPLACES 01-124-6752 SERVICES APPROVED 0-DAY 1-4-90	PG	20.53	D
	<384> F87= F90=7 <483> F87= F90=2 <484> F87= F90=18 <485> F87= F90=38			

STOCK NUMBER / OMSB CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-01-172-2851 3-2212	DOXYCYCLINE HYCLATE FOR INJ USP EQ TO 200 MG OF DOXYCYCLINE	VI	11.50	D
	<306> F87= F90=1			
6505-01-173-3911	MEDENDAZULE TABLETS USP 100MG I.S. 36 TABLETS PER PACKAGE NEW ITEM IN D-DAY REPLACED 6505-01-080-1525 1:3	PG	68.63	D
	<306> F87=12 F90=12			
6505-01-177-1982 4-0336	CLINDAMYCIN PHOSPHATE INJECTION USP 600MG VIAL 25 VIALS PER PG AVAL 2/86 ABBOTT MARKETING PRODUCT APPROX 9-87	PG	153.03	D
	<301> F87=1 F90= <306> F87=.F90=12 <308> F87=1.F90= <309> F87=2 F90=1			
	<310> F87=2 F90= <380> F87=40 F90=12 <381> F87=62 F90=19 <382> F87=128 F90=31			
	<384> F87=352 F90=186 <385> F87=265 F90=273 <386> F87=558 F90=600 <483> F87=155 F90=77			
	<484> F87=363 F90=368 <485> F87=779 F90=780 <487> F87=1 F90= <488> F87=4 F90=			
	<489> F87=3 F90=1 <490> F87=4 F90=10			
6505-01-182-8009	DEXTROSE INJECTION USP 5% 250ML PLASTIC BAG 24 BAGS PER PACKAGE REV: WT=10/CU=.9	PG	20.62	D
	<306> F87=.F90=1 <308> F87=1 F90= <309> F87=1 F90= <380> F87=1 F90=			
	<381> F87=1 F90= <382> F87=2 F90= <384> F87=6 F90=3 <385> F87=4 F90=3			
	<386> F87=6 F90=4 <483> F87=2 F90= <484> F87=3 F90= <485> F87=2 F90=			
6505-01-182-8013	SODIUM CHLORIDE INJECTION USP 0.9% 250ML PLASTIC BAG 24 BAGS/PG REV: WT=17.8/CU=.866	PG	23.81	D
	<306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90= <380> F87=1 F90=			
	<381> F87=1 F90= <382> F87=1 F90= <384> F87=1 F90= <385> F87=1 F90=			
	<386> F87=1 F90= <483> F87=1 F90= <484> F87=1 F90= <485> F87=1 F90=			
6505-01-193-2030 7-0125	SODIUM POLYSTYRENE SULFONATE SUSPENSION 500ML SERVICES APPROVED D-DAY 1-4-90	BT	26.25	D
	<306> F87= F90=1			
6505-01-202-7998 1-093	POTASSIUM ACETATE INJ USP 2MEQ PER ML VI 5GL DS 20ML PG OF 25 VI REPLACES 01-044-1959 (PEP ACTION)D-DAY APPROVED 1-4-90	PG	14.23	D
	<384> F87= F90=1 <483> F87= F90=1 <484> F87= F90=1 <485> F87= F90=2			
6505-01-204-9753 6-0331	MULTIVITAMIN SOLUTION FOR INJECTION 5ML VIAL 50 VIALS/PACKAGE REPLACES 6505-01-067-1633 ON D-DAY(4 NEW : 1 OLD)	PG	27.93	D
	<306> F87= F90=1 <309> F87=1 F90= <380> F87=1 F90=1 <381> F87=1 F90=1			
	<382> F87=3 F90=1 <384> F87=5 F90=4 <385> F87=5 F90=3 <386> F87=11 F90=2			
	<483> F87=3 F90=1 <484> F87=74 F90=8 <485> F87=151 F90=18 <490> F87= F90=1			
6505-01-206-5977 5-0137	BRUMPHENIRAMINE MALEATE AND PHENYLPROPANOLAMINE HCL TABS 500/BT	BT	19.17	D
	<306> F87= F90=2 <310> F87=1 F90= <311> F87=1 F90= <374> F87= F90=1			
	<381> F87=1 F90=1 <382> F87=1 F90=1 <384> F87=1 F90=1 <385> F87=1 F90=1			
	<386> F87=1 F90=1 <483> F87=1 F90=1 <484> F87= F90=1 <485> F87= F90=1			
	<487> F87= F90=2 <489> F87= F90=1 <490> F87= F90=1			

STOCK NUMBER / UMSB CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-01-206-9240 5-0551	ACYCLOVIR CAPSULES 200MG 100 CAPSULES PER BOTTLE AVAL 11/05	BT	57.19	D
	<306> F87= F90=1 <316> F87=1 F90= <384> F87= F90=1 <487> F87= F90=1			
6505-01-207-1195 5-0135	NEUMYCIN AND POLYMYXIN B SULFATES CREAM 15GM COLLAPSIBLE TUDE REPLACED 6505-00-926-2159	TU	0.75	D
	<480> F87=1 F90= <489> F87=1 F90= <490> F87=1 F90=			
6505-01-208-7344 5-0478	THEOPHYLLINE CAPSULES MODIFIED 250MG 100 CAPSULES PER BOTTLE REPLACES 6505-01-064-9555D-DAY/DEPMEDS LISTS	BT	4.38	D
	<306> F87= F90=4 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90= <311> F87=1 F90= <380> F87=1 F90= <381> F87=2 F90=3 <382> F87=5 F90=7 <384> F87=13 F90=4 <385> F87=1 F90= <386> F87=3 F90=7 <483> F87=1 F90=5 <485> F87=1 F90=3 <487> F87= F90=1 <489> F87= F90=2 <490> F87= F90=8			
6505-01-210-9506 5-0525	NYSTATIN AND TRIAMCINOLONE ACETONIDE CREAM 15GM COLLAPSIBLE TUBE REPLACES 6505-00-961-5504 ON 0-DAY	TU	0.73	D
	<306> F87=1 F90= <316> F87=1 F90=			
6505-01-212-7483 9-0754-P	IODINE USP CRYSTAL FORM 125GM BOTTLE UMSD STANDARD ACC D	BT	47.75	D
	<303> F87=1 F90=1			
6505-01-213-7114	BRETYLIUM TOSYLATE INJECTION 50MG/ML 10ML AMPUL 20 PER PACKAGE	PG	103.37	D
	<306> F87= F90=1 <308> F87=1 F90= <309> F87=1 F90=1 <313> F87=2 F90= <380> F87=1 F90= <381> F87=1 F90= <382> F87=1 F90= <384> F87=1 F90= <385> F87=1 F90= <386> F87=1 F90= <483> F87=1 F90= <484> F87=1 F90= <485> F87=1 F90= <488> F87=0 F90= <489> F87=1 F90= <490> F87=1 F90=			
6505-01-213-9514 5-0542	GENTAMICIN SULFATE INJECTION USP 40MG EQUIV/ML 2ML VIAL 25/PG REPLACES 00-181-7180 ON 0-DAY/DEPMEDS(1:25)	PG	8.95	D
	<301> F87=1 F90= <306> F87= F90=13 <308> F87=1 F90= <309> F87=2 F90=1 <310> F87=2 F90= <380> F87=27 F90=9 <381> F87=42 F90=12 <382> F87=86 F90=18 <384> F87=235 F90=76 <385> F87=177 F90=144 <386> F87=373 F90=323 <483> F87=104 F90=42 <484> F87=242 F90=196 <485> F87=319 F90=421 <490> F87= F90=5			
6505-01-214-0774 5-0569	FUROSEMIDE INJ USP 10 MG/ML 4ML ACT INGRED PER 5ML SYRNG OF 10S SERVICES APPROVED 0-DAY 1-4-90	PG	13.65	L
	<306> F87= F90=1			
6505-01-215-7753 7-0409	MICONAZOLE NITRATE VAGINAL SUPPOSITORIES USP 200MG 1.S.3/PACKAGE	PG	4.33	D
	<306> F87= F90=20 <316> F87=1 F90= <381> F87= F90=1 <382> F87= F90=1 <384> F87= F90=3 <385> F87= F90=1 <386> F87= F90=1 <489> F87= F90=1 <490> F87= F90=1			

STOCK NUMBER / DMSO CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-01-226-2931 H-001	FAT EMULSION INJECTION 500 ML 10S	PG	79.66 D	
	<304> F87= F90=7 <483> F87= F90=4 <484> F87= F90=38 <485> F87= F90=80			
6505-01-227-7028 6-0023	CEFTRIAXONE SODIUM STERILE USP 250MG VIAL 10 VIALS PER PACKAGE	PG	79.38 D	
	<306> F87= F90=8 <380> F87= F90=7 <381> F87= F90=9 <382> F87= F90=14			
	<384> F87= F90=78 <385> F87= F90=113 <386> F87= F90=252 <483> F87= F90=33			
	<484> F87= F90=154 <485> F87= F90=326 <490> F87= F90=3			
6505-01-228-1892	CALCIUM HYDROXIDE USP POWDER FORM 0.40Z BOTTLE	BT	1.36 L	
	REPLACED 00-111-7995 ON 0-DAY/DEPMEDS			
	<370> F87=12 F90= <374> F87= F90=1 <381> F87=1 F90=1 <382> F87=1 F90=1			
	<384> F87=19 F90=1 <385> F87=1 F90=1 <386> F87=1 F90=1 <483> F87=3 F90=1			
	<484> F87=19 F90=1 <485> F87= F90=1 <487> F87= F90=1 <489> F87= F90=1			
	<490> F87= F90=1			
6505-01-230-0726 6-0091	BENZTROPINE MESYLATE TABLETS USP 2MG 100 TABLETS PER BOTTLE	BT	4.99 D	
	SERVICES APPROVED 0-DAY 1-4-90			
	<306> F87= F90=1 <382> F87= F90=1 <384> F87= F90=6 <483> F87= F90=1			
	<485> F87= F90=2			
6505-01-231-4807 8-0244	CEFTAZIDIME FOR INJECTION 2GM VIAL 10 VIALS PER PACKAGE	PG	241.02 D	
	REPLACES 01-117-1986 (1:1)			
	<306> F87= F90=8 <380> F87= F90=7 <381> F87= F90=9 <382> F87= F90=14			
	<384> F87= F90=78 <385> F87= F90=113 <386> F87= F90=252 <483> F87= F90=33			
	<484> F87= F90=154 <485> F87= F90=326 <490> F87= F90=3			
6505-01-233-7616 6-0085	METHYLPREDNISOLONE ACETATE SUSPENSION STERILE USP 40MG/ML 5ML	VI	3.78 L	
	REPLACES 6505-00-890-1186 ON 0-DAY			
	<306> F87=3 F90=3			
6505-01-234-8962 6-0069-P	DILUTING SOLUTION FROZEN BLOOD 150ML PLASTIC BAG 36 BAGS/PACKAGE	PG	86.66 L	
	<304> F87=33 F90= <380> F87=4 F90= <381> F87=4 F90=4 <382> F87= F90=4			
	<384> F87=19 F90=20 <385> F87=18 F90=36 <386> F87=37 F90=75 <404> F87= F90=4			
	<483> F87=11 F90=3 <484> F87=1 F90=13 <485> F87=3 F90=28 <488> F87= F90=1			
	<489> F87= F90=1 <490> F87= F90=1			
6505-01-234-9583 6-0067-P	WASHING SOLUTION FROZEN BLOOD 3000ML BAG 6 BAGS PER PACKAGE	PG	30.00 L	
	<304> F87=10 F90= <380> F87=24 F90= <381> F87=24 F90=18 <382> F87= F90=18			
	<384> F87=116 F90=116 <385> F87=105 F90=210 <386> F87=223 F90=445 <404> F87= F90=34			
	<483> F87=63 F90=14 <484> F87=9 F90=75 <485> F87=20 F90=163 <488> F87= F90=2			
	<489> F87= F90=2 <490> F87= F90=2			

STOCK NUMBER / OMSB CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-01-230-9443	GUAIFENESIN TABLETS MODIFIED SUST-REL 12 HOUR 600MG 100 TABS/BT	BT	12.62 D	
	REPLACES 6505-00-064-8765 ON DEPMEOPER CRG FUNECUN (81:BT)			
	<306> F87= F90=2 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=1			
	<311> F87=3 F90= <380> F87=9 F90= <381> F87=43 F90=1 <382> F87=89 F90=3			
	<384> F87=243 F90=2 <385> F87=25 F90= <386> F87=51 F90=4 <483> F87=2 F90=2			
	<484> F87=89 F90= <485> F87=3 F90=1 <487> F87= F90=1 <489> F87= F90=1			
	<490> F87= F90=3			
6505-01-239-4660 6-0341	DOBUTAMINE HYDROCHLORIDE INJECTION 250MG 20ML SINGLE DOSE VIAL	VI	26.35 D	
	REPLACES 6505-01-085-1833ON D-DAY/DEPMEDS			
	<306> F87= F90=1 <309> F87=1 F90= <380> F87=1 F90= <381> F87=1 F90=			
	<382> F87=1 F90= <384> F87=1 F90= <385> F87=1 F90= <386> F87=1 F90=			
	<403> F87=1 F90=			
6505-01-239-6963	DANTROLENE SODIUM FOR INJECTION 20 MG VIAL 6 VIALS PER PACKAGE	PG	175.00 L	
	REPLACES 6505-01-096-2297 ON D-DAY			
	<301> F87= F90=1 <306> F87= F90=5			
6505-01-240-0507 6-0231	BECLOMETHASONE DIPROPIONATE INHALATION AEROSOL 16.8GM OR 5.88OZ	PG	4.21 D	
	REPLACES 6505-01-028-9707 ON D-DAY			
	<306> F87= F90=6 <308> F87=1 F90= <309> F87=1 F90= <310> F87=1 F90=			
	<311> F87=1 F90= <380> F87=1 F90= <381> F87=1 F90=4 <382> F87=1 F90=10			
	<384> F87=3 F90=6 <385> F87=1 F90= <386> F87=1 F90=11 <403> F87=1 F90=1			
	<485> F87=1 F90=4 <487> F87= F90=1 <489> F87= F90=3 <490> F87= F90=8			
6505-01-242-9149 H-033	MEPIVACAINE HYDROCHLORIDE INJECTION USP 3% 1.8ML CARTRIDGE100/PG	PG	11.83 D	
	REPLACES 6505-00-982-7301 ON D-DAY			
	<320> F87= F90=1 <370> F87= F90=1 <381> F87= F90=1 <382> F87= F90=1			
	<384> F87= F90=2 <385> F87= F90=2 <386> F87= F90=2 <403> F87= F90=2			
	<484> F87= F90=2 <485> F87= F90=2 <487> F87= F90=1 <489> F87= F90=1			
	<490> F87= F90=1			
6505-01-246-3781 6-0470	NITROGLYCERIN LINGUAL AEROSOL 13.8 GM	CO	5.47 D	
	<306> F87= F90=1 <384> F87= F90=1 <385> F87= F90=2 <386> F87= F90=6			
6505-01-249-2134 6-0570	SODIUM CHLORIDE TABLETS FOR SOLUTION USP 1GM 1000 TABLETS/BOTTLE	BT	4.97 D	
	REPLACES 6505-00-153-8708 ON D-DAY LIST			
	<302> F87= F90=10			
6505-01-258-0983 7-0224	VECURONIUM BROMIDE FOR INJECTION 10 MG 10ML VIALS 10/PKG	PG	116.17 D	
	SERVICES APPROVED D-DAY 1-4-90			
	<306> F87= F90=3 <380> F87= F90=3 <381> F87= F90=3 <382> F87= F90=3			
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STOCK NUMBER / ONSB CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-01-266-3771 7-0492	VERAPAMIL HCL INJECTION 2.5MG/ML 4ML SYRINGE W/NEEDLE 10 PER PKG	PG	22.99	0
	<306> F87= F90=1			
6505-01-266-3773 7-0491	DRETYLIUM TOSYLATE INJECTION 50MG/ML 10ML SYRINGE W/NDLE 10/PG	PG	9.56	L
	<306> F87= F90=1			
6505-01-267-8219 7-0490	NALOXONE HYDROCHLORIDE INJECTION USP 1MG/ML 2ML SYR W/NDL 10/PKG	PG	60.98	0
	<306> F87= F90=1			
6505-01-280-4732 8-0412	PERITONEAL DIALYSIS SOLUTION 2000ML PLASTIC BAG 6 PER PACKAGE	PG	40.62	L
	SERVICES APPROVED 0-DAY 1-4-90			
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	<485> F87= F90=227 <488> F87= F90=1 <489> F87= F90=6 <490> F87= F90=10			
6505-01-281-1246 8-0411	PERITONEAL DIALYSIS SOLUTION 2000ML PLASTIC BAG 6 PER PACKAGE	PG	43.10	L
	SERVICES APPROVED 0-DAY 1-4-90			
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6505-01-281-1247 7-0445	HETASTARCH IN SODIUM CHLORIDE INJECTION 500ML BAG 12 BAGS/PG	PG	471.27	0
	SERVICES APPROVED 0-DAY 1-4-90			
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	<489> F87= F90=3 <490> F87= F90=5			
6505-01-281-6758 8-0571	HYDROCORTISONE ACETATE AND PRAMOXINE HYDROCHLORIDE CREAM 1OZ 12S	PG	4.10	0
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6505-01-293-5593 J-070	ERYTHROMYCIN LACTOBIONATE FOR INJECTION USP 1GM VIAL 10 VIALS/PG	PG	20.50	0
	REPLACED 6505-00-656-0483 1:2 RATIO 3-15-89			
	<306> F87= F90=5 <308> F87= F90=1 <309> F87= F90=1 <380> F87= F90=5			
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STOCK NUMBER / DMSU CONTROL NO	NOMENCLATURE / COMMENTS	UNIT ISSUE	UNIT PRICE	AAC
6505-01-302-2669 K-012	PHENOBARBITAL TABLETS USP 30MG I.S. 250 TABLETS PER PACKAGE REPLACED 6505-00-933-8965 WHICH WAS NON CONTRACTIBLE 10-19-89	PG	11.00 D	
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6508-00-116-1367	SHAMPOO MEDICATED 4OZ	BT	0.64 D	
	<489> F87=1 F90= <490> F87=1 F90=			
6508-00-852-6597 1-0223	SOAP ANTISEPTIC CAKE 2 TO 3 OZ (57TO85 GRAM) 200S	PG	35.04 D	
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6508-01-019-7101	EMULLIENT LUTION 240ML IN PLASTIC BOTTLE WITH DISPENSER CAP NONDETERIORATIVE SL	BT	0.65 D	
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6510-00-003-3058	ADHESIVE TIES SURGICAL 7.25 BY 11.125 INCHES 24S	PG	24.82 D	
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6510-00-018-6184	PAD NONADHERENT 2 BY 3 INCHES 100S	PG	2.02 D	
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6510-00-054-7254	SKIN CLOSURE ADHESIVE SURGICAL POROUS .50 BY 4 INCHES 30OS	PG	10.54 D	
	<301> F87=1 F90= <311> F87=1 F90= <320> F87=1 F90=1 <380> F87=1 F90=1			
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6510-00-058-4421	SPONGE SURGICAL GAUZE 2 BY 2 INCHES STERILE WHITE 3000S	PG	37.31 D	
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U.S. ARMY

MEDICAL MATERIEL AGENCY

Frederick, Maryland 21702 - 5001

MEDICAL CUSTOMER SHOPPING GUIDE FOR SAUDI ARABIA

All Supply Classes

MEDICAL CUSTOMER SHOPPING GUIDE (ALL SUPPLY CLASSES) AND THEATER ARMY MEDICAL MANAGEMENT INFORMATION SYSTEM (TAMMIS) INSTRUCTIONS FOR SAUDI ARABIA

1. In order to ensure more responsive medical supply support for units participating in Desert Shield, the Army Surgeon General's Office and the U.S. Army Medical Materiel Agency (USAMMA) have developed a Customer Shopping Guide for medical supplies. The shopping guide informs customers where current stocks are located and the levels of stockage. With this data, customers will be able to determine where they can obtain supplies in the time frames they need the supplies.

2. The TAMMIS Customer Guide (TAB A).

a. This document is a guide to customers to understand TAMMIS and products that TAMMIS provides to customers.

b. The TAMMIS Customer Reorder List (Page A-3 of the Customer Guide) is the key document for customers to manually communicate their request to the U.S. Army Medical Materiel Center Saudi Arabia (USAMMCSA) or to their supporting Medical Supply, Optical and Maintenance Unit (MEDSOM). For items on the reorder list, the customer only needs to write in the quantity needed for an item. The USAMMCSA currently has four Customer Reorder Lists available that can be used by any customer.

(1) Army sick call list
(2) Army trauma treatment list
(3) All stocked drugs (6505)
(4) All stocked bandages and surgical supplies (6510-6515)

These lists are available in either stock number or nomenclature sequence.

c. Customers can receive a tailored Customer Reorder List for items they use.

d. Customers will automatically have items added to their reorder list each month as they order items that were not on their original list.

3. For your convenience the Customer Shopping Guide-Saudi Arabia is published in two sequences:

a. Nomenclature/alphabetical (TAB B).

b. National Stock number (TAB C).

4. How to read the Customer Shopping Guide:

a. If an item has a quantity in the USAMMCSA column, it is stocked at the USAMMCSA and the delivery time should be seven days or less.

b. If an item has a quantity in the U.S. Army Medical Materiel Center, Europe (USAMMCE) column, it is available in Europe and will have a routine delivery time of 14 to 24 days. All items stocked at USAMMCE are medical items frequently used by medical activities in Europe.

c. All items with a quantity in the Defense Personnel Support Center/USAMMA column will have a routine delivery time of between 21 and 32 days for normal requests.

MACK C. HILL
Colonel, MS
Commanding

3 Encls

NOMENCLATURE	NSN	USAMMCSA ASSETS	USAMMCE ASSETS	OPSC USAMMA ASSETS	UI	UNIT PRICE
INSULATOR SEALING MACHINE HEAT REPLACEMENT PARTS F/NYCLAVE IMPUL	3540012549624		24		EA	4.29
PAPER TYMPAN 2.5" WIDE ROLL CAN PERFORM 150 TESTS ON PATIENTS	3610012005756		127		RO	10.00
PUMP INFLATING MANUAL USED WITH 7210002998518 AND 7210002998520	4320002998519	35		807	EA	33.27
FILTER ELEMENT FLUID PRESS FIBER 2.73IN OD 1.045IN ID 4.837IN LG	4330001500671		55	1778	EA	3.81
COMMODE FIELD METAL ENAMELED FINISH OLIVE DRAB BUCKET TYPE	4510007756000	31	1	1828	EA	84.86
CARTRIDGE WATER DEMINERALIZER ION EXCHANGE PLASTIC 6 PER PACKAGE	4610009215622	43	56	932	PG	50.71
TUBING NONMETALLIC RUBBER BLACK 2400PSI STRENGTH 144" LENGTH	4720001419058		156	2835	EA	1.61
TUBING NONMETALLIC RUBBER NATURAL 1/8"ID 1/32"OD 2400 PSI	4720001419063		184	22062	FT	0.08
TUBING NONMETALLIC RUBBER NATURAL 1/4"ID 1/16"OD 2400 PSI	4720001419067		1726	56758	FT	0.11
TUBING NONMETALLIC RUBBER NATURAL .125"ID .188"OD 3500 PSI	4720001419070	293	2239	47244	FT	0.12
TUBING NONMETALLIC RUBBER LATEX CLEAR 3500 PSI .172"MIN ID	4720001419080		9249	291816	FT	0.22
TUBING NONMETALLIC RUBBER NATURAL 1/2"ID 3/32"OD 3000 PSI	4720001422238		115	8440	FT	0.51
TUBING NONMETALLIC RUBBER NATURAL .188"ID .281"OD 3000 PSI	4720001422239		303	23985	FT	0.10
TUBING NONMETALLIC RUBBER 3/8 INCH ID 1/16 INCH WALL	4720001422241	71	200	118363	FT	0.33
TUBING NONMETALLIC RUBBER NATURAL 1/4"ID 3/32"OD 3000 PSI	4720001422367		167	21543	FT	0.27
GASKET ROUND BLACK SYNTH RUBBER 5.5IN OD X 5IN ID	5330011907140		177		EA	2.51
WIRE FABRIC 5-14 BY 36 INCHES	5335003732800	6897	1243	140371	RO	1.99
CONNECTOR PLUG ELEC 3 MALE CONTACTS 15 AMP 125 VOLTS	5935001488190		98	26863	EA	1.19
OUTLET BOX 6 PLACE 110/230 VOLT 50/60 HZ AC	5975011624448		128	979	EA	54.58
BATTERY NONRECHARGEABLE 6V RECTANGULAR 2.625"WX2.625"LX3.812"H	6135000503280		759	871	EA	0.97
BATTERY NONRECHARGEABLE 1.5 VOLT CYL SHAPE 2.375"L DIA 1.313	6135009300030		218	799	PG	9.95
BATTERY NONRECHARGEABLE 1.5V CYLINDRICAL SHAPE DIA 1" HT 1.875"	6135009355301		589	924	PG	7.31
BATTERY NONRECHARGEABLE 9V 2 TERM .856"W X 1.031"L X 1.906"H DRY	6135010631978		119	990	PG	14.95
BATTERY STORAGE ELECTROLYTE POTASSIUM HYDROXIDE 1.2V 11AMPS	6140010795437		87	804	EA	46.00
FLASHLIGHT STRAIGHT 3 VOLT DC 4.375" LENGTH DISPOSABLE 12 PER PG	6230001255528		279	188	PG	5.84
LIGHT DESK 110 VOLTS AC 3" OVERALL WIDTH SWIVEL ARM AND JOINT	6230008094284	19	1	1062	EA	37.88
LAMP INCANDESCENT 82S T 8ULB STYLE 2.6V FROSTED WHITE LIGHT	6240005529672		109	4420	EA	1.55
LAMP INCANDESCENT 82S T STYLE WHITE LIGHT .32 AMPERES.728"LENGTH	6240007548198		128	1377	EA	1.58
LAMP INCANDESCENT 82S T STYLE WHITE LIGHT .280 AMPERES	6240007870420		11	2783	EA	1.55
LAMP INCANDESCENT 1.5 VOLT 0.13 AMPERE BULB T-3/4 WHITE LIGHT	6240007972550		152	8151	EA	1.80
LAMP INCANDESCENT LARINGOSCOPE LARGE ADULT	6240011397464	27			EA	3.65
FLUORESCEIN SODIUM & BENOXINATE HYDROCHLORIDE OPHTHALMIC SOL 5ML	6505000013345				BT	4.89
MINOCYCLINE HYDROCHLORIDE CAPSULES USP 100MG 50 CAPSULES/BOTTLE	6505000035112		87	9923	BT	41.44
CEPHALEXIN FOR ORAL SUSPENSION USP 125MG PER 5ML 100ML	6505000091833		734	12422	BT	2.09
ISOSORBIDE DINITRATE CAPSULES 40MG 100 CAPSULES PER BOTTLE	6505000095059		319	37107	BT	3.70
DOXYCYCLINE HYCLATE CAPSULES USP EQUIV TO100MG DOXYCYCLINE 500S	6505000095063	676	520	15419	BT	23.59
CHLORPROMAZINE HYOROCHLORIDE TABLETS USP 25MG 1000S	6505000221326	3	198		BT	260.14
SODIUM FLUORIDE TABLETS 2.21 MG 1000S	6505000234259		43	3850	BT	2.97
ISOPROTERNOL SULFATE INHALATION AEROSOL USP 2MG/ML 15ML VIAL/PG	6505000236481	7	85	327	PG	4.95
PYRIDOSTIGMINE BROMIDE EXTENDED-RELEASE TABLETS 180MG 100/BOTTLE	6505000454327		433	490	BT	54.01
DOCUSATE SODIUM SOLUTION USP 1% 30 ML	6505000457786		225	2868	PG	3.85
PSYLLIUM HYDROPHILIC MUCILLOID WITH DEXTROSE 14 OZ	6505000504567	311	2199	210969	CO	1.42
AMPICILLIN CAPSULES USP 250MG 500 CAPSULES PER PACKAGE	6505000519050	80	231	4189	BT	16.75
HYDROXYZINE HYDROCHLORIDE INJECTION USP 50 MG PER ML 10 ML	6505000521367		5372	17115	VI	0.70
OXACILLIN SODIUM CAPSULES USP EQUIVALENT TO 500MG/CAPSULE 100/BT	6505000592760	88	66	1124	BT	12.22

NOMENCLATURE	NSN	USAMMCSA ASSETS	USAMMCE ASSETS	DPSC USAMMA ASSETS	UI	UNIT PRICE
CHLORDIAZEPOXIDE HYDROCHLORIDE CAPSULES USP 10MG 500S	6505000599017	33	213	136	BT	4.63
GENTAMICIN SULFATE CREAM USP EQ 1 MG GENTAMICIN	6505000623335	21	62	2628	TU	3.32
FUROSEMIDE TABLETS USP 40 MG 100S	6505000623336	4	149	5489	BT	1.46
ASPIRIN DELAYED-RELEASE TABLETS USP 325MG 1000S	6505000635631	4	3		BT	4.40
LIDOCAINE HYDROCHLORIDE TOPICAL SOLUTION USP VISCOUS 2% 100 ML	6505000636197	1081	1219	2996	BT	1.24
GUAIFENESIN SYRUP USP 20MG/ML 4OZ OR 118ML	6505000648765	1730	25581	946817	BT	0.45
GLUCAGON FOR INJECTION USP 1 MG	6505000654204		187	1429	PG	18.43
PROMETHAZINE HYDROCHLORIDE SUPPOSITORIES 25 MG 12S	6505000654214		322	11631	BX	11.35
VANCOMYCIN HYDROCHLORIDE STERILE USP EQUIV 500 MG OF VANCOMYCIN	6505000655220	60	752	16124	VI	4.48
TRIAMCINOLONE ACETONIDE SUSPENSION STERILE USP 10MG PER ML 5 ML	6505000858772			1419	VI	2.54
TRIAMCINOLONE ACETONIDE CREAM USP 0.500% 80Z	6505000716547		186	3278	JR	9.10
NAPHAZOLINE HYDROCHLORIDE OPHTHALMIC SOLUTION USP 0.1% 15ML	6505000717867		204	1085	BT	1.12
FERROUS FUMARATE&DOCUSATE SODIUM EXTENDED-RELEASE CAPSULES 1000S	6505000742981		135		BT	32.10
DIPHENOXYLATE HYDROCHLORIDE & ATROPINE SULFATE TABLETS USP 500S	6505000744702		987	2450	BT	3.28
CLIOQUINOL AND HYDROCORTISONE CREAM 20GM	6505000749912	127	762	21856	TU	1.07
TYPHOID VACCINE USP 50 DOSES WITH 25ML DILUENT	6505000798759		468	5450	PG	15.36
SPECTINOMYCIN HCL STERILE USP EQUIV TO 2GM	6505000797611	60	115	13156	PG	6.93
SPECTINOMYCIN HYDROCHLORIDE STERILE USP EQUIV TO 4GM POWDER FORM	6505000797643	26	442	2543	PG	13.43
NALOXONE HYDROCHLORIDE INJECTION USP 0.4MG/ML 1ML AMPUL 10/BX	6505000797867	187	6962	11178	BX	6.98
ERYTHROMYCIN ETHYLSUCCINATE FOR ORAL SUSPENSION USP 8GM OF ERYTH	6505000800653			18048	BT	3.36
PENICILLIN V POTASSIUM FOR ORAL SOL USP 160000000UNITS IN200ML BT	6505000800852		2335	53585	BT	1.56
PENICILLIN V POTASSIUM FOR ORAL SOLUTION USP 8000000 UNITS	6505000800853		376	3997	BT	0.88
ALUMINUM HYDROXIDE GEL MAGNESIUM HYDROX&SIMETH SUSP 50Z BT 48S	6505000800975		17	4079	BX	12.05
ETHYNODIOL DIACETATE & ETHINYL ESTRADIOL TABLETS USP 63S	6505000802246		102	6432	BX	6.17
AMITRIPTYLINE HYDROCHLORIDE TABLETS USP 25MG 100S	6505000822659		54	4044	BT	0.95
RINGER'S INJECTION LACTATED USP 1000ML PLASTIC BAG 12 BAGS/BX	6505000836537		4464	35460	BX	11.93
DEXTROSE INJECTION USP 5% 1000ML BAG 12 BAGS PER BOX	6505000836538		708	24880	PG	11.33
DEXTROSE & SODIUM CHL INJ USP 5% DEXTROSE .9% SOD CHL 1000ML 12S	6505000836541		147	3200	BX	9.88
SODIUM CHLORIDE INJECTION USP .9% 1000ML SINGLE OOSE 12S	6505000836544	1331	2133	1393	BX	11.81
ERGOTAMINETAR BELLA ALKA CAFF AND PENTOBARBITOL SUPPOSITORIE 12S	6505000893438		167		BX	15.47
LANOLIN USP 10Z TUBE	6505000933879				TU	0.79
CALCIUM GLUCONATE INJECTION USP 100MG/ML 10ML AMPUL 25/PACKAGE	6505000978138	181	31	1483	PG	9.84
ACETIC ACID GLACIAL USP 1 LB	6505001002470		562	2642	BT	2.34
ASPIRIN TABLETS USP 0.324GM 100S	6505001009985	16143	20969	161737	BT	0.41
ALUMINUM ACETATE AND ACETIC ACID SOLUTION 2% 60ML BOTTLE	6505001048061		52	14493	BT	3.84
MULTIVITAMIN SOLUTION 50 ML	6505001048433		554	17324	PG	1.04
ALCOHOL USP 5 GALLONS	6505001049000	13	61	1728	OR	17.67
ALCOHOL DEHYDRATED USP 1 PT (473 ML)	6505001050000	394	1817	49017	BT	0.80
TUBERCULIN PURIFIED PROTEIN DERIVATIVE 5 UNITS PER 0.1ML 500DOSES	6505001050102		136	10890	CO	3.46
HALOTHANE USP 250ML BOTTLE	6505001050109	6	14	1592	BT	16.10
CHOLESTYRAMINE FOR ORAL SUSPENSION USP 9GM PACKET 60 PER BOX	6505001050372		427	32956	PG	44.36
MAFENIDE ACETATE CREAM USP EQUIVALENT TO 8.5% OF MAFENID 14.5 OZ	6505001050824	21	17	716	CN	68.66
AMINOPHYLLINE INJECTION USP 25MG PER ML 10ML AMPUL 25 PER BOX	6505001059500	7	27	9552	BX	8.21
AMMONIA INHALANT SOLUTION AROMATIC 0.333CC AMPUL 10 PER PACKAGE	6505001060875	555		391372	PG	2.03
PROPRANOLOL HYDROCHLORIDE TABLETS USP 10MG 100 TABLETS/BOTTLE	6505001067395		256	2578	BT	0.59

NOMENCLATURE	NSN	USAMMCSA ASSETS	USAMMCE ASSETS	OPSC USAMMA ASSETS	UI	UNIT PRICE
PROPRANOLOL HYDROCHLORIDE TABLETS USP 10MG 1000S	6505001067397		57	1785	BT	2.54
PROPRANOLOL HYDROCHLORIDE TABLETS USP 40MG 100 TABLETS/BOTTLE	6505001067399	47	12	518	BT	2.18
DEXTROAMPHETAMINE SULFATE TABLETS USP 5MG 100 TABLETS PER BOTTLE	6505001068715			8	BT	9.44
AMYL NITRATE INHALANT USP 0.300ML AMPUL 12 PER PACKAGE	6505001069000		407	41818	PG	1.59
BETAMETHASONE VALERATE CREAM USP .1% ACTIVE INGREDIENT 45 GRAMS	6505001070922		1	2363	TU	1.36
LUBRICANT SURGICAL 5 GRAM 144S	6505001117829		87	2361	BX	4.60
ACETIC ACID GLA BEN CHL PRO GLY PROGLY D1AC&SOD ACE SOL OTIC15ML	6505001117864		70	1072	BT	3.79
COLLODION FLEXIBLE USP 102	6505001150000		10	13323	BT	1.31
CROTAMITON CREAM USP 10% 60GM	6505001160200	45	83	9876	TU	2.31
POTASSIUM CHLORIDE L-LYSINE MONOHYDROCHLORIDE&POTASSIUM TABS 60S	6505001160604		8	11798	PG	5.44
DEXTROSE & SOD CHL INJ 5% DEXTRO IN 0.45% SOL SOD CHL 1000ML 12S	6505001161025	327	1	6117	BX	9.42
DEXTROSE&SOD CHL INJ USP 5% DEXT IN.33%SOL OF SOD CHL 1000ML 12S	6505001161037		31	929	BX	9.84
DEXTROSE & SOD CHL INJ 5% OEXTR IN 0.2% SOL SOD CHL 1000 ML 12S	6505001161038		122	1339	BX	9.61
DEXTROSE IN LACTATED RINGERS INJECTION 5% 1000 ML 12S	6505001161064	104	634	18961	BX	9.63
SULFUR CREAM 2% 1OZ OR 28.75GM TUBE	6505001161159		149	753	TU	2.66
SULFUR AND SALICYLIC ACID CAKE 3 3/4 OZ (106.3 GM)	6505001161315		428	20368	CK	1.85
METHYLERGONOVINE MALEATE INJECTION USP 0.2MG/CC 1ML AMPUL 20/BX	6505001161374	62	1	661	BX	16.88
OXYTOCIN INJECTION USP 1ML AMPUL 20 AMPULS PER BOX	6505001161376		14	7287	BX	7.45
PENICILLIN V POTASSIUM TABLETS USP EQUIVALENT TO 400000UN I.S100	6505001161408	29	117	694	BX	5.89
HEXACHLOROPHENE CLEANSING EMULSION USP 1GL OR 3.78OL1	6505001161750		585	1932	BT	33.26
DIGOXIN TABLETS USP .25MG ORAL NONCHEWABLE BOTTLE OF 100S	6505001167750	24	180	9	BT	8.17
DIPHENHYDRAMINE HYDROCHLORIDE CAPSULES USP 50MG 100S	6505001168350	15669	31478	80186	BT	1.13
DIMENHYDRINATE TABLETS USP 50MG 100 TABLETS PER BOTTLE	6505001169660		210	3730	BT	0.89
HYDROCHLOROTHIAZIDE TABLETS USP 50 MG INDIVIDUALLY SEALED 100S	6505001175984	37			PG	2.73
CHLOROQUINE PHOSPHATE TABLETS USP 0.3GM 500 TABLETS PER BOTTLE	6505001176450		18	18	BT	161.73
PENICILLIN V POTASSIUM TABLETS USP 400000 UNITS 40 TABS/BOTTLE	6505001178579	13465	4635	85752	BT	1.55
FERROUS SULFATE TABLETS USP 0.324 GRAM 100S SUGAR COATED	6505001178602		8513	61569	BT	0.60
DOCUSATE CALCIUM CAPSULES USP 0.24 GRAM 30S	8505001178607	100	192	11330	CO	1.60
AMPICILLIN CAPSULES USP 250 MG 40S	6505001178835	569	464	17258	BT	1.78
TUBERCULIN PURIFIED PROTEIN DERIVATIVE EQUIV 5 US UN/DOSE 10 DOS	6505001178783		205	4931	BT	1.79
THIOPENTAL SODIUM FOR INJECTION USP 1 GRAM 25S	6505001179204	4	3	64	BX	160.04
THIAMYLAL SODIUM FOR INJECTION USP VETERINARY USE POWDER 5GM	6505001181096		89		BT	2.51
KETAMINE HCL INJECTION USP 100MG PER ML 10ML VETERINARY	6505001181099		70	6627	BT	5.19
PROPOXYPHENE HYDROCHLORIDE CAPSULES USP 65MG I.S. 100 CAPS/BX	6505001181207		143		BX	1.83
DIPHENOXYLATE HYDROCHLORIDE&ATROPINE SULFATE TABS USP I.S. 100S	6505001181814	8	89	10	BX	2.20
ASPIRIN TABLETS USP 0.325GM INDIVIDUALLY SEALED 100 TABS/PACKAGE	6505001181848	50	512	10607	PG	1.63
NYSTATIN TABLETS USP 500000 UNITS ACTIVE INGREDIENT 100S	6505001181949		180	1303	BT	7.07
CODEINE SULFATE TABLETS USP 30 MG 100S	6505001182132	1036	318	6184	BT	7.44
HALOPROGIN TOPICAL SOLUTION USP 1% 10ML PLASTIC SQUEEZE DROP TIP	6505001182211		101	6168	BT	3.41
HALOPROGIN CREAM USP 1% 30GM TUBE	6505001182318		24	7838	TU	5.15
CODEINE PHOSPHATE AND ASPIRIN TABLETS 325MG ASPIRIN I.S. 25S	6505001182347		433	838	BX	6.93
CHLORPROMAZINE HYDROCHLORIDE TABLETS USP 25MG I.S. 100S	6505001182529		388	1312	BX	27.34
PROCHLORPERAZINE MALEATE TABLETS USP 5MG INDIVIDUALLY SEALED100S	6505001182563				BX	6.66
BISACODYL TABLETS USP 5 MG INDIVIDUALLY SEALED 100S	6505001182759	972	374	32	BX	4.29
FERROUS SULFATE TABLETS USP 0.324 GM 1000S	6505001193300		306	9514	BT	3.08

NOMENCLATURE	NSN	USAMMCSA ASSETS	USAMMCE ASSETS	DPSC USAMMA ASSETS	UI	UNIT PRICE
NITROFURANTOIN CAPSULES 50 MG 500S	6505001199321	1	77	2183	BT	44.79
CHLORAMPHENICOL OPHTHALMIC SOLUTION MODIFIED 0.5% 7.5 ML	6505001262037		101	2995	BT	1.23
SULFACETAMIDE SODIUM AND PREDNIS ACE OPH 1.8OZ	6505001262040	24	2		TU	6.86
SODIUM CHLORIDE TABLETS IMPREGNATED 648MG 500S	6505001263407		128219	83524	BT	1.44
MAGNESIUM SULFATE INJECTION USP 2ML AMPUL 12 AMPULS/PACKAGE	6505001265100		252	8	PG	18.09
MENTHOL USP CRYSTAL OR MASS BOTTLE 28.35GM	6505001269000		121	687	BT	2.92
MEPERIDINE HYDROCHLORIDE INJECTION 50 MG PER ML 30 ML	6505001269360		132		BT	5.58
MEPERIDINE HYDROCHLORIDE TABLETS 50 MG 100S	6505001269375	6	49	2643	BT	6.49
DOPAMINE HYDROCHLORIDE INJECTION 40MG PER ML 5ML	6505001272923		29	983	AM	0.38
THIMEROSAL TINCTURE USP 1 PT (473 ML)	6505001285705		161	5163	BT	2.96
IBUPROFEN TABLETS USP 400 MG 500S	6505001288035	150	272	39167	BT	7.51
MORPHINE INJECTION EQUIVALENT TO 16MG 1.5ML TUBE WITH NEEDLE	6505001295517	980	14159	1118896	EA	0.48
MORPHINE INJECTION USP 16 MG 1.5 ML 5S	6505001295518	72		60908	PG	2.24
CHLORPROMAZINE HYDROCHLORIDE INJECTION USP 25MG/ML 2ML AMPUL 10S	6505001296709	133	5444	2931	PG	6.98
NITROUS OXIDE USP SIZE D CYLINDER 2500L	6505001301920	58	283	12105	EA	19.12
DIPHENHYDRAMINE HYDROCHLORIDE CAPSULES USP 25 MG IND SEALED 100S	6505001320284				PG	2.52
DIPHENHYDRAMINE HYDROCHLORIDE CAPSULES USP 50MG I.S. 100S	6505001320315	21	57	1426	PG	2.56
DIAZEPAM TABLETS USP 2 MG INDIVIDUALLY SEALED 100S	6505001320318		195	58	PG	6.67
GLUCOSE TEST SOLUTION 100 GRAM 12 FL OZ (355 ML)	6505001320373		708	41154	BT	0.54
PAREGORIC USP 1PT OR 473ML	6505001323030		513	250	BT	2.97
ORANGE OIL NF 1 FL OZ (29.5 ML)	6505001323600		11	6670	BT	0.98
OXYGEN USP 99% CYLINDER TYPE D 95GL	6505001325181	810	2517	1410	EA	56.05
OXYGEN USP 99% CYLINDER TYPE H 1650 GALLON	6505001325199	2082	8011	16078	EA	160.79
ISONIAZID TABLETS USP 300 MG 100S	6505001326904		616	12151	BT	1.33
PENICILLIN G BENZATHINE SUSP STERILE USP 600000 UNITS/ML 2ML 10S	6505001334447	174	2816	5835	BX	48.92
EPINEPHRINE INJECTION USP AQUEOUS CARTRIDGE NEEDLE UNIT 1ML 10S	6505001334449	739	2694	82869	PG	12.28
PENICILLIN G PROCAINE SUSPENSION STERILE USP 600000UN/ML 2ML 10S	6505001334452		74	1003	PG	20.23
PSEUDOEPHEDRINE HCL SYRUP USP 30MG/5ML 4 FL OZ (118 ML)	6505001334948		4309	102983	BT	0.56
PROCHLORPERAZINE SUPPOSITORIES USP 25MG ADULT RECTAL I.S. 12S	6505001335214		588	9081	BX	14.80
DIAZEPAM TABLETS USP 5 MG 50S	6505001335443		61	1229	BT	0.89
PREDNISOLONE ACETATE OPHTHALMIC SUSPENSION 1% 5 ML	6505001335843		76	3509	BT	0.83
MINERAL OIL USP 1QT OR 946ML	6505001336000	51		4768	CO	2.23
MINERAL OIL USP 1GAL CAN	6505001337000		117	368	CO	6.74
PETROLATUM WHITE USP 1 LB (453.6 GM)	6505001338025		150	23039	CO	1.32
PHENOL USP CRYSTAL OR MASS 1LB OR 453.600 GRAMS	6505001339920	51	146	976	BT	3.22
HYPERALIMENTATION KIT 3 KITS PER PACKAGE	6505001352604	15	152	5266	PG	26.77
CHARCOAL ACTIVATED USP POWDER 15GM	6505001352881	985	4673	9637	BT	0.82
POTASSIUM IODIDE USP 1 LB (453.6 GRAM)	6505001367000	6		2634	BT	10.62
DIAZEPAM INJECTION USP 5MG/ML 2ML SYRINGE WITH NEEDLE 10/PACKAGE	6505001375891	11136	22746	31316	PG	14.20
PROPYLTHIOURACIL TABLETS USP 50MG 100 TABLETS PER BOTTLE	6505001384225		258	1727	BT	3.36
PYRIDOXINE HYDROCHLORIDE TABLETS USP 50MG 100 TABLETS PER BOTTLE	6505001384995	46	880	24635	BT	0.70
BUPIVACAINE HYDROCHLORIDE INJECTION USP 50ML VIAL	6505001387347	325	15	3541	VI	2.99
QUINIDINE SULFATE TABLETS USP 200MG 100 TABLETS PER BOTTLE	6505001387400		124	7314	BT	4.70
PHENAZOPYRIDINE HYDROCHLORIDE TABLETS USP 100MG 100 TABLETS/BT	6505001388461	102	44	6471	BT	3.33
ORPHENADRINE CITRATE TABLETS 100MG 100S	6505001388462		11	211	BT	3.58

NOMENCLATURE	NSN	USAMMCSA ASSETS	USAMMCE ASSETS	DPSC USAMMA ASSETS	UI	UNIT PRICE
FLUOROMETHOLONE OPHTHALMIC SUSPENSION USP 0.1% 5 ML	6505001389875	61	68	2704	BT	1.10
PHENYTOIN SODIUM INJECTION USP 50MG/ML 5ML AMPUL 10 AMPULS/PG	6505001394348	37	274	18185	PG	9.04
DEXTROSE INJECTION USP 5G% 50ML CARTRIDGE 10 PER BOX	6505001394460		30	21	PG	23.98
CALCIUM CHLORIDE INJECTION USP 10% 10CC NEEDLE W/SYRINGE 10S	6505001394548		248	3439	PG	14.88
SODIUM BICARBONATE INJ 7.5% SYR-NDL UNIT 50 ML 10S 18 GA NEEDLE	6505001394561		105	1778	BX	16.09
ETHINYL ESTRADIOL TABLETS 0.02 MG 100S SUGAR COATED	6505001394596		67	2009	BT	13.13
TETRAHYDROZOLINE HYDROCHLORIDE OPHTHALMIC SOLUTION USP 0.05%15ML	6505001394600	256	692	75	BT	0.54
SECOBARBITAL SODIUM CAPSULES USP 100 MG 100S	6505001403050		236	1613	BT	15.43
SILVER NITRATE USP 1 OZ (28.35 GM)	6505001405000		328	1868	BT	8.24
SODIUM BICARBONATE USP 1 LB (453.6 GM)	6505001415000		102	1827	CO	1.22
TUBERCULIN OLD USP LIQUID MULTIPLE POINT INDIVIDUAL 25 TESTS	6505001428868		48	2894	PG	8.94
TRIPROLIDINE AND PSEUDOEPHEDRINE HYDROCHLORIDES TABLETS USP1000S	6505001429206		106	4545	BT	9.06
SUCROSE NF 1/4 LB (113.4 GRAM)	6505001460585	100		651	BT	2.19
SULFISOXAZOLE TABLETS USP 0.500GM 1000 TABLETS PER BOTTLE	6505001464425	13	1538	1335	BT	23.02
THIAMINE HYDROCHLORIDE TABLETS USP 50MG 100 TABLETS PER BOTTLE	6505001472618	14	281	5003	BT	0.99
THYROID TABLETS USP 32MG 100 TABLETS PER BOTTLE	6505001475900		458	2243	BT	1.33
CODEINE PHOSPHATE AND ACETAMINOPHEN TABLETS 500S	6505001478347		4	6996	BT	13.81
AMANTADINE HYDROCHLORIDE CAPSULES USP 100MG 100 CAPSULES/BOTTLE	6505001484624	18	23	6432	BT	9.82
ALUMINUM HYDROXIDE GEL DRIED MAGNESIUM TRISILICATE TABLETS 100S	6505001484631		3570	49339	BT	1.72
DESONIDE CREAM 0.05% 60 GRAM IN TUBE	6505001486968		501	4997	TU	6.32
DESONIDE CREAM 0.05% 15 GRAM IN TUBE	6505001486969		79	15022	TU	2.54
POTASSIUM CHLORIDE ORAL SOL USP EQUIV 20 MIL POT & CHLORIDE 30S	6505001486984		240	20979	BX	0.70
POVIDONE-IODINE OINT USP 10% 1/8OZ (3.54 GRAM) I.S. 144S	6505001487096		25	270	PG	23.74
SULFAMETHOXAZOLE AND TRIMETHOPRIM TABLETS USP 500 TABLETS/BOTTLE	6505001487164	127		1515	BT	16.65
DIPHENHYDRAMINE HCL INJECTION USP 50MG PER CC SYR-NDL 1ML 10/BX	6505001487177	501	47	7722	BX	11.06
MILK OF MAGNESIA USP 12 FL OZ (355 ML)	6505001487263		468	3583	BT	1.11
FUROSEMIDE INJECTION USP 10 MG PER ML 10 ML 5S	6505001488814			6728	PG	18.12
PSEUDOEPHEDRINE HYDROCHLORIDE TABLETS USP 30MG 24 TABLETS/60TTLE	6505001490098	4061	10975	492737	CO	0.36
PANCURONIUM BROMIDE-INJECTION 2MG/ML 5ML AMPUL 25 AMPULS PER BOX	6505001490108	9	50	2022	BX	205.20
MORPHINE SULFATE INJECTION USP 15MG/ML 1ML CARTRIDGE-NDL UNIT10S	6505001490112		594	12540	BX	5.31
MORPHINE SULFATE INJECTION USP 10MG 1ML CARTRIDGE-NEEDLE UNIT10S	6505001490113	1816	26028	34916	BX	4.84
ERYTHROMYCIN STEARATE TABS USP EQUIV TO 250MG OF ERYTHROMYCIN40S	6505001490119	951	87	60768	BT	2.15
PENICILLIN V POTASSIUM TABLETS USP 800000 UNITS 100 TABS/BOTTLE	6505001490139				BT	3.67
PENICILLIN V POTASSIUM TABLETS USP 400000 UNITS 100 TABLETS/BT	6505001490141	78	3440	26103	BT	2.03
FLUOCINONIDE CREAM USP 0.05% 15GM TUBE	8505001490160		1893	11950	TU	1.38
FLUOCINONIDE CREAM USP 0.05% 60 GM	6505001490164		165	6999	TU	3.39
ALUMINUM HYDROXIDE GEL MAGNESIUM HYDROX&SIMETH SUSP 50Z BOTTLE48	6505001490247	229	415	3067	BX	15.09
CHLORPHENIRAMINE MALEATE SYRUP USP 2 MG PER 5 ML 4 FL OZ	6505001490333		2667	41824	BT	0.77
PREDNISOLONE ACETATE OPHTHALMIC SUSPENSION 0.125% 5ML	6505001491318		110	2022	BT	0.8
WATER FOR INJECTION STERILE USP 1000 ML 6S	6505001491720	51	65	2610	BX	8.29
BUPIVACAINE HYDROCHLORIDE INJECTION USP 0.25% 50ML VIAL	6505001493500		145		BT	2.65
BUPIVACAINE HYDROCHLORIDE INJECTION 0.75% 30ML AMPUL 5 AMPULS/BX	6505001493502			44	BX	11.33
ZINC OXIDE USP 1 LB (453.6 GM)	6505001501000	9	249	2675	BT	2.39
ZINC OXIDE OINTMENT USP 1 OZ (28.35 GM)	6505001501990	107	49	86001	TU	0.42
LUBRICANT OPHTHALMIC TOPICAL 1/8OZ OR 3.5GM W/.5% CHLRBTNL	6505001507622	411	405	41183	TU	0.51

NOMENCLATURE	NSN	USAMMCSA ASSETS	USAMMCE ASSETS	OPSC USAMMA ASSETS	UI	UNIT PRICE
SODIUM CITRATE USP CRYSTAL .25LB OR 113.4GM BOTTLE	6505001538199			1232	BT	1.71
GLYCERIN USP 1 LB (453.6 GRAM)	6505001538220		281	2321	BT	2.26
GLOBULIN IMMUNE USP 10 ML	6505001538278		5455	42594	VI	2.53
CASTOR OIL USP 1QT OR 946ML	6505001538372		106	203	CN	7.02
EUGENOL USP BOTTLE 1OZ OR 23.35GM	6505001538379	36	2	4501	BT	0.96
HYDROGEN PEROXIDE TOPICAL SOLUTION USP 1PINT (473 ML)	6505001538480	294	431	116577	BT	0.27
ASPIRIN TABLETS USP 0.324 GM 1000S	6505001538750	161	275	4728	BT	2.85
LUBRICANT SURGICAL 4 OZ (113.4 GM)	6505001538809	3833	22881	124846	TU	0.51
TETRACAINE AND MENTHOL OINTMENT USP 1OZ COLLAPSIBLE TUBE	6505001538818		2053	4943	TU	1.18
HEPARIN SODIUM INJECTION USP 1000 UNITS PER ML 10 ML	6505001539740	717	19796	71518	VI	0.52
THYROID TABLETS USP 64 MG 100S	6505001539745		128	9570	BT	1.63
NORETHINDRONE AND MESTRANOL TABLETS USP 63 TABLETS PER BOX	6505001584489	901	4650	45603	BX	2.58
CLINDAMYCIN HYDROCHLORIDE CAPSULES USP EQUIVALENT TO 150MG 100S	6505001594892	33	71	3066	BT	52.61
BACITRACIN OINTMENT USP 7100 UNITS 0.5OZ TUBE 12 TUBES/PACKAGE	6505001596625	1220	81	1218	PG	4.73
CHOLERA VACCINE USP 20ML BOTTLE	6505001601500		61	840	BT	2.31
THROMBIN USP 5000 UNITS THROMBIN & 5ML ISOTONIC SODIUM CHLORIDE	6505001612950		498	5269	PG	5.86
YELLOW FEVER VACCINE USP 10ML PACKAGE 20 DOSES	6505001621520		283	7982	PG	20.24
DOCUSATE SODIUM CAPSULES USP 100 MG INDIVIDUALLY SEALED 100S	6505001637656	657	300	3569	PG	1.93
MEASLES MUMPS & RUBELLA VIR VAC LIVE USP LYOPHILIZED SGL DOSE10S	6505001656519		2517	6521	PG	168.43
CEPHALEXIN CAPSULES USP EQUIVALENT TO 250MG 100 PER BOTTLE	6505001656545	761	171	2590	BT	10.14
RIFAMPIN CAPSULES USP 300MG 100 CAPSULES PER BOTTLE	6505001656575	15	235	1645	BT	22.87
FLURANDRENOLIDE TAPE USP 7.5 CM BY 200 CM	6505001686813		131	2060	RO	19.07
POLYVINYL ALCOHOL OPHTHALMIC SOLUTION 30 ML	6505001742290		141		BT	5.75
PHYTONADIONE INJECTION 1 GM 0.5 ML 25S	6505001806372		64	573	BX	30.56
EDROPHONIUM CHLORIDE INJECTION USP 10MG 1ML AMPUL 10 AMPULS/PG	6505001816279	109	157	1331	PG	18.02
CLOMIPHENE CITRATE TABLETS USP 50 MG INDIVIDUALLY SEALED 30S	6505001817678		216	2294	PG	34.78
COLISTIMETHATE SODIUM STERILE USP 0.150GM	6505001817774		1020	309	BT	14.46
PHENYLBUTAZONE TABLETS USP 100 MG 100 TABLETS PER BOTTLE	6505001817888		121	1397	BT	2.91
SULFACETAMIDE SOD OPHTHALMIC OINTMENT USP 10% 1/8 OZ (3.5 GM)	6505001839419	1294	6688	86609	TU	0.50
OATMEAL COLLOIDAL CONCENTRATE POWDER FORM 16OZ OR 453.6GM	6505002006984	395	198	1798	PG	1.91
MEDROXYPROGESTERONE ACETATE SUSPENSION STERIL USP100MG PER ML5ML	6505002077965	72		447	BT	22.29
NYSTATIN ORAL SUSPENSION 100000 UNITS OF NYSTATIN PER ML 60 ML	6505002165051	137	2184		PG	1.48
SODIUM BICARBONATE INJ USP 8.4% SYRINGE-NEEDLE UNIT 50ML 10S	6505002165370		44	595	PG	30.90
PROPRANOLOL HYDORCHLORIDE TABLETS USP 40MG 1000S	6505002213393	46	48	6293	BT	5.01
NORGESTREL AND ETHINYL ESTRADIOL TABLETS USP 1265	6505002213452	100	612	8872	PG	9.30
PSYLLIUM HYDROPHILIC MUCILLOID CITRIC ACID&SOD BICAR6.4GR SGL30S	6505002261213		77		PG	4.38
CARBAMAZEPINE TABLETS USP 200MG 100S	6505002325046	38	524	35470	BT	4.72
UNDECYLENIC ACID SOLUTION 59 ML CONTAINS 10% UNDECYLENIC ACID	6505002378468		53	10466	BT	0.54
PETROLATUM WHITE USP 1 OZ (28.35 GM)	6505002545527		427	89747	TU	0.45
ISOPROPYL ALCOHOL USP 1 QT (946 ML)	6505002617256		885	22647	CN	1.37
BENZOIN TINCTURE COMPOUND USP 1 PINT OR 473 MILLILITERS TOPICAL	6505002617257		64	7257	CN	4.05
VITAMIN A CAPSULES USP 50000 USP UNITS 100 CAPSULES PER BOTTLE	6505002617267		221		BT	3.66
CONTRACEPTIVE JELLY 126 GM	6505002646782		721	1536	TU	1.10
LINDANE SHAMPOO USP 1% 2 FL OZ OR 59ML BOTTLE	6505002688574		547	23084	BT	1.25
METHYLPHENIDATE HYDROCHLORIDE TABLETS USP 10 MG 100S	6505002695837		46	11222	BT	7.02

NOMENCLATURE	NSN	USAMMCSA ASSETS	USAMMCE ASSETS	DPSC USAMMA ASSETS	UI	UNIT PRICE
PHENYLEPHRINE HYDROCHLORIDE OPHTHALMIC SOLUTION USP 2.5% 15ML	6505002719220			4164	BT	2.15
PREDNISONE TABLETS USP 20MG 500S	6505002797606	7	2R	1471	BT	13.04
GLYCOPYRROLATE INJECTION USP 0.2 MG PER ML 5 ML	6505002797691		458	651	BT	0.62
KAOLIN AND PECTIN SUSPENSION 30ML CUP 100 CUPS PER BOX	6505002824019	81	9		BX	18.43
LAXATIVE KIT PRERADIOGRAPHIC EXAMINATION	6505002824618		156		EA	3.89
AMPICILLIN FOR ORAL SUSPENSION USP 250MG/5ML 200ML BOTTLE	6505002833198		290	1357	BT	2.20
SULFISOXAZOLE ACETYL ORAL SUSP USP PEDIATRIC 1 PT (473 ML)	6505002852038		512	16950	BT	26.32
DIPHTHERIA&TETANUS TOXOIDS&PERTUSSIS VACCINE ADSORBED USP 7.5ML	6505002865349		2891	31686	VI	173.51
POVIDONE-IODINE TOPICAL SOLUTION USP EQUIV 1% IODINE BTL OZ	6505002867011		437	39398	BT	0.75
CORTICOTROPIN INJECTION REPOSITORY USP 40 UNITS PER ML 5 ML	6505002882870		123	774	VI	14.12
ISOPROPYL ALCOHOL USP 5 GALLONS OR 946ML	6505002888095		872	5330	DR	19.51
ALBUMIN HUMAN USP 25% 100ML	6505002898179		8926	83121	CN	64.80
LINDANE CREAM USP 1MG GAMMA BENZENE HEXACHLORIDE 60GM TUBE	6505002898279	3424	874	23437	TU	3.76
TETANUS AND DIPHTHERIA TOXOIDS FOR ADULT USE ADSORBED USP 5ML	6505002898296		5704	40491	BT	2.75
SULFACETAMIDE SULFABENZAMIDE SULFATHIAZOLE&UREA CREAM 2.75OZ	6505002898598	178	1498	22466	PG	2.06
CHLORPHENIRAMINE MALEATE TABLETS USP 4MG 1000 TABLETS PER BOTTLE	6505002898610		517	14303	BT	2.06
DIPHENHYDRAMINE HYDROCHLORIDE INJECTION USP 10 MG PER ML 10 ML	6505002898611	4	171	17	BT	1.18
PROCAINAMIDE HYDROCHLORIDE INJECTION USP 100 MG PER ML 10 ML	6505002898614		866	232	BT	1.61
RINGER'S INJECTION LACTATED USP 1000ML GLASS BOTTLE 6 BOTTLES/BX	6505002898615		347	257	BX	9.45
SELENIUM SULFIDE LOTION USP 2.5% 4OZ OR 118ML TOPICAL BOTTLE	6505002898671		1704	79376	BT	0.83
NEOMYCIN SULFATE AND BACITRACIN OINTMENT USP .5OOZ OR 14.2GM	6505002898740	17354	4181	146989	TU	0.58
EPINEPHRINE INJECTION USP AQUEOUS 1ML AMPUL 25 AMPULS/PG	6505002898760	155	75	2003	PG	4.15
NOREPINEPHRINE BITARTRATE INJECTION USP 4ML AMPUL 10 PER PACKAGE	6505002899496		99	24	BX	45.87
DIBUCAINE OINTMENT USP 1% 1OZ TUBE WITH RECTAL APPLICATOR	6505002899535	13857	507	24616	PG	0.83
CYCLOPENTOLATE HYDROCHLORIDE OPHTHALMIC SOLUTION USP 1% 15ML	6505002899686	8	233	6976	BT	1.78
SILVER NITRATE APPLICATORS 6 INCH 100S	6505002899672	261	365	2210	CO	3.42
ATROPINE SULFATE INJECTION USP 2ML PER CC 25ML	6505002899673	20	8509	7878	BT	0.87
ISONIAZID TABLETS USP 100 MG 100S	6505002899674		349	2927	BT	1.18
LIDOCAINE HCL INJ USP 40MG PER ML 25ML VIAL FOR CONT IV INFUSION	6505003004657	246	1725	3667	PG	1.11
METHYSERGIDE MALEATE TABLETS USP 2 MG 100S	6505003307191	1	256	466	BT	55.28
LIDOCAINE HCL INJ USP 2 GM 40 MG PER ML 50 ML	6505003343461		69	1635	PG	1.15
DIAZOXIDE INJECTION USP 300MG 20ML	6505003344478	59		2650	AM	34.42
LINDANE LOTION USP 1% W/V LINDANE 2 OUNCES	6505003557035		156	10393	BT	2.39
FLUOCINONIDE OINTMENT USP 0.05% 15 GRAM	6505003557066	60	1006	11888	TU	7.11
DOXYCYCLINE HYCLATE CAPSULES EQUIV TO 100MG OF DOXYCYCLINE 50S	6505003697296		267	12096	BT	2.77
DIAZEPAM INJECTION USP 5 MG PER ML 2 ML 10S	6505003758955	18	1	2348	PG	3.40
ALUMINUM HYDROXIDE GEL DRIED MAGNESIUM HYDROX&SIMETHICONE 1.5.60	6505003888772	1284	5	26677	BX	1.30
CODEINE PHOSPHATE AND ACETAMINOPHEN TABLETS USP 100 TABLETS/BT	6505004002054	396	893	43293	BT	2.95
FLURAZEPAM HYDROCHLORIDE CAPSULES USP 30 MG 500S	6505004007294		132	186	BT	16.52
DOXEPIN HYDROCHLORIDE CAPSULES USP 25MG EQUIVALENT 100 CAPS/BT	6505004088935		109	10431	BT	3.76
BETAMETHASONE VALERATE OINTMENT USP 45GM COLLAPSIBLE TUBE	6505004093782		72	3	TU	1.81
GLOBULIN RHO (D) IMMUNE USP	6505004209582		380	4258	PG	15.51
GENTAMICIN SULFATE OPHTHALMIC OINTMENT USP 1/8 OZ (3.5 GRAM)	6505004321065	463	147	5716	TU	2.14
KETAMINE HCL INJ USP EQUIV TO 50 MG KETAMINE BASE PER ML 10 ML	6505004327047	45	1482	477	BT	6.11
FUROSEMIDE INJECTION USP 10 MG PER ML 2 ML 5S	6505004350377	105	11	23682	PG	2.45

NOMENCLATURE	NSN	USAMMCSA ASSETS	USAMMCE ASSETS	DPSC USAMMA ASSETS	UI	UNIT PRICE
SODIUM CHLORIDE IRRIGATION USP AQUEOUS 3000CC 4S	6505004434582	40	130	784	PG	19.38
OINTMENT BASE 1 LB	6505004434613		2131	31292	JR	2.39
DIGOXIN TABLETS USP .125 MG 100S	6505004490321		196	3310	BT	7.28
ALUMINUM HYDROXIDE GEL USP 64MG PER ML 12 OUNCES OR 355 ML	6505004807216				BT	1.32
LITHIUM CARBONATE CAPSULES USP 300 MG 100S	6505004828058	19	184	3767	BT	1.91
POVIDONE-IODINE CLEANSING SOLUTION USP 7.5% 4 FL OUNCES OR 118ML	6505004917557	3579	1628	252847	BT	0.49
IMIPRAMINE PAMOATE CAPSULES EQUIV TO 75MG IMPRAMINE HCL 30S	6505005029595		254	2046	BT	7.88
PROPANTHELINE BROMIDE TABLETS USP 15 MG 100S	6505005151577		154	3979	BT	16.26
PROBENECID TABLETS USP 0.5 GRAM 100S	6505005276885	183		3863	BT	4.36
PREDNISONE TABLETS USP 5 MG 1000S	6505005306470	8	140	7704	BT	7.40
CALCIUM LACTATE TABLETS USP 0.65GM 100 TABLETS PER BOTTLE	6505005307099		740	3595	BT	1.07
DIGOXIN INJECTION USP .25 MG 2 MILLILITERS AMPUL 10 PER PG	6505005317761	9	30	4500	PG	4.35
WATER FOR INJECTION STERILE USP 5ML AMPUL 25 AMPULS PER BOX	6505005434048	627	6833	54443	BX	5.35
SALICYLIC ACID GEL 6% 1OZ (28.35 GRAM)	6505005467319		44	4085	TU	1.32
INSULIN INJECTION 100 UNITS 10 ML	6505005467821		55		VI	7.62
UREA CREAM 20% 3 OZ (85 GRAM)	6505005493826		459	6558	TU	3.86
PUMICE USP POWDER FORM FLOUR 1LB	6505005506650	6	42	1361	CO	1.60
PHENOBARBITAL ELIXIR USP 4MG/ML 1PT BOTTLE	6505005594819		190		BT	2.96
SODIUM CHLORIDE INJECTION USP .9% 5ML 25 PER BOX	6505005598456		3168	22499	BX	7.83
SUCCINYLCHOLINE CHLORIDE INJECTION USP 20MG/ML 10ML VIAL	6505005599811		1239	43269	VI	0.54
SULFADIAZINE SILVER CREAM 1% TOPICAL 400GM JAR	6505005607331	5665	440	149834	JR	13.18
DICHLOROTETRAFLUOROETHANE NF TOPICAL 8OZ OR 226.8GM AEROSOL CAN	6505005768815		19	4748	CN	5.87
SULFACETAMIDE SODIUM OPHTHALMIC SOLUTION MODIFIED 15% 15ML	6505005769120	143	1296	30491	BT	0.57
HEPARIN SODIUM INJECTION USP 20000 UNITS PER ML 2ML VIAL 12/PG	6505005798432	155	33	1110	PG	18.47
HYDROXYZINE HYDROCHLORIDE TABLETS USP 10 MG 500S	6505005799715		62	1894	BT	2.99
HYDROXYZINE HYDROCHLORIDE TABLETS USP 25MG 500 TABLETS/BOTTLE	6505005799717	16	1617	9892	BT	4.17
BACITRACIN OPHTHALMIC OINTMENT USP 500 UNITS .125 OUNCES	6505005824190		60	22913	TU	0.65
PILOCARPINE HYDROCHLORIDE OPHTHALMIC SOLUTION STERILE 1% 15 ML	6505005824678	3	141	5090	BT	0.78
PILOCARPINE HYDROCHLORIDE OPHTHALMIC SOLUTION USP 2% 15 ML	6505005824679		239	22099	BT	0.90
PILOCARPINE HYDROCHLORIDE OPHTHALMIC SOLUTION USP 4% 15 ML	6505005824680		122	47331	BT	0.83
ATROPINE SULFATE OPHTHALMIC SOLUTION USP 1% 15ML	6505005824735		77	8	BT	0.89
TETRACAINE HYDROCHLORIDE OPHTHALMIC SOLUTION 0.5% 15 ML	6505005824737	788	82	40049	BT	0.75
DIPHENHYDRAMINE HYDROCHLORIDE CAPSULES USP 25 MG 1000S	6505005824867		160	163	BT	7.37
LIDOCAINEHCL & EPINEPHRINE INJ USP 1% 20ML 5S	6505005825182	290	155	2192	BX	2.68
LIDOCAINE HYDROCHLORIDE AND EPINEPHRINE INJ USP 50 ML 5S	6505005825183	73		2030	PG	4.60
PROCAINAMIDE HYDROCHLORIDE CAPSULES USP 250MG 100S	6505005825370	15	47	1418	BT	1.73
ESTROGENS CONJUGATED TABLETS USP 0.625MG 1000S	6505005840412	4	259	12441	BT	53.09
PHENYTOINSODIUM CAPSULES EXTENDED USP 100 MG 1000S	6505005842338		163	6330	BT	19.21
HYDRALAZINE HYDROCHLORIDE TABLETS USP 25 MG 1000S	6505005842895	1	49	4541	BT	5.70
HEPARIN SODIUM INJECTION USP 10000 UNITS PER ML 5ML VIAL	6505005842914	15	55	86255	VI	1.90
LIDOCAINE HYDROCHLORIDE JELLY USP 2% 30 ML	6505005643131		72	39785	PG	2.42
METHYLPHENIDATE HYDROCHLORIDE TABLETS USP 5 MG 100S	6505005843174		13	5436	BT	5.91
PROMETHAZINE HYDROCHLORIDE TABLETS USP 25 MG 1000 TABLETS/BOTTLE	6505005843277		21	735	BT	6.44
ISOMETHEPTENE MUCAT CAPSULES 50S	6505005900470		851	16535	BT	5.00
ANTIPYRINE AND BENZOCAINE OTIC SOLUTION USP 10ML	6505005985830		45	37343	BT	2.40

NOMENCLATURE	NSN	USAMMCSA ASSETS	USAMMCE ASSETS	DPSC USAMMA ASSETS	UI	UNIT PRICE
LIDOCAINE HYDROCHLORIDE INJECTION USP 5MG PER ML 50ML	6505005986115		50	6334	BT	0.53
LIDOCAINE HYDROCHLORIDE INJECTION USP 10MG PER ML 50ML	6505005986116	961	23703	64786	BT	0.57
LIDOCAINE HYDORCHLORIDE INJECTION USP 20MG PER ML 20ML	6505005986117	363	9	32714	VI	0.45
ERYTHROMYCIN TABLETS USP 250 MG 100S	6505006041223				BT	3.76
NYSTATIN VAGINAL TABLETS USP 100000 UNITS 15S	6505006169128		420	11405	PG	1.01
SODIUM PHOSPHATES ENEMA USP DISP ENEMA UNIT 4-1/2 FL OZ (133 ML)	6505006198215		1393	63067	BT	0.44
TETRACYCLINE HYDROCHLORIDE CAPSULES USP 250MG 100 CAPSULES/BT	6505006558355		184257	813685	BT	2.78
ISOPROPYL RUBBING ALCOHOL USP 1 PT (473 ML)	6505006558366		559	61304	BT	0.46
CHLORPHENIRAMINE MALEATE TABLETS MODIFIED 8MG 1000TABLETS/BOTTLE	6505006558460		56	701	BT	57.98
SENNA FRUIT EXTRACT TABLETS 100 TABLETS PER BOTTLE	6505006561468	18	293	7460	BT	1.17
PROCHLORPERAZINE EDISYLATE INJECTION USP 2ML AMPUL 100 AMPULS/PG	6505006561610	9		33	PG	118.11
TETRACYCLINE HYDROCHLORIDE FOR INJECTION USP 500MG	6505006600138		199	6377	BT	5.82
DIENESTROL CREAM USP VAGINAL ADMINISTRATION 2.75OZ TUBE/PACKAGE	6505006600466		37	5090	PG	4.84
METHOCARBAMOL TABLETS USP 600MG 500 TABLETS PER BOTTLE	6505006601601		240	1888	BT	12.53
KANAMYCIN SULFATE INJECTION USP 333MG KANAMYCIN PER ML 3ML	6505006601676		8	2679	VI	1.30
BENZONATATE CAPSULES USP 100 MG 100S	6505006601798	105	879	15788	BT	16.92
FERROUS SULFATE ORAL SOLUTION USP EQUIV TO25MG IRON PER ML 50 ML	6505006640856		571	6697	BT	1.49
ACETAZOLAMIDE TABLETS USP 250 MG 100S	6505006640857	26	194	333	BT	3.22
UNDECYLENIC ACID OINTMENT COMPOUND USP 25.5GM	6505006644814		5535	11085	TU	0.70
PENICILLIN G POTASSIUM FOR INJECTION USP EQUIVALENT TO 1000000UN	6505006647116		1394		BT	0.52
PRIMIDONE TABLETS USP 250MG 100 TABLETS PER BOTTLE	6505006801908		48	2951	BT	3.22
HYDROCORTISONE USP MICROCRYSTALLINE POWDER FORM 10GM BOTTLE	6505006802407		408	5941	BT	10.56
ANTIVENIN CROTALIDAE POLYVALENT USP	6505006802787		69	266	PG	83.51
PROMETHAZINE HYDROCHLORIDE INJECTION USP 25MG/ML 1ML AMPUL 25/BX	6505006807352	16	332	17971	BX	7.84
TRIAMCINOLONE ACETONIDE CREAM USP TOPICAL 0.1% 15 GM	6505006828194	1292	832	792	TU	0.48
TETANUS TOXOID ADSORBED USP 5ML VIAL	6505006855189	291	272	9645	VI	2.45
NITROGLYCERIN TABLETS USP 0.300MG 100 TABLETS PER BOTTLE	6505006873662	13	13	1667	BT	2.33
CYANOCOBALAMIN INJECTION USP 1000 MICROGRAMS PER ML 10 ML	6505006874049	40	73	15662	VI	0.82
COLCHICINE TABLETS USP 0.650MG 100 TABLETS PER BOTTLE	6505006874053	69	71	7518	BT	1.25
TERPIN HYDRATE ELIXIR USP 4 FL OZ BOTTLE	6505006874482		889	36749	BT	1.01
TERPIN HYDRATE AND CODEINE ELIXIR USP 4 FL OZ (118 ML)	6505006874484	45	434	72474	BT	1.17
CALAMINE LOTION USP 4 OUNCES OR 118 MILLILITERS	6505006874534		2129	11792	BT	0.35
CALAMINE LOTION PHENOLATED USP 4 FL OZ (118 ML)	6505006874535	445	93	73285	BT	0.38
DIPHENHYDRAMINE HCL ELIXIR USP 4FL OZ (118 ML) 24S	6505006874545		292	605	PG	21.19
PHENYTOIN TABLETS USP 50 MG 100S	6505006878486	36	99	6686	BT	8.66
ISOPROTERENOL HYDROCHLORIDE INJECTION USP 0.200MG/ML 5ML AMPUL10	6505006895522		9	79	PG	29.18
HOMATROPINE HYDROBROMIDE OPHTHALMIC SOLUTION USP 5% 15ML BOTTLE	6505006895532	5	159	158	BT	1.11
THEOPHYLLINE EPHEDRINE HCL&PHENOBARBITAL TABLETS MODIFIED 100/BT	6505006895598		160	243	BT	13.11
SENNA FRUIT EXTRACT STANDARIZED ORAL SOLUTION 2.5OZ BOTTLE	6505007150232		103	149	BT	2.99
HYDROXYZINE HYDROCHLORIDE SYRUP USP 2 MG PER ML 1 PT (473 ML)	6505007218899		225	8518	BT	3.58
XYLOMETAZOLINE HCL NASAL SOLUTION USP 0.1% 15 ML	6505007235020		141		BT	2.06
AMITRIPTYLINE HYDROCHLORIDE TABLETS USP 25MG 1000 TABLETS/BOTTLE	6505007246358		50	5065	BT	5.31
VITAMIN A AND VITAMIN D CREAM 1OZ TUBE	6505007281119		121	3851	TU	1.61
QUINIDINE GLUCONATE EXTENDED-RELEASE TABLETS 324MG 250/BOTTLE	6505007282009		117	12405	BT	13.06
FLURANDRENOLIDE OINTMENT USP 0.05% 15 GRAM	6505007282626		1	858	TU	8.07

NOMENCLATURE	NSN	USAMMCSA ASSETS	USAMMCE ASSETS	DPSC USAMMA ASSETS	UI	UNIT PRICE
EPINEPHRINE INJECTION USP 1ML AMPUL 10 AMPULS PER PACKAGE	6505007341026	88	522		PG	6.44
ALUMINUM HYDROXIDE GEL ORIED MAGNESIUM HYDROX&SIMETH TAB I.S.100	6505007351742		931	19166	PG	1.30
METHYL SALICYLATE NF 1 PT (473 ML)	6505007534773		172	4218	BT	3.82
STREPTOMYCIN SULFATE STERILE USP POWDER FORM 1GM BOTTLE	6505007535042	8	2312	16350	BT	1.10
METARAMINOL BITARTRATE INJECTION USP EQUIVALENT TO 10MG/ML 10ML	6505007539601		82	4588	VI	7.04
HYDROCORTISONE SODIUM SUCCINATE F/INJECTION USP2ML RECONSTITUTED	6505007539609	4	295	56221	VI	0.80
TRIPROLIDINE AND PSEUDOEPHEDRINE HYDROCHLORIDES TABLETS USP 100S	6505007539615	4677	3396	28756	BT	1.54
PROPARACAINE HYDROCHLORIDE OPHTHALMIC SOLUTION USP 0.5% 15 ML	6505007539902		35	295	BT	0.93
MEPIVACAINE HYDROCHLORIDE INJECTION USP 1% 30 ML	6505007540076	62		5958	BT	3.53
CHLORAMPHENICOL SODIUM SUCCINATE STERILE USP 1 GRAM VIAL 10/BOX	6505007540280	48	218	4600	BX	14.08
POVIDONE-IODINE TOPICAL SOLUTION USP 1GL (3.780 LITER)	6505007540374	418	972	13881	BT	6.14
METHOCARBAMOL INJECTION USP 100MG/ML 10ML AMPUL 5 PER BOX	6505007540395	20	91	868	BX	5.91
ATROPINE SULFATE INJECTION USP 0.4MG/ML 20ML VIAL	6505007542547	843	1080	6107	VI	0.47
SULFASALAZINE TABLETS USP 0.500GM 500 TABLETS PER BOTTLE	6505007542797	7	138	3705	BT	21.46
ISOSORBIDE DINITRATE TABLETS MODIFIED 10MG 500 TABLETS/BOTTLE	8505007611506	1	39	2072	BT	2.19
MAGALORATE ORAL SUSPENSION USP 12 FL OZ 355 ML	8505007643365		198	2458	BT	0.84
DEXTROAMPHETAMINE SULFATE CAPSULES 15MG SUSTAINED RELEASE 50/BT	6505007692090		207		BT	21.48
AMITRIPTYLINE HYDROCHLORIDE TABLETS USP 50MG 100 TABLETS/BOTTLE	6505007702061		232	290	BT	1.32
AMPICILLIN CAPSULES USP 250 MG 100S	8505007708343		376	3783	BT	4.60
ACETYLCYSTEINE SOLUTION USP 20% 30CC BOTTLE 3 PER PACKAGE	6505007822688	506	7	725	PG	41.34
SODA LIME NF POWDER CARTRIDGE DISP 2.5LB GRNDLR SZ 8ET 4&8 MESH	6505007826484		876	20394	EA	5.19
TRIPROLIDINE AND PSEUDOEPHEDRINE HCL SYRUP USP 4FL OZ (118 ML)	6505007826761		339	12269	BT	0.70
ETHOSUXIMIDE CAPSULES USP 0.25 GM 100S	6505007826762		133	576	BT	31.49
DIAZEPAM TABLETS USP 5MG 500S	8505007837218	12	495	2947	BT	4.05
IMIPRAMINE HYDROCHLORIDE TABLETS USP 10MG 100S	6505007846216		136		BT	3.07
BENZTROPINE MESYLATE INJECTION USP 1MG/ML 2ML AMPUL 6 AMPULES/PG	8505007850307		47		PG	11.49
LIDOCAINE OINTMENT USP 5% 35 GM	6505007854357			3674	TU	0.84
DOCUSATE SODIUM CAPSULES USP 100 MG 1000S	8505008090241	78	311	3549	BT	7.02
BETAMETHASONE VALERATE CREAM USP 15GM COLLAPSIBLE TUBE	8505008122103		546	22818	TU	0.65
PHENOBARBITAL SODIUM INJ USP 130MG PER ML CART-NDL 1 ML 10S	6505008122556	77	910	3429	BX	16.08
MORPHINE SULFATE INJECTION USP 10MG/ML 1ML AMPUL 25 PER PACKAGE	6505008122596		5425	8178	PG	8.75
CHLORPROPAMIDE TABLETS 0.25 GM 250S	6505008172279		204	7729	BT	2.80
OINTMENT BASE 1 LB	8505008188744		25		JR	8.30
MEPIVACAINE HCL&LEVONORDEFRIN 1.8ML F/USE W/6515010108761 50S	6505008237942		189	4054	CN	10.14
MEPERIDINE HCL TABLETS USP 50MG INDIVIDUALLY SEALED 25S	6505008516589		146	710	BX	3.08
IMIPRAMINE HYDROCHLORIDE TABLETS USP 25MG 100 TABLETS PER BOTTLE	6505008534799		388	13533	BT	1.20
CLOXACILLIN SODIUM CAPSULES USP 250MG 100 CAPSULES PER BOTTLE	6505008538608		162	2762	BT	6.26
PHYTONADIONE INJECTION 10 MG 1ML 6S	6505008542499	6	44	2383	BX	16.55
HALOTHANE USP 125 ML	6505008542504	35	38	4145	BT	10.02
MEPERIDINE HYDROCHLORIDE INJECTION USP 50MG/ML 1ML UNIT 10/BOX	6505008556979		18	3471	BX	3.46
MEPERIDINE HYDROCHLORIDE INJECTION USP 75MG/ML 1ML UNIT 10/BOX	6505008556982	75	425	4955	BX	3.69
MEPERIDINE HYDROCHLORIDE INJECTION USP 100MG/ML 1ML UNIT 10/BOX	6505008556984	309	172	3176	BX	3.93
HYDROXYPROGESTERONE CAPROATE INJECTION USP 250MG/ML 5ML BOTTLE	6505008645221		120	949	BT	3.58
CALCIUM CHLORIDE INJECTION USP 10% 10ML AMPUL	6505008652401	271	128	4546	PG	10.08
OXYMETAZOLINE HYDROCHLORIDE NASAL SOLUTION 15ML SPRAY BOTTLE	6505008694177	1397	4461	44902	BT	0.82

NOMENCLATURE	NSN	USAMMCSA ASSETS	USAMMCE ASSETS	DPSC USAMMA ASSETS	UI	UNIT PRICE
TROPICAMIDE OPHTHALMIC SOLUTION USP 1% 15 ML	6505008718289			14946	BT	1.42
METHYLERGONOVINE MALEATE TABLETS USP 0.2 MG 100S	6505008718309		39		BT	11.13
DEXAMETHASONE SODIUM PHOSPHATE INHALATION AEROSOL USP 12.6GM	6505008856302	111	36	1867	PG	18.39
HYDROXYCHLOROQUINE SULFATE TABLETS USP 200 MG 100S	6505008885790		281	780	BT	56.48
NYSTATIN OINTMENT USP 100000 UNITS/GRAM 30GM COLLAPSIBLE TUBE	6505008895794	180	332	9065	TU	1.54
HYDROCHLOROTHIAZIDE TABLETS USP 50 MG 1000S	6505008897929		257	6344	BT	3.88
BISACODYL SUPPOSITORIES USP 10MG ADULT RECTAL I.S.50 PER PACKAGE	6505008899033		87	6694	PG	1.78
BISACODYL TABLETS USP 5MG FILM ENTERIC 1000 TABLETS PER BOTTLE	6505008899034		249	168	BT	5.20
NYSTATIN TOPICAL POWDER USP 100000 UNITS/GM 15GM PLASTIC BOTTLE	6505008901218		152	1447	BT	10.78
MEDROXYPROGESTERONE ACETATE TABLETS USP 10MG 100 TABLETS/BOTTLE	6505008901355	57	307	18598	BT	10.22
SIMETHICONE TABLETS USP 40 MG 500S	6505008901373	1	36	2048	BT	3.21
TUBERCULIN USP OLD TUBERCULIN DRIED 25 DISKS PER PACKAGE	6505008901534	20	66	605	PG	11.39
METHICILLIN SODIUM FOR INJECTION USP EQUIVALENT TO 900MG 1GM/8T	6505008901561		744	2428	BT	4.89
ESTROGENS CONJUGATED CREAM VAGINAL 0.0625% 1-1/2 OZ	6505008901573		350		PG	7.62
TETRACYCLINE HYDROCHLORIDE FOR INJECTION USP 100MG	6505008901574		114	1588	BT	4.12
ALUMINUM ACETATE SOLUTION TABLETS EFFERVESCENT I.S. 100 TABS/PG	6505008901633	157	212	1194	PG	7.64
KAOLIN & PECTIN MIXTURE DEHYDRATED 53.2GM BOTTLE POWDER	6505008901657	5574	508	12520	BT	1.78
DIGOXIN ELIXIR USP PEDIATRIC 0.05MG PER ML 60 ML	6505008901726		131	2411	PG	12.29
PLASMA PROTEIN FRACTION USP HEAT-TREATED 5% SOLUTION 250 ML	6505008901764	5	141	5	PG	29.71
TRIMETHOBENZAMIDE HCL & BENZOCAINE SUPPOSITORIES NF 50S	6505008901819		84	41	BX	11.03
METRONIDAZOLE TABLETS USP 250MG 250 TABLETS PER BOTTLE	6505008901840	97	2	12	BT	3.34
METHYLDOPA TABLETS USP 250MG 100 TABLETS PER BOTTLE	6505008901856		468	1363	BT	5.01
CYPROHEPTADINE HYDROCHLORIDE TABLETS USP 4 MG 100S	6505008901884		451	9683	BT	1.32
COLISTIN SULF HYDROCOR ACE NEO SULF & THONZO BROM SUS OTIC 5 ML	6505008901907		177	1556	BT	6.75
GLOBULIN TETANUS IMMUNE USP 250 UNITS	6505008901975		24		VI	3.68
NYSTATIN CREAM USP 100000 USP UNITS PER GRAM 15GM TUBE	6505008902013		2477	52414	TU	0.74
ERGOTAMINE TAR BELLA ALKALOIDS AND PHENOLBARBITAL TABLETS 100S	6505008902015				BT	13.26
MINERAL OIL LANOLATED WATER DISPERSIBLE BATH OIL 8 FL OZ	6505008902027		863	11019	BT	0.71
PENICILLIN G POTASSIUM STERILE USP 20000000 UNITS	6505008902172	8434	2923	8854	BT	3.58
ASCORBIC ACID TABLETS USP 500 MG 100S	6505008917555		2985	8892	BT	1.18
OXACILLIN SODIUM F/INJECTION USP EQUIV TO 1GM OXACILLIN	6505009000354	7356	326626	20898	VI	1.54
TRIAMTERENE AND HYDROCHLOROTHIAZIDE CAPSULES 1000 PER BOTTLE	6505009010043		109	4491	BT	59.65
FUNGICIDAL SOLUTION 120ML OR 4OZ BOTTLE	6505009013608		95		BT	4.36
LIDOCAINE HYDROCHLORIDE AND EPINEPHRINE INJECTION USP 50 ML	6505009037600		230	4659	VI	0.84
BETAMETHASONE SODIUM PHOSPHATE & ACETATE SUSP STER 3MG P/ML 5ML	6505009042190	73	20	10435	VI	4.35
MEPIVACAINE HYDROCHLORIDE INJECTION USP 15MG PER ML 30ML	6505009141742		5999	652	BT	4.76
POVIDONE-IODINE TOPICAL SOL USP 10% 1/2 FL OZ (14.8 ML) 50S	6505008143593	1400	414	5419	BX	21.40
FLUOCINOLONE ACETONIDE TOPICAL SOLUTION USP 0.01% 20 ML	6505009171905		262	10933	BT	1.30
DOXAPRAM HYDROCHLORIDE INJECTION USP 20MG/CC 20ML BOTTLE	6505009173709	7	28	816	BT	13.72
HYDROCORTISONE CREAM USP 1% 1 OZ (28.35 GM)	6505009262095	8451	45719	45883	TU	0.68
HYDROCORTISONE CREAM USP 1% 1 LB (453.6 GM)	6505009262096	78		2967	JR	7.92
HYDROCORTISONE CREAM USP 0.5% 1 OZ 28.350GM	6505009262097		2124	12029	TU	0.62
MECLIZINE HYDROCHLORIDE TABLETS USP CHEWABLE 25 MG 100S	6505009262111		82	27492	BT	1.18
PUMICE MODIFIED 2 LB 907.2 GRAM	6505009262239	25		1035	PG	8.24
TOLNAFTATE TOPICAL SOLUTION USP 1% 10 ML	6505009262241	25404	6651	356083	BT	0.31

NOMENCLATURE	NSN	USAMMCSA ASSETS	USAMMCE ASSETS	OPSC USAMMA ASSETS	UI	UNIT PRICE
NORTRIPTYLINE HCL CAP USP EQUIV TO 25MG NORTRIPTYLINE 100S	6505009264773	7	175	13251	BT	24.84
TRIAMCINOLONE ACETONIDE DENTAL PASTE USP 5GM	6505009268913		756	9068	TU	2.21
HYDROCORTISONE ENEMMA USP DISPOSABLE UNIT 100 MG 60 ML	6505009268927		1022	28150	BT	2.53
DEXTROMETHORPHAN HYDROBROMIDE&GUAIFENESIN SYRUP 4OZ OR 118ML	6505009268985	2077	11391	120	BT	0.75
SPIRONOLACTONE TABLETS USP 25 MG 500S	6505009268996		20	5477	BT	8.24
DEXBROMPHENIRAMINE MALEATE&PSEUDOEPHEDRINE SULFATE TABLETS 100S	6505009269019		649	24691	BT	4.68
ATROPINE INJECTION AQUEOUS TYPE 0.7ML SYRINGE WITH NEEDLE	6505009269083	8416	697817	172484	EA	3.97
IODIPAMIDE MEGLUMINE INJECTION USP 52% 20 ML	6505009269109	10	8		VI	21.77
IPECAC SYRUP USP 7% 30ML	6505009269197	222	8919	15391	BT	0.54
COAL TAR AND MINERAL OIL 8 FL OZ (237 ML)	6505009285890		96	8015	BT	1.36
INDOMETHACIN CAPSULES USP 25MG 1000S	6505009310680	50		5271	BT	10.44
AMPICILLIN CAPSULES USP 500 MG 100S	6505009310702		579	11838	BT	6.43
THIAMINE HYDROCHLORIDE INJECTION USP 100 MG PER ML 10 ML	6505009351000	12	767	4837	VI	2.55
PLAGUE VACCINE USP 20ML BOTTLE	6505009351128	11	23	10905	BT	32.64
MINERAL OIL DIISOPROPYL SEBACATE&ISOPROPYL MYRISTATE LOTION 8 OZ	6505009354022		292	3374	BT	0.96
EPINEPHRINE OPHTHALMIC SOLUTION USP 2% 15ML BOTTLE	6505009358861	52	22	2690	BT	5.91
CICYCLOMINE HYDROCHLORIDE TABLETS USP 20 MG 100S	6505009444130		34		BT	1.47
AMPICILLIN SODIUM STERILE USP POWDER 600MG	6505009464700		1183	23536	VI	0.46
HYDROCORTISONE SODIUM SUCCINATE FOR INJECTION USP 250 MG	6505009515533		77	10010	VI	1.02
TRIAMCINOLONE ACETONIDE OINT USP 15 GRAMS	6505009578094		222		TU	1.56
QUININE SULFATE CAPSULES USP 325MG 100 CAPSULES PER BOTTLE	6505009579532		42		BT	5.67
PSEUDOEPHEDRINE HYDROCHLORIDE TABLETS USP 30MG 1000 TABLETS/BT	6505009581774		151	10430	BT	5.91
PROPOXYPHENE HYDROCHLORIDE CAPSULES USP 65MG 500 CAPSULES/BOTTLE	6505009582364	2	2	3341	BT	10.44
PSEUDOEPHEDRINE HYDROCHLORIDE TABLETS USP 60MG 1000 TABLETS/BT	6505009582366		243	2380	BT	15.39
PENICILLIN G POTASSIUM F/INJECTION USP 6000000 UNITS PENICILLIN	6505009583305			21	VI	1.15
NEOSTIGMINE METHYLSULFATE INJECTION USP 10ML MULTIPLE DOSE VIAL	6505009586325		25	13	VI	2.26
DEXAMETHASONE SODIUM PHOSPHATE OPHTHALMIC OINTMENT USP .1250Z	6505009615508		237	2252	TU	4.60
POLYVINYL ALCOHOL OPHTHALMIC SOLUTION 1.4% 15ML	6505009617486	3079	1396	27590	BT	0.51
TETRACYCLINE HYDROCHLORIDE CAPSULES USP 0.25 GRAM 1000S	6505009634924		181	9802	BT	18.48
DEXAMETHASONE SODIUM PHOSPHATE INJECTION USP 5CC	6505009635355	469	1194	48325	VI	0.58
TRIMETHOBENZAMIDE HYDROCHLORIDE CAPSULES USP 250MG 500S	6505009652319				BT	55.94
OXYGEN USP 99% 24GL DISPOSABLE STEEL CYLINDER WITH FACE MASK	6505009652439	13		7072	PG	47.55
OXYTOCIN INJECTION USP 1ML 100S	6505009652512		272	1562	BX	20.89
NAPHAZOLINE HCL&ANTAZOLINE PHOSPHATE OPHTHALMIC SOLUTION 15 ML	6505009746353	75	4093	3723	BT	1.22
ERYTHROMYCIN OPHTHALMIC OINT USP 5MG PER GRAM 1/8 OZ (3.5 GRAM)	6505009820288		1135		TU	0.70
WARFARIN SODIUM TABLETS USP 5 MG 100S	6505009824229	13	59	6665	BT	2.27
WARFARIN SODIUM TABLETS USP 2 MG 100S	6505009824230	3	29	2500	BT	1.91
TOLBUTAMIDE TABLETS USP 0.5GM 200 TABLETS PER BOTTLE	6505009829069	10	73	861	BT	2.97
VITAMIN B COMPLEX AND ASCORBIC ACID TABLETS 100S	6505009829173		96	305	BT	4.54
POVIDONE-IODINE OINTMENT USP 10% 1 OZ (28.35 GRAM)	6505009829196	7214	2395	44910	TU	0.72
FLUOCINOLONE ACETONIDE CREAM USP 0.025% 15 GRAM	6505009857110		210	3723	TU	0.88
ACETAMINOPHEN TABLETS USP 0.325GM 1000S	6505009857301	103	358	16229	BT	4.29
LEVOTHYROXINE SODIUM TABLETS USP 100S	6505009902021		24		BT	0.87
AMPICILLIN SODIUM STERILE USP POWDER FORM 1GM BOTTLE	6505009933518		77516	92917	BT	0.52
POVIDONE-IODINE CLEANSING SOLUTION USP 7.5% 1GL OR 3.78LI	6505009947224		181	783	BT	8.53

NOMENCLATURE	NSN	USAMMCSA ASSETS	USAMMCE ASSETS	DPSC USAMMA ASSETS	UI	UNIT PRICE
ALLOPURINOL TABLETS USP 100 MG 100S	6505009984381		174	11222	BT	1.48
ESTROGENS CONJUGATED TABLETS USP 1.25MG 1000S	6505010033127		107	887	BT	74.99
THIOPENTAL SODIUM FOR INJECTION USP 5GM BOTTLE 25 PER BOX	6505010035343	22	10	1757	BX	227.11
ALLOPURINOL TABLETS USP 300MG 100 TABLETS PER BOTTLE	6505010043952		108	20699	BT	3.97
CLONIDINE HYDROCHLORIDE TABLETS 0.2MG 100S	6505010058425				BT	1.22
FLUOCINONIDE GEL USP 0.05 % 60 GRAM	6505010058429		38	1836	TU	17.50
MULTIVITAMIN AND MINERAL TABLETS PRENATAL 100S	6505010076116	785	11725	60886	BT	1.67
UNDECYLENIC ACID AND ZINC UNDECYLENATE POWDER 45GM	6505010083054	6889	27091	454852	CO	0.39
NITROGLYCERIN OINTMENT 2% 80GM COLLAPSIBLE TUBE	6505010083401		201	6100	TU	1.48
POTASSIUM CHLORIDE EXTENDED-RELEASE TABLETS USP 600MG 100TABS/BT	6505010085994		199	66225	BT	0.53
MINERAL OIL LOTION LANOLATED 8-1/2FB OZ 195ML	6505010092897		817	26183	BT	0.87
SODIUM NITROPRUSSIDE STERILE USP 60 MG	6505010095019			1725	BT	1.13
CEPHRADINE CAPSULES USP 250 MG 100S	6505010099531		743	39048	BT	14.29
CEFAZOLIN SODIUM STERILE USP EQUIVALENT TO 1GM CEFAZOLIN10M VIAL	6505010100832		95		BT	1.78
CEFAZOLIN SODIUM STERILE USP POWDER INTRAMUSCULAR VIAL 500 MG	6505010100833	506	96	146	BT	1.11
METAPROTERENOL SULFATE TABLETS 20MG 100S	6505010103044		138	6377	BT	4.48
FENTANYL CITRATE INJ USP .05MG EQUIV INTRAVENOUS 2ML AMPUL 10S	6505010104170	637	867	13453	PG	3.09
AMOXICILLIN CAPSULES USP 250 MG 100S	6505010107953	834	2539	78682	BT	5.07
AMOXICILLIN FOR ORAL SUSPENSION USP 125MG/5ML 150ML BOTTLE	6505010111464		5462	171406	BT	1.08
PANCURONIUM BROMIDE INJECTION 1MG PER ML 10ML 25S	6505010127559	4	2		BX	108.26
INSULIN ISOPHANE SUSPENSION USP PORK U-100 10 ML	6505010128682		185	24556	VI	6.09
TERBUTALINE SULFATE INJECTION USP 1MG/ML 1ML AMPUL 10/PACKAGE	6505010139941	30	1536	47997	PG	6.70
BETAMETHASONE VALERATE LOTION USP 60ML PLASTIC BOTTLE	6505010140894		32	2346	BT	2.20
NEOMYCIN&POLYMYXIN B SULFATES&HYDROCORTISONE OTIC SOL USP 10ML	6505010141378	1253	144	13416	PG	1.12
NITROGLYCERIN TABLETS USP0.3MG25TABLETS/BOTTLE 48OTTLES/80X=100S	6505010141576		352	5698	PG	5.41
NITROGLYCERIN TABLETS USP 0.6MG 100S	6505010141577	109	3	1409	BX	4.42
CLOTRIMAZOLE CREAM USP TOPICAL 1% 30 GRAM	6505010151405	599	1626	20967	TU	0.83
CLOTRIMAZOLE TOPICAL SOLUTION USP 1% 10 ML	6505010151406	542		31812	BT	0.80
MINOCYCLINE HYDROCHLOR CAPS USP EQUIV TO50MG OF MINOCYCLINE 100S	6505010154147		145	3027	BT	46.33
ARTIFICIAL TEARS SOLUTION 15ML BOTTLE WITH OPHTHALMIC TIP	6505010156456	922	312	85446	BT	0.50
SULFAMETHOXAZOLE AND TRIMETHOPRIM TABLETS USP 100 TABLETS/BOTTLE	6505010161470	468	6	1030	BT	5.36
DEXTROSE INJECTION USP 50% 50 ML AMPUL 25 PER BOX	6505010170338	16	57	3049	BX	13.94
CLOXACILLIN SODIUM FOR ORAL SOL USP 125MG/5ML 200 ML	6505010170340		277	7528	BT	3.58
ACETAMINOPHEN TABLETS USP 325 MG 50S	6505010171625	3880	71909	7515	BT	0.59
ENFLURANE USP 125ML BOTTLE 6 BOTTLES PER BOX	6505010173094	40	609	923	BX	450.95
MINERAL OIL LANOLATED WATER-DISPERSIBLE 2 OZ	6505010176881				BT	0.30
SULFAMETHOXAZOLE AND TRIMETHOPRIM TAB USP IND SEALED 100S	6505010178470		28	1789	BX	6.67
GLYCOPYRROLATE INJECTION USP 0.2 MG PER ML 20 ML	6505010197627		225	3065	BT	2.21
METHOTREXATE SODIUM INJECTION USP EQUIV 25MG METHOTREX PER ML2ML	6505010202367		200	3944	BT	1.58
MINERAL OIL LOTION LANOLATED 20Z 144S	6505010219546	8398	166	131	PG	33.67
GENTAMICIN SULF OPHTH SOL USP EQUIV 3.0MG GENTAMICIN PER ML 5ML	6505010222646	728	753	11608	BT	0.92
FLUOCINONIDE OINTMENT USP 0.05 % 60 GRAM	6505010222647		491	4870	TU	17.50
TOLNAFTATE CREAM USP 1% 15GM TUBE 6 TUBES PER BOX	6505010222648	170	631	1832	BX	2.72
ASCORBIC ACID TABLETS USP 100 MG 100S	6505010231020		174		BT	0.88
HEMORRHOIDAL SUPPOSITORIES ADULT RECTAL INDIVIDUALLY SEALED 12S	6505010233319		1307	37274	BX	0.47

NOMENCLATURE	NSN	USAMMCSA ASSETS	USAMMCE ASSETS	DPSC USAMMA ASSETS	UI	UNIT PRICE
CLOTRIMAZOLE CREAM USP TOPICAL 1% 15GM	6505010235011	27115	446	146096	TU	0.47
SULFACETAMIDE SODIUM OPHTHALMIC SOLUTION USP 10% 15ML	6505010238713		943	24902	BT	2.73
CEPHRADINE CAPSULES USP 500 MG 100S	6505010238714	183		703	BT	25.23
DICLOXACILLIN SODIUM CAPSULES USP 250MG 500 CAPSULES PER BOTTLE	6505010248335	345	37	16	BT	27.97
DICLOXACILLIN SODIUM FOR ORAL SUSPENSION USP 2.5GM BOTTLE	6505010248900	105	484	456	BT	13.13
PHENYLEPHRINE HYDROCHLORIDE	6505010251408		151	8581	BT	8.88
PHENYLPROPANOLAMINE HCL GUAIFENESIN&PHENYLEPHRINE HCL CAPS 500S	6505010257416	84		8536	BT	12.52
PHYSOSTIGMINE SALICYLATE INJ USP 1MG PER ML 2 ML 12S	6505010288403		951	1833	BX	27.12
NAPROXEN TABLETS USP 250 MG 100S	6505010269730	75	284	5644	BT	37.04
SUCCINYLCHOLINE CHLORIDE STERILE USP 1GM CONTAINER 12 PER BOX	6505010282260	198	1322	1059	BX	101.69
HYDROCORTISONE LOTION USP 120ML OR 4FL OZ BOTTLE PER PACKAGE	6505010289392		386		BT	6.49
DICLOXACILLIN SODIUM CAPSULES USP 250MG 40 CAPSULES PER BOTTLE	6505010297892		149	56	BT	3.75
DIPHENHYDRAMINE HYDROCHLORIDE SYRUP 4 FL OZ OR 118ML BOTTLE	6505010298074		976	4659	BT	0.74
ORPHENADRINE CITRATE ASPIRIN AND CAFFEINE TABLETS 500S	6505010299116	66		2536	BT	23.59
CLONIDINE HYDROCHLORIDE TABLETS 0.1 MG 100S	6505010301647	152	216	289	BT	1.04
GRISEOFULVIN TABLETS ULTRAMICROSIZE USP 125 MG 500S	6505010307982	133	107	1344	BT	39.37
SULFUR AND SALICYLIC ACID CREAM 4 OZ (113.4 GRAM) 12S	6505010309067		55		BX	16.90
ASPIRIN TABLETS USP 81MG FLAVORED ORAL CHEWABLE 36 TABS/BOTTLE	6505010339866		296		BT	0.34
CHLOROPROCAINE HYDROCHLORIDE INJECTION USP 30MG PER ML 30ML	6505010341373			2017	VI	6.32
CODEINE PHOSPHATE AND ACETAMINOPHEN ELIXER 473 ML	6505010351963	28	194	3715	BT	3.80
OXYBUTYNIN CHLORIDE TABLETS USP 5MG 100 TABLETS PER BOTTLE	6505010352358	27	5	3624	BT	18.49
BETAMETHASONE DIPROPIONATE CREAM USP 0.05% 15GM TUBE	6505010356357	25	32	2484	TU	1.97
THEOPHYLLINE EXTENDED-RELEASE TABLETS 300MG 100 TABLETS/BOTTLE	6505010375607	156	4	10145	BT	2.21
TOLNAFTATE POWDER USP 1% 45 GRAM 6S	6505010376536		484	494	PG	4.76
AMPICILLIN FOR ORAL SUSPENSION USP 125MG/5ML 200ML BOTTLE	6505010384540		156		BT	1.75
AMINO ACID INJECTION 500 ML BOTTLE 12 PER PACKAGE	6505010384918	97	6		PG	98.78
TOLMETIN SODIUM TABLETS USP EQUIVALENT TO 200MG OF TOLMETIN 100S	6505010387460		129	5083	BT	11.82
TERBUTALINE SULFATE TABLETS USP 5MG 100 TABLETS PER BOTTLE	6505010392808	127	481	8050	BT	4.67
ASPIRIN ALUMINUM HYDROXIDE GEL DRIED & MAGNESIUM OXIDE TABS 100S	6505010395846	161	701	19204	BT	1.96
PRAZOSIN HYDROCHLORIDE CAPSULES USP 1MG EQUIVALENT 250 CAPS/BT	6505010396320	132		2947	BT	39.43
PRAZOSIN HYDROCHLORIDE CAPSULES USP 2MG EQUIVALENT 250 CAPS/BT	6505010396321	25	123	10156	BT	54.85
CEPHAPARIN SOD STERILE USP EQUIV TO 20 GRAMS OF CEPHAPIRIN	6505010400764		240	1455	BT	25.06
PRAZOSIN HCL CAPSULES EQUIV 5 MG PRAZOSIN BASE EACH CAPSULE 250S	6505010402278	17	17	6822	BT	20.29
IBUPROFEN TABLETS USP 400MG INDIVIDUALLY SEALED 100S	6505010416911	267	77	2295	PG	3.21
QUININE SULFATE CAPSULES USP 325MG 1000 CAPSULES PER BOTTLE	6505010428040	91		2917	BT	41.50
LEVOTHYROXINE SODIUM TABLETS USP 0.1 MG 1000S	6505010429260		213	1961	BT	5.55
NEOMYCIN&POLYMYXIN B SULFATES&HYDROCORTISONE OTIC SUSP USP 10ML	6505010430230	1149	1173	14768	PG	1.12
INSECT STING KIT	6505010436795	738		9184	EA	10.12
IBUPROFEN TABLETS USP 400 MG 120S	6505010442566	61		12612	BT	2.10
DETERGENT SURGICAL 4% CHLORHEXIDINE GLUCONATE 32FL OZ	6505010453255		617		BT	4.10
NAPROXEN TABLETS USP 250 MG 500S	6505010460126	12	357	23089	BT	180.62
SODIUM FLUORIDE ORAL SOLUTION USP 50 ML	6505010469447		4607	8178	PG	0.93
TRIMETHOBENZAMIDE HYDROCHLORIDE INJ USP 100MG/ML 2ML SYRINGE 25S	6505010480827	40	23	36	BX	69.19
CLONAZEPAM TABLETS USP 0.5 MG 100S	6505010496735		128	11936	BT	41.55
MICONAZOLE NITRATE CREAM USP 45 GM TUBE W/VAGINAL APPLICATOR	6505010498881	233	1637	19251	PG	5.15

NOMENCLATURE	NSN	USAMMCSA ASSETS	USAMMCE ASSETS	DPSC USAMMA ASSETS	UI	UNIT PRICE
CIMETIDINE TABLETS USP 300MG 100S	6505010503547		64	26610	BT	32.31
COLESTIPOL HYDORCHLORIDE F/ORAL SUSPENSION USP 5GM 30 PACKETS PG	6505010514697		291	44498	PG	11.58
GLOBULIN HEPATITIS B IMMUNE USP 5 ML	6505010526862	40	29		BT	150.10
SODIUM BICARBONATE INJECTION USP 75 MG PER ML 50 ML 25S	6505010532634	36		746	BX	20.53
CHLORHEXIDINE GLUCONATE SOL 4% 1 GAL (3.78 LITERS)	6505010538820		55	461	BT	16.80
PHENOBARBITAL TABLETS USP 15 MG 100S	6505010555248		1068	1871	BT	2.60
PHENOBARBITAL TABLETS USP 30 MG 100S	6505010555249		194	10138	BT	1.93
COAL TAR GEL 3 OZ 85 GRAM	6505010562916		175	3707	TU	2.71
SALSALATE TABLETS 500 MG 100S	6505010571525				BT	3.22
LORZAEPAM TABLETS 1 MG 100S	8505010579846			1552	BT	1.34
CEFAZOLIN SODIUM STERILE USP 100ML BOTTLE 10 PER PACKAGE	6505010582046		103	410	PG	128.25
CLONIDINE HYDROCHLORIDE TABLETS 0.1MG 1000S	6505010585727	5	14	4798	BT	4.94
TETRACYCLINE HYDROCHLORIDE CAPSULES USP 0.25 GRAM 40 S	6505010598897			23410	BT	1.55
MICONAZOLE NITRATE CREAM USP TOPICAL 2% 1OZ (28.35 GRAM) 24S	6505010601864	27	87	2038	PG	134.81
MULTIVITAMIN TABLETS 100S	6505010602393		20		BT	1.05
METHYL SALICYLATE AND MENTHOL OINTMENT 1-1/4 OZ 35.45 GM 8S	6505010609935		130	899	BX	3.54
OXYMETAZOLINE HYDROCHLORIDE NASAL SOLUTION USP3ML SPRAY BOTTLE2S	6505010620904	422	53	432	BX	12.64
LORAZEPAM TABLETS 2MG 100S	6505010628008	20		698	BT	2.11
CYCLOBENZAPRINE HYDROCHLORIDE TABLETS USP 10 MG 100S	6505010628010	265	40	47427	BT	29.77
VITAMIN E CAPS USP 400IU VITAMIN E 100S	6505010639570		55	957	BT	1.87
BENZOCAINE GEL 20% 1OZ OR 28GM BOTTLE	6505010645769		316	14495	BT	1.75
BENZOCAINE ORAL TOPICAL SOLUTION 20% PINA COLADA 1FL OZ	6505010645770			9757	BT	1.63
TRIAMCINOLONE ACETONIDE AEROSOL NF 0.0147% 63 GRAM	6505010661325		576	2854	CN	11.65
TRETINOIN GEL USP 0.025% 15 GRAM 24S	6505010663354		112	1251	PG	135.28
AMOXICILLIN FOR ORAL SUSPENSION USP 250MG/5ML 150ML BOTTLE	6505010664195	198	9124	221800	BT	1.73
LOPERAMIDE HYDROCHLORIDE CAPSULES 2MG 100S	6505010666568	81	1	2918	BT	29.92
GLOBULIN RABIES IMMUNE USP 10 DOSES 150 UNIT PER ML	6505010670807	64	11	31	VI	155.38
BACITRACIN STERILE USP 50000 UNITS PER BOTTLE	6505010673977		10	24631	BT	2.55
CIMETIDINE HYDROCHLORIDE INJECTION 8ML VIAL 10 VIALS PER PG	6505010691661		139	731	PG	74.85
CALCIUM CARBONATE TABLETS USP 60 TABLETS PER BOTTLE	6505010696261		1171	3886	BT	0.84
TIMOLOL MALEATE OPHTH SOL USP EQUIV TO 0.25% TIMOLOL 5 ML	6505010696518		90	8478	BT	9.05
TIMOLOL MALEATE OPHTH SOL USP EQUIV TO 0.5% OF TIMOLOL 5 ML	6505010696519		1006	136217	BT	10.72
THEOPHYLLINE EXTENDED-RELEASE TABLETS 300MG 1000 TABLETS/BOTTLE	6505010696520		1	2259	BT	22.15
THEOPHYLLINE EXTENDED-RELEASE TABLETS 200MG 1000 TABLETS/BOTTLE	6505010700821		2	2266	BT	19.21
ISOETHARINE INHALATION SOLUTION USP 1% 10ML	6505010705807	32	4	1190	BT	1.65
PUMICE USP POWDER FORM COARSE 4LB	6505010712822	3	71	1702	CN	4.03
SULINDAC TABLETS 150MG 100S	6505010715559		36	13205	BT	54.61
OXYCODONE HCL & ACETAMINOPHEN TABLETS INDIVIDUALLY SEALED 250S	6505010718405	29	70	705	BX	6.36
ISOMETHEPTENE MUCATE ACETAMINOPHEN AND DICHLORALPHENAZONE CAP100	6505010719112	103	3	6166	BT	9.82
SULINDAC TABLETS 200 MG 100S	6505010723426		114	29147	BT	68.31
MAGNESIUM SULFATE USP 8 OZ EPSOM SALT	6505010723623		293	1543	CO	1.14
DESOXIMETASONE CREAM USP 0.25% 15GM TUBE	6505010723624			8656	TU	3.64
VALPROIC ACID CAPSULES 250MG 100S	6505010725364		120	565	BT	8.08
PREDNISONE TABLETS USP 20MG 100 TABLETS PER BOTTLE	6505010729666		141	3489	BT	2.63
FENTANYL CITRATE INJECTION USP 5ML AMPUL 10 AMPULES PER BOX	6505010731316	202	358	1688	PG	4.09

NOMENCLATURE	NSN	USAMMCSA ASSETS	USAMMCE ASSETS	DPSC USAMMA ASSETS	UI	UNIT PRICE
HEPARIN LOCK FLUSH SOLUTION USP 100 UNITS/ML 1ML 50CARTRIDGES/PG	6505010733013		266	9061	PG	17.57
ACETAMINOPHEN TABLETS USP 325 MG INDIVIDUALLY SEALED 250S	6505010739536		343	11367	PG	1.61
SODIUM CHLORIDE IRRIGATION USP 0.9% 1000ML BOTTLE 12 PER BOX	6505010750678	317	26207	22950	BX	9.84
WATER FOR IRRIGATION STERILE USP 1000ML CONTAINER 12 PER BOX	6505010750679	587	923	9291	PG	10.14
ACETAMINOPHEN SUPPOSITORIES 650MG ADULT RECTAL I.S. 12/PACKAGE	6505010767866			432	PG	1.85
METAPROTERENOL SULFATE SYRUP 10 MG PER 5ML 1PT (473 ML)	6505010780667		672	19483	BT	4.29
CHLOROQUINE HYDROCHLORIDE INJECTION USP 50MG/CC 5ML AMPUL 5/BOX	6505010783717	26	414	471	BX	29.34
ISOPROPYL RUBBING ALCOHOL USP 1 GAL (3.78 LITERS)	6505010789605	8	1		BT	3.94
PHENYLEPHRINE HCL NASAL SOLUTION USP 1 FL OZ	6505010796651		2067	592	PG	0.95
SODIUM CHLORIDE INJECTION 0.45% 1000 ML 12S	6505010798768			1855	PG	13.04
PRALIDOXINE CHLORIDE STERILE USP 1 GM BS	6505010801986		7900	1367	BX	32.14
POTASSIUM CHLORIDE INJECTION USP 20 MEQ 10 ML 25S	6505010801987	39		1904	PG	11.64
POTASSIUM CHLORIDE INJECTION USP 20 ML 25S FOR IV AFTER DILUTION	6505010801988		1010	1428	PG	14.32
HYDROCORTISONE ACETATE AND PRAMOXINE HYDROCHLORIDE FOAM 10GM	6505010802904	132	181	8844	PG	6.43
OXYCODONE HYDROCHLORIDE & ACETAMINOPHEN TABLETS 100S	6505010825509	49	598	13028	BT	1.20
LAXATIVE KIT PRERADIOGRAPHIC EXAMINATION	6505010826726		399		EA	1.58
BROMOCRIPTINE MESYLATE TABLETS USP 2.5MG 30 TABLETS PER BOTTLE	8505010830900		349	48947	BT	20.52
ERYTHROMYCIN STEARATE TABS USP EQUIV TO 250MG ERYTHROYMCIN 100S	6505010835988	235	844	30779	BT	4.41
ALUMINUM HYDROXIDE GEL AND MAGNESIUM CARBONATE SUSPENSION 12OZ	6505010836612		224	8773	BT	4.95
THEOPHYLLINE EXTENDED-RELEASE TABLETS 200MG 100 TABLETS/BOTTLE	6505010836613		24	14183	BT	1.93
FUROSEMIDE INJECTION USP 10MG 4ML SYRINGE WITH NEEDLE 5 PER BOX	6505010837833		1		BX	6.42
HYDROCORTISONE VALERATE CREAM USP 0.2% 45 GRAM	6505010839395		71	3698	TU	6.12
NORETHINDRONE AND ETHINYL ESTRADIOL TABLETS USP 126 S	6505010842667		169	1399	BX	11.49
AMPHOTERICIN B FOR INJECTION USP 50MG BOTTLE	6505010849453	112	76		BT	13.88
CODEINE PHOSPHATE ACETAMINOPHEN TABLET INDIVIDUALLY SEALED 500S	6505010862993	29	40	753	BX	31.02
ERGOTAMINE TARTRATE AND CAFFEINE TABLETS USP 250S	6505010865925	16	33	1749	BT	83.91
SULFAMETHOXAZOLE & TRIMETHOPRIM ORAL SUSPENSION USP 473ML	6505010867611		507	15745	BT	3.28
METAPROTERENOL SULFATE TABLET 10MG 100S	6505010878486		252	3314	BT	3.62
GENTAMICIN SULF INJ USP EQ TO 40MG GENTAMICIN/ML 20ML	6505010883692	38	71		VI	0.88
DETERGENT SURGICAL MEDICATED 4% CHLORHEXIDINE GLUCONATE 16 OZ	6505010895358		108		BT	4.07
CLOTRIMAZOLE VAGINAL TABLETS USP 100MG INDIVIDUALLY SEALED 7S	6505010906795				PG	2.24
METOPROLOL TARTRATE TABLETS 100 MG 100S	6505010906796		100	3373	BT	28.20
METOPROLOL TARTRATE TABLETS 50 MG 100S	6505010906797	51	520	11189	BT	15.66
GENTAMICIN SULFATE INJ USP EQUIV TO 10MG GENTAMICIN PER ML 2ML	8505010912326		46	3	BT	0.41
RABIES VACCINE HUMAN DIPLOID CELL STRAIN 1 DOSE	6505010916063	238	245	13241	PG	44.73
CHLORPHENIRAMINE MALEATE&PSEUDOEPHEDRINE HCL CAPS SUST-REL 500S	8505010917508		547	4495	BT	17.03
TOLMETIN SODIUM CAPSULES USP 400 MG 100S	6505010919624	107	950	15418	BT	21.47
AMINOPHYLLINE INJECTION USP 25MG/ML 10ML BOTTLE 10 PER BOX	6505010920415		160	1255	BX	20.52
DIPHENHYDRAMIDE HYDROCHLORIDE INJECTION USP 5ML BOTTLE 10/BOX	6505010920416		513	958	BX	61.38
LIDOCAINE HCL INJ USP 20% SYRINGE-NEEDLE UNIT 10ML 10S	6505010920417	37	68	316	PG	31.62
SODIUM BICARBONATE INJECTION USP 4.2% 10ML 10 DISP SYR-NDL UNITS	6505010920420	3	9		BX	15.63
DEXAMETHASONE SODIUM PHOSPHATE INJECTION USP 5ML 10 PER PACKAGE	6505010920421	94	889	5057	BX	108.50
TIMOLOL MALEATE OPHTHALMIC SOLUTION USP 10ML	6505010920422			175	BT	22.75
TAMOXIFEN CITRATE TABLETS USP 10MG EQUIVALENT 60 TABLETS/BOTTLE	6505010925321		30	3604	BT	50.52
LIDOCAINE HYDROCHLORIDE INJ USP 1% SYRINGE-NEEDLE UNIT 10ML 10S	6505010932382		15	46	BX	29.71

NOMENCLATURE	NSN	USAMMCSA ASSETS	USAMMCE ASSETS	OPSC USAMMA ASSETS	UI	UNIT PRICE
EPINEPHRINE INJECTION USPO.1MG PER ML SYRINGE-NEEDLE UNIT10ML10S	6505010932384		24	5519	PG	13.60
ERYTHROMYCIN TABLETS USP 250MG 500 TABLETS PER BOTTLE	6505010932887			878	BT	18.48
EPHEDRINE SULFATE INJECTION USP 25MG/ML 1ML 6 PER PACKAGE	6505010937115	40	448	5441	BX	7.65
AMCINONIDE CREAM USP 0.1% 60GM TUBE	6505010937968		129	6698	TU	7.38
HYDROCORTISONE VALERATE CREAM USP 0.2% 15 GRAM	6505010939801		580	2383	TU	2.40
PHENYLPROPANOLAMINE HCL CHLORPHENIRAMINE MAL PHENYL HCL SYR 1PT	6505010941974		80	360	BT	4.05
CONTRACEPTIVE FOAM 20 GM 36S	6505010942384		94	189	BX	55.05
ATROPINE SULFATE INJECTION USP 0.1MG/CC 10ML BOTTLE 10 PER BOX	6505010946196		145	2404	BX	12.78
CARBINOXIMINE MALEATE AND PSEUDOEPHEDRINE HCL SYRUP 30ML BOTTLE	6505010949242		780	10123	PG	3.64
DOXYCYCLINE HYCLATE TABLETS USP 100MG 50S	6505010854175		58	1065	BT	3.50
PROPRANOLOL HYDROCHLORIDE TABLETS USP 80MG 100S	6505010962734		117	548	BT	1.20
METHYLDOPATE HYDROCHLORIOE INJECTION USP 50MG PER ML 5ML	6505010962735		265	4244	VI	8.44
SODIUM CITRATE AND CITRIC ACID ORAL SOLUTION USP 473ML BOTTLE	6505010974786				BT	3.72
CODEINE PHOSPHATE & GUAIFENE SYRUP 4 OZ	6505010980221		4336		BT	1.00
IBUPROFEN TABLETS USP 600MG 500 TABLETS PER BOTTLE	6505010980247	163	652	8021	BT	9.50
DIAZEPAM TABLETS USP 5MG INDIVIDUALLY SEALED 100S	6505010985802	253		40	PG	4.74
DUSTING POWDER SUSPENSION ABSORBABLE SURGICAL 100Z CAN UNSCENTED	6505010986476		15820	13556	CN	2.72
BELLADONNA ALKALOIDS WITH PHENOBARBITAL TABLETS 1000S	6505011007983	108		1201	BT	5.36
IOTHALAMATE MEGLUMINE INJECTION USP 60% 30ML VIAL 50 VIALS/PG	6505011007984	7	247	807	PG	146.74
CETYLPYRIDINIUM CHLORIDE SOLUTION ALCOHOLIC 0.05% 40Z BOTTLE 60S	6505011012124		228	1047	BX	15.47
DIPYRIDAMOLE TABLETS USP 75 MG ORAL 100S	6505011015360		129	16814	BT	2.26
DROPERIDOL INJECTION USP 2.5MG/ML 2ML AMPUL 10 AMPULS/PACKAGE	6505011040399		10	521	PG	6.50
METAPROTERENOL SULFATE INHALANT SOL 5% 10 ML	6505011041639	75	345	46097	PG	2.27
CEFOXITIN SODIUM STERILE USP 2GM 25S	6505011046393	5	10	16	PG	329.13
DIPIVEFRIN HYDROCHLORIDE OPHTHALMIC SOLUTION 0.1% 10ML	6505011051264				BT	7.25
PROCAINAMIDE HYDROCHLORIDE EXTENDED-RELEASE TABLETS USP500MG100S	6505011065973		161	8501	BT	3.91
CLOTRIMAZOLE VAGINAL CREAM USP 1% 45GM TUBE WITH APPLICATOR	6505011067281	1116	1317	45287	PG	2.14
PHENYLPROPANOLAMINE HCL AND GUAIFENESIN TABLETS 100 TABLETS/BT	6505011071479	485	642	30697	BT	2.00
TRIAMCINOLONE ACETONIDE CREAM USP TOPICAL 0.1% 60 GRAM	6505011071731	77	283	2858	TU	2.70
METHYLPREONISOLONE SODIUM SUCCINATE FOR INJECTION USP 1000MG	6505011080808	11	9	10115	CO	6.90
METHYLPREDNISOLONE SODIUM SUCCINATE FOR INJECTION USP 125MG	6505011080809		363	34561	CO	1.09
DEXTROSE INJECTION USP 5% 50ML BAG 48 BAGS PER PACKAGE	6505011082215	14	145	2553	PG	33.64
DEXTROSE INJECTION USP 5% 100 ML 48S	6505011082216		4	2414	PG	33.64
SODIUM CHLORIDE INJECTION USP 50ML PLASTIC BAG 48 BAGS/PACKAGE	6505011082217	44	233	4750	PG	33.64
SODIUM CHLORIDE INJECTION USP 100 ML PLASTIC BAG 48 PER PKG	6505011082218	278	262	3126	PG	33.64
DOXYCYCLINE HYCLATE FOR INJ USP EQUIV TO100MG OF DOXYCYCLINE 5S	6505011084828				PG	8.36
AMOXAPINE TABLETS 50MG 100 TABLETS PER BOTTLE	6505011113195		171	715	BT	31.73
BENZOYL PEROXIDE CLEANSING SOLUTION 5% 5FL OZ BOTTLE	6505011132627	107	382	8914	BT	1.59
CALCIUM THIOGLYCOLLATE TRIHYDRATE CREAM 5% TOPICAL 100 GM 12S	6505011132645	61	15	881	PG	17.63
ERYTHROMYCIN TABLETS USP 250MG 40S	6505011134758	835	5285	42	BT	1.61
NALDOLOL TABLETS 40MG 100S	6505011138345		40	938	BT	44.43
TRIETHANOLAMINE POLYPEPTIDE OLEATE-CONDENSATE SOLUTION 10% 8ML	6505011157836		859	4660	PG	5.19
NALBUPHINE HCL INJ 10 MG PER ML 1 ML 10S	6505011159852		33		PG	7.76
CLINDAMYCIN PHOSPHATE TOPICAL SOLUTION 60ML BOTTLE W/APPLICATOR	6505011165655			29300	BT	7.31
ALBUTEROL INHALATION AEROSOL 17GM CONTAINER 200 METERED SPRAYS	6505011169245		7063	143583	PG	4.60

NOMENCLATURE	NSN	USAMMCSA ASSETS	USAMMCE ASSETS	OPSC USAMMA ASSETS	UI	UNIT PRICE
NALBUPHINE HYDROCHL	6505011179690	70	78	689	VI	3.52
ISOFLURANE USP 100ML	6505011179832	514	4794	9270	BT	67.41
ERYTHROMYCIN TOPICAL SOLUTION 15MG PER ML 60ML	6505011186098			6409	BT	2.53
CEFOXITIN SODIUM STERILE USP 1GM EQUIV.10ML VIAL 25 PER PG	6505011196005			199	PG	175.25
OPHTHALMIC IRRIGATING SOLUTION 15-18ML BOTTLE 36 BOTTLES/PACKAGE	6505011197693		7		PG	62.28
OPHTHALMIC IRRIGATING SOLUTION 500ML BOTTLE W/HANGING DEVICE 6S	6505011197694	217	304	180	PG	39.37
CAPTOPRIL TABLETS USP 50MG 100 TABLETS PER BOTTLE	6505011197847		265	6823	BT	56.43
CAPTOPRIL TABLETS USP 25MG 100 TABLETS PER BOTTLE	6505011197848	218	361	10467	BT	33.86
HYDROCORTISONE LOTION USP 1% 30ML BOTTLE	6505011204574		297		BT	2.73
HYDROCORTISONE VALERATE CREAM 0.2% 60 GRAM	6505011210118		109	4787	TU	6.12
ORAL PROTECTIVE PASTE 5 GRAM	6505011212334	2	40		TU	1.08
SUNSCREEN PREPARATION FACTOR 15 4FL OZ BOTTLE	6505011212335	5560	9	271922	BT	1.18
SUNSCREEN PREPARATION SPF FACTOR 15 4OZ BOTTLE	6505011212336	11103	28462	335135	BT	1.59
SALICYLIC & LACTIC ACID PREP IN FLEX COLLODION 15ML 12S	6505011212337		104	1654	PG	57.26
POLYCARBOPHIL CALCIUM TAB CHEWABLE EQUIV TO 500MG POLYCAR USP100	6505011220594		54	232	BT	5.91
SUCRALFATE TABLETS 1 GRAM 100S	6505011230984	104	169	67001	BT	35.14
DOPAMINE HYDROCHLORIDE INJECTION USP 40MG/ML 10ML UNIT 10/PG	6505011231060	29	63		PG	27.56
METOCLOPRAMIDE HCL TAB EQUIV TO 10MG METOCLOPRAMIDE BASE 500S	6505011243800		68	21248	BT	4.57
PRALIDOXIME CHLORIDE INJECTION 300MG/ML 2ML AUTOMATIC INJECTOR	6505011253248	8433	214449	1362111	EA	8.03
MANNITOL INJECTION USP 25% 50ML SINGLE DOSE VIALS 25 VIALS/PG	6505011253253	4	2543	2323	PG	25.95
NIFEDIPINE CAPSULES USP 10MG 100 CAPSULES PER BOTTLE	6505011263842	42	1509	187182	BT	30.19
NIACIN TABLETS USP 500MG 100 TABLETS PER BOTTLE	6505011264325		60		BT	4.92
LIDOCAINE HYDROCHLORIDE AND GLUCOSE INJECTION 2 ML 10S	6505011264915	15		179	PG	32.10
GLYCERIN SUPPOSITORIES USP ADULT RECTAL 12 SUPPOSITORIES/JAR	6505011272214		123	1131	JR	0.89
DEX POT CHL&SOD CHL IN0.15% PCHL IN SOL6% DEX&0.45% SCH1000ML12S	6505011274005			12331	PG	13.84
PROGESTERONE IN OIL INJECTION USP 50MG PER ML 10ML	6505011276883	14		142	VI	3.34
GLYCERIN SUPPOSITORIES USP INFANT 12S	6505011276884		82	3155	JR	1.02
PHENYLEPHRINE HCL & PYRILAMINE MALEATE OPHTHALMIC SOLN 15 ML	6505011306276		345	1168	BT	3.22
NAPROXEN SODIUM TABS 275 MG 500S	6505011306832		100	641	BT	154.15
METHYLPREDNISOLONE SODIUM SUCCINATE F/INJ USP 40MG MULTIPLE DOSE	6505011306924		277	22885	CO	0.77
SULFADIAZINE SILVER CREAM 1% 50GM	6505011308647	408	664		JR	3.05
METOCLOPRAMIDE HCL TABLET 10MG 100S	6505011309358		205	2304	BT	1.17
NITROGLYCERIN TRANSDERM SYSTEM 25MG PER SYSTEM 30S	6505011310311		115		PG	4.00
MENINGOCOCCAL POLYSACCHARIDE VAC GRPS A C Y W-135 COMB FROR50DOS	6505011313436		515	819	PG	156.17
SULFADOXINE AND PYRIMETHAMINE TABLETS I.S. 25 TABLETS/PACKAGE	6505011320257	17	203	8092	PG	53.89
LACTULOSE SYRUP 10GR LACTULOSE PER 15ML 1PT (473 ML)	6505011324609		165	2157	BT	8.43
RITODRINE HYDROCHLORIDE TABLETS 10MG 60S	6505011325705		98	1841	BT	74.57
FLUNISOLIDE NASAL SPRAY 0.025% 25ML	6505011329979	34	446	34296	PG	11.41
OPHTHALMIC IRRIGATING SOLUTION 1 FL OZ (28.5 ML)	6505011331454		293	4035	BT	1.13
BARIUM SULFATE SUSPENSION 51% 64FL OZ CONTAINER 4 PER PACKAGE	6505011342210			16	PG	76.45
METHOXYFLURANE USP 125ML BOTTLE 4 BOTTLES PER PACKAGE	6505011343199	14	42		PG	706.50
VERAPAMIL HYDROCHLORIDE TABLETS 120MG 100S	6505011349846		26	7371	BT	4.16
VERAPAMIL HYDROCHLORIDE TABLETS 80 MG 100S	6505011354251	206	282	47282	BT	2.92
ATENOLOL TABLETS 50MG 100 TABLETS PER BOTTLE	6505011357373	336	291	52167	BT	41.11
SULFAMETHOXAZOLE & TRIMETHOPRIM ORAL SUSPENSION USP 100ML	6505011368178		1301	47097	BT	1.11

NOMENCLATURE	NSN	USAMMCSA ASSETS	USAMMCE ASSETS	DPSC USAMMA ASSETS	UI	UNIT PRICE
TRAZODONE HCL TABLETS 50MG 100S	6505011374627		180	8327	BT	5.13
PIROXICAM CAPSULES 20 MG 100S	6505011374628		39		BT	102.36
INDOMETHACIN CAPSULES MODIFIED 75MG 60 CAPSULES PER BOTTLE	6505011374629		135	1798	BT	23.78
NAPHAZOLINE HCL AND PHENIRAMINE MALEATE OPHTHALMIC SOL 15ML	6505011377901		1293		BT	1.19
GRISEOFULVIN ORAL SUSPENSION USP 125MG/5ML 118ML OR 4OZ BOTTLE	6505011378448		416	906	BT	14.93
ACYCLOVIR OINTMENT 5% 15GM COLLAPSIBLE TUBE	6505011378451	191	85	20920	TU	23.69
CHIGGER REPELLANT AND ANTIPRURITIC LOTION 4FL OZ BOTTLE	6505011378456	7828	37	169545	BT	2.39
SULFACETAMIDE SODIUM &PREDNISOLONE ACETATE OPHTHALMIC SUSP 10ML	6505011378464				BT	2.57
ATENOLOL TABLETS 100MG 100 TABLETS PER BOTTLE	6505011384751		218	3084	BT	62.31
GEMFIBROZIL CAPSULES 300 MG 100S	6505011385846		401	26428	BT	29.77
SCOPOLAMINE TRANSDERMAL SYSTEM 1.5 MG 12S	6505011385892		113	1803	PG	27.42
ALBUTEROL SULFATE TABLETS 2MG 100 TABLETS PER BOTTLE	6505011393423		309	4849	BT	2.49
METRONIDAZOLE INJ USP 5MG PER ML 100 ML 24S	6505011394931	120		1578	PG	81.85
ALPRAZOLAM TABLETS USP 0.5MG 100 TABLETS PER BOTTLE	6505011403198	235	214	10489	BT	24.68
ERYTHROMY ETHYLSUCC&SULFISOXAZ ACETYL FOR ORAL SUSP USP 100 ML	6505011403207		831	14997	BT	4.10
CLINDAMYCIN PHOSPHATE TOPICAL SOLUTION 30 ML	6505011406450			2907	BT	5.11
DEFEROXAMINE MESYLATE INJECTION USP 500MG PER 5ML 4S	6505011406454		157	613	PG	24.46
CARBINOXAMINE MALEATE PSEUDOEPHEDRINE HCL&DEXTROMETHORPHAN 30ML	6505011410823				PG	6.54
CARBINOXAMINE MALEATE&PSEUDOEPHEDRINE HCL SYRUP 4OZ (118ML)	6505011411629		180		BT	3.18
OINTMENT BASE 4 OZ	6606011414883		666	20335	JR	1.97
INSULIN ISOPHANE SUSPENSION USP,100 USP UNITS PER ML 10ML BOTTLE	6505011419463	82	657	66393	BT	5.85
INSULIN INJECTION USP 100 USP UNITS PER ML 10ML	6505011419464	23	1298	6011	BT	5.85
CEFACLOR FOR ORAL SUSPENSION USP 125MG/5ML 150ML BOTTLE	6505011419488		772	25138	BT	16.68
CEFACLOR FOR ORAL SUSPENSION USP 250MG IN A 150ML BOTTLE	6505011419489		1892	75579	BT	30.24
INSULIN ZINC SUSPENSION USP BEEF AND PORK U-100 10 ML	6505011425588		163	7197	VI	5.85
TRIPROLIDINE AND PSEUDOEPHEDRINE HCL TABLETS USP 1.S. 24S	6505011425595	405	8109	155120	PG	0.68
NITROGLYCERIN TRANSDERMAL SYSTEM 50MG 30S	6505011430758		11		PG	4.00
NEOMYCIN &POLYMYXIN B SULF AND DEXAMETHASONE OPHTH OINT USP3.5GM	6505011434642		198	4286	TU	0.77
NEOMYCIN&POLYMYXIN B SULFATES&GRAMICIDIN OPHTHALMIC SOL USP 10ML	6505011434643	334	1006	24181	BT	0.99
NEOMYCIN&POLYMYXIN B SULFATES&BACITRACIN ZINC OPHTH OINT3.5GM12S	6505011434644	1356	5067	2280	PG	6.86
VERAPAMIL HYDROCHLORIDE TABLETS 80 MG 500S	6505011438070				BT	16.62
ALPRAZOLAM TABLETS USP 0.25MG 100 TABLETS PER BOTTLE	6505011439269		164	3600	BT	18.92
MULTIPLE VITAMIN AND SODIUM FLUORIDE SOLUTION 50 DOSES	6505011439511			17373	PG	1.10
MAGNESIUM CITRATE ORAL SOLUTION USP 10FL OZ BOTTLE 24 BOTTLES/PG	6505011442810	10	30		PG	15.92
ERYTHROMYCIN ETHYLSUCCINATE & SULFISOXAZOLE ACETYL FOR ORAL SUSP	6505011445318		2804	84785	BT	8.31
WATER FOR INJECTION STERILE USP 50ML VIAL 100 VIALS PER PACKAGE	6505011450513		445		PG	49.34
NIFEDIPINE CAPSULES USP 10MG 300 CAPSULES PER BOTTLE	6505011451272		24		BT	109.40
PODOPHYLLUM RESIN USP POWDER FORM 26 TO 30GM BOTTLE	6505011455217			6	BT	11.59
FORMALDEHYDE AND CRESOL SOLUTION 1FL OZ BOTTLE	6505011455220	7	176		BT	8.00
ESTRADIOL VALERATE INJECTION USP 20 MG PER ML 5 ML	6505011455222		25		VI	22.97
PIROXICAM CAPSULES USP 20MG ORAL 500 PER BOTTLE	6505011456757	10		1428	BT	501.14
VERAPAMIL HYDROCHLORIDE INJECTION 2.5MG/ML 2ML UNIT 10/PACKAGE	6505011456758	32	2	4	PG	23.86
LEVOTHYROXINE SODIUM TABLETS USP,1ML 100S	6505011458137	86	535	2322	BT	4.49
ALUMINUM CHLORIDE SOLUTION 20ML BOTTLE	6505011458774		47		BT	12.57
DILTIAZEM HYDROCHLORIDE TABLETS 30MG 100 TABLETS PER BOTTLE	6505011458825		689	16250	BT	22.15

NOMENCLATURE	NSN	USAMMCSA ASSETS	USAMMCE ASSETS	DPSC USAMMA ASSETS	UI	UNIT PRICE
LIDOCAINE HYDROCHLORIDE AND EPINEPHRINE INJECTION USP1.8ML 100S	6505011461139	321	703	3596	PG	9.54
SODIUM CHLORIDE OPHTHALMIC SOLUTION MODIFIED 15ML BOTTLE 12/PG	6505011462620				PG	5.62
STANNOUS FLUORIDE GEL USP 0.4% CINNAMON FLAVOR 2.3OZ BOTTLE	6505011462621		881		BT	1.48
UREA LOTION 10% 6 FL OZ OR 180ML BOTTLE	6505011462624		67	6853	BT	3.64
CHLORAMPHENICOL PALMITATE ORAL SUSPENSION USP 60ML	6505011462634		106	366	BT	12.39
DILTIAZEM HYDROCHLORIDE TABLETS 60 MG 100 TABLETS PER BOTTLE	6505011464174	28	146	84839	BT	35.55
TUBOCURARINE CHLORIDE INJECTION USP 3MG/ML 10ML VIAL 10 VIALS/PG	6505011464264		134	2632	PG	23.83
ALUMINUM CHLORIDE HEXAHYDRATE SOLUTION 37.5 ML BOTTLE	6505011464268			3862	BT	4.16
TRIAMCINOLONE ACETONIDE SUSP STERILE USP 40MG 1 ML	6505011467792		101		VI	2.68
LIDOCAINE HYDROCHLORIDE AND EPINEPHRINE INJECTION USP1.8ML 100S	6505011467793		323	2228	PG	9.54
BUTALBITAL ASPIRIN AND CAFFEINE TABLETS 1000 TABLETS PER BOTTLE	6505011468044		73	1532	BT	8.54
ASCORBIC ACID VITAMIN W/IRON 50 ML ORAL	6505011472070		527		BT	6.57
SULFACETAMIDE SOD LOTION USP 10% 3 OZ	6505011472081		156		TU	6.89
HYDROXYPROPYL METHYLCELLULOSE OPHTHALMIC SOL USP 2.5%15ML BOTTLE	6505011472082	22			BT	3.82
OPHTHALMIC IRRIGATING SOLUTION 4 FL OZ (118 ML)	6505011472084	3694		120	BT	1.36
CODEINE PHOSPHATE GUAIFENESIN&PSEUDOEPHEDRINE HCL SYRUP 4 OZ	6505011479537		688	19580	BT	1.22
NORGESTREL AND ETHINYL ESTRADIOL TAB USP 168S	6505011479542	24	2241	8252	PG	9.30
CHLORAMPHENICOL OPHTHALMIC OINT USP 1% 3.5 GM	6505011479544		116	2027	TU	5.64
NEOMYCIN AND POLYMYXIN B SULFATES&BACITRACIN ZINC OINT USP 1OZ	6505011479553		152		TU	2.73
BENZOYL PEROXIDE GEL USP 5% 1.5OZ OR 42.5GM TUBE	6505011479554	52	609	21868	TU	0.89
BENZOYL PEROXIDE GEL USP 10% 1.5OZ OR 42.5GM TUBE	8505011479555	659	142	13544	TU	1.25
BENZOYL PEROXIDE GEL USP 10% 1.5OZ OR 42.5GM TUBE	6505011479556	75	304	12832	TU	1.15
BENZOYL PEROXIDE GEL USP 5% 1.5OZ OR 42.5GM TUBE WATER BASE	6505011479557		992	8948	TU	1.15
ERGOTAMINE TARTRATE TABLETS MODIFIED 2MG 20S	6505011488967		120	1454	CO	8.17
BENZOYL PEROXIDE LOTION USP 5% 1FL OZ BOTTLE	6505011493565		270		BT	3.27
DEXTROMETHORPHAN HYDROBROMIDE AND GUAIFENESIN LOZENGES 16S	6505011494121		1513	10662	PG	1.61
CEFACLOR CAPSULES USP 250MG 100 CAPSULES PER BOTTLE	6505011502101		150	4792	BT	116.39
AMCINONIDE OINTMENT USP 0.1% 60GM COLLAPSIBLE TUBE	6505011503824		48	2472	TU	8.04
ACETAMINOPHEN TABLETS USP 80MG 30 TABLETS/BOTTLE 12 BOTTLES/PG	6505011505430		107		PG	14.40
CEFACLOR FOR ORAL SUSPENSION USP 75ML BOTTLE	6505011523607		254	15483	BT	15.57
SODIUM FLUORIDE ORAL SOLUTION USP 1 FL OZ (29.5 ML)	6505011532947		1110	1302	BT	0.84
SODIUM FLUORIDE TABLETS USP 2.21 MG 1000S	6505011532986		115	998	BT	3.28
DESIPRAMINE HYDROCHLORIDE CAPSULES USP 25MG 100 CAPSULES/BOTTLE	6505011533034		211		BT	71.75
DEXTROAMPHETAMINE SULFATE CAPSULES 10MG SUSTAINED RELEASE 50/BT	8505011533038				BT	7.16
PHENOBARBITAL SOD INJ USP 80 MG CART-NDL UNIT 1 ML 10S	6505011533173		248		PG	11.43
DICYCLOMINE HYDROCHLORIDE INJECTION USP 10MG/ML 10ML VIAL	6505011533280		30		VI	29.83
METHOHEXITAL SODIUM FOR INJECTION USP 500 MG 50 ML VIAL	6505011533292		118	1148	PG	8.20
LEVOTHYROXINE SODIUM TABLETS USP .150MG 1000 TABLETS PER BOTTLE	6505011533338	25	68	795	BT	5.94
NITROGLYCERIN TABLETS USP 0.4MG 25 TABLETS/BOTTLE 4 BOTTLES/PG	6505011533379				PG	6.23
HYDROXYPROPYL METHYLCELLULOSE OPHTH SOL 0.5% 15 ML	6505011533391		108		BT	5.44
HYDROCORTISONE LOTION 1% 120ML BOTTLE	6505011533411		189		BT	4.93
DESIPRAMINE HYDROCHLORIDE TABLETS USP 25 MG 100S	6505011533463		706	5066	BT	3.44
MALT SOUP EXTRACT POWDER 8 OZ	6505011533482	12	33		BT	3.39
BABY POWDER MEDICATED 14OZ CAN	6505011533530				CN	1.02
THEOPHYLLINE EXTENDED-RELEASE CAPSULES 60MG 100 CAPSULES/BOTTLE	6505011533811		263		BT	5.06

NOMENCLATURE	NSN	USAMMCSA ASSETS	USAMMCE ASSETS	OPSC USAMMA ASSETS	UI	UNIT PRICE
GLUCOSE TEST SOL ORANGE FLAVOR 10 OZ 12S	6505011533850		165		PG	12.65
SULFISOXAZOLE ACETYL ORAL SUSP USP PED 4 OZ	6505011533872		22		BT	4.34
GUAIFENESIN AND PHENYLPROPANOLAMINE HYDROCHLORIDE SYRUP 118ML	6505011533981		486	95	BT	3.93
COCOA BUTTER USP 1.1 OZ	6505011533991		1		TU	0.91
MULTI-VITAMIN SOD FLUORIDE IRON SOL 50 ML	6505011534006		222		BT	1.34
POLYVINYL ALCOHOL OPHTHALMIC SOLUTION 1% 15ML	6505011534014				BT	3.58
MINERAL OIL USP 8OZ	6505011534041		128		BT	1.82
NORETHINDRONE&ETHINYL ESTRADIOL TABLETS USP 4032 TABLETS/PG	6505011534086		215		PG	231.79
OESOMIDE OINTMENT 0.05% 15 GM	6505011534092		91		TU	2.13
POVIDONE-IODINE SOL 16 OZ	6505011534192				PG	4.85
NAFCILLIN SODIUM FOR INJECTION USP 100ML VIAL	6505011534196		93	1617	VI	11.33
NORETHINDRONE AND ETHINYL ESTRADIOL TABS USP 63S	6505011534284		1069	18964	PG	2.36
DOXYCYCLINE HYCLATE TABLETS USP 100MG 500 TABLETS PER BOTTLE	6505011534335	17	147	1768	BT	23.59
MELANEX TOPICAL SOL 3% 30 ML	6505011534362				PG	5.26
BABY POWDER 2 OZ 12S	6505011534424		339		BX	3.24
CHLORHEXIDINE GLUCONATE CLEANSING SOLUTION 118ML BOTTLE	6505011534431				BT	2.09
SALICYLIC ACID LACTIC ACID MENTHOL CAMPHOR IN FLEX COLL 15 ML	6505011634449				BT	1.75
CARBAMAZEPINE TABLETS USP 100MG 100 TABLETS PER BOTTLE	6505011534524		194		BT	4.38
SODIUM CHLORIDE INHALATION USP 0.9% 5 ML 100S	6505011541748		123	782	PG	7.56
DEXTROSE IN LACTATED RINGER'S INJECTION 5% 500ML 18S	6505011549916		172		PG	13.38
DEXTROSE INJECTION USP5% 500ML 18S	6505011549918	236	11	1665	PG	14.99
DEXTROSE AND SODIUM CHLORIDE INJECTION USP 5% 500 ML 18S	6505011549920		149	849	PG	24.48
RINGER'S INJECTION LACTATED USP 500ML PLASTIC BAG 18 BAGS/PG	6505011549922	1503	491	605	PG	14.90
RINGER'S INJECTION USP 600ML PLASTIC BAG 18 BAGS PER PACKAGE	6505011549923	361		1688	PG	14.38
DIVALPROEX SODIUM TABLETS EQ TO 250MG OF VALPROIC ACID 100S	6505011553574		228	6819	BT	28.93
KETOCONAZOLE TABLETS 200 MG 100S	6505011560701	16	94	160	BT	113.48
CHLOROTHIAZIDE FOR ORAL SUSP 250 MG/5 ML 237 ML	6505011561800	83	1		BT	7.17
HYDROXYETHYLCELLULOSE OPHTHALMIC SOLN 15 ML	6505011561633		113		BT	3.53
VITAMIN E CAP 100S	6505011561772				BT	4.83
CALCIUM CARBONATE AND VITAMIN D TABLETS 100 TABLETS PER BOTTLE	6505011561775		54		BT	0.72
LEVOTHYROXINE SODIUM TABLETS USP .050MG 100 TABLETS PER BOTTLE	6505011561807		432		BT	0.94
OINTMENT BASE 16OZ OR 1LB	6505011562077		136		JR	11.00
SOAP NON-MEDICATED 3.6 OZ	6505011562160				CK	0.78
BELLADONNA ALKALOIDS WITH PHENOBARBITAL ELIXIR 4FL OZ/118ML BT	6505011562184		622	11853	BT	2.27
ANTISEPTIC SOLUTION UMBILICAL TOPICAL 30ML	6505011587996		41		BT	2.56
FLUORESCEIN SODIUM OPHTHALMIC STRIPS MODIFIED 300S	6505011591493	28	78	1713	PG	19.95
METHYLPHENIDATE HYDROCHLORIDE TABLETS MODIFIED 20MG 100TABS/BT	6505011604201			3465	BT	29.53
THIOPENTAL SODIUM FOR INJECTION USP 500 MG 25 SYRINGES/PACKAGE	6505011604986				PG	73.50
RANITIDINE HYDROCHLORIDE TABLETS 150MG 60 TABLETS PER BOTTLE	6505011607702	276	1199		BT	37.44
SODIUM PHOSPHATES ENEMA USP 2.260 FL OZ PLAS BT SQUEEZE W/REC TP	6505011608378		128		BT	0.63
THEOPHYLLINE CAPSULES MODIFIED 50MG 100 CAPSULES PER BOTTLE	6505011611935		674	8224	BT	2.33
SULFADIAZINE SILVER CREAM 1% 20 GRAM	6505011617135		951	2676	TU	2.12
POTASSIUM PHOSPHATES INJ USP 5 ML 50S	6505011624449	18	96	1123	PG	25.65
GLYCERIN OPHTHALMIC SOLUTION USP 7.5O ML	6505011636333	8	1711	2704	BT	9.53
PROPRANOLOL HYDROCHLORIDE CAPSULES 80MG 100 CAPSULES PER BOTTLE	6505011637906		99		BT	32.22

NOMENCLATURE	NSN	USAMMCSA ASSETS	USAMMCE ASSETS	OPSC USAMMA ASSETS	UI	UNIT PRICE
VITAMIN A VITAMIN C VITAMIN D AND FLUORIDE SOLUTION 50 ML	6505011637978		1411	6711	PG	1.79
DEXTROSE INJECTION USP 50% 500ML BOTTLE 6 BOTTLES PER PACKAGE	6505011638086		140	2080	PG	13.01
NORETHINDRONE & ETHINYL ESTRADIOL TABLETS USP 84S	6505011682610	54	2955	46975	PG	2.11
CETYLPYRIDINIUM CHLORIDE AND BENZOCAINE LOZENGES 324S	6505011716051	181	438	376	PG	17.60
SALIVA SYNTHETIC SOLUTION 75 GM	6505011721141		149		PG	4.34
THEOPHYLLINE CAPSULES MODIFIED 75MG 100 CAPSULES PER BOTTLE	6505011721146		79	2883	BT	7.10
TRETINOIN GEL USP 0.01% TOPICAL 15 GRAMS 24S	6505011721149	66	18	376	PG	124.55
DOXYCYCLINE HYCLATE FOR INJ USP EQ TO 200 MG OF DOXYCYCLINE	6505011722851	23	241	869	VI	14.32
NEOMYCIN SULF HYDROCORTISONE POLYMYXIN B SULF OPHTH SUSP 7.5 ML	6505011728892		44	3797	BT	4.67
DIPHTHERIA AND TETANUS TOXOIDS ADSORBED USP FOR PEDIATRIC USE5ML	6505011728898		104		VI	4.10
ACETAMINOPHEN TABLETS USP 80MG 30 TABS/BOTTLE 48 BOTTLES/PG=1440	6505011741470		107	1282	PG	13.74
ACETAMINOPHEN SUPPOSITORIES 120MG INFANT RECTAL I.S. 12/PACKAGE	6505011741476		631		PG	2.27
CROMOLYN SODIUM INHALATION USP 10MG/ML 2ML AMPUL 60 AMPULS/PG	6505011742383		277	6045	PG	30.06
CROMOLYN SODIUM NASAL SOLUTION USP 40MG/ML 100 DOSES 13ML	6505011742384		1936	77555	EA	12.93
MICONAZOLE INJECTION 10MG PER ML 20ML	6505011749914				AM	9.58
ANTIDOTE TREATMENT NERVE AGENT	6505011749919	98277	6204	48992	EA	23.99
HYDROCORTISONE OINTMENT 1% TOPICAL 1 OZ	6505011749931		326		TU	1.38
CIMETIDINE TABLETS 400 MG 60S	6505011760712		386	3235	BT	34.93
WATER FOR INJECTION STERILE USP 10 ML VIAL	6505011761231		231		PG	6.83
BETAMETHASONE DIPROPIONATE OINTMENT USP .050% 15GM PLASTIC TUBE	6505011769356			58	TU	5.67
CETYLPYRIDINIUM CHLORIDE LOZENGES USP 1.5MG 648S	6505011770127	61	2795	2528	PG	17.86
CLINDAMYCIN PHOSPHATE INJECTION USP 600MG VIAL 25 VIALS PER PG	6505011771982		395	77	PG	98.72
BUTALBITAL ASPIRIN AND CAFFEINE TABLETS 100 TABLETS PER BOTTLE	6505011787737	70		3393	BT	2.17
PYRIDOSTIGMINE BROMIDE TABS USP 30 MG INDIV-SEALED 210S	6505011787903	582	1076	7639	PG	14.38
CHLORPHENIRAMINE MAL ACETAMINOPHEN PHENYL HCL TAB 200S	6505011790102			1785	PG	10.68
AMINOPHYLLINE ORAL SOLUTION 315MG/ML 240ML OR 8FL OZ BOTTLE	6505011794958		121		BT	18.66
L-TRYPTOPHAN TABLETS 500 MG 100S	6505011803222		151		BT	19.95
CICLOPIROX OLAMINE CREAM 1% 30GM COLLAPSIBLE TUBE	6505011806961		118	1461	TU	7.04
THEOPHYLLINE CAPSULES MODIFIED 125MG 100 CAPSULES PER BOTTLE	6505011828005		136	817	BT	4.12
DEXTROSE INJECTION USP 5% 250ML PLASTIC BAG 24 BAGS PER PACKAGE	6505011828009	30		152	PG	22.06
SODIUM CHLORIDE INJECTION USP 0.9% 250ML PLASTIC BAG 24 BAGS/PG	6505011828013	18	52	5173	PG	24.63
NORETHINDRONE AND ETHINYL ESTRADIOL TABLETS USP 126 TABLETS/PG	6505011834882		46		PG	8.16
MEDROXYPROGESTERONE ACETATE TABLETS USP 2.5MG 30 TABLETS/BOTTLE	6505011841249		85	8886	BT	2.97
CARBAMIDE PEROXIDE OTIC SOLUTION 0.5FL OZ BOTTLE	6505011841250	33	898	24277	BT	2.92
ERYTHROMYCIN TOPICAL SOLUTION MODIFIED 2% 60ML BOTTLE	6505011849140		25	3249	BT	2.39
AZATADINE MALEATE AND PSEUDOEPHEDRINE SULFATE TABLETS 100TABS/BT	6505011858832		70	2825	BT	12.53
POLIOVIRUS VACCINE LIVE ORAL USP TYPES1,2,3 SINGLE DOSE 50S	6505011858848		242	128	PG	114.53
VAGINAL JELLY ACIDIFYING 85 GRAM	6505011868427		745		TU	10.51
CLINDAMYCIN PHOSPHATE INJECTION USP 6ML VIAL 25 VIALS/PACKAGE	6505011875540	35			PG	206.98
GLYBURIDE TABLETS 5 MG 100S	6505011876585			548	BT	18.50
NICOTINE POLACRILEX GUM 2 MG 96S	6505011885354		691	4567	PG	18.25
CEFOXITINSODIUM STERILE USP EQUIVALENT TO 1GRAM CEFOXITIN 10S	6505011893960		149	2801	PG	66.10
CEFOXITIN SODIUM STERILE USP 20ML VIALS 10S	6505011893961	147	113	6743	PG	131.64
BUPIVACAINE HYDROCHLORIDE AND EPINEPHRINE INJ USP 1.8ML CART 50S	6505011893973	30	118	66	CN	11.93
GLYBURIDE TABLETS 5MG 500 TABLETS PER BOTTLE	6505011904388		24	2766	BT	89.44

NOMENCLATURE	NSN	USAMMCSA ASSETS	USAMMCE ASSETS	DPSC USAMMA ASSETS	UI	UNIT PRICE
PENTOXIFYLLINE TABLETS 400MG 100 TABLETS PER BOTTLE	6505011908688		145	19253	BT	30.00
CHLORPHENIRAMINE MALEATE AND PSEUDOEPHEDRINE HCL CAPS 100S	6505011934031		134		BT	5.05
POLYETHYLENE GLYCOL AND ELECTROLYTES FOR ORAL SOL 274.31GM	6505011937331		421		CO	5.07
HEPARIN LOCK FLUSH SOL USP 100 UNITS/ML 2 ML 25S	6505011947262	27	69	492	PG	6.92
GLIPIZIDE TABLETS 5 MG 100S	6505011966212		241	13787	BT	17.48
REHYDRATION SALTS FOR ORAL SOLUTION 27.9 GRAM 125S	6505011978809	230			PG	65.70
GLIPIZIDE TABLETS 10 MG 100S	6505011980075		796	732	BT	30.87
MAGNESIUM SULFATE INJ USP 10 ML 25S	6505011998359	9			PG	8.00
ANTIHEMOPHILIC FACTOR USP LYOPHILIZED 240-300 AHF UNIT	6505011998360		101		PG	24.65
ACETAMINOPHEN ORAL SOLUTION USP 4FL OZ OR 118ML BOTTLE	6505012013458		9469	231238	BT	0.38
TERBUTALINE SULFATE INHALATION AEROSOL 75MG	6505012022226		88		PG	3.70
CHARCOAL ACTIVATED AND SORBITOL SUSPENSION 120ML BOTTLE	6505012036253		16		BT	1.21
AMOXICILLIN AND POTASSIUM CLAVULANATE TABLETS 30 TABLETS/BOTTLE	6505012036259	30	156		BT	29.62
ACETAMINOPHEN ORAL SOLUTION USP 15ML BOTTLE PEDIATRIC USE	6505012036283		16040	45319	PG	0.29
ETOMIDATE INJECTION 20 MG/ML 20 ML SYRINGE 10 PER PACKAGE	6505012040681	76			PG	83.60
AMOXICILLIN AND POTASSIUM CLAVULANATE FOR ORAL SUSPENSION 150ML	6505012045388		816	11407	BT	13.91
GLYBURIDE TABLETS 5 MG 100S	6505012045417		76	12674	BT	18.50
CROMOLYN SODIUM OPHTHALMIC SOL 40MG/ML 10 ML	6505012052338		224	3483	BT	13.59
ACETAMINOPHEN SUPPOSITORIES 125MG CHILD RECTAL 12 PER PACKAGE	6505012052395		151		PG	6.00
TRIAMTERENE AND HYDROCHLOROTHIAZIDE TABLETS 500 TABLETS/BOTTLE	6505012065068		40	6802	BT	14.32
BROMPHENIRAMINE MALEATE AND PHENYLPROPANOLAMINE HCL TABS 500/BT	6505012065977	169		14703	BT	23.26
BROMPHENIRAMINE MALEATE AND PHENYLPROPANOLAMINE HCL ELIXIR 4OZ	6505012065979		19114	191825	BT	0.75
SODIUM NITRITE INJECTION USP 300 MG 10 ML 5S	6505012066009	2375			PG	2.50
AMOXICILLIN AND POTASSIUM CLAVULANATE TABLETS 30 TABLETS/BOTTLE	6505012066228			767	BT	47.82
TRIAMCINOLONE ACETONIDE INHALATION AEROSOL 20GM 240 DOSES	6505012069233		3108		PG	3.25
BENZOYL PEROXIDE CLEANSING LIQUID 10% 8OZ BOTTLE	6505012069237		186		BT	5.18
ACYCLOVIR CAPSULES 200MG 100 CAPSULES PER BOTTLE	6505012069246		7	19389	BT	65.37
BENZOYL PEROXIDE GEL USP 2.5%-4.5OZ TUBE	6505012069252		81		TU	0.79
AMOXICILLIN AND POTASSIUM CLAVULANATE FOR ORAL SUSPENSION 150ML	6505012070795		1273	38690	BT	26.45
NEOMYCIN AND POLYMYXIN B SULFATES CREAM 15GM COLLAPSIBLE TUBE	6505012071195		4477	32957	TU	2.95
GLOBULIN IMMUNE FOR INJECTION LYOPHILIZED 3 GRAM 100ML VIAL	6505012078231		77	51	PG	119.18
NORETHINDRONE AND ETHINYL ESTRADIOL TABLETS USP 84S	6505012085994		1760	91767	PG	1.61
LORAZEPAM INJECTION 2MG/ML 1 ML VIAL	6505012090723		13		VI	5.48
PREDNISONE SYRUP USP 1MG/ML 120ML BOTTLE	6505012100146		37		BT	3.30
TRIAMCINOLONE DIACETATE SUSP STERILE USP 40MG/ML 5ML	6505012102147		107	2720	VI	3.04
OXYCODONE HCL AND ACETAMINOPHEN CAPS 100S	6505012104450		324	5039	BT	1.19
TRIAMCINOLONE ACETONIDE SUSP STERILE USP 40MG/ML 5 ML	6505012104472	39	2	62	VI	2.68
CHLORHEXIDINE GLUCONATE SOLUTION 4% 4OZ (118ML) 48S	6505012104477		101	51	PG	87.72
NYSTATIN AND TRIAMCINOLONE ACETONIDE CREAM 15GM COLLAPSIBLE TUBE	6505012109506		497	72493	TU	1.01
CHLORPHENIRAMINE MALEATE AND PHENYLPROPANOLAMINE HCL ELIXIR 4OZ	6505012112393		136		BT	2.58
NORETHINDRONE AND ETHINYL ESTRADIOL TABLETS USP 84S	6505012123154		553		PG	2.65
BUPIVACAINE HYDROCHLORIDE AND DEXTROSE INJECTION 2ML AMPUL 10/PG	6505012125338	13	70		PG	24.87
GENTAMICIN SULFATE INJECTION USP 40MG EQUIV/ML 2ML VIAL 25/PG	6505012139514		627	4828	PG	7.45
FUROSEMIDE INJ USP 10 MG/ML 4ML ACT INGRED PER 5ML SYRNG OF 10S	6505012148774	40	6		PG	13.65
IBUPROFEN TABLETS USP 800 MG 500S	6505012149062	394	39	27436	BT	12.56

NOMENCLATURE	NSN	USAMMCSA ASSETS	USAMMCE ASSETS	OPSC USAMMA ASSETS	UI	UNIT PRICE
CHLORPHENIRAMINE MALEATE AND PHENYLPROPANOLAMINE HCL SYRUP 4 OZ	6505012154151		172		BT	1.71
INSULIN HUMAN INJECTION MODIFIED 100UN/ML 10ML VIAL	6505012154825		399	7614	VI	6.25
AMMONIUM LACTATE LOTION 5OZ TUBE	6505012166274		313	7264	TU	4.01
INSULIN HUMAN ISOPHANE SUSPENSION 100USP UN/ML 10ML VIAL	6505012171244		322	111853	VI	6.25
LEVONORGESTREL AND ETHINYL ESTRADIOL TABLETS 84S	6505012178844	72	3084		PG	3.58
CEFTRIAXONE SODIUM STERILE EQUIV 1GR CEFTRI 10ML 10S	6505012192760	33		477	PG	282.28
SODIUM FLUORIDE TREATMENT KIT	6505012198568		307		EA	51.00
MAGNESIUM SULFATE INJ USP 50 ML VIALS 25S	6505012198593		57		PG	129.90
PREDNISONE TABLETS USP 20 MG 1000 TABLETS PER BOTTLE	6505012205067	12			BT	41.25
NORGESTREL AND ETHINYL ESTRADIOL TABLETS USP 126S	6505012207190	18	942	15562	PG	9.30
TERFENADINE TABLETS USP 60MG 100 TABLETS PER BOTTLE	6505012208416	239	237	11674	BT	46.48
TRIAMCINOLONE ACETONIDE OINTMENT USP 1% GRAM	6505012213311		188		TU	0.59
LEVONORGESTREL AND ETHINYL ESTRADIOL TABS USP 336TABLETS/PACKAGE	6505012229959		138		PG	12.18
BARIUM SULFATE FOR SUSPENSION MODIFIED CHERRY&STRAWBERRY 120Z36S	6505012235684		43		PG	80.75
HYDROCORTISONE VALERATE OINTMENT USP 0.2% 15 GM	6505012240178		118	3915	TU	2.40
MENINGOCOCCAL POLYSACCHARIDE VACCINE GROUPS A,C,Y&W COMBINED10DS	6505012240184		48		PG	143.00
LEVOTHYROXINE SODIUM TABLETS USP 0.125MG 100S	6505012249075		25		BT	2.09
PILOCARPINE HYDROCHLORIDE OPHTHALMIC GEL 5GM TUBE	6505012262913		112	1980	TU	10.58
FAT EMULSION INJECTION 500 ML 10S	6505012262931	15		2	PG	90.07
INSULIN HUMAN ZINC SUSPENSION 100 USP UNITS PER ML 10ML MULTI DS	6505012262958		51		VI	13.08
AURANOFIN CAPSULES 3MG 80 CAPSULES PER BOTTLE	6505012269907		4		BT	41.72
BETAXOLOL HYDROCHLORIDE OPHTHALMIC SOLUTION 10ML BOTTLE	6505012271545		112		BT	14.56
CEFTRIAXONE SODIUM STERILE USP 250MG VIAL 10 VIALS PER PACKAGE	6505012277028	166		976	PG	86.17
CALCIUM HYDROXIDE USP POWDER FORM 0.40Z BOTTLE	6505012281892	13	43	30	BT	1.36
DISULFIRAM TABLETS USP 250 MG 100S	6505012308728	2	336	13447	BT	2.96
PHENYLPROPANOLAMINE TABLETS I.S. 144S	6505012308729	16	93		PG	5.84
METHYLPREDNISOLONE ACETATE SUSPENSION STERILE USP 40MG/ML 5ML	6505012337616		230	32	VI	3.78
DILUTING SOLUTION FROZEN BLOOD 150ML PLASTIC BAG 36 BAGS/PACKAGE	6505012348962		441		PG	86.66
WASHING SOLUTION FROZEN BLOOD 3000ML BAG 6 BAGS PER PACKAGE	6505012349583				PG	30.00
HEMORRHOIDAL SUPPOSITORIES WITH HYDROCORTISONE ACETATE 24/PG	6505012349591				PG	13.98
ENALAPRIL MALEATE TABLETS 5 MG 100S	6505012368880	29	576	100763	BT	58.68
ENALAPRIL MALEATE TABLETS 10 MG 100S	6505012368881	517	29	58056	BT	60.67
ELECTROLYTE SOLUTION INFANT FEEDING 8 OZ BOTTLES 24S	6505012370561		113		PG	20.48
ALBUTEROL INHALATION AEROSOL 90MCG/SPRAY 17GM CONTAINER200SPRAYS	6505012384243		5376		PG	3.95
BECLOMETHASONE DIPROPIONATE INHALATION AEROSOL 17GM PER PACKAGE	6505012385635		2496		PG	4.38
GUAIFENESIN TABLETS MODIFIED SUST-REL 12 HOUR 600MG100TABS/BOTTLE	6505012389443	487	106	20115	BT	10.18
CROMOLYN SODIUM INHALATION AEROSOL 1.70 OZ 200 METERED SPRAYS	6505012394689	14	3610	7628	PG	43.01
MIDAZOLAM HYDROCHLORIDE INJECTION EQ 5MG/ML 2ML DISP SYRIN NE 10	6505012395493			134	PG	90.24
BECLOMETHASONE DIPROPIONATE INHALATION AEROSOL 16.8GM OR 5.880Z	6505012400587	15	23	9920	PG	4.60
BECLOMETHASONE DIPROPIONATE INHALATION AEROSOL 17GM PER PACKAGE	6505012400588		725		PG	4.38
PHENOL AND SODIUM PHENOLATE SOLUTION 6FL OZ SPRAY BOTTLE 12/PG	6505012403838		207	15593	PG	17.04
BECLOMETHASONE DIPROPIONATE INHALATION AEROSOL 17GM PER PACKAGE	6505012405813	255	7708	16605	PG	4.60
MIDAZOLAM HYDROCHLORIDE INJECTION EQUIV 5MG/ML 2ML 10S MULTIVIAL	6505012415747		116	133	PG	96.18
MEPIVACAINE HYDROCHLORIDE INJECTION USP 3% 1.8ML CARTRIDGE100/PG	6505012429149		60	33866	PG	12.89
CALCIUM CARBONATE TABLETS USP 500 MG 120 TABLETS PER BOTTLE	6505012429482		39		BT	8.76

NOMENCLATURE	NSN	USAMMCSA ASSETS	USAMMCE ASSETS	DPSC USAMMA ASSETS	UI	UNIT PRICE
DIPHENHYDRAMINE HYDROCHLORIDE CAPSULES USP 25MG 1.S. 24 CAPS/PG	6505012433240	70	34	3632	PG	1.70
LABETALOL HYDROCHLORIDE INJECTION 5MG/ML 20ML MULTI-DOSE VIAL	6505012447982				VI	13.20
NITROGLYCERIN LINGUAL AEROSOL 13.8 GM	6505012463781		81	3093	CO	5.49
BUTOCONAZOLE NITRATE CREAM VAGINAL 2% 5.8GM DISP SYRINGE 3S	6505012466606	70	766	1384	PG	4.52
ARTIFICIAL TEARS SOLUTION 0.3ML BOTTLE 30 BOTTLES PER PACKAGE	6505012488732	692	17		PG	4.10
VANCOMYCIN HYDROCHLORIDE STERILE USP 1GM VIAL 10 PER PKG	6505012478801	8		499	PG	89.48
SODIUM CHLORIDE TABLETS FOR SOLUTION USP 1GM 1000 TABLETS/BOTTLE	6505012492134	18	8		BT	4.97
PHENYLPROPANOLAMINE HCL AND GUAIFENESIN TABS SUST-REL 6-12HR100S	6505012503531	23	281		BT	8.00
VERAPAMIL HYDROCHLORIDE TABLETS 240MG 60 TABLETS PER BOTTLE	6505012503850	1			BT	39.37
BUTALBITAL ACETAMINOPHEN AND CAFFEINE TABLETS 500 TABLETS/BOTTLE	6505012511778		20		BT	47.72
BUSPIRONE HYDROCHLORIDE TABLETS 5MG 100 TABLETS PER BOTTLE	6505012532832		34		BT	43.32
CHLORHEXIDINE GLUCONATE ORAL RINSE 0.12% 16 FL OZ (473 ML)	6505012538138	232		19804	BT	6.30
ETHYNODIOL DIACETATE AND ETHINYL ESTRADIOL TABS USP 1/35	6505012552859		268	703	PG	7.16
IPRATROPIUM BROMIDE INHALATION AEROSOL 14GM VIAL 200 INHALATIONS	6505012561948		2	1432	PG	14.29
NIACIN CAPSULES 500MG 100 CAPSULES PER BOTTLE	6505012564894		308		BT	51.79
ALBUTEROL SULFATE SYRUP 0.4MG/ML STRAWBERRY FLAVOR 480ML BOTTLE	6505012564897		42		BT	16.68
ALBUTEROL SULFATE INHALATION SOLUTION 20ML BOTTLE WITH DROPPER	6505012579953				BT	9.49
VECURONIUM BROMIDE FOR INJECTION 10 MG 10ML VIALS 10/PKG	6505012580983	16		2534	PG	139.11
ESTRADIOL TRANSDERMAL SYSTEM 4MG/SYSTEM 48 PER PACKAGE	6505012581731		53		PG	88.97
CHLORZOXAZONE TABLETS 500 MG 100S	6505012844453				BT	14.37
FERROUS FUMARATE AND DOCUSATE SODIUM TABLETS 30 TABLETS/BOTTLE	6505012653380		55		BT	2.29
BRETYLIUM TOSYLATE INJECTION 50MG/ML 10ML SYRINGE W/NDL 10/PG	6505012663773				PG	94.56
HEPATITIS B VIRUS VACCINE INACTIVATED MODIFIED 10MCG/ML 3ML VIAL	6505012683780	756	600	6127	VI	87.68
FERROUS FUMARATE & DOCUSATE SODIUM TABLETS 1000 TABLETS/BOTTLE	6505012666527		230	4187	BT	32.10
SULFANILAMIDE VAGINAL CREAM 15% 4OZ OR 113.4GM TUBE W/APPLICATOR	6505012667462	147	50	191	PG	5.07
SUNBURN PREVENTIVE PREPARATION CREAM PASTE 4 OZ	6505012671483		3310		BT	1.95
LOVASTATIN TABLETS 20MG 60 TABLETS PER BOTTLE	6505012672497		95	29531	BT	81.55
WATER FOR IRRIGATION STERILE USP 1500ML PLASTIC BOTTLE 9/PACKAGE	6505012675592	49	156		PG	14.00
VERAPAMIL HYDROCHLORIDE TABLETS 240MG 100 TABLETS BOTTLE	6505012717867	114	69	2803	BT	69.90
CIPROFLOXACIN TABLETS 750 MG 50S	6505012722384		104	983	BT	172.99
CIPROFLOXACIN HYDROCHLORIDE TABLETS 500MG 50 TABLETS PER BOTTLE	6505012722385	618	563	3143	BT	89.48
CIPROFLOXACIN HYDROCHLORIDE TABLETS 250MG 50S	6505012722386	345		3764	BT	86.30
CHOLESTYRAMINE FOR ORAL SUSPENSION USP 4GM EQUIV/DOSE 378GM	6505012742720		189	3214	CN	13.39
LISINOPRIL TABLETS 10MG 100 TABLETS PER BOTTLE	6505012750081	255	13		BT	49.81
BECLOMETHASONE DIPROPIONATE NASAL SUSPENSION 25GM BOTTLE	6505012754811			826	EA	11.28
PHENYLPROPANOLAMINE HYDROCHLORIDE&GUAIFENESIN TABLETS 600/BOTTLE	6505012758748		60		BT	26.00
SULFADIAZINE SILVER CREAM 1% 65GM	6505012804733		616		TU	4.89
HYDROCORTISONE ACETATE AND PRAMOXINE HYDROCHLORIDE CREAM 1OZ	6505012816758	6		438	PG	4.47
FLUOXETINE HYDROCHLORIDE CAPSULES 20MG 100 CAPSULES PER BOTTLE	6505012817430	7		143	BT	144.12
INSULIN HUMAN INJECTION USP 100UN/ML 10ML VIAL	6505012818772		9		VI	10.35
LOPERAMIDE HYDROCHLORIDE ORAL SOLUTION 1MG/5ML 120ML BOTTLE	6505012819890		161		BT	5.26
HAEMOPHILUS B CONJUGATE VACCINE 10 DOSES/0.5ML MULTI-DOSE VIAL	6505012819695		21	1092	VI	104.62
HAEMOPHILUS B CONJUGATE VACCINE 0.5ML/VIAL 5 VIALS PER PACKAGE	6505012822835		89		PG	70.00
LEVULOSE DEXTROSE AND ORTHOPHOSPHORIC ACID SOLUTION 4FL OZ	6505012860962		41		BT	4.43
LEVOTHYROXINE SODIUM TABLETS USP 0.15MG 1000 TABLETS PER BOTTLE	6505012870622	15	68		BT	4.20

NOMENCLATURE	NSN	USAMMCSA ASSETS	USAMMCE ASSETS	DPSC USAMMA ASSETS	UI	UNIT PRICE
VECURONIUM BROMIDE F/INJECTION 10MG/ML TEN 10ML VIALS PER PG	6505012892004	921		632	PG	144.71
ISOTRETINOIN CAPSULES 40MG I.S. 100 CAPSULES PER PACKAGE	6505012929832		348	677	PG	249.90
ERYTHROMYCIN LACTOBIONATE FOR INJECTION USP 1GM VIAL 10 VIALS/PG	6505012935593	48	7		PG	21.35
HYDROCORTISONE ACETATE SUPPOSITORIES 25MG ADULT RECTAL I.S. 12S	650501300818S				PG	1.18
ASTEMIZOLE TABLETS 10MG 100 TABLETS PER BOTTLE	6505013015261		55		BT	65.62
MAGNESIUM SULFATE INJECTION USP 2ML AMPUL 25 AMPULS PER PACKAGE	850501301817S	24		187	PG	6.86
MUPIROCIN OINTMENT 15GM COLLAPSIBLE TUBE 3 TUBES PER PACKAGE	6505013020220	5	10		PG	27.33
PHENOBARBITAL TABLETS USP 30MG I.S. 250 TABLETS PER PACKAGE	6505013022669	17	13	143	PG	14.32
NITROGLYCERIN CAPSULES 6.5MG 100 CAPSULES PER BOTTLE	6505013041014	20	23		BT	9.68
CEPHAPIRIN SODIUM STERILE USP POWDER FORM 1GM VIAL 10 VIALS/PG	6505013043028		1190	12143	PG	13.97
OINTMENT BASE 454GM OR 1LB JAR	6505013075427		105		JR	4.32
METAPROTERENOL SULFATE INHALATION AEROSOL USP 15MG/ML 10ML/PG	6505013118441		140	8490S	PG	2.74
HYDROCORTISONE ACETATE SUPPOSITORIES 25MG ADULT RECTAL I.S. 24S	6505013122962	4			PG	20.71
ATTAPULGITE TABLETS 750MG I.S. 12 TABLETS PER PACKAGE	6505013155357		70		PG	2.62
SHAMPOO MEDICATED SULFUR AND SALICYLIC ACID 4 OZ (113.4 GRAM)	6508001161362		317	8467	BT	0.69
SHAMPOO MEDICATED 4OZ	6508001161367		614	37142	BT	0.69
LIPSTICK ANTICHAP HOT CLIMATE 3.7 GRAM 100S	6508001161473	60		47	PG	13.95
SOAP ANTISEPTIC CAKE 2 TO 3 OZ (57TO85 GRAM) 200S	6508008526597	3	13	1748	PG	38.18
DETERGENT SKIN CLEANSING 1PT (473ML) 50% LAURYL SULFATE	650800978605?		810	18235	BT	0.99
EMOLLIENT LOTION 240ML IN PLASTIC BOTTLE WITH DISPENSER CAP	6508010197181	118	4990	29192	BT	0.68
DETERGENT SKIN CLEANSING 5 FL OZ 148 ML 48S	6508010362507		154	106	BX	42.95
EMOLLIENT CREAM BREAST CARE 2 OZ	6508010854779		27	4908	TU	1.17
SHAMPOO MEDICATED 4 OZ 6S	6508011379989				PG	18.54
SHAMPOO MED ALC,BENZALKONIUM CHL, COAL TAR SOL,SALICYLIC ACID4OZ	6508011533043			2990	BT	2.61
SHAMPOO MEDICATED CREAM 3 OZ	6508011794987		27		TU	1.43
DETERGENT SKIN CLEANSING MEDICATED 49.7% ETHYL ALCOHOL 8OZ	6508011942243		62		BT	2.76
EMOLLIENT LOTION 4 FL OZ	6508012446517		256	14246	BT	0.78
LIPSTICK ANTICHAP COLD OR HOT CLIMATE SPF15 100 PER PACKAGE	6508012650079	18487	2	9296	PG	17.90
ADHESIVE TIES SURGICAL 7.25 BY 11.125 INCHES 24S	6510000033058	26	1699	1352	PG	27.04
P/D NONADHERENT 2 BY 3 INCHES 100S	6510000186184	37	1577	22762	PG	2.78
S' IN CLOSURE ADHESIVE SURGICAL POROUS .50 BY 4 INCHES 300S	6510000547254	32	120	2258	PG	11.49
S IN CLOSURE ADHESIVE SURGICAL POROUS .25 BY 4 INCHES 500S	6510000547255		87	2069	PG	11.49
SKIN CLOSURE ADHESIVE SURGICAL POROUS 1/8 X 3 IN 250S	6510000547256		44		PG	7.69
SPONGE SURGICAL GAUZE 2 BY 2 INCHES STERILE WHITE 3000S	6510000584421	441	3	2499	PG	64.13
SPONGE ABSORBABLE GELATIN USP 2 X 2 X .7 CM RECTANGULAR 15S	6510000644858	11	63	1054	JR	8.33
SPONGE SURGICAL POST OPERATIVE 4 X 4 INCHES WHITE STERILE 1200S	8510000744579	107	177	454	PG	107.37
SPONGE ABSORBABLE GELATIN USP INDIVIDUALLY SEALED12.5X8X1CM 6S	6510000802054	2	6	2468	BX	57.53
DRESSING FIRST AID FIELD WHITE 4"W X 6.250-7.250" LG ABSORBENT	6510000835573		1267	4684	EA	1.42
BANDAGE ELASTIC COTTON RUBBER WARP THREADS 4 IN X 1.50 YARDS 10S	6510001039749	31	22	2612	PG	18.10
PAD NONADHERENT 3 BY 4 INCHES WHITE STERILE 100S	6510001110708			18606	PG	7.25
SPONGE SURGICAL GAUZE RADIOPAQUE 4X8" WHITE STERILE ABSORBENT80S	6510001161285	36	109	3982	PG	77.30
SPONGE SURGICAL GAUZE 4 BY 4 INCHES 1280S	6510001161311	158	178	8917	PG	63.23
BANDAGE FELT ORTHOPEDIC WHITE ROLLED NONSTERILE 4IN X 4YD 72S	6510001334369		46	7577	PG	26.66
SPONGE SURGICAL GAUZE 6.25X7INCHES WHITE NONSTERILE ABSORBENT600	6510001428728	6	164	733	PG	67.02
PAD WITCH HAZEL-LANOLIN IMPREG CLOTH 6.5 X 5.5 INCHES WHITE 100S	6510001428812	13	1245	8319	PG	2.09

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U.S. CHEMICAL AND BIOLOGICAL WARFARE-RELATED DUAL USE EXPORTS TO IRAQ AND THEIR POSSIBLE IMPACT ON THE HEALTH CONSEQUENCES OF THE PERSIAN GULF WAR

A REPORT
OF
CHAIRMAN DONALD W. RIEGLE, JR.
and
RANKING MEMBER ALFONSE M. D'AMATO
OF THE
COMMITTEE ON BANKING, HOUSING
AND URBAN AFFAIRS
WITH RESPECT TO
EXPORT ADMINISTRATION

UNITED STATES SENATE

May 25, 1994

TABLE OF CONTENTS

INTRODUCTION 1
FINDINGS 10
RECOMMENDATIONS 14

Chapter 1. Iraqi Chemical and Biological Warfare Capability 16

Status of Iraqi Readiness to Use Chemical Weapons Against Coalition Force 18
Destruction of Iraq's Chemicals and Chemical Weapons by the United Nations 21
Chemical Warfare Doctrine and the Use of Combined Agent Warfare 23
Chemical Nerve Agents 25
Sarin (GB) 28
Soman (GD) 28
Tabun (GA) 29
VX 29
Vesicants and Blood Agents 29
Lewisite 29
Cyanogen Chloride 30
Hydrogen Cyanide 30
Blister Agents 31
Mustard Gas 31
Related Chemical Agent Information 32
Biotoxins 32
Biological Warfare Capability 33
U.S. Exports of Biological Materials to Iraq 36
UNSCOM Biological Warfare Inspections 48
Biological Warfare Defense 48
Types of Biological Agents 49
Dissemination of Biological Agents 51
Defensive Measures 52
Iraq's Experience in the Use of Chemical Warfare Agents 53

Gulf War Syndrome: The Case for Chemical/Biological Agent Exposure 57

Chapter 2. Group I Exposures: Reported Direct Exposure Events 58

Reports by Coalition Forces of Iraqi Chemical Mines Located During Breaching Operations 81
Other Combat-Related Reports 83
Conclusions 84
Map: Approximate Locations of Direct Exposure Events 86

Chapter 3. Reports of Exposure of Coalition Forces Resulting from the Fallout of the Bombings of Iraqi Chemical, Biological, and Nuclear Facilities (Group II) 87

The Czechoslovak Chemical Defense Unit in the Persian Gulf and the Results of the Investigations of the Military Use of Poisonous Gases 89
Other Related Information 93
U.S Unofficial Reports of Downwind Exposure Due to Coalition Bombings of Iraqi Chemical and Biological Facilities 96
Weather Reports, Climatic Information, and Imagery Smoke Plume Data 98
Gulf War Weather 99
Conclusions 132

Chapter 4. Other Identifiable Exposures 134

Chemical/Biological Warfare Pre-Treatment Drug Reaction 134
Anthrax and Botulinum Toxoid Vaccines 135
Pyridostigmine Bromide (Group III) 136
Reported Contact with Iraqi Enemy Prisoners of War 138
Chemical Agent Resistant Coating (CARC) 139
Depleted Uranium Ammunition 140
Environmental Exposures 142
Decontamination of Equipment Returned from the Persian Gulf Theater Operations 142
Transmission 143

Conclusions 145

Chemical /Biological Warfare Agent Exposure: Why Wasn't Everyone Affected? 145
Chemical /Biological Warfare Agent Exposure: Did the Military Know or Suspect that Individuals Were Exposed to these Hazardous Substances? 146
The Need for Immediate Primary Scientific Research and Advanced Medical Research 147
Conclusions 150

Appendix A - Material Safety Data Sheets 152

Chemical Nerve Agents
Tabun (GA)
Sarin (GB)
Soman (GD)
VX
Blister Agents
Sulfur Mustard (HD), (HDT)
Sulfur Mustard (HT)

U.S. SENATE COMMITTEE ON BANKING, HOUSING, AND URBAN AFFAIRS

Staff Report on U.S. Chemical and Biological Warfare-Related Dual-Use Exports to Iraq and Their Possible Impact on the Health Consequences of the Persian Gulf War

INTRODUCTION

In October 1992, the Committee on Banking, Housing, and Urban Affairs, which has Senate oversight responsibility for the Export Administration Act (EAA), held an inquiry into the U.S. export policy to Iraq prior to the Persian Gulf War. During that hearing it was learned that U.N. inspectors identified many U.S.- manufactured items exported pursuant to licenses issued by the U.S. Department of Commerce that were used to further Iraq's chemical and nuclear weapons development and missile delivery system development programs.

On June 30, 1993, several veterans testified at a hearing of the Senate Committee on Armed Services. There, they related details of unexplained events that took place during the Persian Gulf War which they believed to be chemical warfare agent attacks. After these unexplained events, many of the veterans present reported symptoms consistent with exposure to a mixed agent attack. Then, on July 29, 1993, the Czech Minister of Defense announced that a Czechoslovak chemical decontamination unit had detected the chemical warfare agent Sarin in areas of northern Saudi Arabia during the early phases of the Gulf War. They had attributed the detections to fallout from coalition bombing of Iraqi chemical warfare agent production facilities.

In August 1993, Senate Banking Committee Chairman Donald W. Riegle Jr. began to research the possibility that there may be a connection between the Iraqi chemical, biological, and radiological warfare research and development programs and a mysterious illness which was then being reported by thousands of returning Gulf War veterans. In September 1993, Senator Riegle released a staff report on this issue and introduced an amendment to the Fiscal Year 1994 National Defense Authorization Act that provided preliminary funding for research of the illnesses and investigation of reported exposures.

When this first staff report was released by Senator Riegle, the estimates of the number of veterans suffering from these unexplained illnesses varied from

hundreds, according to the Department of Defense, to thousands, according to the Department of Veterans Affairs. It is now believed that tens of thousands of U.S. Gulf War veterans are suffering from a myriad of symptoms collectively labelled either Gulf War Syndrome, Persian Gulf Syndrome, or Desert War Syndrome. Hundreds and possibly thousands of servicemen and women still on active duty are reluctant to come forward for fear of losing their jobs and medical care. These Gulf War veterans are reporting muscle and joint pain, memory loss, intestinal and heart problems, fatigue, nasal congestion, urinary urgency, diarrhea, twitching, rashes, sores, and a number of other symptoms.

They began experiencing these multiple symptoms during and after -- often many months after -- their tour of duty in the Gulf. A number of the veterans who initially exhibited these symptoms have died since returning from the Gulf. Perhaps most disturbingly, members of veteran's families are now suffering these symptoms to a debilitating degree. The scope and urgency of this crisis demands an appropriate response.

This investigation into Gulf War Syndrome, which was initiated by the Banking Committee under the direction of Chairman Riegle, has uncovered a large body of evidence linking the symptoms of the syndrome to the exposure of Gulf War participants to chemical and biological warfare agents, chemical and biological warfare pre-treatment drugs, and other hazardous materials and substances. Since the release of the first staff report on September 9, 1993, this inquiry has continued. Thousands of government officials, scientists, and veterans have been interviewed or consulted, and additional evidence has been compiled. This report will detail the findings of this ongoing investigation.

Since the Banking Committee began its inquiry, the position of the Department of Defense regarding the possible causes of Gulf War Syndrome has altered only when challenged with evidence that is difficult to dispute. Yet, despite the vast resources of the Department of Defense, several independent and congressional inquiries with limited resources continue to uncover additional evidence of hazardous exposures and suspicious events.

The Department of Defense, when first approached regarding this issue by Committee staff, contended that there was no evidence that U.S. forces were exposed to chemical warfare agents. However, during a telephone interview on September 7, 1993 with Walter Reed Army Medical Center commander Major

General Ronald Blanck, Committee staff was informed that the issue of chemical and biological warfare agent exposure had not been explored because it was the position of "military intelligence" that such exposures never occurred.

Then, during a November 10, 1993 press briefing at the Pentagon, the Department of Defense acknowledged that the Czech government did detect chemical agents in the Southwest Asia theater of operations. After analyzing the results of the Czech report, the Department of Defense concluded that the detections were unrelated to the "mysterious health problems that have victimized some of our veterans." According to former Secretary of Defense Les Aspin, in some cases the wind was wrong and the distances too great to suggest a link. For instance, Seabees serving to the south and east of the detection site have complained of persistent health problems; but according to the Pentagon, the wind was blowing in the other direction at the time of the detections and the concentrations were too low to do harm over that kind of a distance.

The fact is, no one has ever suggested that there was a link between the Czech detections and what occurred during the early morning hours of January 19, 1991 near the Port of Jubayl. (These two events will be described in detail in Chapter 2.) Former Defense Secretary Aspin said at the briefing that this incident could not have been from the Coalition bombings of the Iraqi chemical weapons facilities because the winds were blowing to the northwest. Yet according to available Soviet documents, the dispersal of chemical agents and other hazardous substances is controlled by other factors in addition to surface wind direction and velocity, such as topography, temperature, precipitation, vertical temperature gradient, and atmospheric humidity. These factors all contribute to the size and type of dispersal that will be observed.[1] Unclassified visual and thermal satellite imagery confirms that the fallout from the bombings of Iraqi targets during the air and ground war moved to the southeast, with the weather patterns and upper atmospheric wind currents, towards Coalition force positions. (See Chapter 3.)

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[1]United States, Department of the Army, Field Manual 100-5, Operations (Washington, D.C.: U.S. Army, August 1982), 7-13,Joachim Krause and Charles K. Mallory, Chemical Weapons in Soviet Military Doctrine: Military and Historical Experience, 1915-1991, (Boulder, Co.: Westview Press, 1992), 142-143.

According to a knowledgeable source who has requested confidentiality, the Czechs believed that the detections were caused by the weather inversion which occurred that day (January 19, 1991) as the weather front moved southward. The Czechoslovak chemical detection unit reported this information to U.S. command officials immediately, but the responding units were unable to confirm their findings when they arrived, according to the Pentagon. Nonetheless, at the November 10, 1993 briefing, the Department of Defense admitted that the Czech detections were believed to be valid. The Department of Defense failed to disclose that the Czechoslovak chemical detection team also detected yperite (HD) that morning. The presence of both of these agents in such close proximity could only reasonably be the result of one of two possibilities: (1) direct Iraqi mixed agent attack, or (2) fallout from the Coalition bombings of Iraqi weapons facilities and storage bunkers.

Defense Department officials, having had possession of the Czech report for over a month, were at a loss to explain the chemical mustard agent detected by the Czechoslovak chemical detection team in the Saudi desert near King Khalid Military City on January 24, 1991. This despite the fact that both the Czechs and French claim that this detection was reported to U.S. command authorities during the Persian Gulf War. [2] Additionally, during the Gulf War, the Czechs claimed that they detected chemical nerve agent after a Scud missile attack. These statements, heretofore only reported in the press, have been confirmed by a member of the U.S. 1st Cavalry Division and by an entire platoon of a U.S. Army chemical detection unit who trained with the Czechoslovak chemical detection unit near King Khalid Military City. These reports have not been addressed publicly by the Department of Defense and will be addressed in this report in Chapter 3.

The contents of this report supports the conclusion that U.S. forces were exposed to some level of chemical and possibly biological warfare agents during their service in the Gulf War. Any review conducted by the Pentagon must extend far beyond the information being reported by the Czech Ministry of Defense. The Czech information, while important, represents just a small

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[2] Congressional Record, 103d Congress, Second Session, Vol. 140, No. 30, "Senator Shelby's Conclusions on the Persian Gulf Syndrome (March 17, 1994), S3098-S3106;

fraction of the evidence currently available, only some of which will be detailed in this report.

It is now the position of the Department of Defense that it has no other evidence that U.S. forces were exposed to chemical agents. Yet this report contains descriptions and direct eyewitness accounts that provide evidence which suggests that gas was detected, along with many other events which may have been actual attacks on U.S. forces.

This report supports the conclusion that U.S. forces were exposed to chemical agents. The assertion that the levels of nerve agent detected by the Czechs and others were not harmful is flawed. In subsequent requirements for chemical detection equipment, the Department of the Army acknowledges that the principal chemical agent detection alarm deployed during the war, the M8A1 was not sufficiently sensitive to detect sustained low levels of chemical agent and to monitor personnel for contamination.[3] **Further, U.S. Army Material Safety Data Sheets (MSDS) indicate that chronic exposures to levels of over .0001 mg/m3 for Sarin (GB) is hazardous and requires the use of protective equipment. (See appendix A.) The minimum level of chemical agent required to activate the automatic chemical agent detection alarm M8A1, commonly in use during the war, exceeds this threshold by a factor of 1,000.**[4] (See appendix A.)

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[3]DAAA15-90-R-0020, Appendix 2, "Revised Joint Service Operational Requirement (JSOR) for an Advanced Chemical Agent Detector/Alarm (ACADA), 85.

[4]According to the manufacturer of the M8A1 Automatic Chemical Detection Alarm "the G-Agent sensitivity requirement is that the alarm must sound within 2 minutes when exposed to 0.1 milligram per cubic meter (mg/m3)." The M8A1 alarm does not detect chemical blister agents.

This information was confirmed by the U.S. Army Chemical and Biological Defense Command, Edgewood, Area, Aberdeen Proving Ground, Maryland 21010. According to the U.S. Army the sensitivity capacity for the M43A1 detector unit (detection component of the M8A1 alarm) is: GA, GB, GD - 0.1 - 0.2 mg/m3
VX - 0.4 mg/m3

The required response time for these levels is 10 minutes, however actual performance is a response time of approximately 2 minutes to detect at these levels. The capability and specifications of this unit are not classified.

As the chemical agent alarms began to sound during the "air war," French, Czech, and many U.S. commanders confirmed that they were sounding from the fallout from the bombings. Over time, even at these levels, after repeatedly being told that there was no danger, many U.S. forces failed to take precautionary measures. Others report that the alarms were sounding so frequently that they were turned off. M8A1 alarms do not detect blister agents.

The findings of this report prepared at the request of Chairman Riegle detail many other events reported by U.S. servicemen and women that in some cases confirm the detection of chemical agents by U.S. forces. In other cases these reports indicate the need for further detailed investigation. But still the question remains: Is exposure to these and other chemical agents the cause of Gulf War Syndrome? We have received hundreds of reports that many of these symptoms are being experienced by family members. Numerous developments have taken place over the last several months which suggest that, while chemical agents and other environmental hazards may have contributed to the Gulf War illnesses, bacteriological, fungal, and possibly other biological illnesses may be the fundamental cause. This position is supported by the following:

First, Dr. Edward S. Hyman, a New Orleans bacteriologist, has treated a small number of the sick veterans and several of their wives for bacteriological infections, and has developed a protocol of treatment that has resulted in symptom abatement in many of his patients.

Second, during the November 10, 1993 unclassified briefing for Members of the U.S. Senate, in response to direct questioning, then Undersecretary of Defense John Deutch said that the Department of Defense was withholding classified information on the exposure of U.S. forces to biological materials. In a Department of Defense-sponsored conference on counter-proliferation, held at Los Alamos National Laboratory on 6-7 May, 1994, Dr. Deutch admitted that biological agent detection is a priority development area for the Department of Defense, since there currently is no biological agent detection system fielded with any U.S. forces anywhere in the world.

Third, the Department of Defense has named Dr. Joshua Lederberg to head its research team into the causes of Gulf War illnesses. Dr. Lederberg, among his other credits, is a Nobel Laureate and an expert in the fields of bacteriology, genetics, and biological warfare defenses.

Fourth, in detailed informational interviews conducted of 400 Gulf War veterans, it has been learned that over 3/4 of their spouses complain that they have begun to suffer from many of the same debilitating symptoms. (See Chapter 4.)

This report, like the one which preceded it, will discuss the relationship between the high rate of Gulf War illnesses among Group I individuals (those possibly exposed to a direct mixed agent event), and the lower rates among those in Group II (individuals exposed to the indirect fallout from coalition bombings of Iraqi chemical, biological, and nuclear targets) and Group III (individuals who suffered severe adverse reactions to the nerve agent pre-treatment pills). Despite the varying rates of illness between the groups, however, the symptoms are similar. While other possible causes of the Gulf War Syndrome such as petrochemical poisoning, depleted uranium exposure, and regionally prevalent diseases, have been discussed elsewhere and must be pursued, there is a great deal of compelling evidence which indicates that all of these possibilities must now be seriously considered. We believe, however, that no other explanations prove as compelling as the ones which will be presented in this report.

This report includes a great number of first-hand accounts and other documentary evidence in addition to the anecdotal information that appeared in the print and electronic media during the Gulf War. It establishes convincingly that the Department of Defense assertions are inaccurate. We believe there is reliable evidence that U.S. forces were exposed to chemical and possibly biological agents. But regardless of whether U.S. forces were exposed or not, the entire official body of information, including all classified or heretofore unpublished information, available research data sets, case histories, and diagnostic breakdown information must be made available to independent civilian medical researchers in order to further the research into the causes of and treatments for these illnesses. Absent a release of information by the

Department of Defense of the science which forms the bases for their theories, the Department of Defense position must be viewed by qualified scientists as anecdotal and unsubstantiated.

Given that there is also a growing body of evidence indicating that spouses and children of Gulf War veterans are vulnerable to similar illnesses, the Department of Defense must now share all of its information with civilian, non-governmental researchers. These family members are civilians who may be at risk. This illness was first reported over three years ago.

On February 9, 1994, Chairman Riegle sent a letter to Secretary of Defense William Perry asking that he release all U.S. military personnel from any oath of secrecy they may have taken regarding classified information specifically pertaining to chemical or biological warfare agent exposure in the Persian Gulf theater. This request was based on a recommendation of the National Academy of Sciences, National Institute of Medicine in their 1993 publication Veterans at Risk: The Health Effects of Mustard Gas and Lewisite. [5] On May 4, 1994, the Secretaries of Defense, Health and Human Services, and Veterans Affairs responded to the Chairman's letter stating that there was no classified information on chemical or biological detections or exposures. This directly contradicts the statement of Deputy Secretary Deutch in his November 10, 1993 unclassified briefing to Members and staff.

Why isn't the Department of Defense aggressively pursuing the answers to the questions surrounding of the events which may have caused illnesses being suffered by many Gulf War veterans? One possible explanation lies in a 1982 article.[6] Then Senate Armed Services Committee Chairman John Tower wrote, "Chemical training in the United States armed forces is, at best, perfunctory. It is rarely conducted in a simulated contaminated environment and stocks of individual protective equipment are too limited, and therefore too valuable, to risk them in the numbers necessary to allow troops to operate in them for realistic training. As a result, most U.S. personnel are relegated to a minimal and highly artificial exposure to the problems and hardships entailed in

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[5]Constance M. Pechura and David P. Rall, eds., Veterans at Risk: The Health Effects of Mustard Gas and Lewisite, (Washington, D.C.: National Academy Press, 1993), 8.

[6]Senator John G. Tower, "The Politics of Chemical Deterrence," The Washington Quarterly, Vol. 5, No. 2, (Spring 1982).

performing their respective combat missions should they have to 'button up'." As numerous U.S. General Accounting Office (GAO) reports have noted, the U.S. was not much better prepared prior to the Gulf War than it was when Senator Tower wrote his article.[7]

According to Senator Tower, "Our greatest casualties will not be caused by direct exposure to chemical agents, but by the physical and mental disruption their use will cause our tactical planning and deployment. Certainly, physical on-the-ground contamination and casualties will exist, but their most decisive effect will be their mental intimidation and our unwillingness to operate in the chemical environment. This lack of confidence in our ability to operate in such conditions could be rapidly exploited by Soviet units having no such qualms." This lack of confidence could also have been exploited by the Soviet-trained

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[7]For further information see the following General Accounting Office (GAO) reports:

Chemical Warfare: Soldiers Inadequately Equipped and Trained to Conduct Chemical Operations, GAO/NSIAD-91-197 (Washington, D.C.: Government Printing Office, May 1991).

Operation Desert Storm: DOD Met Need for Chemical Suits and Masks, but Longer Term Action Needed, GAO/NSIAD-92-116 (Washington, D.C.: Government Printing Office, April 7, 1992).

Operation Desert Storm: Army Not Adequately Prepared to Deal with Depleted Uranium Contamination, GAO/NSIAD-93-90 (Washington, D.C.: Government Printing Office, January 29, 1993).

Operation Desert Storm: Problems with Air Force Medical Readiness, GAO/NSIAD-94-58, (Washington, D.C.: Government Printing Office, December 30, 1993).

Operation Desert Storm: Army Medical Supply Issues, GAO/NSIAD-93-206, (Washington,D.C.: Government Printing Office, August 11, 1993).

Operation Desert Storm: Improvements Required in the Navy's Wartime Medical Care Program, GAO/NSIAD-93-189 (Washington, D.C.: Government Printing Office, July 28, 1993).

Operation Desert Storm: Full Army Medical Capability not Achieved, GAO/NSIAD-92-175 (Washington, D.C.: Government Printing Office, August 18, 1992;GAO/NSIAD-92-8 (Washington, D.C.: Government Printing Office, February 5, 1992.

Iraqi forces, who have an extensive history in the use of chemical and biological warfare.

If the Department of Defense intended to conceal these exposures during the Gulf War to avoid the physical and mental disruption their use would have had on our tactical planning and deployment, their actions would have been understandable. Hoping to avoid responsibility for the casualties of this conflict, however, is quite another matter. Our afflicted veterans are sick and suffering, and some have died. Others are now destitute, having spent tens of thousands of dollars, depleting their life savings, in an unsuccessful search for an explanation for their ailments. Our enemies surely know the extent of our vulnerabilities. They would not hesitate to exploit them, nor would they hesitate to reveal them to others. The veterans of the Gulf War have asked us for nothing more than the assistance they have earned. Our refusal to come to their immediate assistance can only lead others to question the integrity of the nation they serve.

The following is a summary of the findings and recommendations of this report:

FINDINGS:

1. **Iraq had a highly-developed chemical warfare program with:**
   - **numerous large production facilities;**
   - **binary (precursor chemical/solvent) capabilities;**
   - **stockpiled agents and weapons;**
   - **multiple and varied delivery systems; and,**
   - **a documented history of chemical warfare agent use.**

2. **Iraq had an offensive biological weapons program with:**
   - **multiple research/production facilities;**
   - **evidence of weaponization experimentation; and,**
   - **a history of reported but unconfirmed use.**

3. The United States provided the Government of Iraq with "dual use" licensed materials which assisted in the development of Iraqi chemical, biological, and missile-system programs, including:[8]
   - chemical warfare agent precursors;
   - chemical warfare agent production facility plans and technical drawings (provided as pesticide production facility plans);
   - chemical warhead filling equipment;
   - biological warfare related materials;
   - missile fabrication equipment; and,
   - missile-system guidance equipment.

4. The United States military planned for the use of chemical and biological weapons by Iraq by:
   - discussing the chemical/biological threat in pre-war threat assessments;
   - designating chemical/biological production facilities priority bombing targets;
   - assigning a very high priority to SCUD missile units; and,
   - conferring with the U.S. national laboratories about the hazards associated with the bombings of the chemical, biological, nuclear weapons facilities.

5. The United States military made preparations for the expected use of chemical/biological weapons by Iraq, including:
   - acquiring German-made FOX NBC detection surveillance vehicles shortly before the war;
   - deploying as part of standard operating procedure, automatic chemical agent alarms, chemical agent detection equipment, chemical decontamination equipment, and chemical agent protection suits, gloves, boots, and masks;
   - administering anthrax vaccines, an experimental botulinum toxin vaccine, and pyridostigmine bromide as a nerve agent pretreatment pill; and,

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[8]See "United States Export Policy Toward Iraq Prior to Iraq's Invasion of Kuwait," Senate Report 102-996, Senate Committee on Banking Housing and Urban Affairs, 102d Congress, Second Session (October 27, 1992)

- preparing and using personnel medical questionnaires asking soldiers departing the theater about their health and whether or not they believed they were exposed to chemical or germ warfare.

U.S. General Accounting Office reports issued after the war noted deficiencies in U.S. military medical preparations for chemical/biological warfare, including potential shortages of vaccines, NBC equipment, and NBC capability.

6. United States and Coalition Forces did detect chemical warfare agents in conjunction with definable events, including:
   - multiple chemical alarms sounding repeatedly with the onset of the air war, and directly attributed by multiple official and unofficial sources to the fallout from the bombings of Iraqi chemical facilities;
   - multiple chemical agent alarm soundings and chemical detections after both missile attacks or otherwise unexplained explosions;
   - Czechoslovak, French, and British unit detections and reporting of chemical/biological agents in the air, in puddles on the ground, after SCUD attacks, and from artillery or chemical mine explosions;
   - U.S. units detected and/or reported chemical agents in the air, as a result of SCUD missile attacks, after artillery or mine explosions, and from Iraqi munitions bunkers;
   - multiple eyewitness reporting and corroboration of a number of direct attacks as well as ongoing alarms due to fallout from the Coalition bombings; and,
   - news reports during the war confirming that U.S. units made detections of chemical agents which they believed were the result of Coalition bombings.

7. U.S. and Coalition Forces were exposed to fallout from Coalition bombings of Iraqi chemical, biological, and nuclear facilities, as evidenced by:
   - pre-war concerns requiring consultations with the U.S. national laboratories regarding the fallout expected from the bombings;
   - post-war assessments of the degree of damage to these facilities and the quantities of agents which survived the Coalition attacks;

- official weather documents showing a continual movement from Iraq of weather patterns down across Coalition troop emplacements throughout the air and ground wars;
- chemical alarms that began sounding nearly contemporaneous with the initiation of the air war, and actual chemical detections confirming the reasons for the alarm soundings; and,
- then Secretary of Defense Aspin's December 1993 comments that the U.S. needed to develop bombs that could target chemical and biological warfare facilities without releasing large amounts of agent into the air.

8. Wartime and post-war discoveries support the conclusion that Iraq had chemical and possibly biological weapons deployed with front line units and was prepared to use them, as evidenced by:
   - UNSCOM findings of large and well-financed chemical and biological warfare programs, including large stocks of missiles, artillery, aerial bombs, rockets, and mines;
   - U.S. military unit reports of finding chemical munitions in the forward area, including artillery, mines, and bulk agents;
   - captured Iraqi documents purportedly containing orders to use chemical weapons (documents currently being independently verified);
   - reported British intercepts of Iraqi communications giving orders to use chemical weapons at the onset of the ground war; and,
   - UNSCOM reports of the discovery and subsequent destruction of 28 Scuds with chemical agent warheads -- obtained from the Soviet Union.

9. Use of biological weapons during the war can only be inferred at this time because:
   - no biological agent detectors are available for or fielded with any U.S. or Coalition forces;
   - no samples are known to have been collected in situ or from sick military personnel or animals for testing for the presence of biological agents; and,
   - current test results from sick veterans and contaminated equipment are not yet publicly available.

10. **The symptomology of the Gulf War veterans is consistent with exposure to a chemical/biological exposure explanation, illustrated by:**
    - **large body of common symptoms; and,**
    - **distribution of illness that appear related to source of exposures, whether by proximity to an explosion, fallout, reaction to pills, contact with EPWs, contact with contaminated vehicles and equipment, or prolonged exposure to sick veterans.**

RECOMMENDATIONS:

1. **All classified information regarding events before, during, and after the war relating to:**
    - **the nature of Iraqi chemical and biological warfare development programs,**
    - **the deployment of these materials, the location of Iraqi chemical/biological forces, equipment and weapons;**
    - **the intentional use of, inadvertent dispersal of, and destruction of Iraqi chemical and biological warfare agents; and,**
    - **the detection or confirmation of chemical or biological agents should be immediately reviewed for declassification and released by the Department of Defense.**

2. **The massive amounts of testing data already collected by the Department of Defense and the Department of Veterans Affairs relating to the complaints of Persian Gulf War veterans should be made available to medical researchers and physicians treating these veterans and their family members.**

3. **A thorough and detailed epidemiological study involving all Gulf War veterans should be conducted by the Department of Defense to determine the origins and causes of the illnesses and the reported transmission of the symptoms to family members.**

4. **Independent testing of samples is needed from:**
    - **ground sites in Iraq and Kuwait;**
    - **sick veterans and affected family members; and,**
    - **contaminated equipment.**

5. **A post-conflict assessment of the impact of administration of cholinesterase inhibitors in a nerve agent pre-treatment program should be conducted. Particular attention should be focused on the potential synergistic or even potentiation effects administration of these drugs might produce when combined with other hazardous exposures.**

6. **Presumption of service-connection for the purposes of medical treatment and determining disability, compensation and vocational rehabilitation eligibility (until a diagnostic protocol can be established).**

7. **The Department of Veterans Affairs claims and appeals process must be streamlined.**

8. **Government financed health care (when no other medical insurance is available) for spouses and children determined to have contracted a service-connected illness from a Gulf War veteran.**

9. **Development of appropriate diagnostic and treatment protocols both on the battlefield and in identifying post-conflict casualties.**

10. **Greater efforts to develop NBC detectors, vaccines, personnel protective equipment, and decontamination equipment.**

Chapter 1. Iraqi Chemical and Biological Warfare Capability

Over the last ten years, Iraq, a signatory to both the Geneva Protocols of 1925 (prohibiting the use of poisoned gas) and the Biological Warfare Convention of 1972 (banning biological weapons), has expended an enormous amount of research and energy in developing these and other prohibited weapons.

Iraq was believed to have been manufacturing mustard gas at a production facility in Samarra since the early 1980s. It also began an extensive program to produce nerve agent precursor chemicals, taking advantage of its own natural resources. Phosphate mines/industries are at Akashat, Al Qaim, and Rutbah.[1] The Iraqi Al Fallujah gas warfare complex was believed to be capable of producing up to 1,000 tons per month of Sarin, as well as the nerve agent VX.[2] In addition, with the assistance of foreign firms, Iraq developed the capability to experiment with hydrogen cyanide, cyanogen chloride, and lewisite.[3] By the start of the Gulf War, Iraqi forces had developed chemical delivery capabilities

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[1]Task Force on Terrorism and Unconventional Warfare, "Chemical Weapons In The Third World," 2; "Iraq's Expanding Chemical Arsenal," House Republican Research Committee, U.S House of Representatives (May 29, 1990), 9-10; Anthony H. Cordesman, After the Storm: The Changing Military Balance in the Middle East (Boulder and San Francisco: Westview Press, 1993), 497-498.

[2]Anthony H. Cordesman, After the Storm: The Changing Military Balance in the Middle East (Boulder and San Francisco: Westview Press, 1993), 498, 546. According to Cordesman, some of these reports may be exaggerated. "There is no question that Falluja had large scale facilities, but some of these facilities seem to produce nothing but the precursor chemicals for sarin, like phosphorous oxychloride and phosphorous trichloride. Falluja had been concentrating on the production of precursors." For additional views, see Task Force on Terrorism and Unconventional Warfare, "Chemical Weapons In The Third World," 2; "Iraq's Expanding Chemical Arsenal," House Republican Research Committee, U.S. House of Representatives (May 29, 1990), 8.

[3]Peter Dunn, "The Chemical War: Journey to Iran," NBC Defense and Technology International, pp. 28-37; W.Seth Carus, The Genie Unleashed: Iraq's Chemical and Biological Weapons Production, (Washington: Washington Institute Policy Papers, No. 14) 22-23; Foreign Report (March 31, 1988), 12; Jane's Defence Weekly (January 9, 1998), 3; Jane's Defence Weekly (February 27, 1988), 336; Anthony H. Cordesman, After the Storm: The Changing Military Balance in the Middle East (Boulder and San Francisco: Westview Press, 1993) 498, 546.

for rifle grenades, 81mm mortars, 152mm, 130mm, and 122mm artillery rounds; bombs; 90mm air-to-ground rockets; 216 kilogram FROG and 555 kilogram SCUD warheads; and possibly land mines and cruise missiles.[4]

On July 30, 1991, Ambassador Rolf Ekeus, director of the United Nations Special Commission on Iraq (UNSCOM), charged with overseeing the elimination of Iraq's chemical and nuclear arsenals, told the Security Council that U.N. inspectors had found chemical warheads armed with nerve gas. Mr. Ekeus claimed that some warheads found were already fitted onto the SCUD missiles.[5]

Iraq's chemical warfare capability was known to the U.S. government before the war. A month before the war began, then Central Intelligence Agency (CIA) Director William Webster estimated that Iraq possessed 1,000 tons of poisonous chemical agents, much of it capable of being loaded into two types of missiles: the FROG (Free Rocket Over Ground) and the SCUD B (SS-1).[6] Jane's Strategic Weapons Systems lists warhead capabilities for the FROG-7 as high explosive (HE), chemical, or nuclear, and for the Iraqi versions of the SCUD as probably HE or chemical.[7]

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[4]Michael Eisenstadt, The Sword of the Arabs: Iraq's Strategic Weapons (Washington: Washington Institute Policy Papers, No. 21, September 1990), 7; Seth Carus, "Chemical Weapons in the Middle East," Policy Focus, No. 9, Washington Institute for Near East Policy (December 1988), 4; "Iraq's Scare Tactic," Newsweek (August 2, 1982);"In Mideast, Warfare of a New Nature: Chemical Arms, Ballistic Missiles Mark New Nature of Mideast Warfare," Washington Post (April 5, 1988), A1; Dick Palowski, Changes in Threat Air Combat Doctrine and Force Structure, 24th Edition (Fort Worth: General Dynamics DWIC-91, February 1992), II-325, II-334; Jane's Soviet Intelligence Review (June 1989), 256; Foreign Report (March 31, 1988), 1; New York Times (November 12, 1991; as cited in Anthony H. Cordesman, After the Storm: The Changing Military Balance in the Middle East (Boulder and San Francisco: Westview Press, 1993), 499, 547;

[5] Frank J. Prial, "U.N. Team Finds Chemical Arms Four Times Greater Than Iraq Claims," New York Times (July 31, 1991), A1.

[6]Duncan Lennox, Janes: Strategic Weapons Systems (Surrey, U.K.: Janes Information Group, 1990); George Lardner, Jr., "No Iraq Move Seen Until Attack Near: CIA Expects Saddam to Extend Crisis," Washington Post (December 15, 1990), A1.

[7]Ibid.

Status of Iraqi Readiness to Use Chemical Weapons Against Coalition Forces

In March 1991, Molly Moore reported from Jubayl, Saudi Arabia that Marine Commanders found no indications of chemical weapons stockpiles on the battlefields of Kuwait. According to a Washington Post report that day, (March 7, 1991), U.S. intelligence analysts claimed that these weapons "never got distributed down to the battlefield" from storage sites north of the Euphrates River. [8] A U.S. military intelligence source stated in March 1991 that "it was a matter of not deploying chemical weapons, rather than not having them, . . . my guess . . . is they never managed to get it down to division level."[9]

Regarding the presence of chemical weapons and Iraqi readiness to use them against Coalition forces, Committee staff has received the following information:

Dale Glover, of the 1165th Military Police Company, was with the 7th Corps, approximately 75 miles inside Iraq, when they came upon a destroyed artillery site. They entered a bunker that was half uncovered by the bombing. Inside there was a very strong ammonia smell. They discovered leaking chemical munitions inserts packed inside aluminum casings. A test confirmed a blister agent. They went back to their unit and reported what they had found. Mr. Glover recalled that "they didn't get back to us for 2-3 hours, then told us it was a false positive, nothing to be concerned about." However, he said, within hours they were ordered to move from the location where they were camped, about three miles from the bunker. Mr. Glover recalled that they had been at that position only a couple of weeks and had not expected to move that soon. When questioned if the site they discovered was south of the Euphrates, he confirmed that it was.[10]

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[8]Rick Atkinson, "No Chemical Arms Found on Battlefield: U.S. Says Iraqi Logistics Failed," Washington Post (March 7, 1991), A1.

[9]"No Iraqi Chemical Munitions Have Turned Up So Far," United Press International (March 2, 1991), BC Cycle.

[10]Staff Interviews.

Another source who identified himself to the Committee but wishes to remain anonymous has informed Committee staff that he also was with the 7th Corps in southern Iraq. Somewhere between As Salman and Bashra (in a position south of the Euphrates River), his unit came upon bunkers containing crates of substances that "made you choke, made you want to throw up, burned your eyes. It smelled like ammonia, only a lot stronger." He could not approach the crates without experiencing immediate breathing problems. He said these crates were leaking.[11]

Chris Alan Kornkven was a Staff Sergeant with the 340th Combat Support Company during the Persian Gulf War. He reported to Committee staff that a U.S. military doctor at the 312th Evacuation Hospital told him that doctors at the hospital had been speaking with Iraqi officers. According to these doctors, the Iraqi officers said that they had chemical weapons at the front, and had authorization to use them, but that the winds in their area were blowing the wrong way.[12]

Several press sources carried reports of encounters with chemical mines by the 2nd Marine Division during the initial mine field breaching operation early on February 24, 1991. According to the Chicago Tribune, which interviewed officers and enlisted Marines involved in the operation, a FOX vehicle confirmed positive readings for a nerve agent and for a mustard gas. A second detecting device gave the same positive reading. General Keys, the 2nd Division commander, and Colonel Livingston, commander of the 6th Marine Regiment, told reporters they believed it was possible that a chemical mine was blown up or hit.[13] General Schwarzkopf told reporters he considered the reports "bogus."[14]

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[11]Staff Interviews.

[12]Staff interview.

[13]Colin Nickerson, "War Diary: From Chaos and Fear, A Victory," The Boston Globe, (March 3, 1991), 1.

[14]The Associated Press, (February 24, 1991), Sunday, BC cycle; David Evans, William Neikirk, David Elsner, Linnet Myers, "U.S. Tanks vs. Desert Sand First Priority: Breach Iraqi Minefields," Chicago Tribune (December 15, 1991), A3.

British troops also discovered Iraqi chemical mines on the Gulf battlefield, according to Gannett News Service. A British official (not further identified) said that the incident was reported to Prime Minister John Major's war cabinet; no details were given.[15]

Press reports indicate Iraqi readiness to use these weapons against Coalition forces. The British Sunday Times reported on January 27, 1991, that American intelligence detected greatly increased activity at Iraq's main chemical plant at Samarra in the last week of December, and the British Ministry of Defence said that the Allies believe that Iraq "may have as many as 100,000 artillery shells filled with chemicals and several tons [of bulk agent] stored near the front line." According to the Times report, a British Ministry of Defence official said: "The plant was at peak activity and the chemicals were distributed to the troops in Kuwait and elsewhere in theatre." The Times reported that an unnamed Pentagon source said that Hussein had given front-line commanders permission to use these weapons at their discretion, and that "it was no longer a question of if, but when."[16]

Iraqi soldiers captured by the British units also informed the allies that before the war started, Iraq distributed substantial supplies of chemical weapons along the front lines to be held for the ground war.[17] According to Newsweek, U.S. intelligence sources had reported that Saddam Hussein had ordered his commanders to fire chemical weapons as soon as the allies launched a ground offensive. [18] A British signals officer was reported to have said that "we were tuned into the Iraqi command radio net. We heard them give the release

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[15]USA TODAY, (March 1, 1991), 3A; "War Log," Gannett Company, Inc., International Edition (March 1, 1991), A3.

[16]James Adams and Andrew Alderson, Strategic View from the Saddam Bunker, The Times Newspapers, Ltd., (February 2, 1991); "British Paper Says Saddam Hussein Approved the Use of Chemical Weapons," Reuters, (February 2, 1991), A.M. Cycle .

[17]Jesse Birnbaum, "The Prisoners," Time Magazine, (March 4, 1991).

[18]Tom Masland and Douglas Walker, "Are We Ready for Chemical War," Newsweek, (March 4, 1991).

order to their front-line troops to use chemical weapons against Rhino Force if it crossed the border."[19]

Destruction of Iraq's Chemicals and Chemical Weapons by the United Nations

In April 1993, weapons inspectors from the United Nations charged with locating all of Iraq's nuclear, chemical and biological weapons by U.N. Resolution 687, confirmed that in Muthanna, 65 miles northwest of Baghdad, Iraq manufactured a form of mustard gas as well as Sarin and Tabun, both nerve agents. This vast desert complex was the nucleus of Iraq's chemical weapons program. During the allied bombing in the early days of the Gulf War, Muthanna was a priority target. It was repeatedly attacked and production sites were destroyed. As United Nations inspectors attempted to destroy Iraq's chemical weapons arsenal, they discovered bombs, missiles, and chemical weapons of mass destruction spread out across this immense complex. Of particular concern were the chemical warheads of Al-Hussein modified SCUD missiles, each filled with five gallons of Sarin. Twenty-eight of these warheads have been drained and destroyed by the U.N. inspectors. These weapons were not destroyed during the bombings at Muthanna because they had been removed to other locations before the Gulf War started. Their relocation and transfer back to Muthanna was described by U.N. inspectors as a painstaking process.[20] According to Brigadier General Walter Busbee, U.S. Army Chemical and Materiel Destruction Agency, Aberdeen Proving Grounds, these warheads were exported to Iraq from the former Soviet Union.[21]

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[19] John Fullerton, "Britian's Phantom Army Helped Defeat Iraq, Reuters, (March 2, 1991).

[20] "New Method Found to Destroy Iraqi Poison Gas Shells," Xinhua News Service, Item No. 0320210, Cairo, Egypt (March 20, 1993); Brent Sadler, "U.N. and Iraqi Teams Work to Destroy Chemical Weapons," Cable News Network Transcript #133-5 (October 8, 1992).

Note: A Scud warhead should be able to hold much more than 5 gallons of agent. Additional information is being sought regarding the configuration of these warheads.

[21] B.Gen Walter Busbee, in oral remarks at The Chemical Weapons Convention Seminar Series, hosted by The Henry L. Stimson Center (May 12, 1994).

Chemical warfare agents which either survived the allied bombing or were inventoried and returned to the Muthanna facility for destruction include:[22]

13,000 155-mm artillery shells loaded with mustard gas;
6,200 rockets loaded with nerve agent;
800 nerve agent aerial bombs;
28 SCUD warheads loaded with Sarin;
75 tons of the nerve agent Sarin;
60-70 tons of the nerve agent Tabun; and,
250 tons of mustard gas and stocks of thiodiglycol, a precursor chemical for mustard gas.

U.N inspectors have concluded that the Muthanna plant was capable of producing two tons of Sarin and five tons of mustard gas daily. The plant was also capable of manufacturing VX, a nerve gas and one of the most toxic chemicals ever produced.[23]

In addition to Muthanna, chemical agents were destroyed at two airbases: one located 40 miles west of Baghdad and the other located near An Nassiriyah, where a number of 122mm rockets loaded with Sarin (GB) were blown in place. According to UNSCOM sources, many of these weapons were hastily deployed prior to the air war and later returned for destruction. The U.N. has destroyed hundreds of tons of bulk chemical agents and tens of thousands of chemical munitions. In addition, hundreds of thousands of liters of key chemical precursors which have been identified and destroyed include: 14,600 liters of DF; 121,000 liters of D4 and 153,983 liters of thiodiglycol. According to UNSCOM, the Iraqis were capable of employing both binary and mixed agent weapons. Binary weapons identified used DF. When combined with appropriate chemicals, GB and GF are produced.[24]

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[22] "New Method Found to Destroy Iraqi Poison Gas Shells," Xinhua News Agency (March 20, 1993); "United Nations Destroying Iraqi Nerve Gas Stockpiles," Associated Press (September 24, 1992); Judith Perera, "Iraq: Chemical Weapons Program Disabled, Say U.N. Inspectors," Inter Press Service (September 29, 1992).

[23]Victoria Graham, "Chemical Weapons Destruction Team Resumes Work," Associated Press (January 23, 1993) A.M. Cycle.

[24]Staff interview, February 22, 1994.

UNSCOM also discovered, at various locations, evidence of research into certain biological agents, including botulinus toxin, anthrax, an organism responsible for gas gangrene (clostridium perfringens) and others as identified below. The evidence discovered by the group suggested that this was primarily an offensive biological warfare program.[25]

On February 13, 1994, a clandestine radio service in Iraq, the Voice of the Iraqi People, reported that Saddam Hussein's government was still attempting to hide chemical and biological weapons from international inspectors by repeatedly relocating them. Citing unidentified individuals, the radio reported that the banned weapons were being hidden in the oil pipelines that have been "out of operation because of the international embargo."[26]

Chemical Warfare Doctrine and the Use of Combined Agent Warfare

There is substantial evidence to suggest that in the use of chemical weapons, as in other military areas, the Iraqi military adhered, at least in part, to Soviet military doctrine. Soviet military doctrine suggested that chemical warfare should be conducted with mixed agents.[27] Mixed agents, often referred to as "cocktails," are intended to enhance the capabilities of nerve agents and defeat the precautions taken by the enemy.[28] Use of mixed agents could account for the wide variety of symptoms displayed by the Gulf War veterans. Mixed agents can be made by combining a variety of biotoxins, nerve agents, vesicants,

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[25]Bill Gertz, "Biological Arms Elude Inspectors," WashingtonTimes (April 21, 1992), A1; Staff interviews, UNSCOM.

[26]JPRS-TAC-94-003 (March 7, 1994), Citing the (Clandestine) Voice of the Iraqi People in Arabic, 1400 GMT, 13 Feb 94.

[27] Interview with Dr. Sanford Leffingwell, Center for Disease Control on September 3, 1993. Dr. Leffingwell advised that Soviet Chemical Warfare Doctrine recommends the use of mixed agents in chemical warfare attacks (using several canisters of agents); Anthony H. Cordesman, After the Storm: The Changing Military Balance in the Middle East (Boulder and San Francisco: Westview Press, 1993), 499, 547; Jane's Defence Weekly (January 9, 1988); Jane's Defense Weekly (January 28, 1989); Task Force on Terrorism and Unconventional Warfare, "Chemical Weapons In The Third World," 2; "Iraq's Expanding Chemical Arsenal," House Republican Research Committee, U.S. House of Representatives (May 29, 1990),10.

[28]Ibid.

blister agents and some biological agents -- such as bacteria and fungi, and others described briefly below.

According to some sources, Iraq used mixed agent weapons combining cyanogen, mustard gas, and tabun against the Kurds. Saddam Hussein stated on April 2, 1990, that Iraq had "double combined chemical" weapons since the last year of the Iran-Iraq War.[29] It was also believed that in 1984 Iraq may have used mixed agent weapons with biological tricothecenes and mycotoxins against Majnoon Island during the Iran-Iraq War.[30]

The utility of chemical weapons and the possibility of exposing one's own troops to indirect chemical weapons effects is an issue which has been seriously debated by both U.S. and Soviet military planners. Soviet doctrine questions the utility of initiating chemical warfare, since chemical weapons produce secondary effects that could obstruct troop advances. U.S. military doctrine warns that, according to its calculations, the use of a nerve agent against a target area of no more than a dozen hectares (a hectare is about 2.47 acres) can, under certain weather conditions, create a hazard zone downwind of up to 100 kilometers in length. Within this downwind area, friendly military units would have to take protective measures.[31]

According to the official military announcements made in the last half of January 1991 and based on the quantity of chemical agents observed by UN inspectors after the war, the scope of coalition bombing against these facilities involved hundreds -- if not thousands -- of tons of bulk chemical nerve agents, mustard gas, as well as tens of thousands of pieces of chemical munitions. This

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[29]Ibid.

[30]H. Kadivar and S.C. Adams, "Treatment of Chemical and Biological Warfare Injuries; Insights Derived From the 1984 Attack on Majnoon Island," Military Medicine, (April 1991), 171-7.

[31] United States, Department of the Army, Field Manual 100-5, Operations (Washington, D.C.: U.S. Army, August 1982), 7-13;Joachim Krause and Charles K. Mallory, Chemical Weapons in Soviet Military Doctrine: Military and Historical Experience, 1915-1991, (Boulder, Co.: Westview Press, 1992), 142-143.

quantity of chemical warfare agents vastly exceeds the amounts that might be expected to be deployed by a military force in a single chemical attack.

The dispersal of the chemical agents and other hazardous substances is controlled by factors such as topography, wind velocity, direction, temperature, precipitation, vertical temperature gradient and atmospheric humidity. These factors all contribute to the size and type of dispersal pattern which will be observed.[32] In addition, as confirmed by unclassified U.S. satellite imagery, debris from the Coalition bombings were upwardly dispersed, rather than downwardly dispersed as would occur in offensive use, causing chemical agents to be carried by upper atmospheric currents and distributed as "traces" of chemical fallout over "down weather" positions. Czech and French officials confirmed the detections of these chemicals during the war. (See Chapter 3.)

In considering the consequences of the placement of troops in areas downwind (where non-lethal exposure to chemical warfare agents might be expected), it must be remembered that chemical nerve agents, such as Sarin and Soman and other agents, have cumulative effects -- often explained as slow rates of detoxification.[33]

Chemical Nerve Agents

Nerve agents kill by disrupting the metabolic processes, causing a buildup of a chemical messenger (acetylcholine) by inhibiting the production of acetylcholine-esterase, a key regulator of neurotransmission. Lethal exposure to chemical nerve agents is generally characterized by drooling, sweating,

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[32]Ibid.

[33] Joachim Krause and Charles K. Mallory, Chemical Weapons in Soviet Military Doctrine: Military and Historical Experience, 1915-1991, (Boulder, Co.: Westview Press, 1992), 208-9; V.V. Miasnikov, Defense Against Weapons of Mass-Destruction: A Guide (Moscow: Voyenizdat, 1984), 78; James Compton, Military Chemical and Biological Agents: Chemical and Toxicological Properties (Caldwell, N.J.: The Telford Press, September 1987), 146, 153.

cramping, vomiting, confusion, irregular heart beat, convulsions, loss of consciousness and coma.[34]

According to a material safety data sheet (MSDS) for Soman (GD), and VX prepared by the U.S. Army Chemical Research, Development and Engineering Center, Aberdeen Proving Grounds, Maryland, "the inhibition of cholinesterase enzymes throughout the body by nerve agents is more or less irreversible so that their effects are prolonged. Until the tissue cholinesterase enzymes are restored to normal activity, probably by very slow regeneration over a period of weeks or 2 to 3 months if damage is severe, there is a period of increased susceptibility to the effects of another exposure to any nerve agent. During this period the effects of repeated exposures are cumulative; after a single exposure, daily exposure to concentrations of nerve agent insufficient to produce symptoms may result in the onset of symptoms after several days. Continued daily exposure may be followed by increasingly severe effects. After symptoms subside, increased susceptibility persists for one to several days. The degree of exposure required to produce recurrence of symptoms, and the severity of these symptoms depend on duration of exposure and time required to produce recurrence of symptoms, and the severity of these symptoms depend on the duration of exposure and the time intervals between exposures. Increased susceptibility is not specific to the particular nerve agent initially absorbed." (See appendix A for MSDS on Soman, Sarin, Tabun, and VX.).

Some of the symptoms commonly associated with acute exposure to chemical nerve agents include myosis, frontal headaches, eye pain on focusing, slight dimness of vision, occasional nausea and vomiting, runny nose, tightness in chest, sometimes with prolonged wheezing, expiration suggestive of broncho-constriction or increased secretion and coughing. Following systemic absorption, these symptoms are identified as typical: tightness in chest, wheezing, anorexia, nausea, vomiting, abdominal cramps, epigastric and substernal tightness, heartburn, diarrhea, involuntary defecation, increased sweating, increased salivation, increased tearing, slight bradycardia, myosis, blurring vision, urinary urgency and frequency, fatigue, mild weakness, muscular twitching, cramps, generalized weakness, including muscles of respiration, with dyspnea and cyanosis, pallor and occasional elevation of blood

[34]William Booth, "Gas Masks, Antidote Cause Three Deaths and Illness in Israel," Washington Post (January 19, 1991) A20.

pressure; giddiness, tension, anxiety, jitteriness, restlessness, emotional lability, excessive dreaming, insomnia, nightmares, headaches, tremors, withdrawal and depression; bursts of slow waves of elevated voltage in EEG (especially on over ventilation), drowsiness, difficulty concentrating, slowness on recall. confusion, slurred speech, ataxia, coma (with absence of reflexes), Cheyne-Stokes respirations, convulsions, depression of the respiratory and circulatory centers, with dyspnea, cyanosis and fall in blood pressure.[35]

The majority of automatic chemical agent detection alarms (M8A1) deployed during the war were not sufficiently sensitive for detecting sustained low levels of chemical agent and monitoring personnel for contamination.[36] U.S. Army Material Safety Data Sheets (MSDS) indicate that chronic exposure to levels of over .0001 mg/m3 for Sarin (GB) is hazardous and required the use of protective equipment. (See appendix A). The minimum level of chemical agent required to activate the automatic chemical agent detection alarm M8A1, commonly in use during the war, exceeds this threshold by a factor of 1,000. [37] As the chemical agent alarms began to sound during the "air war," French, Czech, and many U.S. commanders confirmed that they were sounding from the fallout from the bombings. Over time, even at these levels, after repeatedly

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[35]Material Safety Data Sheet (MSDS) for Soman (GD), Sarin (GB) and VX, prepared by the U.S. Army Chemical Research, Development and Engineering Center, Aberdeen Proving Grounds, Maryland. (See appendix A).

[36]DAAA15-90-R-0020, Appendix 2, "Revised Joint Service Operational Requirement (JSOR) for an Advanced Chemical Agent Detector/Alarm (ACADA), 85.

[37]According to the manufacturer of the M8A1 Automatic Chemical Detection Alarm "the G-Agent sensitivity requirement is that the alarm must sound within 2 minutes when exposed to 0.1 milligram per cubic meter (mg/m3)." The M8A1 alarm does not detect chemical blister agents

This information was confirmed by the U.S. Army Chemical and Biological Defense Command, Edgewood, Area, Aberdeen Proving Ground, Maryland 21010. According to the U.S. Army the sensitivity capacity for the M43A1 detector unit (detection component of the M8A1 alarm) is: GA, GB, GD - 0.1 - 0.2 mg/m3
VX - 0.4 mg/m3

The required response time for these levels is 10 minutes, however actual performance is a response time of approximately 2 minutes to detect at these levels. The capability and specifications of this unit are not classified.

being told that there was no danger, U.S. forces failed to take precautionary measures. Others report that the alarms were sounding so frequently that they were turned off.

This increased susceptibility associated with prolonged exposures to non-lethal dosages of nerve gases, suggests that the synergistic effects of the fallout from the bombings of the chemical warfare agent facilities and the administration of the cholinesterase inhibiting drug, pyridostigmine bromide, should be further researched as factors contributing to the symptoms being described by the Gulf War veterans.

The following is a listing of a number of agents which the Iraqi government could have combined or which could have been combined in the atmosphere as a result of Coalition bombings:

Sarin (GB) - A colorless and practically odorless liquid, Sarin dissolves well in water and organic solvents. The basic military use of Sarin is as a gas and a persistent aerosol. A highly toxic agent with a clearly defined myopic effect, symptoms of intoxication appear quickly without any period of latent effect. Sarin has cumulative effects -- that is, a slow rate of detoxification independent of its method of entry into the body. According to Joachim Krause and Charles K. Mallory in Chemical Weapons in Soviet Military Doctrine: Military and Historical Experience, 1915-1991, the progressive signs of initial Sarin intoxication include myosis (contraction of the pupil), photophobia, difficulty breathing and chest pain.[38]

Soman (GD)- A neuro-paralytic toxic agent. Soman is a transparent, colorless, involatile liquid smelling of camphor. Soluble in water to a limited degree, Soman is absorbed into porous and painted surfaces. Soman is similar

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[38] Joachim Krause and Charles K. Mallory, Chemical Weapons in Soviet Military Doctrine: Military and Historical Experience, 1915-1991, (Boulder, Co.: Westview Press, 1992), 208); James A F. Compton, Military Chemical and Biological Agents: Chemical and Toxicological Properties (Caldwell, NJ: The Telford Press, September 1987); Material Safety Data Sheet (MSDS) for Soman (GD), Sarin (GB) and VX, prepared by the U.S. Army Chemical Research, Development and Engineering Center, Aberdeen Proving Grounds, Maryland (See appendix A)

to Sarin in its injurious effects, but more toxic. When it acts on the skin in either droplet or vapor form, it causes a general poisoning of the organism.[39]

Tabun (GA) - A neuro-paralytic toxic agent. Tabun is a transparent, colorless liquid. The industrial product is a brown liquid with a weak sweetish smell; in small concentrations, it smells of fruit, but in large concentrations, it smells of fish. Tabun dissolves poorly in water but well in organic solvents; it is easily absorbed into rubber products and painted surfaces. Injury occurs upon skin contact with Tabun vapor and droplets. The symptoms of injury appear almost immediately. Marked myosis occurs.[40]

VX - This colorless, odorless, liquid has a low volatility and is poorly soluble in water, but dissolves well in organic solvents. The danger of pulmonary VX intoxication is determined by meteorological conditions and the delivery method used. VX is thought to be very effective against respiratory organs when in the form of a thinly dispersed aerosol. The symptoms of VX intoxication are analogous to those of other nerve agents, but their development is markedly slower. As with other nerve agents, VX has a cumulative effect.[41]

Vesicants and Blood Agents

Lewisite - A vesicant toxic agent, industrial lewisite is a dark-brown liquid with a strong smell. Lewisite is a contact poison with practically no period of latent effect. Lewisite vapors cause irritation to the eyes and upper respiratory tract.[42] According to the Center for Disease Control, lewisite would cause stinging and burning. Its smell, generally characterized as the strong smell of geraniums, could be confused with the smell of ammonia (the reaction

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[39] Joachim Krause and Charles K. Mallory, Chemical Weapons in Soviet Military Doctrine: Military and Historical Experience, 1915-1991, (Boulder, Co.: Westview Press, 1992), 209.

[40]Ibid, 209.

[41]Ibid, 210.

[42] Ibid, 205

86-558 95 – 10

to which is regulated by pain fibers rather than smell).[43] Iraqi stores of lewisite were not located after the war according to the Department of Defense.

Cyanogen Chloride - The French first suggested the use of cyanogen chloride as a toxic agent. U.S. analysts have reported that it is capable of penetrating gas mask filters. Partially soluble in water, it dissolves well in organic solvents. It is absorbed easily into porous materials; its military state is a gas. Cyanogen chloride is a quick acting toxic agent. Upon contact with the eyes or respiratory organs, it injures immediately. Lethal exposures result in loss of consciousness, convulsions and paralysis.[44]

Hydrogen Cyanide - A colorless liquid smelling of bitter almonds, hydrogen cyanide is a very strong, quick-acting poison. Hydrogen cyanide affects unprotected humans through the respiratory organs and during the ingestion of contaminated food and water. It inhibits the enzymes which regulate the intra-cell oxidant-restorative process. As a result, the cells of the nervous system, especially those affecting breathing -- are injured, which in turn leads to quick death. An important feature of hydrogen cyanide is the absence o a period of latent effect. The military state of hydrogen cyanide is a gas. The toxic and physiologic properties of hydrogen cyanide permit it to be used effectively in munitions -- predominantly in rocket-launched artillery. Death occurs after intoxication due to paralysis of the heart. Non-lethal doses do not cause intoxication.[45]

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[43]Interview with Dr. Sanford Leffingwell, Center for Disease Control on September 3, 1993.

[44]Joachim Krause and Charles K. Mallory, Chemical Weapons in Soviet Military Doctrine: Military and Historical Experience, 1915-1991, (Boulder, Co.: Westview Press, 1992), 202; V.V. Miasnikov, Defense Against Weapons of Mass-Destruction: A Guide (Moscow: Voyenizdat, 1984, 82-83).

[45]Joachim Krause and Charles K. Mallory, Chemical Weapons in Soviet Military Doctrine: Military and Historical Experience, 1915-1991, (Boulder, Co.: Westview Press, 1992), 205; V.V. Miasnikov, Defense Against Weapons of Mass-Destruction: A Guide (Moscow: Voyenizdat, 1984, 82; Vladimir K. Pikalov, "Toxic Agents," The Soviet Military Encyclopedia, Volume 6 (Moscow: Voyenizdat, 1978).

Blister Agents

According to the material safety data sheet (MSDS) for sulfur mustard gas (HD) prepared by the U.S. Army Chemical Research, Development and Engineering Center, Aberdeen Proving Grounds, Maryland, "chronic exposure to HD can cause skin sensitization, chronic lung impairment, cough, shortness of breath, chest pain, and cancer of the mouth, throat, respiratory tract, skin, and leukemia. It may also cause birth defects. (See appendix A for the MSDS sheets on sulfur mustard agents HD and T.) The U.S. Army Chemical and Biological Defense Command lists the current detector sensitivity threshold for the M256A1 kits, a commonly used piece of chemical agent detection equipment in the Gulf War, as 2.0 mg/m3.[46] According to the Material Data Safety Sheets for sulfur mustard, total weight average exposures of greater than .003mg/m3 over an 8-hr period requires the use of protective equipment. (See appendix A.) Therefore, the detection kit would not detect the agent until the amount of agent present exceeded the safety threshold by a factor of over 660. The M8A1 automatic alarms do not detect blister agent.

Mustard Gas - This is a colorless, oily liquid which dissolves poorly in water, but relatively well in organic solvents, petroleum, lubricant products, and other toxic agents. The injurious effect of mustard gas is associated with its ability to inhibit many enzyme systems of the body. This, in turn, prevents the intra-cell exchange of chemicals and leads to necrosis of the tissue. Death is associated mainly with necrosis of the tissue of the central nervous system. Mustard gas has a period of latent effect (the first signs of injury appear after 2-12 hours), but does not act cumulatively. It does not have any known antidotes. In military use it can come in gas, aerosol, and droplet form. It therefore acts through inhalation, cutaneously, perorally and directly through the blood stream.

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[46]This information was provided by the U.S. Army Chemical and Biological Defense Command, Edgewood, Area, Aberdeen Proving Ground, Maryland 21010. According to the U.S. Army the sensitivity capacity for the M256A1 detector kit is:

Mustard	2.0	mg/m3
VX	0.020	mg/m3
G-Agents	0.005	mg/m3

The required response time for these levels is 15 minutes. The capability and specifications of this unit are not classified.

The toxic and physico-chemical properties of mustard gas allow it to be used in all types of munitions.[47]

Related Chemical Agent Information

Committee staff has learned that Iraq may have acquired any one of a number of the Soviet binary novachok ("newcomer") series of chemical warfare agent compounds or information relevant to the development of those compounds. This series of chemical warfare agents reportedly contains both lethal and debilitating agents. According to a confidential Committee source, if the Iraqis had obtained samples of these compounds they could be easily analyzed and produced with readily available materials. Several of these compounds are described as agents that even in microdoses can have long lasting effects. These agents are described as inducing myosis, vomiting, memory loss, involuntary motions and internal organ dysfunction. Many of these materials are also described as having mutagenic effects. These materials are, according to the source, stored in the lipids (body fats) and have no known antidotes. In addition, according to the Committee source, the Soviets were believed to have conducted research in a number of dioxin-based chemical warfare agents, and on at least one agent that could be used to contaminate drinking water supplies. Committee staff is conducting further inquiries to determine if Iraq may have had access to any of these compounds.[48]

Biotoxins

Biotoxins are natural poisons, chiefly of cellular structure. A distinction is made between exotoxins which are given off by an organism while it is alive, and endotoxins which are given off after a cell's death. The exotoxins cause the injurious effects of biological weapons, but endotoxins guarantee the effects of chemical weapons and do not cause the widespread disease outbreaks associated

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[47]Vladimir K. Pikalov, "Toxic Agents," The Soviet Military Encyclopedia, Volume 6 (Moscow: Voyenizdat, 1978); Joachim Krause and Charles K. Mallory, Chemical Weapons in Soviet Military Doctrine: Military and Historical Experience, 1915-1991, (Boulder, Co.: Westview Press, 1992), 206-7.

[48]Staff Interviews, April 19, 1994.

with biological warfare. Some examples of biotoxins include botulinus toxin and staphylococcic enterotoxin.[49]

Biological Warfare Capability

According to the U.N., the Iraqi biological warfare program was initiated in mid-1986 at Salman Pak. UNSCOM inspectors discovered evidence of research into certain biological agents including botulinus toxin and anthrax -- as well as organisms responsible for gas gangrene, tetanus and brucellosis, components of a biological weapons program which was not defensive in nature. In four years of work prior to the war, only 10 papers were published. These research programs focused on Iraqi efforts to isolate the most pathogenic spores. They also did research on the aerosolization and on the environmental survivability of some of these biological materials according to the United Nations.[50]

While the Department of Defense maintains that the Iraqi military did not weaponize its biological warfare program, UNSCOM is less certain, reporting that their degree of confidence that weaponization did not occur is low. In fact, readily available high performance agricultural aerosol generators could easily be converted to both decontaminate areas in which chemicals are used and to aerosolize biological and chemical warfare agents.

Other ways in which biological materials could have been weaponized include the use of Iraqi 250 and 500lb bombs, aerial rockets, unmanned aerial vehicles, FAW ground-to-ground missiles, helicopters and Iraqi aircraft. The Committee has received several reports of Iraqi helicopters penetrating Saudi airspace during the war by flying at low levels through the wadis and of Iraqi aircraft penetrating the area over the northern Persian Gulf.

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[49]Joachim Krause and Charles K. Mallory, Chemical Weapons in Soviet Military Doctrine: Military and Historical Experience, 1915-1991, (Boulder, Co.: Westview Press, 1992), 162, 209.

[50]Staff interview, February 22, 1994

According to UNSCOM, indications that suggested that the program was offensive in nature include:

- No declared links between the BW defense program and medical corps research.
- No links between aerosolization research and research on defensive filters.

The United Nations said that the first Biological Inspection was initiated on August 8, 1991 at Salman Pak. The inspection was delayed because of the need to extensively immunize the members of the inspection team. The Salman Pak facility was razed one week prior to the arrival of the inspection team.[51]

The United States is aware of the Iraqi potential for using biological weapons. The employment of biological agents in a "cocktail" mix with chemical warfare agents is consistent with Soviet military doctrine. It is clear that biological weapons are much more difficult than chemical weapons to detect and defend against. Some of the symptoms experienced by veterans suffering from Persian Gulf Syndrome are consistent with biological warfare agent use. Verification will require sophisticated medical diagnosis, which to date has not been publicly undertaken.

The question of whether U.S. forces were attacked with a biological agent is problematic. According to Chemical/Biological Program: A Department of Defense Perspective, "It has been recognized that our biological defense program was inadequate. Credible analysis indicated that optimal employment of biological agents could result in a significantly large hazard area." It further cites a memo from the Chairman of the Joint Chiefs of Staff to the SECDEF (Secretary of Defense) noting: "inadequate ability to counter BW (biological warfare) attack/BW defense is a priority requirement."[52] The inadequacy of the

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[51]Ibid.

[52]Bill Richardson, John Carrico, Col. Frank J. Cox, LTC Jeffery Thomas, and Richard Sanders, Chemical/Biological Program: A Department of Defense Perspective, Office of the Assistant Secretary of Defense for Atomic Energy, presented as a paper to the Nuclear, Biological, and Chemical Symposium of the American Defense Preparedness Association, Camp Lejeune, North Carolina (May 12-14, 1993), 10.

current biological defense and detection program was also supported by Deputy Secretary of Defense John Deutch in an unclassified May 6, 1994 address delivered at a Department of Defense-sponsored counterproliferation conference at the Los Alamos National Laboratory. According to Deputy Secretary Deutch, the United States has "no biological detection capability deployed with any forces, anywhere."

Novel BW agents created by altering DNA plasmids and vectors are specifically intended to avoid detection. As noted below, several shipments of biological materials that might have been used to carry out such a program were licensed for export from the United States to the Iraq Atomic Energy Commission. In such a program, common intestinal flora such as e. coli could be altered to produce viral, bacterial, or other toxins and would be difficult to treat. If Iraq was successful in developing such agents, diagnosis will continue to elude physicians testing for traditional illnesses. Novel BW agents would certainly elude biological detection devices. There is evidence, based on the nature of the materials imported, that this type of research was being conducted.. Since the Iraqi government managed to dismantle much of its biological warfare program prior to the UNSCOM inspections, we can only speculate on how advanced this program might have been.[53]

It has been suggested that if these problems the veterans are experiencing are Gulf War-related, then we should be seeing even more serious problems among the Iraqis. Since beginning this investigation we have learned that many Iraqi enemy prisoners of war (EPW) suffered skin rashes, sores, nausea, vomiting, coughing and other medical problems while they were being detained in Saudi Arabia. Many members of units who had close contact with these individuals are now reporting to the Committee symptoms consistent with those being suffered by other Gulf War veterans. In addition, Iraq has claimed a dramatic rise in reported cases of communicable diseases since the end of the Gulf War including typhoid, brucellosis, hepatitis and cholera. [54]

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[53]Staff Interview, UNSCOM, February 22, 1994.

[54]"Iraq Launches Drive to Combat Increasing Communicable Diseases," Xinhua News Agency (June 8, 1993), Item No: 0608002; "Iraq Faces Health Crisis," The Guardian (September 13, 1993), 7.

Further, reports of Gulf War illnesses being reported are no longer limited to military veterans of the Gulf War. Others reporting manifestation of these symptoms include:

- Department of Defense civilians who served in the Persian Gulf War.

- Department of Defense civilians working at the Anniston (AL) Army Depot and the Sharpsite (CA) Army Depot decontaminating equipment which was returned from the Persian Gulf.

- Spouses, particularly the spouses of male veterans, are reporting the following symptoms: chronic or recurring vaginal yeast infections, menstrual irregularities (excessive bleeding and severe cramping), rashes, fatigue, joint and muscle pain, and memory loss.

- Children born to veterans prior to the Gulf War. In many cases both male and female children born prior to the war have experienced symptoms similar to those of the veterans and their spouses.

- Children born following the Gulf War. Some reports have been published which suggest a high rate of miscarriages in the families of Gulf War veterans. Further, several reports have surfaced which suggest that there has been a high rate of physical abnormalities in children born to Gulf War veterans since the war.

U.S. Exports of Biological Materials to Iraq

The Senate Committee on Banking, Housing, and Urban Affairs has oversight responsibility for the Export Administration Act. Pursuant to the Act, Committee staff contacted the U.S. Department of Commerce and requested information on the export of biological materials during the years prior to the Gulf War. After receiving this information, we contacted a principal supplier of these materials to determine what, if any, materials were exported to Iraq which might have contributed to an offensive or defensive biological warfare program. Records available from the supplier for the period from 1985 until the present show that during this time, pathogenic (meaning "disease producing"), toxigenic (meaning "poisonous"), and other biological research materials were exported to Iraq pursuant to application and licensing by the U.S. Department of Commerce. Records prior to 1985 were not available, according to the supplier.

These exported biological materials were not attenuated or weakened and were capable of reproduction. According to the Department of Defense's own Report to Congress on the Conduct of the Persian Gulf War, released in April 1992: "By the time of the invasion of Kuwait, Iraq had developed biological weapons. It's advanced and aggressive biological warfare program was the most advanced in the Arab world... The program probably began late in the 1970's and concentrated on the development of two agents, botulinum toxin and anthrax bacteria... Large scale production of these agents began in 1989 at four facilities near Baghdad. Delivery means for biological agents ranged from simple aerial bombs and artillery rockets to surface-to-surface missiles." [55]

Included in the approved sales are the following biological materials (which have been considered by various nations for use in war), with their associated disease symptoms:[56]

Bacillus Anthracis: anthrax is a disease-producing bacteria identified by the Department of Defense in The Conduct of the Persian Gulf War: Final Report to Congress, as being a major component in the Iraqi biological warfare program.

Anthrax is an often-fatal infectious disease due to ingestion of spores. It begins abruptly with high fever, difficulty in breathing, and chest pain. The disease eventually results in septicemia (blood poisoning), and the mortality is high. Once septicemia is advanced, antibiotic therapy may prove useless, probably because the exotoxins remain, despite the death of the bacteria.

Clostridium Botulinum: a bacterial source of botulinum toxin, which causes vomiting, constipation, thirst, general weakness, headache, fever, dizziness, double vision, dilation of the pupils and paralysis of the muscles involving swallowing. It is often fatal.

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[55]Department of Defense, Conduct of the Persian Gulf War: Final Report to Congress (April 1992).

[56]Terry J. Gander, ed., Jane's NBC Protection Equipment 1991-92, (Surrey, U.K.: Jane's Information Group, 1992), 3-12: Dorland's Pocket Medical Dictionary, 24th Edition (Philadelphia: W.B. Saunders Co., 1989); James A.F. Compton, Military Chemical and Biological Agents: Chemical and Toxicological Properties (Caldwell, NJ: The Telford Press, September 1987).

Histoplasma Capsulatum: causes a disease superficially resembling tuberculosis that may cause pneumonia, enlargement of the liver and spleen, anemia, an influenza-like illness and an acute inflammatory skin disease marked by tender red nodules, usually on the shins. Reactivated infection usually involves the lungs, the brain, spinal membranes, heart, peritoneum, and the adrenals.

Brucella Melitensis: a bacteria which can cause chronic fatigue, loss of appetite, profuse sweating when at rest, pain in joints and muscles, insomnia, nausea, and damage to major organs.

Clostridium Perfringens: a highly toxic bacteria which causes gas gangrene. The bacteria produce toxins that move along muscle bundles in the body killing cells and producing necrotic tissue that is then favorable for further growth of the bacteria itself. Eventually, these toxins and bacteria enter the bloodstream and cause a systemic illness.

In addition, several shipments of Escherichia Coli (E.Coli) and genetic materials, as well as human and bacterial DNA, were shipped directly to the Iraq Atomic Energy Commission.

The following is a detailed listing of biological materials, provided by the American Type Culture Collection, which were exported to agencies of the government of Iraq pursuant to the issuance of an export licensed by the U.S. Commerce Department:[57]

Date : February 8, 1985
Sent to : Iraq Atomic Energy Agency
Materials Shipped:

Ustilago nuda (Jensen) Rostrup

[57]American Type Culture Collection, Rockville, Maryland (January 21, 1994).

Date : February 22, 1985
Sent to : Ministry of Higher Education
Materials Shipped:

Histoplasma capsulatum var. farciminosum (ATCC 32136)
Class III pathogen

Date : July 11, 1985
Sent to : Middle and Near East Regional A
Materials Shipped:

Histoplasma capsulatum var. farciminosum (ATCC 32136)
Class III pathogen

Date : May 2, 1986
Sent to : Ministry of Higher Education
Materials Shipped:

1. Bacillus Anthracis Cohn (ATCC 10)
   Batch # 08-20-82 (2 each)
   Class III pathogen.

2. Bacillus Subtilis (Ehrenberg) Cohn (ATCC 82)
   Batch # 06-20-84 (2 each)

3. Clostridium botulinum Type A (ATCC 3502)
   Batch# 07-07-81 (3 each)
   Class III Pathogen

4. Clostridium perfringens (Weillon and Zuber) Hauduroy, et al (ATCC 3624) Batch# 10-85SV (2 each)

5. Bacillus subtilis (ATCC 6051)
   Batch# 12-06-84 (2 each)

6. Francisella tularensis var. tularensis Olsufiev (ATCC 6223)Batch# 05-14-79 (2 each)
Avirulent, suitable for preparations of diagnostic antigens.

7. Clostridium tetani (ATCC 9441)
Batch# 03-84 (3 each)
Highly toxigenic.

8. Clostridium botulinum Type E (ATCC 9564)
Batch# 03-02-79 (2 each)
Class III pathogen

9. Clostridium tetani (ATCC 10779)
Batch# 04-24-84S (3 each)

10. Clostridium perfringens (ATCC 12916)
Batch# 08-14-80 (2 each)
Agglutinating type 2.

11. Clostridium perfringens (ATCC 13124)
Batch# 07-84SV (3 each)
Type A, alpha-toxigenic, produces lecithinase C.J. Appl.

12. Bacillus Anthracis (ATCC 14185)
Batch# 01-14-80 (3 each)
G.G. Wright (Fort Detrick) V770-NP1-R. Bovine anthrax,
Class III pathogen

13. Bacillus Anthracis (ATCC 14578)
Batch# 01-06-78 (2 each)
Class III pathogen.

14. Bacillus megaterium (ATCC 14581)
Batch# 04-18-85 (2 each)

15. Bacillus megaterium (ATCC 14945)
Batch# 06-21-81 (2 each)

16. Clostridium botulinum Type E (ATCC 17855)
Batch# 06-21-71
Class III pathogen.

17. Bacillus megaterium (ATCC 19213)
Batch# 3-84 (2 each)

18. Clostridium botulinum Type A (ATCC 19397)
Batch# 08-18-81 (2 each)
Class III pathogen

19. Brucella abortus Biotype 3 (ATCC 23450)
Batch# 08-02-84 (3 each)
Class III pathogen

20. Brucella abortus Biotype 9 (ATCC 23455)
Batch# 02-05-68 (3 each)
Class III pathogen

21. Brucella melitensis Biotype 1 (ATCC 23456)
Batch# 03-08-78 (2 each)
Class III pathogen

22. Brucella melitensis Biotype 3 (ATCC 23458)
Batch# 01-29-68 (2 each)
Class III pathogen

23. Clostridium botulinum Type A (ATCC 25763)
Batch# 8-83 (2 each)
Class III pathogen

24. Clostridium botulinum Type F (ATCC 35415)
Batch# 02-02-84 (2 each)
Class III pathogen

Date : August 31, 1987
Sent to : State Company for Drug Industries
Materials Shipped:

1. Saccharomyces cerevesiae (ATCC 2601)
   Batch# 08-28-08 (1 each)

2. Salmonella choleraesuis subsp. choleraesuis Serotype typhi
   (ATCC 6539) Batch# 06-86S (1 each)

3. Bacillus subtillus (ATCC 6633)
   Batch# 10-85 (2 each)

4. Klebsiella pneumoniae subsp. pneumoniae (ATCC 10031)
   Batch# 08-13-80 (1 each)

5. Escherichia coli (ATCC 10536)
   Batch# 04-09-80 (1 each)

6. Bacillus cereus (11778)
   Batch# 05-85SV (2 each)

7. Staphylococcus epidermidis (ATCC 12228)
   Batch# 11-86s (1 each)

8. Bacillus pumilus (ATCC 14884)
   Batch# 09-08-80 (2each)

Date : July 11, 1988
Sent to : Iraq Atomic Energy Commission
Materials Shipped:

1. Escherichia coli (ATCC 11303)
   Batch# 04-87S
   Phage host

2. Cauliflower Mosaic Caulimovirus (ATCC45031)
   Batch# 06-14-85
   Plant virus

3. Plasmid in Agrobacterium Tumefaciens (ATCC37349)
   (Ti plasmid for co-cultivation with plant integration vectors in E. Coli) Batch# 05-28-85

Date : April 26, 1988
Sent to : Iraq Atomic Energy Commission
Materials Shipped:

1. Hulambda4x-8, clone: human hypoxanthine phosphoribosyltransferase (HPRT) Chromosome(s) X q26.1 (ATCC 57236) Phage vector; Suggested host: E.coli

2. Hulambda14-8, clone: human hypoxanthine phosphoribosyltransferase (HPRT) Chromosome(s): X q26.1 (ATCC 57240) Phage vector; Suggested host: E.coli

3. Hulambda15, clone: human hypoxanthine phosphoribosyltransferase (HPRT) Chromosome(s) X q26.1 (ATCC 57242) Phage vector; Suggested host: E.coli

Date : August 31, 1987
Sent to : Iraq Atomic Energy Commission
Materials Shipped:

1. Escherichia coli (ATCC 23846)
   Batch# 07-29-83 (1 each)

2. Escherichia coli (ATCC 33694)
   Batch# 05-87 (1 each)

Date : September 29, 1988
Sent to : Ministry of Trade
Materials Shipped:

1. Bacillus anthracis (ATCC 240)
   Batch#05-14-63 (3 each)
   Class III pathogen

2. Bacillus anthracis (ATCC 938)
   Batch#1963 (3 each)
   Class III pathogen

3. Clostridium perfringens (ATCC 3629)
   Batch#10-23-85 (3 each)

4. Clostridium perfringens (ATCC 8009)
   Batch#03-30-84 (3 each)

5. Bacillus anthracis (ATCC 8705)
   Batch# 06-27-62 (3 each)
   Class III pathogen

6. Brucella abortus (ATCC 9014)
   Batch# 05-11-66 (3 each)
   Class III pathogen

7. Clostridium perfringens (ATCC 10388)
   Batch# 06-01-73 (3 each)

8. Bacillus anthracis (ATCC 11966)
   Batch# 05-05-70 (3 each)
   Class III pathogen

9. Clostridium botulinum Type A
   Batch# 07-86 (3 each)
   Class III pathogen

10. Bacillus cereus (ATCC 33018)
Batch# 04-83 (3 each)

11. Bacillus ceres (ATCC 33019)
Batch# 03-88 (3 each)

Date : January 31, 1989
Sent to : Iraq Atomic Energy Commission
Materials Shipped:

1. PHPT31, clone: human hypoxanthine phosphoribosyltransferase (HPRT) Chromosome(s) X q26.1 (ATCC 57057)

2. plambda500, clone: human hypoxanthine phosphoribosyltransferase pseudogene (HPRT) Chromosome(s): 5 p14-p13 (ATCC 57212)

Date : January 17, 1989
Sent to : Iraq Atomic Energy Commission
Materials Shipped:

1. Hulambda4x-8, clone: human hypoxanthine phosphoribosyltransferase (HPRT) Chromosome(s) X q26.1 (ATCC 57237) Phage vector; Suggested host: E.coli

2. Hulambda14, clone: human hypoxanthine phosphoribosyltransferase (HPRT) Chromosome(s): X q26.1 (ATCC 57240) Cloned from human lymphoblast Phage vector; Suggested host: E.coli

3. Hulambda15, clone: human hypoxanthine phosphoribosyltransferase (HPRT) Chromosome(s) X q26.1 (ATCC 57241) Phage vector; Suggested host: E.coli

Additionally, the Centers for Disease Control has compiled a listing of biological materials shipped to Iraq prior to the Gulf War. The listing covers the period from October 1, 1984 (when the CDC began keeping records) through

October 13, 1993. The following materials with biological warfare significance were shipped to Iraq during this period:[58]

Date : November 28, 1989
Sent to : University of Basrah, College of Science, Department of Biology
Materials Shipped:

1. Enterococcus faecalis
2. Enterococcus faecium
3. Enterococcus avium
4. Enterococcus raffinosus
5. Enterococcus gallinarium
6. Enterococcus durans
7. Enterococcus hirae
8. Streptococcus bovis (etiologic)

Date : April 21, 1986
Sent to : Officers City Al-Muthanna, Quartret 710, Street 13, Close 69 House 28/I, Baghdad, Iraq
Materials Shipped:

1. 1 vial botulinum toxoid (non-infectious)

[58]Memorandum from Director of the Centers for Disease Control to Chairman Riegle.

Date : March 10, 1986
Sent to : Officers City Al-Muthanna, Quartret 710, Street 13, Close 69 House 28/I, Baghdad, Iraq
Materials Shipped:

1. 1 vial botulinum toxoid #A2 (non-infectious)

Date : June 25, 1985
Sent to : University of Baghdad, College of Medicine , Department of Microbiology
Materials Shipped:

1. 3 yeast cultures (etiologic) Candida sp.

Date : May 21, 1985
Sent to : Basrah, Iraq
Materials Shipped:

1. Lyophilized arbovirus seed (etiologic)

2. West Nile Fever Virus

Date : April 26, 1985
Sent to : Minister of Health, Ministry of Health, Baghdad, Iraq
Materials Shipped:

1. 8 vials antigen and antisera (r. rickettsii and r. typhi) to diagnose rickettsial infections (non-infectious)

UNSCOM Biological Warfare Inspections

UNSCOM inspections uncovered evidence that the government of Iraq was conducting research on pathogen enhancement on the following biological warfare-related materials:[59]

- bacillus anthracis
- clostridium botulinum
- clostridium perfringens
- brucella abortis
- brucella melentensis
- francisella tularensis
- clostridium tetani

In addition, the UNSCOM inspections revealed that biological warfare-related stimulant research was being conducted on the following materials:

- bacillus subtillus
- bacillus ceres
- bacillus megatillus

UNSCOM reported to Committee staff that a biological warfare inspection (BW3) was conducted at the Iraq Atomic Energy Commission in 1993. This suggests that the Iraqi government may have been experimenting with the materials cited above (E.Coli and rDNA) in an effort to create genetically altered microorganisms (novel biological warfare agents).

Biological Warfare Defense

The following section, describing the types, dissemination, and defensive measures against biological agents, is quoted verbatim from a United States Marine Corps Institute document, Nuclear and Chemical Operations, MCI 7711B, used in the Command and Staff College's nonresident program. It is clear from this document that the Department of Defense recognizes both the threat and U.S. vulnerability to biological weapons. This document also outlines

[59]Staff interview, UNSCOM, February 22, 1994..

the Department's understanding of what actions should be taken in the event that a biological weapon has been or is suspected to have been employed.

"Biological agents cannot be detected by the human senses. A person could become a casualty before he is aware he has been exposed to a biological agent. An aerosol or mist of biological agent is borne in the air. These agents can silently and effectively attack man, animals, plants, and in some cases, materiel. Agents can be tailored for a specific type of target.[60]

Methods of using antipersonnel agents undoubtedly vary so that no uniform pattern of employment or operation is evident. It is likely that agents will be used in combinations so that the disease symptoms will confuse diagnosis and interfere with proper treatment. It is also probable that biological agents would be used in heavy concentrations to insure a high percentage of infection in the target area. The use of such concentrations could result in the breakdown of individual immunity because the large number of micro-organisms entering the body could overwhelm the natural body defenses. [61]

Types of Biological Agents

Different antipersonnel agents require varying periods of time before they take effect, and the periods of time for which they will incapacitate a person also vary. Most of the diseases having antipersonnel employment potential are found among a group of diseases that are naturally transmitted between animals and man. Mankind is highly vulnerable to them since he has little contact with animals in today's urban society. The micro-organisms of possible use in warfare are found in four naturally occurring groups - the fungi, bacteria, rickettsiae, and viruses.[62]

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[60] Nuclear and Chemical Operations, MCI 7711B, Marine Corps Institute, Command and Staff College's nonresident program (Marine Barracks, Washington, D.C., 1983), p. 8, section 1501.

[61] Ibid.

[62] Ibid, p. 9, section 1502.

a. Fungi. Fungi occur in many forms and are found almost everywhere. They range in size from a single cell, such as yeast, to multicellular forms, such as mushrooms and puffballs. Their greatest employment potential is against plants, although some forms cause disease in man. A fungus causes the disease coccidioidomycosis in man. Other common infections caused by Fungi include ringworm and "athletes foot." [63]

b. Bacteria. Bacteria comprise a large and varied group of organisms. They occur in varying shapes, such as rods, spheres, and spirals, but they are all one-celled plants. Some bacteria can assume a resistant structure called a spore, which enables them to resist adverse environmental conditions. Others may produce poisonous substances called toxins. Examples of human disease caused by bacteria are anthrax, brucellosis, tularemia, staphylococcus, and streptococcus.[64]

c. Rickettsiae. Rickettsiae organisms have the physical appearance of bacteria and the growth characteristics of viruses. Members of this group must have living tissue for growth and reproduction, whereas most fungi and bacteria can be grown on artificial material. Another characteristic of rickettsiae is that most diseases caused by this group are transmitted by the bite of an insect, such as the mosquito, mite, or tick. Rocky Mountain Spotted Fever, Q fever, and typhus are diseases of mankind caused by rickettsiae.[65]

d. Virus. The smallest living things known to mankind are viruses. Viruses are so small than an electron microscope is required to see them. Viruses cannot be grown in the absence of living tissue. Diseases which are caused by viruses cannot normally be treated with antibiotics. Viruses cause yellow fever, rabies, and poliomyelitis.[66]

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[63]Ibid, p. 9, section 1502a.

[64]Ibid, p. 9, Section 1502b.

[65] Ibid, p. 9, Section 1502c.

[66]Ibid, p. 9, Section 1502d.

Dissemination of Biological Agents

a. Aerosol. Biological agents may be disseminated on, or over, the target by many means, such as aircraft, missiles, and explosive munitions. These devices produce a biological aerosol, and, if antipersonnel biological agents are ever used, they will probably be disseminated in the form of biological mists or aerosols. This method of dissemination would be extremely effective because the micro-organisms would be drawn into the lungs as a person breathes, and there they would be rapidly absorbed into the blood stream. ***The hours from dusk until dawn appear to be the best time for dissemination of biological agents. The weather conditions are most favorable for these agents at night, since sunlight will destroy many of them. In field trials, using harmless biological aerosols, area coverages of thousands of square miles have been accomplished. The aerosol particles were carried for long distances by air currents.***[67] (emphasis added)

b. Living Hosts. Personnel may be infected by disease carrying vectors, such as insects, rats, or other animals. Mosquitos may spread malaria, yellow fever, or encephalitis; rats spread plague (any mammal may carry rabies). Militarily, specific vectors may be selected, infected as required, and then released in the target area to seek out their human victims and pass on the disease. Since infection is transmitted through a bite in the skin, protective masks offer no protection. A vectorborne agent may remain in the target area for as long as there are live hosts; thus, a major disadvantage results. The vectorborne agent can become a permanent hazard in the area as the host infects others of his species.[68]

c. Food and Water Contamination. Biological agents could also be delivered to target personnel by placing the agent in food and water supplies (sabotage). This type of attack would probably be directed against small targets, such as industrial complexes, headquarters, or specific individuals. The methods of delivering the attack are many and varied. [69]

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[67]Ibid, p. 9, Section 1503a.

[68]Ibid, p. 9, Section 1503b.

[69]Ibid, p. 9, Section 1503c.

Defensive Measures

The United States carries out research aimed at improved means of detection of biological agents and treatment and immunization of personnel. Both of these are essential to biological defense.[70]

a. Before an Attack: The inability of the individual to detect a biological attack is perhaps the greatest problem. Contributing factors are the delay experienced before the onset of symptoms and the time required to identify specific agents. Without an adequate means of detection, complete defensive measures may not be taken since an attack must first be detected before you can defend against it. Diseases caused by biological agents do not appear until a few days to weeks after contact with the agent. Personnel are protected against biological agents in aerosol form by the protective mask. Ordinary clothing protects the skin from contamination by biological agents. Other means of protection include immunizations; quarantining contaminated areas; cleanliness of the body, clothing, and living quarters; stringent rodent and pest control; proper care of cuts and wounds; and education of troops to eat and drink only from approved sources.[71]

b. After an Attack: ***After a biological agent attack has occurred, it will be necessary to identify the agent used in the attack so that proper medical treatment may be given to exposed personnel. To perform this identification, it is necessary to collect samples or objects from the contaminated area and send them to a laboratory or suitable facility for processing. Samples may by taken from the air, from contaminated surfaces, or from contaminated water. After the sample is taken, laboratory time will be required to identify the suspected biological agent.*** *The length of time for identification is being significantly shortened through the use of new medical and laboratory techniques. Proper defensive actions taken during a biological attack depend upon the rapid detection of the attack. Biological defense is continuous. You must always be prepared for the employment of these weapons.*[72] (emphasis added)

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[70]Ibid, p. 10, Section 1504.

[71]Ibid, p. 10, Section 1504a.

[72]Ibid, p. 10, Section 1504b.

Iraq's Experience in the Use of Chemical Warfare Agents

The fears and the precautions taken prior to the Gulf War were not the product of excessive hysteria. Five United Nations reports have confirmed the use of chemical warfare agents in the Iran-Iraq War.[73] Use of chemical weapons against both the Kurds and Shiite Moslems within Iraq is well documented. Press reports also document Iraqi readiness to use these weapons against Coalition forces during the Persian Gulf War.

In April 1993, two U.S.-based human rights organizations confirmed that they had found residues of chemical weapons used by the Iraqi government of Saddam Hussein against a Kurdish village in northern Iraq in 1988. These groups, Physicians for Human Rights and Human Rights Watch, said they had used advanced analytical techniques to discover the presence of mustard gas and the nerve gas Sarin. Those chemical weapons reportedly were dropped by aircraft on August 25, 1988 and killed four people in the Kurdish village of Birjinni.[74] Testimony from survivors of the Birjinni bombing, who said victims of the raids died writhing and coughing blood, led to accusations that Iraq had gassed its own citizens as part of a campaign against rebellious Kurds that killed tens of thousands.[75] This was the first time that scientists had been able to prove the use of chemical weapons, and especially a nerve gas, through the analysis of environmental residue acquired years after such an attack occurred.[76]

Soil samples were gathered from the 1988 bombing sites and then delivered to a British laboratory. Chemists at Porton Down found traces of mustard gas and Sarin. Dr. Graham Pearson, director of the British Chemical and Biological Defence Establishment, verified these results and confirmed the

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[73]Steven R. Bowman, Congressional Research Service Issue Brief: Chemical Weapons Proliferation: Issues for Congress, IB90084 (Washington, D.C.: Congressional Research Service, Foreign Affairs and Defense Division, Updated August 17, 1993) 2.

[74] "Washington Dateline: Group Offers Evidence Iraq Used Poison Gas Against Own People," Associated Press (April 29, 1993), PM Cycle; Deborah Zabarenko, "Scientists: Lab Shows Iraq Used Poison Gas on Kurds," Reuters (April 29, 1993), BC Cycle.

[75] Ibid.

[76] Ibid.

samples were taken from bomb craters near the northern Iraqi village of Birjinni in June 1992. The byproducts of the breakdown of these poisons are so specific that they provide a "unique fingerprint" in chemical analysis that points directly to a poison gas attack.[77]

An earlier attack had been reported on March 17, 1988 on the village of Halabja. Amnesty International reported that chemical weapons were used in an attack by Iraq, in which "some 5,000 Kurds were killed within an hour."[78] A U.N. team sent to investigate the attack found evidence of chemical weapons, although they did not rule on who carried out the attack on the town, which had been occupied by Iran since mid-March. [79]

On September 26, 1993, Shiite rebels living in the southern Iraqi marshlands reported an early morning shelling attack by Iraqi forces. The eyewitnesses, who spoke with a New York Times reporter, mentioned that the shells landed with a thud "and not the usual explosion" sending up white clouds. The artillery attack was followed by a ground assault by Iraqi troops who were equipped with gas masks.[80]

A Shiite rebel claimed that upon entering one of the Iraqi armored personnel carriers they found battle orders calling for a chemical attack. Rebel leaders provided a copy of the captured orders. Written in Arabic on the twenty-sixth of September, the orders, numbered 1-15, instructed the Iraqi soldiers to use chemical weapons to "retake the village" and that "each soldier must be instructed on how to respond during the chemical attack."[81]

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[77]"British Lab Shows Iraq Used Poison Gas on Kurds," Associated Press, Press Newsfile (April 29, 1993).

[78] Patricia Dibsie, "Kurds Demonstrate in Memory of 5,000 Killed by Iraqi Weapons," San Diego Union Tribune, (March 18, 1994).

[79]"Iraq Says it Has Launched a New Offensive Against Iran," Reuters, (May 28, 1988), P M. Cycle.

[80]Chris Hedges, "In a Remote Southern Marsh, Iraq is Strangling the Shiites," New York Times (November 16, 1993), A1.

[81]Ibid

After the attack, some villagers returned for their belongings, but there was nothing left. They discovered that trees and plants had withered and yellowed. Furthermore, "the cats, the dogs, the birds and even the water snakes had died. But for some reason the victims had been removed by the troops. We saw no bodies."[82]

In November 1993, a nine-member U.N. inspection team arrived to take samples from the area of the alleged chemical attack. The results of the inspection were inconclusive.

It is also suspected that Iraq may have used biological agents (mycotoxins) during the 1984 attack on Majnoon Island, during the Iran-Iraq War, and in 1988 against the Kurds (cholera and typhus). However, no medical verification of Iraqi use of biological warfare agents yet exists.[83]

The above documented instances of chemical weapons use (and suspected use) against Iranians, Kurds, and Shiites undermine Department of Defense assertions that Iraq may not have used these weapons against Coalition forces because they "feared contamination of their own men."[81] Marine Brigadier General Richard Neil said that prisoner debriefings of Persian Gulf War EPWs had "yielded the impression that the Iraqis were not comfortable operating in a chemical environment,...and...Iraqi soldiers had poor chemical protection equipment of their own." [82] Lt. General Thomas Kelly stated in a press briefing that "the Iraqi Army was very uncomfortable, we are finding out from the POWs, about the use of chemical weapons because they are not familiar with

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[82]Ibid.

[83]Thomas Hargrove, "Doctors Say Gulf War Vets Gasses: Biological Weapons Believed Responsible for Mysterious Ailments of Returned U.S. Troops," San Francisco Examiner (November 17, 1993), A7;H. Kadivar and S.C. Adams, "Treatment of Chemical and Biological Warfare Injuries; Insights Derived From the 1984 Attack on Majnoon Island," Military Medicine, (April 1991), 171-7; A. Heyndrickx, "Chemical Warfare Injuries," The Lancet, Vol. 337 (February 16, 1991)..

[81]Tony Walker, "The Gulf Ceasefire; Formal Ceasefire Talks to Begin Soon -- Victors Will Meet Vanquished Amid Claims of Truce Violations, Financial Times, (March 2, 1991).

[82]Ann Deuroy and Guy Gugliotta, "Bush to Move Fast on Mideast Peace; Ceasefire Talks Delayed by 'Technical Details'," Washington Post, (March 2, 1991), A1.

it." [83] However, as the preceding paragraphs make clear, the Iraqi Army had operational experience with the use of these weapons, unlike their American counterparts.

[83] Federal News Service, Department of Defense Regular Briefing (March 4, 1991).

GULF WAR SYNDROME: THE CASE FOR CHEMICAL/BIOLOGICAL AGENT EXPOSURE

As the preceding sections of this report make clear, the Government of Iraq possessed a large and sophisticated chemical and biological weapons production complex. Iraq's army, organized and equipped along Soviet lines, also appeared to employ Soviet chemical warfare doctrine, which advocated the use of mixed agent warfare. Iraq used these weapons against its own people in the 1980's, and possibly again in 1993. It should not be surprising that Baghdad would also use every weapon in its arsenal against the much more serious threat to its own survival posed by the massed Coalition forces. Additionally, the release of chemical and biological agents as a result of Coalition bombing should have been expected by the Allied forces, based upon their own doctrine regarding the dispersal of chemical agents.

Several theories have been put forward to explain the cause(s) of Gulf War Syndrome. Most of them lack credibility because they do not explain transmission of similar symptoms across a broad and dissimilar population whose only commonality was the service of a family member in the Persian Gulf theater of operations or contact with materiel returned from that venue. Meanwhile, the passage of over three years since the appearance of the first symptoms, and the inability of the Departments of Defense and Veterans Affairs to find a cause, suggests that the illnesses may be caused by something that these institutions have not examined. Further, the absence of credible and verifiable published scientific research on the syndrome by these agencies, providing specifics of the types of laboratory research that have been conducted, case histories, and methodologies used, leaves each interested scientist in the dark as to what diagnostic processes have been attempted and which have failed.

There is a growing body of evidence, outlined in detail below, which supports the claims of Gulf War veterans that exposure to chemical and/or biological warfare agents may be the cause of the complex of illnesses they currently suffer. There appear to be four primary sources of exposure: 1) as a result of direct attack, via missile, rocket, artillery, or aircraft munitions; 2) as a result of intermittent low-level exposure to fallout from Coalition bombing of Iraqi chemical and biological warfare plants and munitions bunkers; 3) as a result of administration of a nerve agent pre-treatment drug that acts in a manner similar to actual nerve agent; and, 4) as a result of continuing contact

with the Iraqi enemy prisoners of war (EPWs). In addition, there appear to be two secondary sources of exposure: 1) exposure to occupational/environmental hazards in Southwest Asia and to contaminated materiel returned from the theater of operations, and 2) transmission among family members. Exposure to endemic diseases and illnesses and diseases must also be thoroughly researched.

Hundreds of Gulf War veterans have been interviewed by the Committee staff. The events cited below are included because the veterans reporting them could remember approximately when they occurred, or because there were multiple independent confirming sources. A map showing the location of these events appears at the end of this section.

Chapter 2. Group I Exposures: Reported Direct Exposure Events

A number of direct exposure events are described below as reported by members of the U.S. Armed Forces who served in the Gulf War. Not every detail can be verified by multiple sources to date, but additional data from unofficial and unrelated sources continue to bolster initial accounts of events best explained as missile and rocket attacks or aerial explosions. Units located in areas where these events occurred are reporting high rates of illnesses. The areas in which these events occurred were key logistic and staging areas, as well as those areas which were breached during the liberation of Kuwait. Many veterans of these units have reported seeing large numbers of dead or dying animals in the area after the attacks; one veteran noted that "all the insects were dead too."

Department of Defense conclusions that no chemical or biological attacks occurred seem to be based on the assumption that there was no significant evidence of immediate chemical and biological casualties. However, since one of the primary goals of a biological attack is to debilitate your adversary's forces, while retaining a high degree of deniability, and since many of those interviewed describe both immediate physical reactions and long-term debilitating effects, the issue of what these individuals may have been exposed to becomes highly critical.

Event 1:

January 17, 1991, early morning hours
Cement City

Mr. Willie Hicks, then with the 644th Ordinance Company, was serving as the non-commissioned officer in charge of arms and ammunitions shipments. Staff Sergeant Hicks has testified before the Senate Committee on Armed Services' Subcommittee for Force Structure and Personnel that, at about 2:30a.m. on January 17, 1991, he heard a loud explosion, which was followed by a sounding of alarms. As Hicks was running to the bunker, his face began to burn. One member of the unit "just dropped." About ten minutes later, according to Hicks, the unit's first sergeant came by and told members of the unit to go to the highest level of alert. The unit remained at that level for 24 hours.

Two or three days later, Hicks began feeling ill and noticed blood in his urine. Several other members of the unit began experiencing "problems" with their rectums. Hicks testified that when members of the unit began to question what had happened, they were ordered by their commanding officer not to discuss it. Of the unit's 110 soldiers, 85 now suffer from medical problems, and one, Staff Sergeant Bayle, who Hicks described as having been in good physical shape, has inexplicably died. Hicks described another member of the unit, Staff Sergeant Heal, as being seriously incapacitated.

Hicks, a former teacher and Vietnam veteran, carries a notebook with him everywhere. He claims to have a severe problem with memory loss. He quit his job because he kept passing out and getting lost on the way to work. Other symptoms being suffered by Mr. Hicks include headaches, blood in his urine, insomnia, joint and muscle pain, deteriorating vision, loss of mobility in his left arm, night sweats, and diarrhea (sometimes bloody). His illness has been classified by the Veterans Administration as post traumatic stress disorder.

Event 2:

January 19, 1991, early morning hours.
Camp 13, 6-7 miles west of Port of Jubayl, Kingdom of Saudi Arabia
(Although some individuals reported this event as taking place on January 20, documentary evidence indicates that it took place on the 19th.)

Witness 01: Petty Officer Sterling Symms, then assigned to the Naval Reserve Construction Battalion 24, in an area south of the Kuwaiti border, testified before the Senate Armed Services Committee that between 2:00a.m. and 3:00a.m. on January 20, 1991, there was a "real bad explosion" overhead. The alarms went off and everybody started running towards their bunkers. Petty Officer Symms said there was a sharp odor of ammonia in the air. His eyes burned and his skin stung. His unit donned full chemical gear for nearly two hours until the "all clear" was given.[1]

Later, according to Symms, members of the unit were advised that what they heard was a sonic boom. Petty Officer Symms said that he did not believe that it was a sonic boom because there was also a "fireball" associated with the explosion. Members of the unit were ordered not to discuss the incident. Petty Officer Symms says he has since experienced fatigue, sore joints, running nose, a chronic severe rash, and open sores which have been diagnosed as an "itching problem." He has also been treated for streptococcus infections. In his testimony, Symms stated that 4 or 5 other members of his unit and two of their wives have been treated for similar infections.[2]

Witness 02: Mike Moore, assigned to the same unit as Symms, also reported that on January 20, 1991, at about 3a.m., he was awakened by a double explosion. As the sound of the explosion faded the alarms went off. The unit intercom announced "Go to MOPP level 4." Everyone in the tent put on their gas gear and went to the bunker. They stayed at MOPP level 4 until about 7a.m.. Later that day or the next, everyone's chemical suits and masks were collected and replaced. According to Mr. Moore, he was told the explosion was

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[1]Testimony before the Senate Committee on Armed Services, Subcommittee on Force Structure and Personnel (June 30, 1993).

[2]Ibid.

a sonic boom, to quit worrying about it, and to get back to work. Mr. Moore said that he later heard that what he heard was an incoming SCUD, but he also heard rumors that a Iraqi MIG was shot down in the area that night.

Mr. Moore said that he did not feel a spray or smell ammonia. He had no stinging or numb lips. Since returning home from the Gulf, he has suffered a severe thyroid problem, a heart attack, memory loss, tired and aching joints, rashes on his feet, nervousness, and muscle cramps, although he reported no bleeding. According to Mr. Moore, he has had about ten blood tests and two sets of x-rays performed at the Tuskeegee, Alabama, Veterans Affairs Medical Center. In past calls to the Tuskeegee, Alabama, VAMC, however, he had been told that there is no information in his record.

In February 1992, Mr. Moore's daughter began developing a thyroid problem and has been suffering from nervousness, headaches, and fatigue. Over the last year, his wife has begun to develop these symptoms as well. There is no history of thyroid problems in family.

Witness 03: Mr. William Larry Kay was an electrician assigned to Naval Mobile Construction Battalion 24. He was also assigned to Camp 13. On January 20, 1991, Mr. Kay heard two "booms", shaking the whole building. Sirens began going off. The camp intercom announced "confirmed mustard gas -- go to MOPP level 4." Mr. Kay was at the Recreation Center when the blasts occurred. He had fallen asleep. He went outside and put his gas mask on. It immediately filled with fumes. He recalls that it smelled like ammonia. Mr. Kay has been a member of a Hazmat (Hazardous Materials) team of the fire department in Columbus, Georgia; he said the strong smell of ammonia is unusual in an open area. There was an ammonia plant nearby, but he had never smelled such a strong odor of ammonia in the area. He reported to his assigned bunker. Each member of the unit had a duty during these attacks -- Mr. Kay was assigned to a decontamination team. There were other people assigned to test for chemical contamination. A radio call came in for these people to check for gas. Then, almost immediately, the intercom announced "all clear."

Mr. Kay said that after the incident, in response to questions from the unit as to what had occurred, the unit Commanding Officer said "Have you ever heard of a sonic boom?" When members of the unit continued to question the

unit commanders about what had occurred, they were ordered not to discuss the incident.

Witness 04: Mr. Terry Avery of Salem, Alabama worked on utilities for Naval Mobile Construction Battalion 24, and was also assigned to Camp 13. During the night of January 20, 1991, Mr. Avery said that he heard a double explosion. The alert siren went off. He put on his gas mask and went to the bunker. While in the bunker, his unit received the command to go to MOPP level 4 over the camp loudspeaker. He put on his chemical suit. Mr. Avery said he was almost completely dressed when they announced "all clear." He left the bunker and returned to his tent.

Mr. Avery was later told by his Master Chief that the noise he heard was just a sonic boom. A veteran of Vietnam who had heard sonic booms before, Mr. Avery felt that it was not a sonic boom, but he never got a good answer about the explosion. He reported that the rumor going around the camp was that an enemy plane had been shot down over the desert.

Late in the summer of 1991, Mr. Avery began feeling tired and having headaches. He saw a private doctor, who said he was probably working too hard in the sun. He says he does not think he is as ill as the rest of the men in his unit (NMCB24). He feels that he has leveled out, but he still has good days and bad days. He currently suffers from fatigue, headaches, weight gain, itching, muscle and joint pains, and memory loss (inability to concentrate).

His wife is also ill. Mr. Avery feels that she is more ill than he is. She has an enlarged spleen, an enlarged liver and abnormal liver functions, joint pains, night sweats, fatigue, stomach problems, itching, and rashes, but has not complained of memory loss. Two of his children are also complaining of headaches, joint pain, and abdominal pains. His 13-year-old daughter was diagnosed as having mononucleosis. She also has sinus infections, and throat pains from the sinus drainage. His 11-year-old son has had rashes, headaches, joint pain, itching, sinus and throat infections, and fevers.

Witness 05: The following are excerpts from one of two letters written by a U.S. serviceman present at Camp 13 during the January 19, 1991 incident. This individual has been interviewed by U.S. Senate professional staff . These

original letters confirm the actual events of that morning. This individual has requested confidentiality. The original letters have been retained as evidence.

"8:00 pm
19 Jan 91

Dear Mom,

I just talked to you on the phone. I really didn't want to call you and tell you about the SCUD missile/gas attack so you wouldn't worry, but I really needed to hear a familiar voice. ..I'm trying like hell to keep my mind off the fact that it's night time again, and we could get hit again.

Mom, I can deal with getting shot at, because I can fight back and even if I got hit, I can be put back together, a missile, on the other hand, doesn't work like that, but I can even accept that. But gas scares the hell out of me. I know how to put on the protective suits and gear, but it's the thought. Once the missile hit (without warning!) we were so busy getting dressed in our chemical suits we never had time for it to sink in and be scared. I was proud of all of us because no one froze up - we all responded like we'd been trained to, but after we got suited up, we had to sit there and force ourselves to breath slow and try and cool down - the suits are very hot. It's hard to slow your breathing when your heart's beating a million times a minute...[a] fire team [went] out and...patrolled the camp and checked all of the towers. The rest of the camp were in their bunkers except security and the chemical detection teams. I know they detected a cloud of dusty mustard gas because I was there with them, but today everyone denies it. I was there when they radioed the other camps north of us and warned them of the cloud... I talked to the look-outs that saw the air burst and cloud and had to stay with them for a few minutes to try and calm them down even though I was just as scared (probably more!). Jubail is South East of us, and that's where the Scud hit that was confirmed, but the air burst my guys saw was only 200+ yards west of us. I don't know what that was, but that's where most of the gas came from I think. But the wind was almost blowing due North. I probably won't sleep much tonight, but at least I'll be able to respond faster...."

In the interview with Senate staff, the individual said that during patrols around Camp 13 in the days just after the incident he wrote about, he observed

many animals that were either sick or dead. He also confirmed that after the attack, their chemical protective gear was replaced.

Witness 06: Mr. Mike Tidd was assigned to perform security duties with Naval Mobile Construction Battalion 24. He currently suffers from joint aches and pains, sinus infections, diarrhea, urinary urgency and frequency, rashes, small mosquito bite-like sores, heartburn, dizziness, occasional low temperatures, occasional night sweats, and chronic fatigue. Mr.Tidd kept a log while in Saudi Arabia.

According to his log, on January 19, a little past 0330hrs, Mr. Tidd was sitting on Tower 6 when all of a sudden, there was a double boom off to the northwest of the camp, accompanied by a bright flash of light. Within minutes, the general quarters alarm sounded. Mr. Tidd's unit first donned their gas masks and ponchos, and then, minutes later, the call came to go to MOPP level 4. At about 0600hrs, the "all clear" was sounded.

While Mr. Tidd heard the bang and saw the flash, which he described as being fairly close, he does not recall seeing a cloud. He said that he did not experience any symptoms, but attributes that to having been in a covered guard tower about 20 feet off the ground with a 3' visibility area.

Event 3:

January 19, 1991, early morning hours (possibly January 20).
King Abdul Aziz Naval Air Station (NMCB24-Air Det), 3 miles south of Port of Jubayl, Kingdom of Saudi Arabia

Witness 01: Mr. Larry Perry, of North Carolina, was a naval construction worker stationed near the port city of Al-Jubayl, at King Abdul Aziz Naval Air Station. He says the explosion on January 20, 1991 sent his entire unit running for the bomb shelter. When they emerged in their gas masks, they were enveloped by a mist.

Witness 02: Mr. Fred Willoughby of Columbus, Georgia was with Naval Mobile Construction Battalion 24 - Air Det. He currently suffers from headaches, diarrhea, aching joints, blood shot eyes, bloat, intestinal problems,

and chronic fatigue. He has had a polyp removed from his colon, and suffered from rectal bleeding in 1992.

Mr. Willoughby has reported that on January 20, 1991, at about 3-4a.m., he was "hanging out" outside his tent when he heard a long, loud explosion. Shortly thereafter, a siren sounded and he went inside the tent to get his gas mask. By the time he came out, people were yelling 'MOPP 4, MOPP 4, not a drill'. Immediately, his mouth, lips, and face became numb all over, a sensation he likened to novocaine at the dentist's office. He was in the bunker for about an hour or an hour and a half. When he came out of the bunker, he and the others in the unit were told by the officers and chiefs that what they had heard was just a sonic boom. The next day, the unit was told not to talk about it. But the unit's MOPP gear was collected and replaced the next morning. Mr. Willoughby also heard that an enemy aircraft was shot down in the Gulf, not far from the base.

His wife has begun exhibiting similar symptoms, including fatigue, diarrhea, and aching joints.

Witness 03: Roy Morrow of Phenix City, Alabama was a builder with NMCB24 and was assigned to the Air Detachment at King Abdul Aziz Stadium. On January 20, 1991, he heard two explosions between 3:00-3:30a.m.. He was awakened and went to the bunker. The unit went to MOPP level 2 for 25-30 minutes. The "all clear" was then given. When he exited the bunker, Mr. Morrow noticed the Marines running and screaming "MOPP level 4." The siren sounded again. He began to feel a burning sensation on his arms, legs, the back of his neck, and on his ears and face. His lips felt numb. His unit went to full MOPP level 4. Right before he went to the bunker the second time, Mr. Morrow saw a flash at the commercial port of Al-Jubayl. He had a radio in the bunker, and heard a call for the decontamination teams to respond.

BU2 Edwards was the head of the decontamination team in Mr. Morrow's unit. According to Mr. Morrow, BU2 Edwards said the next day that mustard gas and lewisite had been detected. When they began to discuss it, according to Mr. Morrow, the unit was told that the two explosions were a sonic boom, and they were ordered not to talk about it any more. The next day, all of their chemical gear was collected and replaced with new equipment.

The numbness experienced by Mr. Morrow remained for at least a week. Within two to three days after the incident, unit members began to suffer from rashes, diarrhea, and fatigue. The aching joints began a couple of weeks later. Mr. Morrow's symptoms have been getting progressively worse until the present time. He currently suffers from swollen lymph nodes, fatigue, diarrhea, night sweats, low grade temperature, weight loss, aching joints, muscle cramps, rashes (transient) blisters, welts (2-3 times a month), permanent hand rash, and short-term memory loss.

Witness 04: Mr. Harold Jerome Edwards, the chemical NCO in charge of the Nuclear/Biological/Chemical team for the Naval Mobile Construction Battalion 24 Air Detachment at the King Abdul Aziz Naval Air Station was interviewed by U.S. Senate staff on January 13, 1994. During that interview Mr. Edwards said that he conducted three M-256 tests for chemical agents on the evening of this event. According to Edwards, two of the three tests he conducted were positive for chemical blister agent. He said that the negative test was conducted in an area in between a number of rows of tents. He also said that he reported this information to his unit commander. In addition, Mr. Edwards said that a member of the unit, Tom Muse, blistered in the area under his watch during this event. The "all clear" was given from a higher command. Mr. Edwards was called out to serve on a chemical decontamination team that day. He said that the Mark 12 decontamination unit assigned to the team was inoperative and that he was assigned to take out a 500 gallon water truck and stand by to decontaminate incoming personnel. According to Mr. Edwards, no one was decontaminated by his team. He said that this was the only time he was called out on this type of mission throughout the entire war.

Other Information Regarding the Detection of Chemical Agents at Jubayl.

Ken Allison, then a Lance Corporal with the 174th Marine Wing Support Squadron, Group 37, was delivering supplies to Jubayl Airfield. During an interview with Senate staff, he reported that sometime during his deployment there, possibly in January 1991, he saw a sign posted on a guard shack at the airfield's southern gate. The sign warned: that the area had tested positive for chemicals; make sure your MOPP gear was ready; and that when the alarms go off it is for real. Although he did not recall the exact wording on the sign, he remembered the content clearly.

In addition, a number of British military personnel suffering from Gulf War Syndrome who were stationed near the Port of Jubayl have come forward and have described similar events.

Event 4:

Late February 1991
"Log Base Charlie", 7 miles from the Iraqi border near Rafha

Witness 01: Ms. Valerie Sweatman from Columbia, South Carolina, was serving as a telecommunications specialist with the U.S. Army, assigned to the 2nd MASH Hospital. Ms. Sweatman recalls that prior to moving to "Log Base Orange" in Iraq during the ground war, her unit packed up their equipment at "Log Base Charlie." "Log Base Charlie" was located about 7 miles from the Iraqi border, near Rafha. One night in late February 1991, she was awakened by a sergeant and was told there was a chemical alert and to go to MOPP level 4. She put on her MOPP suit and mask and began going outside while she was still putting on her gloves. Her unit stayed at MOPP level 4 for 1-2 hours. That night, she heard that at least one soldier had come into the hospital showing symptoms of nerve agent exposure. She was told that there was a SCUD alert that night. She did not, however, hear any explosion. The morning after this incident, Ms. Sweatman's hands were itching from the wrists on down. She had developed little blisters which went away about a week later. She was treated with ointments and benadryl for a "skin condition."

Ms. Sweatman had heard the chemical alarms go off on other occasions prior to the incident reported above. She was the night telecommunications NCO for her unit, and heard alarms sounding during the first nights of the air war, when her unit was assigned to King Khalid Military City (KKMC). On one occasion during this period, she heard a blast and felt a mist in the same area. After this incident she experienced nausea, diarrhea, and bloody stools. Her unit began taking the nerve agent pre-treatment pills (NAPP) after these earlier alarms. Although the alarms sounded, the NBC NCO claimed that they were sounding because the alarm equipment had bad batteries and not because of chemicals.

Ms. Sweatman currently suffers from headaches, exhaustion, fatigue, memory loss, nausea, muscle and joint pains, rectal and vaginal bleeding, and

rashes. She has been diagnosed as having arthritis, headaches, and post traumatic stress disorder (PTSD).

Event 5:

Early February 1991
In the Desert Between Hafir Al Batin and King Khalid Military City, Northern Saudi Arabia

Witness 01: Ms. Michelle Hanlon of Killeen, Texas was assigned to the 1st Cavalry Division as a communications specialist. On February 14, 1991, during lunch, she heard an explosion overhead. She thought at the time that it was a Scud being intercepted by a Patriot missile and thought nothing more of it.

On another occasion, when her unit was assigned to a field base near Hafir Al Batin, she recalled that one night, the night air breeze made her eyes begin to water. She immediately put on her gas mask and thought nothing more of the incident. She also reported that on a number of days, she could actually smell sulfur from the Coalition bombings of Iraqi chemical plants during the air war.

She is currently suffering from intestinal problems, hemorrhoids, occasional fatigue, a rash on her finger (like little water blisters under the skin), cervical infections which coincide with intestinal problems, and some memory loss. She feels that she is becoming progressively more ill. Her rash has been diagnosed as eczema and has been treated with antibiotics. She is 23 years old. Her child, now 16 months old, has been getting fevers, yeast infections, rectal and penile discolorations.

Witness 02: Mr. Richard Voss was with the 207th Military Intelligence Brigade assigned to the 1st Infantry Division. Mr. Voss recalled witnessing what appeared to be a missile attack while stuck in slow-moving traffic heading west toward Hafir Al Batin on Tapline Road in early February 1991. Mr. Voss reports that sometime between noon and 4:00 p.m., he watched the missile, coming in from the north-northeast, impact to the east of Hafir Al Batin, about one mile away from his vehicle. He saw a large dark brown cloud rise up. Within two or three minutes, MPs came by giving the gas alert signal. He recalled that the wind was blowing from the north or northeast at the time of the

incident. He continued to drive in traffic in MOPP gear for about 1-1/2 - 2 hours past Hafir Al Batin toward an assembly area. He got the "all clear" when he got near Log Base Echo.

Currently, Mr. Voss suffers from headaches, occasional fatigue, joint and muscle pain, memory loss/inability to concentrate, urinary urgency, dizziness, photosensitivity, shortness of breath, rashes, recurring walking pneumonia, chest pains, numbness, and severe joint pains in both wrists and hands. His wife suffers from recurring yeast infections, menstrual irregularities, rashes, fatigue, muscle pain, and severe joint pain in her wrists.

Witness 03: Ms. Patricia Williams of Nolanville, Texas was assigned to the 1st Calvary Division, near Hafir Al Batin, as a civilian mechanic. One late afternoon in mid-February, she recalled an explosion somewhere in the desert. She described it as a very powerful explosion that she both heard and felt. To her knowledge, no chemical alarms had been set up. Coincidentally, her unit was told that they were going to have a chemical practice; they were told to put on their chemical gear. They were kept at MOPP level 4 for about twenty minutes, but told that this was just a practice. They were also told that the sound they had just heard was a sonic boom. Five civilians were so frightened that they departed that night. She reports that of the forty people originally in her unit, only half are left. She said the rest were so scared that they went home. Ms. Williams said that she did not get sick in the Persian Gulf until this incident. After this incident, she experienced headaches, diarrhea, and photosensitivity.

Ms. Williams currently suffers from headaches, fatigue, joint and muscle pain, memory loss, lumps on her arms and neck, night sweats, insomnia, urinary urgency, diarrhea, photosensitivity, gastrointestinal problems, deteriorating vision, shortness of breath, coughing, thyroid problems, abnormal hair loss, swollen lymph nodes, sinusitis, and chest pains. She is forty-four years old.

Witness 04: A confidential source told Senate staff that, on February 14, he was in traffic between KKMC and Hafir Al Batin, near KKMC. Although he did not see or hear this event himself, Military Police with whom he spoke while in traffic told him that a Scud had been shot down near Hafir Al Batin. He was told that it was nothing to worry about. No one around him went to MOPP.

Event 6:

February 22, 1991, late afternoon or early evening.
Near King Khalid Military City (KKMC), Kingdom of Saudi Arabia

Witness 01: Charlene Harmon Davis was a medical secretary with the 34th Aeromedical Patient Staging Station at KKMC. She reported that, on February 22, she was getting ready for work (her shift began at 7:00 p.m.) when three of what she believed to be Scud missiles were intercepted over KKMC by Patriot missiles. Ms. Davis recalls that the chemical alarms went off. After these explosions, her face, eyes, and throat began to burn, her nose began to run, and she began to feel nauseous. There was a funny taste in her mouth. These immediate symptoms lasted for about twenty minutes, but she has gotten progressively more ill since that incident. When she sought medical attention after this event, the doctor told her that she might have had a contaminated gas mask, that the mask might have been contaminated by a previous user. Ms. Davis, however, said that she knew she was the first user of the mask because she broke the seal on it.

Ms. Davis currently suffers from migraine headaches, patellar syndrome, seborrheic dermatitis, hip pain, hair loss, insomnia, nightsweats, nightmares, numbness in toes, fatigue, joint and muscle pain, gastrointestinal problems, and dizziness. She also suffers recurring rashes which she says began after the first explosion, believed to be a Scud missile attack, occurred near her location a few days after the beginning of the air war. Ms. Davis reports that these rashes continue to be a problem to this day. She has advised Senate staff that she is extremely concerned about her health as well as her prognosis. She is twenty-eight years old.

Witness 02: David Pena was a mechanic with the 63 Army Reserve Command (ARCOM), attached to the 3rd Armor Division. He was stationed at Camp Texas, near KKMC. He reports that on approximately February 22, 1991, he was leaving a meeting at about 5:30 p.m. when he heard an explosion, and saw a cloud. His unit went to MOPP level 4 for 1.5 - 2 hours. Mr. Pena recalls that he became nauseous and had blurry vision. He felt very tired for the rest of the night. He recalled that several others in his unit also became nauseous and three or four others also became very tired. Two weeks later, at his

redeployment examination in Kuwait, he was told that he had developed hypertension.

Mr. Pena currently suffers from rashes over 80% of his body, respiratory problems, severe headaches, hypertension, vision problems, memory loss, muscle and joint pain, diarrhea, hair loss, insomnia, and chronic fatigue. He has been diagnosed with nerve damage to the back of the head, blurred vision, lung disease, and skin problems.

Event 7:

Approximately January 20, 1991, early morning (pre-dawn hours).
Vicinity of King Fahd International Airport

Mr. Rocky Gallegos was a Lance Corporal with Bravo Battery, 2nd Light Anti-Aircraft Missile Battalion. He observed what he believed to be a Scud missile shot out of the sky almost directly overhead by a Patriot missile while on the midnight-5:00 a.m. guard duty shift on approximately January 20. He reported that the explosion "blossomed like a flower." According to Mr. Gallegos, it exploded again when it hit the ground. Mr. Gallegos said that after the explosion he experienced a "very strong raunchy taste, like very bitter burnt toast" in his mouth. He also began experiencing headaches, nausea, diarrhea, and sensitivity to bright lights almost immediately after the attack. He did not hear the chemical alarms go off immediately. Approximately 10 minutes later, however, the alert alarms sounded and they were ordered to put on their masks.

Mr. Gallegos remained at his post until approximately 4:00 a.m., when he along with a lieutenant, a staff sergeant, and three other enlisted personnel, went on a patrol to investigate the incident. They drove in the general direction of the explosion, but were not able to find evidence of impact.

Mr. Gallegos remained outside until daylight, when he noticed that his hands were tingling and looked as though they were sunburned. During the events of the early morning, his hands had been the only exposed area; his face was covered by a hood, scarf, and glasses, but he removed his gloves to smoke a cigarette.

Later that morning, about a half hour after they returned from the patrol, Mr. Gallegos was assigned to drive the NBC NCO to check all of the chemical detection units. At the fourth or fifth unit, the NBC NCO came back with something written on a piece of paper. He shoved the piece of paper in his pocket and told Mr. Gallegos: "get me back to camp -- Now!" Mr. Gallegos described him as "very excited about something," but when questioned, the NBC NCO told Mr. Gallegos that it was none of his business.

Two days later, they again went out to patrol the area where the explosion occurred. According to Mr. Gallegos, they saw at least half a dozen dead sheep and a couple of camels that appeared to be very sick.

Unit officials would not tell Mr. Gallegos what had happened. He said that they told him that if it was of concern to him they would tell him. According to Mr. Gallegos, the wind was blowing from the northeast (southwesterly wind) at the time of the explosions.

Mr. Gallegos continued to suffer headaches, nausea, diarrhea, and photosensitivity during his tour of duty in the Saudi Arabia. He became more seriously ill about two weeks before leaving Saudi Arabia. He also suffers from sinus infections (bleeding), narcolepsy, blackouts, dizziness, rashes, hair loss, joint pain in his knees, elbows, and hands, dental problems, muscle pains and spasms, fatigue, night sweats, insomnia, nightmares, and blurred vision. Since his return from the Persian Gulf, his wife Laurie has had bladder surgery, mitral valve prolapse, disrupted menstruation, headaches, yeast infections, and a swollen thyroid. Her physician recently refused to continue treating her, according to Mr. Gallegos, telling her that she was so sick that he did not believe he could help her.

Event 8:

Early in the "Air War" --Approximately January 20, 1991
Dhahran, Kingdom of Saudi Arabia

Witness 01: Ms. Patrecia Browning of New London, North Carolina, then a Staff Sergeant assigned to the 227th Transportation Company, was at Khobar Towers in Dhahran when a Patriot missile intercepted what she believed to be a Scud missile directly overhead. Her unit went to MOPP level 4 for 3-1/2 - 4

hours. Ms. Browning said that her eyes began to burn, and she smelled a strong odor that reminded her of ammonia. Shortly afterwards she broke out in a rash and began experiencing headaches, nausea, vomiting, and sensitivity to bright lights.

Ms. Browning also reports that she received the anthrax vaccine and the pyridostigmine bromide anti-nerve agent pretreatment pills. She reported that when the latter caused her to have episodes of bloody vomiting, she was told to cut the pills in half. The vomiting did not stop, however, until she stopped taking the pill.

Ms. Browning, who is thirty-seven years old, currently suffers from memory loss, severe recurring headaches, fatigue, joint and muscle pain, recurring rashes, night sweats, sleepiness, diarrhea, gastrointestinal problems, dizziness, blurry vision and photosensitivity, coughing and shortness of breath, two duodenal ulcers, chest pains, heart arrhythmia, and erratic blood pressure. She said that many of these symptoms originated while she was still in Saudi Arabia.

Witness 02: Mr. Randall Vallee, a Sergeant with the 1113th Transportation Company, was at the "Expo," just north of Dhahran on January 20. He said that he remembers this incident well because it was the first time he came under attack. He heard two or three explosions and felt the concussion. He was outside at the time, with approximately fifteen others, getting ready to move to Tent City. It was nighttime, although he did not remember the exact time. They ran for cover in school buses parked nearby, but then officers began yelling at everyone to get back into the Expo center and go to MOPP level 4 immediately. While running back to the building, he recalled that the air raid sirens were not going off, but there were other alarms going off in the distance. He stated that he "did not think the alarms he heard were chemical alarms because he had been told that the chemical alarms didn't work; that they were just set up because it was standard operating procedure to have them." The air raid sirens went off after he got into the building. Once in the building, he put his chemical gear on and sat down. He recalled becoming nauseous, weak, dizzy, sweating profusely, his head throbbing, and becoming very, very thirsty, as though he were dehydrated. He stated that his vision became blurry, but at the time he thought it was either because of his mask or his sweating. The blurry vision didn't last long; the headache and nausea lasted about twenty

minutes, and he continued to feel weak and dizzy for about forty-five minutes. When he went outside, after the all clear was given, he immediately noticed a "very suffocating smell, as though there wasn't enough air to breath," "kind of like ammonia, but very strong." He recalled others commenting on the smell, which dissipated soon.

Afterwards, he took the nerve agent pre-treatment pill and boarded his bus for Tent City. Mr. Vallee recalled several attacks and the smell of ammonia several times while at Tent City. He said that the missiles were shot out of the sky so close to them that the fragments would land between the tents. Although his unit's chemical suits were used frequently, they were never replaced. He noticed as the days progressed that his chest "started getting tight," and he was getting "flu symptoms." The nausea, fatigue headaches and respiratory problems continued off and on. Finally he became "so dizzy that he couldn't walk." He was diagnosed with an ear infection, and sent home on January 28.

Mr. Vallee currently suffers very severe recurring headaches, fatigue, respiratory problems, joint pain, memory loss, recurring rashes, depression and irritability, night sweats, insomnia, blood in his urine, constipation, nausea, dizziness, shortness of breath and coughing, thyroid problems, flu symptoms, sinus problems and sensitivity to smells. He always feels cold, and takes medication for pain. His wife suffers from fatigue, yeast infections and menstrual irregularities. Mr. Vallee is twenty-seven years old, his wife is twenty-six.

Event 9:

During ground war; Task Force Ripper

In September 1993, a copy of an excerpt from "NBC Survivability from a User's Perspective," by Brigadier General Carlton W. Fulford, Jr., USMC, Director, Training and Education Division, Marine Corps Combat Development Command, Quantico, Virginia was received by the Committee. It states: "The most significant piece of detection equipment was the FOX NBC reconnaissance system. It demonstrated great detection and analysis capability and quickly moved. Its only disadvantage is that it looks like the Warsaw Pact BTR-60. To protect it from friendly fire, multiple U.S. markings were placed on the vehicle. The FOX was used primarily in mine field breaching operations. After the mine

field was cleared, the FOX was sent through as the lead vehicle. Within minutes, the FOX could confirm or deny the presence of chemical contamination in the area. If a CAM alarm sounded while a unit was moving, the FOX was sent to that location to confirm or deny the CAM's reading. False CAM alarms were attributed to the massive numbers of burning oil wells. In the three-day offensive operation in Kuwait, the CAM alarm sounded four times. In three cases, the FOX confirmed a false alarm. In the fourth case, the FOX indicated a lewisite agent. ***In the opinion of the chemical experts, according to General Fulford, the lewisite reading was attributed to the burning oil wells."*** (emphasis added)

Based on this report, research was done on the method with which the FOX vehicle detects chemicals. It uses some of the same techniques that field alarms might employ to detect chemical agents. In addition, however, it takes multiple air and ground samples and analyzes them using mass spectrometry.

Witness 01: On November 12, 1993, a Committee staff member interviewed CWO3 Joseph Cottrel, the chemical detection supervisor assigned to this vehicle -- a U.S. Marine Corps NBC warrant officer. During the interview, Mr. Cottrel said that he detected chemical agents on three occasions during the Gulf War. According to a memorandum written by Mr. Cottrel, "The first detection occurred near N. 28 degrees, 32 minutes latitude, and E. 47 degrees, 52 minutes longitude. The FOX vehicle detected blister agents at levels below IMMEDIATE threat to personnel (levels below ICt50). It was determined at the time that the rapid movement through the breach sites would not pose a threat to continued combat operations or require decontamination. Exposure time for individuals was not tracked or limited."

"The next detection happened the evening of the first day of the ground attack." (Note: Since the ground war began at night, this would have been the second evening of the ground war.) "As Task Force Ripper held positions around the Ahmed Al Jaber Airbase (N. 28 degrees, 56 minutes latitude, and E. 47 degrees, 50 minutes longitude), the FOX vehicle detected Lewisite blister vapors. This report was produced by the vehicle operator and given to myself. I reported the findings to division headquarters and requested directions in regards to the chemical agent printout. I was told to forward the tape up the chain of command which I did. ***A report came back that the FOX had alerted on the oil smoke. That was checked against the FOX. The computer had***

separated the petroleum compound from the chemical agent. The computer tape has been lost."

The only other detection CWO3 Cottrel was aware of occurred around a bunker complex in the vicinity of N. 29 degrees, 14 minutes latitude, and E. 47 degrees, 54 minutes longitude. The FOX crew was directed to check the area for chemical munitions. A report that some chemical vapors were found was reported. Shortly thereafter, Task Force Ripper was ordered back to the division support area and further detection operations were not carried out by the Task Force Ripper NBC unit.

Witness 02: According to Sergeant Robert A. Maison, Task Force Ripper detected chemical agents on the second night of the ground war. Sergeant Maison reported that as a nuclear, biological, and chemical recon team member, "our team observed an artillery attack to our northwest, at a distance of approximately four kilometers. About five to six minutes later an alarm was sounded by our detection equipment (a mass spectrometer) which is used specifically for that purpose. Taking into account the wind speeds that we were encountering (approximately 40 to 50 knots steady) the reading was not expected to last for a long duration, as it did not (approx. three minutes). The specific agent detected was lewisite in a concentration considered to produce casualties but not death."

"A second [detection] occurred while performing an area recon of an orchard. The second agent type was benzyl-bromide. No liquid contamination was located but the vapor concentration was of casualty strength and documented by the specific ion concentration and identity being printed out by molecular weight on the spectrum analysis printout."

Witness 03: A source who requested confidentiality reported to Senate staff that, on the second night of the ground war, mustard gas was detected by three FOX vehicles at Ahmed Al Jaber Airfield.

He stated that, about 4:30 or 5:00 p.m., "gas, gas, gas" came in over the radio. His unit went to MOPP level 4 for two hours before they were given the "all clear." About a half hour later, they were told that three FOX vehicles had detected mustard agent. After that, he recalled, they were in and out of MOPP gear all night.

Event 10:

Riyadh, date unknown.

Mr. Michael Kingsbury was a driver/mechanic with the 601st Transportation Company during the Gulf War. He was interviewed by Committee staff for this report. Mr. Kingsbury was in Riyadh for six hours rest and relaxation when the first Scud missile attack took place. Although he does not remember the date of the attack, he was certain that it was the first Scud attack on Riyadh. Mr. Kingsbury reported that three Scuds came in, the alarms went off, and they went to MOPP level 4. He immediately began to experience nausea and a sore throat. His nose began to run and his eyes burned a little. He reported seeing a rainbow in the sky after the attack.

The symptoms that began with the attack never went away. In addition, he began to suffer skin irritation after the attack. He began having stomach problems when he returned from the Gulf and currently suffers from memory loss, rashes, aching joints, headaches, rectal bleeding, nausea, sensitivity to light, abnormal hair loss, high fevers, clammy skin, lumps, bloody oral/nasal mucous, night sweats, sore muscles, and fatigue.

Event 11:

January 18, 1991, around midnight (poss. very early on January 19)
Log Base Alpha

Mr. William Brady was the Battalion Logistics NCO with the 217th Maintenance Battalion. Around midnight on January 18, or possibly very early on the 19th, Mr. Brady was awakened by what he believed to be a Scud intercepted by a Patriot directly over his unit's position. He said there was a deafening sound, a flash of light, and everything shook. Chemical alarms were going off everywhere, and there was sheer panic. He remembered the chemical litmus paper turning red, and a positive reading from an M-256 kit. Mr. Brady said that his nose began to run, and he smelled and tasted sulfur. He began coughing up blood a couple of days after the attack, and continued to do so "the whole time we were there after the attack." They remained at MOPP level 4 for five or six hours. They radioed the 16th Support Group, but did not get a response for a couple of hours. Eventually they were told to come to Group

Headquarters (Hq.) for a message that Hq. didn't want to radio over. The message said that what they heard was a sonic boom, and instructed them to perform another test. The second test, performed several hours after the initial test, was negative. Members of the unit were told that the M9 paper had turned red as a result of exposure to diesel fumes. The message also gave the "all clear" for people to come out of MOPP level 4, but, Mr. Brady recalled, everyone was afraid to unmask.

After they got out of MOPP level 4, Mr. Brady went with Lt. Bryant to deliver gas masks and nerve agent pre-treatment pills to the 344th Maintenance Company. When they arrived back at their unit, everyone was dressed in their full chemical suits at MOPP level 4. They were told that while they were out riding around (without a radio), there had been another attack.

Beginning on January 22, Mr. Brady began getting too sick to work. He had been taking the nerve agent pre-treatment pills since about January 17, and had been getting severe headaches from them. Approximately three days after the attack, his eyes began to burn, he developed a high fever, and "taking a breath of air made his lungs feel like they were burning up." He also had diarrhea, sores, nausea, and a runny nose. On January 24, he went to the 13th Evacuation Hospital, which had no beds available for him. He described the hospital as completely filled with people that seemed to have the same illness that he had. His January 26 diary entry said: "I'd rather die than feel like this."

Mr. Brady stated during the interview that he "is convinced that there was a chemical attack." He reported that "everyone started getting pneumonia- or flu-like symptoms after the attack,"...that the nerve agent pre-treatment pills "were useless,"...and that he is convinced that the PB tabs gave people headaches, but that they also "got hit with a nerve agent."

Mr. Brady currently suffers from severe recurring headaches, chronic fatigue, joint and muscle pain, rashes, depression, night sweats, insomnia, urinary urgency, diarrhea, gastrointestinal problems, lightheadedness, photosensitivity, shortness of breath, coughing, abnormal hair loss, sensitivity in his teeth, burning and itching everywhere, arthritis, worsening leg cramps, "flu symptoms all of the time," a tingling in his arms, and a "bulging disc" in his neck. He had a heart attack in May 1993. His wife is suffering from fatigue, yeast infections, a rash, sinus headaches, aching in her right arm and a loss of

feeling in her thumb, and two ruptured discs in her neck. Mr. Brady is forty-seven years old, his wife is thirty-seven years old.

Event 12:

January 1991 (4-5 Days into the Air War)
Near Ras Al Khafji

Mr. Norman Camp is a Staff Sergeant with the U.S. Marine Corps. He told Senate staff during an interview that he was near Ras Al Khafji several days into the air war when the chemical alarms went off, not only at their position, but also at their Division Supply Area, which was about 20 miles to their east. They went on 100% alert, but word was passed down from division not to go to MOPP. Sergeant Camp recalled that his whole platoon began falling ill the following night. He got headaches, nausea, and diarrhea for a day. Most others were sick for about a day and a half.

Sergeant Camp currently suffers from headaches, joint pain in knees and elbows, memory loss, night sweats, occasional insomnia, urinary urgency, dizziness, photosensitivity, shortness of breath, coughing, and heart problems. His wife suffers from fatigue, yeast infections, menstrual irregularities, joint and muscle pain, and chest pain. Sergeant Camp is thirty-six years old, his wife is thirty-two years old.

Event 13:

January 19 or 20, 1991, 3:30 a.m.
3-4 Kilometers West of Log Base Echo

Mr. Dale Glover was a Staff Sergeant with the 1165th Military Police Company. He recalled being awakened at 3:30 a.m.. The Battalion NBC NCO was announcing that they were under chemical attack. An M-256 kit registered a positive reading for a chemical agent. They went to MOPP level 4 for four hours. Afterward, all of them had runny noses.

When asked if people were made sick from the attack, Mr. Glover responded that most people were already sick from the pyridostigmide bromide pills. He said that they had been taking them for two or three days before the

attack and that "a lot of people got sick and three or four had to be medevaced out."

Mr. Glover currently suffers from headaches, fatigue, joint and muscle pain, an inability to concentrate, recurring rashes, irritability, night sweats, insomnia, diarrhea, gastrointestinal problems, dizziness, blackouts, excessive photosensitivity, sore gums, swollen lymph nodes, and a spot on his brain. His wife is suffering from fatigue, menstrual irregularities, yeast infections, joint pain, some memory loss, and hair loss. Mr. Glover is thirty years old, his wife is 28 years old.

Event 14:

February 25, 1991
In Iraq, near the Kuwait Border

Mr. John Jacob, a mechanic with the 1st Infantry Division, was on a road march with Task Force 216. He was sitting in the driver's seat in his humvee when he detected what he believed to be gas. He recalled "getting a whiff of" a sweet, almond-like taste and smell, accompanied by a sudden burning in his throat and lungs, watering eyes, blurry vision and photosensitivity, nausea, dizziness and diarrhea. He donned his mask and gloves, and sounded an alarm. He recalled that whatever it was seemed to come through the driver's side window, as though something was caught in the wind and just drifted into his face. Although no one else seemed to be affected - Mr. Jacob said the others looked at him as though he were crazy - his symptoms never went away. Afterward, he began to get headaches as well. His coordination was "messed up" for a couple of days after this incident. Mr. Jacob said that he later heard that a couple of people in his convoy detected something, but does not have any additional information. He says his M9 paper did not register anything.

Mr. Jacob says that he has been sick ever since that incident, and in addition to those symptoms already described, currently suffers from fatigue, joint and muscle pain, memory loss, recurring rashes, lumps at joint areas, night sweats, depression and irritability, insomnia, urinary urgency, gastrointestinal problems, shortness of breath, coughing, abnormal hair loss, dental problems, swollen lymph nodes, and a foot fungus that will not go away. Mr. Jacob is thirty-one years old.

How these events occurred is a matter for legitimate debate. But given the absence of a credible explanation -- one which explains what occurred during these events, methodical and detailed testing and analysis of the causes of the symptoms these individuals are experiencing and how these symptoms are transmitted must be undertaken. This is not only a matter of providing medical care to veterans and their families, but also a matter of national security. Many of the servicemen and women interviewed believe the foregoing events occurred as a result of Scud or FROG missile attacks. Since the first staff report was issued last September, however, it has been learned that there are other methods by which Iraqi chemical and biological materials might have been dispersed.

A number of troops who were assigned to perimeter security posts have described to Committee staff individuals, who appeared to be Bedouins, who would leave canisters of what they believed to be chemicals outside perimeter fences and would then speed off in their four wheel drive vehicles. In these cases unit NBC NCOs would be assigned to check the canisters. Others talk about indigenous peoples leaving dead animals laying on airstrips used by U.S. personnel or about their tossing dead animals over perimeter walls in protest of the U.S. presence in Saudi Arabia. Still others have told of snipers and other Iraqi special operations missions that occurred as far south as Dhahran during the war.

Reports by Coalition Forces of Iraqi Chemical Mines Located During Breaching Operations

The following accounts provide additional evidence of exposure to chemical warfare agents.

Event 15:

February 24, 1991

The first encounter with chemical mines came at 6:31 a.m. on February 24, 1991, during the initial mine field breaching operation by the 2nd Marine Division. According to the Chicago Tribune, which interviewed officers and enlisted marines involved in the operation, a FOX vehicle confirmed positive readings for a nerve agent and for mustard gas. A second detecting device gave the same positive reading. General Keys, the 2nd Division commander, and

Col. Livingston, commander of the 6th Marine Regiment, told reporters that they believe it is possible that a chemical mine was blown up or hit.

On April 20, 1994, Committee staff received the Battle Assessment Documentation of the 6th Marine Regiment, Operation Desert Storm. [3]

According to that report:

24 Feb 1991 G Day

0630	B Co., 1/6 [Regiment] blows line charge across first mine field in Lane Red 1. C Co., 1/6 engages possible BMPs with M60A1 main tank gun. Target missed due to poor visibility.
0631	B Co., 1/6 reports possible nerve agent in first minefield in Lane Red 1.
0635	B Co., 1/6 is at MOPP level 4. Fox vehicle confirms positive sarin nerve agent and lewisite mustard gas, vic Lane Red 1.
0650	1/6 reports possible nerve agent/mustard agent between obstacle belts.
0730	Rgmt S-2 reports to the 2nd Marine Division that Lane Red 1 is considered contaminated for the first 300m only.
1210	Rgmt S-2 reports TACC reported large number of dead sheep near King Khalid, possible anthrax. MAG-13 reports enemy forces moving rapidly south along highway from Kuwait City. Unknown number of tanks.

[3] Battle Assessment Documentation of the 6th Marine Regiment, Operation Desert Storm

26 Feb 1991 G+2

1537 3/23rd under NBC attack, in MOPP 4; remainder 8th Mar in MOPP 2.

1640 B Co., 1/6 clears Army stores camp, finds large number of weapons and ammo, to include 155 arty shells painted completely yellow. Fox vehicle reports negative findings.

During the war, General Schwarzkopf told reporters *he considered* the reports of chemical agent detection on 24 February 1991 "bogus."[4]

Event 16:

During the Ground War

British troops discovered Iraqi chemical mines on the gulf battlefield, according to Gannett News Service. An official said that the incident was reported to Prime Minister John Major's war cabinet; no details were given.[5]

Other Combat-Related Reports

Event 17:

January 21, 1991
Taif, Saudi Arabia

Sergeant Thomas House served with the 2953rd Combat Logistics Support Squadron (CLSS), attached to the 48th Tactical Fighter Wing in Taif. Sergeant House's duties included the decontamination of U.S. Air Force F-111s that returned from bombing raids against Iraqi chemical and biological warfare facilities. According to the unit's records, the unit aircraft bombed 32 chemical targets, 113 bunkers, 11 Scud missile sites, and 4 mine entrances.

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[4]John Harwood and David Dahl, "Allies Overrun Iraqis; Capture Thousands," Times Publishing Company, St. Petersburg Times, (February 25, 1991), 1A.

[5]"British Report Finding Iraqi Chemical Mines," Reuters (February 28, 1991), BC Cycle.

Sergeant House and several others in his unit assigned to perform decontamination duties had worn only MOPP suits and had used water to decontaminate the aircraft. Sergeant House, whose primary duties are as an aircraft mechanic, later learned that chemical decontamination solutions were supposed to be used and that special suits were supposed to be worn.

On the evening of January 21, 1991, after decontaminating several aircraft that had returned from a bombing raid, Sergeant House's face began to burn and swell. He also noted a pungent odor. The following day, Sergeant House went to a U.S. Air Force medical facility. His U.S. Air Force medical records confirm this report. Shortly after the incident he began to experience headaches, coughing, nausea, vomiting, and diarrhea.

Sergeant House is currently suffering from recurring headaches, fatigue, joint and muscle pain, memory loss, recurring rashes, lumps under the skin, depression, irritability, night sweats, insomnia, urinary urgency, diarrhea, gastrointestinal problems, dizziness, blurry vision, photosensitivity, shortness of breath, coughing, bleeding gums, swollen lymph nodes, seizures, shaking, vomiting, fevers, chest pains, sinus infections and sinus growths. He is 32 years old. His wife currently suffers from nearly all of the same symptoms.

Seven other members of this unit have reported to Committee staff that they experienced similar exposures. They also currently suffer from similar symptoms.

Conclusions

- **Iraq intended to use weapons of mass destruction against coalition forces and had the means to deliver these weapons.**
- **Events did not occur until the air war began.**
- **There are multiple witnesses to what appear to be best explained as chemical or mixed agent attacks. Symptoms appeared simultaneously with alarms going off, Patriots intercepting Scuds, alert alarms going off, etc.**

- Smells, tastes, burning, stinging, numbness are all consistent with chemical or mixed agent attacks.

- Removal and replacement of MOPP gear is consistent with SOP for contaminated equipment.

- Sonic booms are not explosions associated with fireballs and it is unlikely that a commander would order troops not to discuss sonic booms.

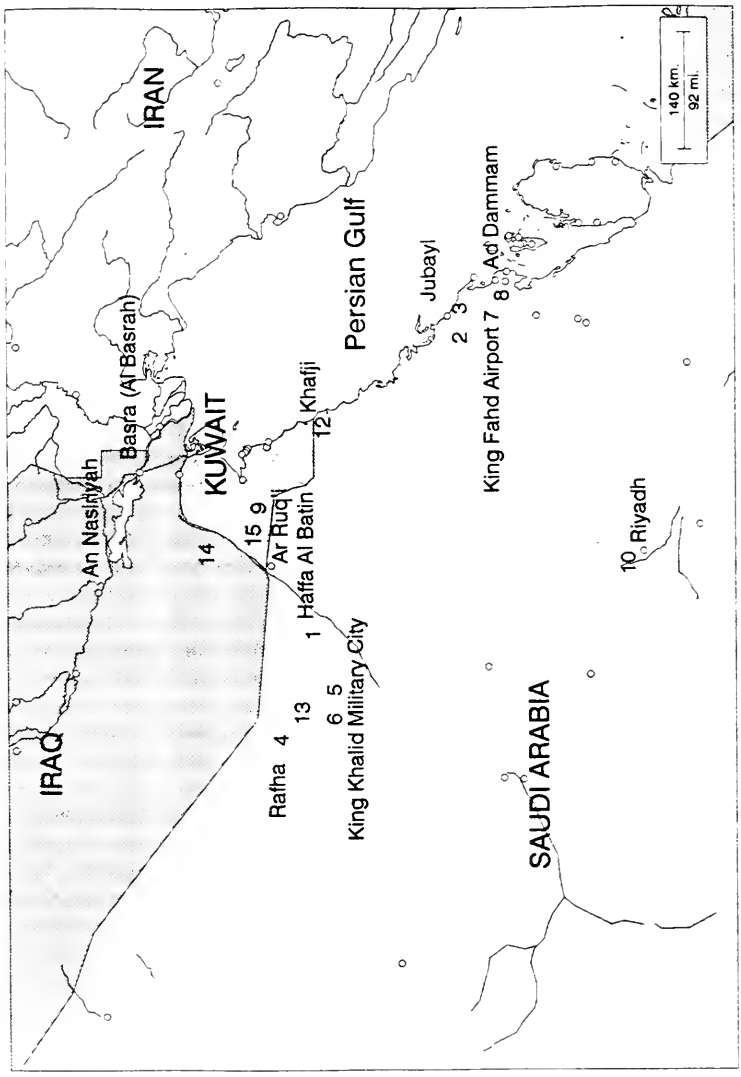
- Rates of illnesses are reportedly high in these units.

- Servicemen and women have not received credible explanations of the events from commanding officers.

- The Department of Defense has consistently denied that there is evidence to exposure to chemical and biological warfare agents by U.S. forces, altering its position on specific aspects of this issue only when challenged with evidence that is difficult to dispute.

- The fact that the "sonic boom" explanation was utilized in units subordinate to different services to describe suspicious events and was followed by orders not to discuss the event, suggests that this explanation originated at least at the theater level. Visual observations reported by field forces suggest this explanation was unrelated to the actual nature of these events.

Map: Approximate Locations of Direct Exposure Events



Chapter 3. Reports of Exposure of Coalition Forces Resulting from the Fallout of the Bombings of Iraqi Chemical, Biological, and Nuclear Facilities (Group II)

There were serious concerns expressed prior to the Persian Gulf War about the fallout that would be caused by the bombing of Iraqi chemical, biological, and nuclear weapons production facilities, storage depots, and bunkers. Certainly these bombings were a necessary part of the conflict, but the consequences as well as the necessity must be acknowledged.

U.S. military doctrine warns that, according to its calculations, the use of a nerve agent against a target area of no more than a dozen hectares (a hectare is about 2.47 acres) can, under certain weather conditions, create a hazard zone downwind of up to 100 kilometers in length. Within this downwind area, friendly military units would have to take protective measures.[1] The amount of agent and materials targeted during the Coalition bombings in Iraq exceeded the amounts cited in the example above certainly by multiples and possibly by orders of magnitude.

The dispersal of the chemical agents and other hazardous substances is controlled by factors such as topography, wind velocity, direction, temperature, precipitation, vertical temperature gradient and atmospheric humidity. These factors will all contribute to the size and type of dispersal pattern which will be observed.[2] Unclassified U.S. satellite imagery confirms that debris from the Coalition bombings was upwardly dispersed, rather than downwardly dispersed as would occur in offensive use, causing chemical agents to be carried by upper atmospheric currents and distributing "trace amounts" of chemical fallout over "down weather" positions. Material distributed from the destruction of the ammunition bunkers and storage depots also travelled upward and outward as confirmed in videotaped records of the destruction of these bunkers obtained by

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[1]United States, Department of the Army, Field Manual 100-5, Operations (Washington, D.C.: U.S. Army, August 1982), 7-13;Joachim Krause and Charles K. Mallory, Chemical Weapons in Soviet Military Doctrine: Military and Historical Experience, 1915-1991, (Boulder, Co.: Westview Press, 1992), 142-143.

[2]Ibid.

Committee staff. These concerns relating to the fallout from the destruction of these materials were expressed by several credible sources as noted below:

1. As a result of these concerns prior to the war, several of the U.S. national laboratories were consulted and/or prepared reports for the U.S. Army, the U.S. Air Force, and the Department of Energy, advising of the hazards which were associated with bombing these facilities.[3]

2. Prior to the war, Soviet chemical weapons expert I. Yevstafyev publicly advocated withholding information from the Coalition forces on chemical weapons and military facilities supplied by Moscow to Iraq, on the grounds of national security. "Strikes on chemical and biological weapons facilities on Iraq's territory could rebound on us and cause damage to the population of our country." [4]

3. On February 4, 1991, media sources reported that General Raymond Germanos, a spokesperson for the French Ministry of Defense, confirmed that chemical fallout -- "probably neurotoxins" -- had been detected in small quantities, "a little bit everywhere," from allied air attacks of Iraqi chemical weapons facilities and the depots that stored them.[5]

4. In late July, 1993, the Czech Minister of Defense confirmed that a Czechoslovak Federative Republic military chemical decontamination unit assigned to an area near the Saudi-Iraqi border had detected the chemical nerve agent Sarin in the air during the early stages of the Gulf War. In this unit, 18 of 169 individuals are believed to be suffering from

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[3]Interviews with representatives of Lawrence Livermore National Laboratory, Livermore, California, Sandia National Laboratory, Albuquerque, New Mexico, and Los Alamos National Laboratory, Los Alamos, New Mexico.

[4]Stephen Handelman, "Kremlin Growing Frustrated with Outsider," Toronto Star (February 10, 1991), H4.

[5]"Chemical Fallout Detected in Iraq," Xinhua General Overseas News Service (February 4, 1991).

Gulf War illnesses.[6] While the report goes to some length to refute any allegations of the detection being the result of a direct chemical attack, it does defend the ability of the Czech chemical detection equipment to irrefutably confirm traces of chemical warfare agents. Further, the U.S. government, in the November 10, 1993, briefing only referenced the detection of the nerve agent Sarin (GB) by the Czech forces on January 19, 1991. The Czech document, however, states that both Sarin and Yperite (HD) were detected that day. The fact that multiple agents were detected in measurable airborne concentrations suggests that the agents may have emanated from fallout from Coalition bombings of Iraqi chemical weapons plants or storage bunkers, or from a direct mixed agent attack.

The Czechoslovak Chemical Defense Unit in the Persian Gulf and the Results of the Investigations of the Military Use of Poisonous Gases.

This section contains the main body of the translated Czech government report, prepared by the Czech Ministry of Defense in response to requests from Members of the Congress of the United States. Following this translation of the report are related accounts from independent sources.

The unit of 169 Czechoslovak military specialists was dispatched into the Gulf on the basis of an agreement between the governments of the Czech and Slovak Federative Republic (CSFR) and the government of the Kingdom of Saudi Arabia (KSA) regarding their activities and the conditions of their stay in Saudi Arabia. This Agreement was signed in Prague on November 19, 1990 and amended in Riyadh on November 22, 1990. The Federal Assembly of the CFSR ratified this Agreement. Resolution 97 was modified by an amendment by the Federal Assembly, authorizing the government of the CFSR to accept a provision of the agreement to permit the crossing of the international borders between the Kingdom of Saudi Arabia and Kuwait. The Government gave its approval through Resolution 71, dated January 31, 1991.

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[6]Dave Parks, "Czechs: Nerve Gas Detected During Gulf War," The Times Picayune (July 30, 1993), A6; Stanislav Mundil, Czech News Agency and Mlada Fronta Dnes (July 29, 1993).

By executive order of the Commander of the Northern Region of the Ministry of Defense of the Kingdom of Saudi Arabia, the unit was assigned on the 22nd of December, in accordance with Article IV of the Agreement, to the military configuration of that region. As of January 1, 1991, the two chemical defense platoons were assigned to the 4th and 20th Brigades of the Army of the Kingdom of Saudi Arabia. The remainder of the unit was assigned to the base camp and to the headquarters.

Dislocation and strategic command of the unit was completely within the power of the Army of Saudi Arabia. Colonel Jan Valo, commander of the unit, provided specific assignment orders. His duty was to assure that in the course of fulfilling their duties, no Czechoslovak law or basic standard of international law was violated.

Beginning on January 27, 1991, the two chemical defense platoons were assigned to the Kingdom of Saudi Arabia brigades, crossing the border into Kuwait. They participated actively in assuring the anti-chemical defenses of the allied units during their execution of the operational plan. On February 5, 1991, the unit was supplemented, bringing its total numbers to 198 people.

The Czechoslovak anti-chemical defense unit primarily performed the following tasks:

1. *Anti-chemical defense of the headquarters of the northern region troops located in the area of King Khalid Military City;*

2. *Anti-chemical defense of the 4th and 20th Brigades of the Kingdom of Saudi Arabia;*

3. *In the case of chemical attack of personnel, provide on their behalf facilities for chemical treatment and decontamination.*

A part of the anti-chemical defense provisions was continuous chemical intelligence and surveillance, with the objective to identify the use of poisonous substances, provide data for alerting forces, and assist commanders in their decision-making.

During the period after the commencement of the war on Janaury 17, 1991, borderline concentrations of poisonous substances were identified in the air by our chemical surveillance. In the Commander's Report, covering the anti-chemical defense battalions' activities during the period from January 1, 1991 until February 28, 1991, it specifically stated.

" During this period borderline life-threatening concentrations of the chemical agents yperite [HD] and sarin [GB] were identified several times in both areas of the brigades and in King Khalid Military City (i.e., in the military encampment where the unit was stationed) probably the result of the Allies' air attacks on the storage facilities of chemical ammunition in the territory of Iraq." This information had been published at the time in the Czechoslovak media."

This aforementioned fact was confirmed by members of the battalion, chemical defense specialists who evaluated and ordered measures for personal protection, (see Attachments - pages from the book of the Operations Unit of the General Command of the Czechoslovak Army in Prague, record #56), and all means of anti-chemical defenses were employed. After about two hours the alert was called off when repeated confirmation tests provided negative results.

The concentrations found, "0.002 grams of yperite per cubic meter and 0.003 mg per liter of an unspecified poisonous substance," [later identified by DoD as Sarin] are at the border of the maximum permitted threshold concentration affecting human organisms. These, however, were only one-time positive results from chemical surveillance which were not confirmed by anyone from the other participating countries. This was supported by the report on January 31, 1991:

"Since January 19th, the Czechoslovak unit has not found any other chemical substances."

The Czechoslovak anti-chemical defense unit had at its disposal all modern chemical surveillance and control technology. These are able to identify borderline levels (levels that do not affect the functions of human organisms) of suspected toxic substances and they can differentiate the nerve agents, such as sarin, from "V" agents.

The assertion that the chemicals were of very low concentrations that do not even cause temporary or minute changes in human organisms can be supported by the following facts:

1. *The results of the aforementioned surveillance;*

2. *No signs of exposure to toxic materials were traced to personnel on site (toxic nerve agents, like sarin, cause instant reactions; for example: myosis. In the case of yperite, the first clinical signs of poisoning usually appear within 4 to 6 hours after exposure);*

3. *None of the personnel present had any later effects (related to exposure).*

All of the chemical specialists were professional soldiers (there were 56 of them assigned over the length of the conflict). They are all graduates of military colleges and middle schools with a chemical defense major, and according to the curriculum, worked with highly toxic substances both in the laboratories and in field training. The training of anti-chemical specialists with selected types of poisonous materials had been conducted practically since the beginning of the anti-chemical defense program in 1956 until February 1990, when such training was halted because of complaints of destruction of the environment from environmental protection movements and the mayors of communities.

The anti-chemical defense specialists who had undergone this training are professionals, and they are able to identify the presence of toxic materials in the terrain, on military equipment, and in the air within the sensitivity ranges of the instruments used. Therefore, there is a high probability that the identified presence of poisonous materials is an objective analysis. At the same time, concentrations that are used at chemical field exercises and in laboratories are several times higher than the concentrations that were measured in the Persian Gulf.

It has been proven that military use of chemical weapons by Iraq did not occur and any such fact would have already have been subjected to extensive investigation by agencies of world peace organizations. One can consider that the data measured could have had origins from industrial facilities or even

storage facilities of chemical ammunition that were hit by allied bombardment. This is supported by a report of the unit's commander, by my statements, and by other direct participants. All members of the unit were equipped with the most modern means of protection against toxic substances. They were fully comparable with the current world standard. Any kind of exposure by these types of toxic substances would manifest itself immediately or in a very short time, and nothing of this kind has been reported. Latent damage, if it can even be considered in this group, would surely have been uncovered during exit examinations.

On the basis of the abovementioned facts, one can conclude that the event cannot in any way be connected with the use of chemical weapons or their use in battlefield activities, and harm to the Czechoslovak anti-chemical defense unit due to the military use of toxic substances could not have occurred.

These conclusions also are supported by health care specialists. Neither at the time of identification of the toxic substances, nor later, was any member of the unit put under medical care as a result of exposure at this event. All members of the unit were subjected to a complex examination in military hospitals after their return from the Persian Gulf -- primarily in the Central Military Hospital in Prague. Even there, no serious changes caused by demanding climatic conditions or by exposure to toxic substances were identified.

Many veterans of the Persian Gulf conflict later participated in, and still participate in, activities of the unit in the Czech Republic Army in Yugoslavia. Even at the time of their departure, no one mentioned any problems.

Despite this, as of 31 August 1993, military doctors had examined 18 Persian Gulf veterans who suffered certain health problems, and three of them remain under a doctor's supervision. So far, in their cases, nothing has been identified beyond 'routine' problems related to similar long-term stays abroad.

Other Related Information:

On October 8 1993, U.S. Senate staff interviewed Joseph Boccardi, who initially came forward with information about the detection of chemical agents by the Czechoslovak chemical detection unit prior to the release of the Czech

86-558 95 – 12

report quoted above. According to this witness, a former member of the U.S. Army assigned to the 1st Cavalry Division as an M1A1 tank crewmember (driver/loader/gunner), he was injured when he fell off of a tank during his service in the Gulf War. He was sent to a medical holding area in northern Saudi Arabia. While there, he was befriended by a lieutenant assigned to the holding unit (Lt. Babika). The lieutenant came to him one day and told him to come along with him.

According to Mr. Boccardi, he and the lieutenant drove about 15-20 minutes to a facility that he was told had been used as a Saudi basic training camp. Mr. Boccardi described the facility as beautiful and palace-like (near King Khalid Military City). Once inside, the lieutenant began speaking a foreign language which Mr. Boccardi believed to be Russian to two soldiers armed with AK-47s standing at the top of a staircase. The soldiers answered. The lieutenant explained that he was speaking Czech and that these soldiers were also Czech.

Mr. Boccardi said that he and lieutenant went into a room where there were about nine soldiers, smoking, drinking vodka, and playing cards. He learned that they were a NBC (nuclear, biological, chemical) team. He asked someone there "if we were kicking their butts so bad, why didn't they hit us with chemicals?" At that, everyone in the room got quiet and the Czech colonel spoke in "broken English" for the first time. He said, according to Mr. Boccardi, "they did hit us with chemicals." According to the Czech colonel, a SCUD hit where they were staying. As soon as they learned that the Patriot had missed the SCUD, they put on their chemical gear and went out onto a balcony near the railing. The Czech colonel said they detected traces of Sarin and another gas which Mr. Boccardi believed began with the letter T.

According to Mr. Boccardi, the Czech colonel said that he called U.S. command officials about the result of their tests. He, the Czech colonel, said that he was told not to say anything about it. The colonel also said that he later heard that a number of the soldiers in the area developed skin rashes shortly after this incident.

After this part of the conversation, the individuals discussed in general terms why they were not supposed to discuss the incident. This Czech colonel was identified as the commanding officer of this unit.

On December 5, 1993, according to published press reports, Jean Paul Ferrand, a logistics officer with the French contingent, told Senator Richard Shelby that nerve agents and mustard agents were detected on January 24 or 25, 1991, in an area south of King Khalid Military City. According to an Agency France Press report on that date, Ferrand said that two chemical weapons alarms went off when a storm blew wind from Iraq. Ferrand was also attributed as having said that special badges worn on the troops protective suits also registered the presence of chemical weapons.[7]

On Monday, March 28, 1994, Committee staff were contacted by a member of the 371st Chemical Company, located in Greenwood, South Carolina. This individual said that during the Gulf War, he served with the 1st platoon of this unit in the vicinity of King Khalid Military City (KKMC). According to this individual and several other members of his platoon interviewed by Committee staff, two days after an Iraqi Scud missile warhead had exploded in the desert, his platoon was sent to a site in the desert a few miles south of KKMC to train with the Czech chemical detection team that had conducted initial tests. They also were trained on the Czech equipment. According to two additional members of the platoon who trained with the Czech team, and were interviewed by Committee staff on April 4, 1994 in the Army Reserve Center in Greenwood, South Carolina, the Czech colonel who commanded the unit had told them that his unit had detected measurable quantities of chemical nerve agent immediately after the Scud attack Unit members were not able to determine the exact date of the incident, but believe it was sometime in mid to late-January 1991.

The members of the unit described the facility where the Czechoslovak team lived as the "glass palace." They believed that it had previously been used as a Saudi military engineering training facility. The members of the U.S. unit who trained with the Czechs, all NBC specialists, said that the Czech equipment appeared to be more reliable than their own.

The unit Executive officer and first sergeant, while not present during the training mission, confirmed that they too were aware of the training, the missile

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[7]"Senator Says France Detected Chemical Agents in Gulf War: Report," Dateline: Birmingham, Agency France Presse (December 5, 1993); "France Says Gulf Troops Detected Chemicals," The Washington Post, from the Associated Press (December 5, 1993), A24.

attack, and the reported detection of the chemicals. The unit first sergeant said that this information had been recorded in the units logs, but that he received a message to send the logs to Washington, D.C. for historical purposes shortly after they returned from the Persian Gulf.

When asked if their unit did biological agent testing after incoming missiles had detonated, members of the unit said that they had no biological agent testing capability. While there were several other NBC units in the area, they were unaware of any unit that was conducting biological agent tests.

Finally, the unit said that they had been deployed on several occasions to decontaminate the buses and other vehicles that were used to transport Iraqi enemy prisoners of war to detention facilities.

One member of the unit estimated that as many as 85% of the members of this unit are currently suffering from many of the symptoms associated with Gulf War Syndrome.

U.S. Unofficial Reports of Downwind Exposure Due to Coalition Bombings of Iraqi Chemical and Biological Facilities.

1. During the early phases of the air war, there was extensive media coverage of the coalition bombing of Iraqi chemical, biological, and nuclear facilities. ABC News reported that on January 27, 1991, near the Saudi-Kuwaiti border, elements of the 82nd Airborne Division went through a chemical alert drill that was more than an exercise. According to ABC News coverage, their sensors actually registered traces of chemicals in the air, the result, it appeared, of allied bombing of chemical plants in Iraq. A U.S. medical corpsman told reporters, "When the Air Force bombers hit all the gas places there in Iraq, there's a lot of contamination in the air. Some may have filtered down and set these things off. They're very, very sensitive."[8]

2. Brian Martin, of Niles, Michigan, a Gulf War veteran of the 37th Airborne Combat Engineer Battalion, 20th Airborne Brigade, 18th Airborne Corps, arrived in Saudi Arabia on October 8, 1990. According to

[8]Sam Donaldson, "This Week With David Brinkley," ABC News (January 27, 1991)

Martin, in late January 1991, while assigned to an area between Rafha and Naryian about six miles south of the Iraqi border, he recorded in his journal and on videotape that chemical "false alarms" were going off almost every day. At first, according to Martin, the alarms were explained as being caused by vapors coming off the sand. Later, since the alarms kept going off and the troops no longer believed that they were being caused by the vapors, Martin said he was informed by both his battalion commander and the battalion NBC NCO that the alarms were sounding because of "minute" quantities of nerve agent in the air, released by the coalition bombing of Iraqi chemical weapons facilities. The troops were assured that there was no danger.

Mr. Martin believes that he witnessed a Patriot intercept of an incoming SCUD missile between Khafji and Wadi Al Batin during the air war period. He was also given the anti-chemical warfare medication pyridostigmine bromide, and suffered some adverse side effects. He says the drug made him jittery and made his vision "jiggle." Since returning from the Saudi Arabia, Mr. Martin has experienced memory loss, swollen and burning feet, joint disorders, muscle weakness, heart palpitations, shortness of breath, rashes, fatigue, headaches, insomnia, bleeding from the rectum, chronic coughing, running nose, burning eyes, and uncontrollable shaking on his right-side extremities.[9]

3. Mr. Troy Albuck, former anti-tank platoon leader with the 82nd Airborne Division, reported to Committee staff that his unit was told that the chemical alarms were going off because of what was drifting down from the Coalition bombings. He explained that his understanding of the situation was that "it was a lot like the effect of gasoline fumes," in that non-lethal exposure was not harmful and would be counteracted by fresh air.[10]

4. Another source who requested confidentiality reported that he was located approximately 40 miles due east of King Khalid Military City (KKMC), when at one position, every M-8 alarm went off -- over 30 at once. The

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[9]Telephone interview of Brian Martin by Committee staff on August 31, 1993.

[10]Staff Interviews.

date was between January 20th and February 1, 1991. The NBC NCO radioed in that a nerve agent plant had been bombed about 150 miles away. The source recalled that they were told to take no action and they did not.[11]

Weather Reports, Climatic Information, and Imagery Smoke Plume Data

Operation Desert Storm

Weather reports during this period were censored by the U.S. and Saudi governments. But environmental groups monitoring an oil spill in the Persian Gulf confirm that the winds were at times blowing from the northwest to the southeast. The chemical and biological warfare agent production plants heavily bombed by the coalition forces during this period are located in Iraq to the north and northwest of coalition troop deployments along the Saudi-Iraqi and Saudi-Kuwaiti border.[12]

As cited above, the dispersal of chemical agents and other hazardous substances is controlled by other factors in addition to wind direction and velocity, such as topography, temperature, precipitation, vertical temperature gradient, and atmospheric humidity. These factors all contribute to the size and type of dispersal that will be observed.

In March 1992, the U.S. Air Force Environmental Technical Application Center published a compendium of the weather during Operation Desert Shield and Operation Desert Storm. The following is a summary of relevant data for January 17, 1991 through March 2, 1991, excerpted from Gulf War Weather. The report documents the changing weather conditions, detailing the wind and rain patterns that could easily have delivered chemical and biological agents to Coalition troop emplacements. On many dates, this report notes the smoke and dust from the bombings and from the burning oil wells. The notation of visible smoke plumes is not intended to depict the actual fallout from the bombed

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[11]Staff Interviews.

[12]Ronald A. Taylor, "Air Masses Battle Over Desert Also," Washington Times (January 24, 1991); "Skies Could Clear in Gulf by Sunday," Reuters (January 25, 1991).

chemical, biological, and nuclear facilities, but rather to generally reflect the direction of movement of debris from the bombings.

Gulf War Weather
17 January 1991

There were extensive early morning clouds over the entire area. These clouds gradually moved southward during the day as their bases raised to 8,000 feet. Broken to overcast high clouds from the approaching frontal system began to move in after 1200Z, quickly spreading over the entire area with ceilings from 20,000 to 25,000 feet. The high cloud base thickened and lowered to 10,000 to 15,000 feet by the end of the day.

Winds were from the south or southwest at 6-20 knots, becoming southeasterly after 1200Z and 3-12 knots after sunset.

Early morning visibilities were as low as 3,200 meters with patchy ground fog in west central Iraq. Blowing sand and suspended dust reduced visibility to 3,200 meters during the afternoon on the Saudi Arabia - Iraq border.

High temperatures were 13-22 degrees celsius; lows 6-10 degrees celsius.

18 January 1991

The entire area was covered by clouds with bases at 10,000-15,000 feet. These quickly lowered to 3,000 feet and, in some places, to as low as 1,500 feet. The western part of the area began clearing in the afternoon, but 200 foot ceilings formed throughout the area by the end of the day. Clouds were layered to 30,000 feet from central Iraq to southeastern Kuwait.

Light rain fell throughout the area, beginning as early as 0500Z and lasting past 1800Z in eastern Iraq.

Winds were east to southeasterly at 5-15 knots.

Visibilities were 5 km in morning ground fog and 3,200 meters in rain. After the rain passed, visibilities were as low as 4,800 meters in haze and fog, falling to 1,600 meters by the end of the day.

High temperatures were 16-22 degrees C; lows, 8-13 degrees C.

19 January 1991

High pressure was centered in central Iraq and central Saudi Arabia. The stationary frontal system over the area became active when an upper-air disturbance crossed it. A low pressure cell developed and moved the front southward.

The entire area was covered with low clouds with bases at 100-200 feet. By 1200Z the northern part, including Baghdad had cleared. Ceilings in the southern section rose briefly at midday to 1,000-1,500 feet , then returned to 500-1,000 feet for the rest of the day. After sunset the clouds spread northward into the Baghdad area, were ceilings were 1,500 feet. Middle and high clouds, layered to 25,000 feet with bases at 10,000 feet, were also present over the southern area throughout the day.

Winds were east to southeasterly at 5-15 knots, becoming north to northeasterly at 10-20 knots in the afternoon and diminishing to 3-10 knots after sunset."

Morning visibilities were near zero in dense fog throughout the area. The northern section cleared by 1200Z. Visibilities in the south rose to 3,200 meters at midday, then returned to as low as 800 meters for the rest of the day. Visibilities in the northern section were as low as 1,600 meters after sunset.

Temperatures fell in response to northerly winds. Highs were 10-18 degrees C; lows, 0-10 degrees C.

The Czechoslovak chemical detection team detected the nerve agent Sarin (GB) in two separate location during the morning hours. In addition, Yperite (HD) was also detected. As noted above, the frontal patterns during this period moved to the south-southeast.

20 January 1991

A weakening low-pressure area moved southeastward down the Persian Gulf to the Strait of Hormuz. Cool moist low-level air moved southwest and west over the northeastern half of Saudi Arabia and extreme southwestern Iraq. Mid-level disturbances across the subtropical jet stream resulted in extensive middle and high cloudiness over northern Saudi Arabia and southern Iraq. By day's end another low had crossed Syria toward western Iraq.

At 0000Z broken low clouds at 1,500-4,000 feet covered Baghdad and the Tigris-Euphrates river valley. These clouds slowly cleared from the northwest; by 2100Z, only broken middle and high clouds from 10,000 to 30,000 feet covered the

southern half of the Valley. The northern half, including Baghdad, saw only thin high clouds. Broken clouds were layered from 1,500 through 25,000 feet over the western slopes of the Zagros mountains. Over the southern Zagros, tops reached 30,000 feet. Isolated afternoon and evening thunderstorms reached 35,000 feet in the extreme southeast near the Zagros mountains. After 2100Z, patchy broken low clouds formed again over the northern part of the Tigris Valley and the immediate Baghdad area; bases were 1,000 to 1,5000 feet; tops, 3,000 feet.

Light rain or showers fell over the southern half of the Tigris-Euphrates river valley and southwestern Iraq. There were isolated afternoon and evening thundershowers over the extreme southeast. Intermittent drizzle fell in the cool air moving west away from the northern Persian Gulf.

Winds were northwesterly to northerly over the Baghdad area, becoming northeasterly over the southern Tigris-Euphrates river valley. Over Kuwait and extreme southern Iraq, winds were northeasterly to easterly. Speeds diminished from 10-15 knots in the morning to 5-10 knots by mid-evening.

Visibilities in southern and southwestern Iraq and in extreme northeastern Saudi Arabia were near zero in fog during the night, but as high as 2,000 meters in southern Iraq and Kuwait during mid-afternoon. After dark, they dropped rapidly to less than 500 meters. Visibilities in the Tigris-Euphrates river valley, northwest of the low clouds, improved to 10 km by late morning. Patchy dense river fog formed after 2100Z, dropping visibilities to less than 500 meters.

High temperatures were 7-10 degrees Centigrade in the north and 18 degrees Centigrade in the south. There were freezing temperatures in Iraq and northern Saudi Arabia, and subfreezing temperatures above 6,000 feet in the mountains of southeastern Turkey and northeastern Iraq. Central Saudi Arabian lows were 5-12 degrees C.

21 January 1991

Mid-level disturbances continued to move east-northeastward along the subtropical jet stream, crossing northern Saudi Arabia and Kuwait into Iran.

Patchy dense fog and low clouds again plagued southwestern Iraq and extreme northeastern Saudi Arabia until they dissipated in late morning. Cloud bases were from zero to 1,000 feet; visibilities, from near zero to 500 meters. Layered middle and high clouds persisted from 10,000 to 32,000 feet over most of northern and central Saudi Arabia and the central Red Sea.

Extensive fog and low clouds also prevailed in this area. Cloud bases were from near zero to 500 meters, and tops reached 2,000 feet. The clouds and fog slowly dissipated by late morning over southwestern Iraq and northeastern Saudi Arabia as far east as Rafha and King Khalid Military City. Over northeastern Saudi Arabia, the low clouds and fog became broken with bases near 3,000 feet and tops at 6,000 feet by early afternoon. On the Saudi Arabian and Persian Gulf coast, early morning ceilings were also near zero, but by late morning, most clouds had become scattered. Patchy fog and low clouds reformed throughout all of northeastern Saudi Arabia and extreme southwestern Iraq shortly after dark. Ceilings dropped to 200-500 feet by 2100Z. Layered middle and high clouds from 10,000-32,000 feet moved slowly southeastward over southern Iraq, northwestern Saudi Arabia, and Kuwait; by 2100Z, they were over central and northeastern Saudi Arabia just southeast of Kuwait. Infrared satellite imagery taken just before sunrise in Kuwait shows these layered decks.

Precipitation, outside of thunderstorms and showers, was limited to light drizzle in areas of dense fog and low clouds.

Winds were northwesterly at 5-10 knots in southeastern Iraq and northeastern Saudi Arabia; they slowly became southeasterly at 5-10 knots in southwestern Iraq and in north-central and northwestern Saudi Arabia.

Early morning visibilities in the fog and low cloud area ranged from zero to 500 meters, improving to 1,000-3,000 meters by late morning and to 5-5 km by late afternoon. Visibilities were as low as 100 meters in denser fog patches. Patchy dense fog again formed after dark. The thickset fog was found along the Persian Gulf coastline and in shallow depressions inland where sand was still moist or where showers had occurred earlier in the day. On the Persian Gulf coast, visibilities improved from near zero at dawn to 1,000-2,000 meters by 0900Z, but dropped below 500 meters in fog by 1900Z. Patchy dense fog over and near the Tigris and Euphrates Rivers northwest of Basrah dissipated by 0600Z, but reformed after 1900Z.

22 January 1991

Easterly to east-northeasterly low-level winds continued to bring moisture to west-central and northwest Saudi Arabia. The subtropical jet stream slowly weakened, but it continued to bring middle and high clouds northeastward across the Arabian peninsula into Kuwait and southwestern Iran.

Multilayered broken middle and high clouds persisted over southwestern Iraq, the southern Persian Gulf, and central Saudi Arabia from 10,000 to 28,000 feet. Visibilities remained good except where mountains were obscured by cloud.

Fog and low clouds again persisted all night over northeastern Saudi Arabia, the northern Saudi Arabian Persian Gulf coast, and extreme southwestern Iraq. Ceilings were again from near zero to 500 feet. Low clouds slowly lifted and dissipated, moving to a small area southwest of Kuwait by late morning. Bases were now 3,000 feet, with tops to 7,000 feet. Isolated thunderstorms, with bases as low as 2,000 feet, formed in late morning and early afternoon in extreme northeastern Saudi Arabia, Kuwait, the northern Persian Gulf, and southwestern Iraq. Tops reached 40,000 feet. Layered broken middle and high clouds persisted from 10,000 to 27,000 feet throughout the day over central and northeastern Saudi Arabia, Kuwait, and extreme southwestern Iraq. Iraq northwest of Basrah was clear. A visual DMSP satellite image taken shortly after sunrise in Kuwait, shows layered clouds with embedded thunderstorms over northern Saudi Arabia, the Persian Gulf, and southwestern Iran.

By sunset, low clouds and fog began to reform along the Iraq-Saudi Arabia border northwest as far as Rafha. By late evening, the fog had lifted into broken low clouds with bases from 1,000 to 2,000 feet and tops to 5,000 feet. These clouds had spread north and northeast as far as the central Tigris-Euphrates river valley by 2100Z.

Showers and thunderstorms fell over northeastern Saudi Arabia, Kuwait, the northern Persian Gulf, and southwestern Iran. Patchy nighttime drizzle fell in area of dense fog and low clouds.

Winds were northeasterly at 5 knots, becoming southeasterly at 5-10 knots after 0900Z.

Visibilities dropped to less than 100 meters in fog before dawn.

23 January 1991

By mid-afternoon, the frontal system had moved south of Baghdad. A weak high pressure center formed over Kuwait early in the day and moved slowly southeast in the northern Persian Gulf. The weak stationary frontal system in central Saudi Arabia weakened further. The southwest to northeast subtropical jet stream over central Saudi Arabia moved southeastward to Qatar by 2100Z.

Isolated blowing dust reduced visibilities to as low as 3,200 meters in western Iraq.

Extensive broken to overcast low clouds, with bases of 500-1,000 feet and tops to 1,500-2,000 feet, covered northeastern and central Saudi Arabia. By early afternoon, skies were scattered to broken and bases had lifted to 3,000 feet. This layer dissipated shortly before sunset over northeastern Saudi Arabia, but reformed by 2000Z. In early evening, broken low clouds from 3,000 to 5,000 feet moved north and northeastward over Kuwait and the southern Tigris-Euphrates river valley in advance of the southward-moving cold front. By 1200Z, the leading edge of broken to overcast frontal cloud layers had moved south of Baghdad, with bases from 3,000 to 4,000 feet; tops were 12,000-15,000 feet with broken high clouds above. Isolated rainshowers along and just ahead of the front reached 20,000 feet. By 2000Z, the leading edge of the frontal clouds had moved to near An Najaf in the Tigris-Euphrates river valley--the trailing edge was 60 miles north of Baghdad. Figure 3-8, a visual satellite image taken at 1037Z, shows these layered clouds well.

Isolated moderate to heavy rain showers fell in central Iraq along and within 100 miles either side of the southeastward-moving cold front. Patchy light drizzle fell in northeastern Saudi Arabia before 0500Z.

Winds were easterly at 5-7 knots before dawn, becoming southeasterly at 5-10 knots by late morning in extreme southern Iraq and northeastern Saudi Arabia. By 1700Z, winds had veered to southerly at 10-15 knots. In central Iraq, winds were light and variable until 1200Z, becoming southerly at 10-20 knots after 1500Z.

24 January 1991

At 1200Z, heavy rain fell in extreme northern Saudi Arabia near the western Iraq border. Fog formed during the night and through the morning in north-central Saudi Arabia, along the western Saudi Arabia-Iraq border, in northern Jordan, and in southern Syria.

Winds were westerly to northwesterly at 10 knots during the first 12 hours, becoming northerly to northeasterly at 10 knots later in the day.

Visibilities in fog were as low as 5 km from 0000 to 1000Z in Saudi Arabia.

25 January 1991

A low moved east-northeast across Syria and Iraq, producing light snow and rain showers, blowing dust, and extensive cloudiness. Conditions improved toward the end of the day as the system moved into Iran. By the end of the day, another low had developed along the eastern Mediterranean coast, increasing cloudiness in western Iraq.

The low produced light snow over western Iraq, northeastern Jordan, and Syria; light rainshowers fell in northwestern Saudi Arabia and Iraq. Winds to 20 knots in northern Saudi Arabia produced duststorms from 0900 to 1500Z as far south as 28 degrees north.

Cloud cover was extensive until evening, by which time the system had moved into Iran. Broken to overcast low and middle clouds, along with some high clouds, preceded the low and its cold front. Scattered to broken low clouds followed the front; ceilings were 2,000-3,000 feet, but as low as 500 feet in rainshowers.

Precipitation consisted of light rainshowers that developed with the frontal system. At Z, Baghdad skies were overcast with rainshowers.

From 0400 to 1100Z in Saudi Arabia, fog reduced visibility to as low as 3,600 meters. Fog redeveloped in the evening. Some dust may have been advected into the area from storms farther west.

26 January 1991

By 1800Z, a weak secondary low had formed along the front in Saudi Arabia near 27 degrees North, 44 degrees East, and drifted slowly east.

The low-pressure system produced light snow over southern Syria and light rainshowers in northern Saudi Arabia and western Iraq. Blowing dust south of the rain in Saudi Arabia reduced visibilities to 5 km. Winds were 20 knots around the low, but reached 30 knots with rain in northwestern Saudi Arabia.

The low moving across southern Iraq produced extensive cloudiness, as well as thunderstorms with bases at 2,000 feet and tops to 35,000 feet. Ceilings were as low as 800 feet in rainshowers.

Precipitation fell as light rain and rainshowers in Saudi Arabia around the low. Rainshowers also fell in Iraq.

Winds were northwesterly at 5-15 knots most of the day, becoming northeasterly as the storm system approached and northwesterly again as it passed. Peak speeds were 23 knots, probably higher in Iraq.

Visibilities in eastern Iraq were 6 km in haze early in the day through 0600Z. Later in the day, visibilities on the south sides of showers and duststorms were reduced to 8 km.

27 January 1991

A low moving eastward from northeastern Saudi Arabia to the Persian Gulf coast produced extensive cloudiness over most of southeastern Iraq. The low gradually weakened throughout the day, leaving only some low clouds in the vicinity of the Gulf by late evening. A cold front extended west-southwest from the low across Saudi Arabia. A strong high moved into northwestern Saudi Arabia, driving the cold front into southern Saudi Arabia; strong winds behind the front produced duststorms.

The storm system produced significant weather over large parts of Saudi Arabia. Light rain and rainshowers moving east with the low persisted at some Gulf coastal stations until 1900Z. The low produced multilayered clouds the first half of the day, but only low cloud the second half. A low overcast with fog developed behind the front in northwestern Saudi Arabia; fog dropped visibilities to as low as 200 meters. Skies improved by mid-morning and cleared by afternoon. Strong winds behind the front produced duststorms. Visibilities in northwestern Saudi Arabia was near zero in early evening because of blowing dust in 35 knot winds.

Skies were initially overcast in the southeastern two-thirds of the area, but Baghdad and vicinity was clear. Middle and high clouds were only present the first half of the day; they dissipated and moved off to the east by 1200Z. The low clouds moved southeast during the day and were out of Iraq by 1500Z. After 1500Z, the low cloud remaining over Saudi Arabia and Kuwait was broken to overcast.

Precipitation fell from 0000 to 0600Z as light drizzle, rain, and rainshowers.

Winds were initially southeasterly at 10-15 knots ahead of the low, by northerly to northwesterly across Iraq behind the front. Winds shifted across the area by 1200Z; northerly to northwesterly winds were 10-20 knots with peak gusts to 30 knots. Speeds dropped to less than 10 knots during the evening.

Visibilities dropped to 9 km under the cloud cover in rain, fog, and haze.

28 January 1991

High pressure began to dominate the weather over Iraq and northern Saudi Arabia, but parts of Saudi Arabia were still affected by weather left in the wake of the low-pressure system that prevailed on the 27th.

Morning fog and low clouds north of Riyadh lowered ceilings and visibility to 2,000 feet and 8 km. There were some scattered to broken low clouds in the western Persian Gulf and at coastal stations. There was broken fog and stratus, with blowing dust, in southern Saudi Arabia.

Skies were generally clear except for thin scattered high cloud at 22,000-28,000 feet over northern Iraq and heavy black smoke over southern Iraq--see Figure 3-14. Winds were northwesterly at 3-10 knots, becoming more northerly toward the end of the day. Visibilities were as low as 1,500 meters over southern Iraq in the heavy smoke.

Visible Smoke Plumes

NOAA visual imagery in Gulf War Weather shows smoke plumes visible originating in an area just south of the two large lakes west of Baghdad and extending to the southeast. Available NOAA thermal imagery details smoke plumes in eastern Iraq moving to the southeast.

29 January 1991

A high-pressure area over Saudi Arabia weakened as it moved southeast toward Qatar. A mid- to upper-level disturbance moved across the northern part of the region, resulting in extensive cloudiness over northern Iraq and Turkey.

The disturbance produced light rain and snow in Syria and snow in Turkey. There was extensive black smoke along the Persian Gulf coast. Suspended dust still reduced visibility in southern Saudi Arabia.

Isolated evening thunderstorms from 3,000 to 35,000 feet developed over southeastern Iraq. Some formed southwest of Baghdad at 1800Z.

Winds were near calm during the night, becoming east-southeasterly at 5-10 knots in the morning and increasing 10-20 knots during the afternoon. On the Persian Gulf coast, however, winds were northwesterly at 5-10 knots for the first half of the day before switching to east-southeast.

Visibilities were 8 km in blowing dust in the afternoon as the winds picked up. Black smoke reduced visibilities along the Persian Gulf coast--one station reported 9 km.

30 January 1991

A low pressure system developed in the eastern Mediterranean and moved eastward across Syria, reaching western Iraq by the end of the day.

Low clouds moved into western Iraq during the day with ceilings around 3,000 feet. The subtropical jet stream produced high clouds across central Saudi Arabia.

Cloud cover from the previous day's disturbance remained over eastern Iraq and Kuwait; broken low clouds at 3,000-6,000 feet in the north around Baghdad dissipated by 1100Z. Over Kuwait, broken middle clouds from 8,000 to 14,000 feet moved off to the east by 0600Z. Broken to overcast low clouds with 3,000-foot ceilings and 6,000-foot tops entered the western part of the area in the evening.

With the storm system approaching, winds were southerly to southeasterly at 5-10 knots.

Visibilities were restricted, primarily by haze and smoke from burning oil. Morning fog reduced visibility to 5 km in some spots; most haze restrictions were reported at 8 km. Some dust was raised during the day with increasing winds from the approaching system.

Visible Smoke Plumes

DMSP visual imagery in Gulf War Weather shows smoke plumes originating in an area west of the two large lakes west of Baghdad and extending to the southeast. The plume splits into two plumes, one extending to the east and the other to the SSE just south of the southernmost lake.

31 January 1991

A slow-moving low in the eastern Mediterranean Sea spread stormy weather throughout the Middle East as an associated frontal system passed through Iraq. At 0600Z, a secondary low-pressure cell was centered southwest of Baghdad. It rapidly moved northeast while the cold front moved south and weakened. In north-central Saudi Arabia, the strong subtropical jet stream spread extensive high clouds.

Broken to overcast low clouds extended over the area until about 1600Z, with ceilings over Iraq as low as 3,000 feet and tops to 6,000 feet. Baghdad was affected

between 0200 and 0900Z. Skies became clear in central Iraq and Kuwait after 1600Z as the front moved southward.

Isolated thunderstorms with tops to 35,000 feet passed northeast of Baghdad near 1100Z. Rain fell in western Iraq when the low-pressure cell moved through.

Winds were southwesterly at 5-10 knots before the front and westerly to northerly at 15-20 knots immediately behind it.

Visibilities were reduced to 4,000 meters by duststorms in Kuwait and southern Iraq as the front passed. Ground fog lowered visibilities to about 6 km in northeastern Saudi Arabia, Kuwait, and southern Iraq.

1 February 1991

High pressure was centered over northwestern Saudi Arabia, keeping central Iraq cloud-free. A weak cold front extended from a low centered in north-central Iran. The front spread middle clouds from Qatar southwestward across Saudi Arabia. A slow-moving low-pressure system centered on the Turkey-Syria border caused rainshowers in western Iraq, Syria, and Jordan. By 1800Z, middle clouds from this low reached Baghdad. A weak low developed on the central Red Sea coast in response to an upper-air disturbance.

Middle clouds covered the mountains to Iraq's west and north. Light rain fell in Syria and northern Iraq between 1800 and 2100Z. Extensive areas of mountain-wave turbulence developed in the west between 0300Z and 1500Z and reached as far east as 43 degrees east. Early-morning ground fog formed in low-lying areas over most of the eastern Arabian Peninsula. Lowest visibilities were 2,000-4,000 meters.

Skies were clear to scattered before about 0900Z, except in the extreme northeast. Broken low clouds from the low in Turkey spread southward; by 1600Z, they had reached Baghdad, with 3,000 foot ceilings. Thin broken or scattered cirrus spread northeastward from the northern Red Sea, covering the area south of 31 degrees North by 1100Z.

Winds were northeasterly at 5-10 knots in the south, westerly to the north. Afternoon winds were light and variable over central Iraq. Visibilities were generally good, but morning ground fog reduced them to about 6 km in northeast Saudi Arabia, Kuwait, and southern Iraq.

2 February 1991

A trough of low pressure formed to the east of a high-pressure cell centered over eastern Saudi Arabia, causing low clouds in southern Iraq. A frontal system with low centers in the southern Caspian Sea and in east-central Syria extended along the northern Iraq border. The strong subtropical jet stream spread high and middle clouds over central Saudi Arabia.

Low and middle clouds prevailed over northern and western Iraq. Early morning ground fog formed in low-lying areas over most of the eastern Arabian Peninsula. Extensive areas of mountain-wave turbulence developed near the Syria-Iraq border between 0300 and 1500Z and reached to 43 degrees East.

The subtropical jet stream caused layered middle and high clouds over the area south of 32 degrees North throughout the day. Ceilings were between 15,000 and 25,000 feet, with the lowest along the northern Persian Gulf. Frontal low clouds stretched along the Syria-Iraq border. The broken low clouds southwest of Baghdad included 4,000 foot ceilings and 6,000 foot tops. These clouds gradually moved east; by 2000Z, they were on the Kuwait coast. Another layer of low clouds with ceilings of about 3,000 feet formed over the Tigris-Euphrates river valley north of 31 degrees North during the night.

Winds were easterly at 10-15 knots south of 30 degrees North, southerly in the central area, and westerly north of 33 degrees North. They were gusty in the southern areas.

Duststorms reduced visibilities in the northern Nafud Desert eastward to southern Kuwait between 1200 and 2000Z. Minimum visibility was about 2,400 meters. Dense smoke was reported in northwestern Kuwait before 0800Z--visibilities were probably below 2,000 meters.

High temperatures were 13-16 degrees Celsius; lows, 2-11 degrees Celsius.

3 February 1991

The frontal system in eastern Syria began to move slowly eastward and break up, resulting in lowered ceilings and gusty winds. The nearly dry front passed Baghdad at 2000Z. A weak front extended from central Iraq to near Riyadh, spreading low clouds to Iraq's eastern section. The subtropical jet stream became more westerly than northwesterly, leaving the northern Persian Gulf cloud-free but spreading scattered to broken middle and high clouds across Saudi Arabia.

Sustained winds to 25 knots were reported in extreme northwestern Saudi Arabia as the front passed. Extensive duststorms reduced visibilities to 1,000 meters near the front in the Syrian and Nafud Deserts. Duststorms were also reported at 1500Z between Riyadh and Kuwait.

Middle and high clouds from the subtropical jet stream had moved out of the area by 1000Z. In the morning, scattered to broken low clouds covered Iraq east of 43 degrees East and all of Kuwait. some locations reported 3,000 foot ceilings. By 1200Z, the clouds had moved eastward to the Iraq-Turkey border. A small area of low clouds with 3,000 foot ceilings formed about 100 miles west of Baghdad at 1600Z.

Winds were westerly at 10-25 knots west of 45 degrees East, but southeasterly at 10-15 knots to the east. There were gusts to 35 knots near the front.

Duststorms reduced visibilities to as low as 500 meters at about 1500Z in southern Kuwait and northeastern Saudi Arabia. Elsewhere, visibilities were above 6 km. High temperatures were 8-20 degrees Celsius; lows, 3-16 degrees Celsius.

4 February 1991

High pressure centered in southeastern Egypt strengthened and built into northwestern Saudi Arabia. The low-pressure system that had been affecting northern Iraq continued to move eastward. By 0900Z, the trough had moved southeastward to the south of Qatar. The subtropical jet stream continued to spread high and middle clouds over the central Arabian Peninsula.

In the early morning, middle clouds produced 10,000 foot ceilings in a triangular area between 30 degrees North and a southwest-northeast line running from 60 miles south of Baghdad, then eastward to the Iraq border. These clouds rapidly moved southeastward. By 0600Z, they affected only the coast of Kuwait. The area was almost cloud-free by 1000Z.

Winds were northeasterly at 10-15 knots inland, but northerly at 15-20 knots on the Kuwait coast. Inland, winds became northerly at 5-10 knots after 1800Z.

Visibilities were generally above 10 km, but scattered fires and smoke plumes reduced visibility in Kuwait to below 4 km. One smoke plume, originating in southern Kuwait, measured 35 miles long and 10-15 miles wide.

High temperatures were 3-13 degrees Celsius; lows, 2-8 degrees Celsius.

5 February 1991

High pressure centered in central Iraq kept skies clear or scattered most of the day, but clouds associated with the subtropical jest stream still spread high and middle clouds over the central Arabian Peninsula. These clouds were scattered in the morning, but denser clouds moved in from Egypt by 1000Z.

Morning haze reduced visibilities in central Saudi Arabia; Riyadh reported 4,800 meters at 0500Z, improving to 8 km by 0800Z. Duststorms after 2000Z were the result of 20 knot winds over the Syrian and Nafud Desert; they lowered visibility to 5 km.

Clouds were limited to scattered cirrus until about 1100Z, but the subtropical jet stream moved scattered to broken middle and high clouds into southwestern Iraq later in the day. These clouds had moved over Kuwait by 1600Z, producing 10,000 foot ceilings during the night.

Winds were northeasterly at 10-15 knots along the coast, but light and variable in Iraq. As the front shifted farther north after 0900Z, winds in the south became stronger and more easterly. Visibilities were above 10 km except in Kuwait, where scattered fires and smoke plumes reduced visibility to below 4 km. High temperatures were 9-17 degrees Celsius; lows, 0-6 degrees Celsius.

Visible Smoke Plumes

DMSP visual imagery in Gulf War Weather shows small visible smoke plumes over Kuwait extending to the south and southeast.

6 February 1991

High pressure was centered in northwestern Iraq, with a weak low pressure trough to the southeast between central Saudi Arabia-- near Riyadh--and Israel. The subtropical jet stream remained over the norther Arabian Peninsula; associated high clouds became increasingly scattered after 0600Z.

At 0000Z, there were only scattered low, middle, and high clouds throughout the area. By 0300Z, the middle cloud deck had thickened; ceilings as low as 12,000 feet, with tops at about 18,000 feet, had formed over the southwestern half of Iraq. These clouds drifted eastward, and by 1900Z they were east of Baghdad and Kuwait. Middle and high clouds from the subtropical jet stream affected Kuwait and southern

Iraq between 0400 and 1100Z; bases were at or above 10,000 feet, with tops to 32,000 feet.

Winds were light and variable in Iraq, but easterly at 5-10 knots in Kuwait. Morning fog, smoke, and dust reduced visibilities in Kuwait and southern Iraq to as low as 3,200 meters in spots. Afternoon visibilities in areas not affected by smoke were above 6 km.

Afternoon high temperatures were between 5 and 13 degrees Celsius. High pressure and almost clear skies drove morning low temperatures down to -2 degrees Celsius in the north and 7 degrees Celsius in the south.

7 February 1991

A low-pressure system over northeastern Saudi Arabia resulted in afternoon and evening rainshowers and thunderstorms over Saudi Arabia and the Persian Gulf. The subtropical jet stream brought middle and upper cloudiness to central Saudi Arabia. Weak high pressure was centered over Iraq.

Scattered low clouds, with some middle and high clouds that were occasionally broken, extended across central Saudi Arabia and the Persian Gulf. Ceilings varied from 10,000 to 25,000 feet. Broken low clouds with bases at 2,000 feet were evident early in the morning over western Iraq. Light afternoon rainshowers fell over east-central Saudi Arabia. Isolated late evening thunderstorms were reported over the west-central part of the Persian Gulf. Tops were about 30,000-35,000 feet. Visibilities in northwestern Saudi Arabia were 7-9 km in haze and suspended dust. Suspended dust also reduced early morning visibilities in east-central Saudi Arabia to 4,800 meters.

Early morning skies were generally clear, but scattered middle clouds from the west moved into central Iraq and Kuwait by mid-morning. The middle clouds over central Iraq went scattered to broken at 10,000 feet by late morning. Skies became scattered by early afternoon. By early evening, cloud cover over Kuwait and southeast Iraq became scattered, variable to broken, at 10,000-18,000 feet. Isolated evening thunderstorms developed over extreme northern Kuwait; tops reached 30,000 feet.

Early morning winds were light and variable, becoming northwesterly to northerly at 10-15 knots by late morning. Haze and suspended dust reduced visibilities over central Iraq to 7-9 km. Smoke, haze, and suspended dust reduced visibilities in northern Kuwait to 5-7 km and to 1,600 meters in southern Kuwait.

High temperatures were 7-15 degrees Celsius; los, 0-6 degrees Celsius.

Visible Smoke Plumes

NOAA visual imagery in Gulf War Weather shows visible smoke plumes extending in varying directions from to the northeast to the south. Imagery captioned: "Smoke from Kuwait is being blown southward into northeast Saudi Arabia.[13]

8 February 1991

The low pressure system was now located over southeastern Saudi Arabia. The subtropical jet stream brought middle and high clouds across eastern Saudi Arabia. Weak high pressure was centered over Iraq.

Although skies were generally clear, broken middle clouds at 10,000 to 12,000 feet were observed over east-southeastern Saudi Arabia during early morning. Skies were broken to overcast at 4,000-5,000 feet between 0500 and 1300Z over northwestern and north-central Saudi Arabia. Scattered middle clouds were observed over western Iraq in the morning and afternoon, becoming broken at 10,000-12,000 feet during the evening. Blowing sand and dust lowered visibilities to 5-7 km in east-central Saudi Arabia.

Skies were generally clear, but scattered middle clouds were observed over southeastern Iraq during early morning. By mid-afternoon, there were scattered middle clouds over central Iraq. By late night, these became scattered to broken at 10,000-12,000 feet.

Winds were light and variable in the morning, becoming northwesterly to northerly at 10-15 knots. Visibilities in smoke over southern Kuwait and southeast Iraq was less than 1,600 meters . High temperatures were 7-15 degrees Celsius; lows, 0-6 degrees Celsius.

Visible Smoke Plumes

NOAA visual imagery in Gulf War Weather shows visible smoke plumes over southeast Iraq and southern Kuwait, extending to the south and southeast.

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[13]U.S. Air Force, ETAC, Gulf War Weather (March 1992), 3-53.

9 February 1991

High pressure dominated the region-- skies were generally clear.

Skies were clear except for scattered low clouds over northwestern Saudi Arabia and western Iraq. Winds increased to 15 knots with gusts of 25 knots across northern Saudi Arabia, where afternoon visibilities decreased to 4,800 meters in blowing sand and dust.

Early morning skies over central Iraq were broken at 10,000-12,000 feet. The clouds slowly moved into southeastern Iraq and dissipated during the day.

Winds were westerly to northwesterly at 10-20 knots. Smoke and haze lowered visibilities in Kuwait to 5-7 km. High temperatures were 12-20 degrees Celsius; lows, 2-8 degrees Celsius.

10 February 1991

High pressure continued to dominate. Skies over Saudi Arabia and Iraq were clear during the day, but scattered to broken mid-level clouds with bases at 10,000-12,000 feet moved into western Iraq by late evening.

Skies were clear during the day, but by late evening, scattered to broken mid-level clouds with bases at 10,000-12,000 feet moved into central Iraq.

Winds were northwesterly at 5-10 knots. Thick smoke over east and southeast Iraq began to show in satellite photos by 0600Z and lasted until early evening. Smoke from southern Kuwait was also still visible; visibilities in the smoke were 800-1,600 meters. High temperatures were 10-15 degrees Celsius; lows, 0-5 degrees Celsius.

Visible Smoke Plumes

Imagery in Gulf War Weather shows smoke plumes visible over western, eastern, and southeastern Iraq. Direction: SSE; Smoke plumes are also visible over southern Kuwait. Direction: South.

11 February 1991

High pressure was centered over southeastern Saudi Arabia, but low pressure formed over western Saudi Arabia. The subtropical jet stream brought increased moisture in the mid- and upper-levels to Iraq and northern Saudi Arabia. A mid-level

disturbance moving over Iraq and northern Saudi Arabia caused isolated thunderstorms and rainshowers.

Scattered high clouds over western Iraq became broken with bases at 20,000 feet from mid-morning through afternoon. There were scattered low clouds over northwestern and east-central Saudi Arabia during the day.

Scattered to broken upper clouds with bases at 22,000 - 25,000 feet were present during the morning and mid-afternoon over central Iraq. Morning skies were clear over Kuwait and southeastern Iraq, but smoke plumes were visible. Cloudiness decreased in central Iraq during the day, but increased in southeastern Iraq and Kuwait. Skies became scattered to broken, occasionally overcast, at 4,000 - 6,000 feet. By late afternoon, thunderstorms (tops 35,000 feet) and rainshowers had formed over Kuwait; they moved off to the east and dissipated by late evening.

Winds accompanying the thunderstorms in Kuwait reached 25-35 knots, but over the rest of the area, they were northwesterly at 10-15 knots.

Smoke and haze lowered morning visibilities to 4,800 meters in Kuwait and southeastern Iraq. Rain and rainshowers reduced evening visibilities to 1,600 - 3,200 meters. High temperatures were 10-15 degrees Celsius; lows were 0-5 degrees Celsius.

Visible Smoke Plumes

Imagery in Gulf War Weather shows smoke plumes clearly visible over Kuwait. Direction: South; Smoke plumes are also visible over southeastern Iraq. Direction: SSE.

12 February 1991

High pressure dominated, but a low-pressure system moved into the eastern *Mediterranean by the end of the day, increasing cloudiness over western Iraq.*

Broken middle clouds at 8,000-10,000 feet were present over northeast, east and central Saudi Arabia and the Persian Gulf during the morning. By late evening, there were scattered to broken high clouds at 20,000-25,000 feet over western Iraq.

Broken middle clouds at 8,000-10,000 feet remained over Kuwait until mid-morning. Scattered upper clouds moved into central Iraq by late evening.

Winds were northwesterly to northerly at 10-15 knots. High temperatures were 10-15 degrees Celsius; lows, 0-5 degrees Celsius. Visibilities in Kuwait were 5-7 km due to smoke and haze

Visible Smoke Plumes

Imagery in Gulf War Weather shows smoke plumes clearly visible over eastern Iraq and Kuwait. Direction: S-SSE.

13 February 1991

High pressure dominated the Saudi Arabian peninsula, but low pressure centered over the eastern Mediterranean sent moisture into Iraq and northern Saudi Arabia. The low moved to the northeast as high pressure intensified behind it.

Scattered skies became broken to overcast over western and northern Iraq. The 25,000 foot ceilings prevailing in the morning became 8,000-10,000 feet during the day. By the end of the day, skies were scattered again. Over northern Saudi Arabia, skies were scattered, but occasionally broken, at 20,000-25,000 feet.

Scattered skies became gradually broken over central, east-central, and southeast Iraq and Kuwait. Smoke plumes were visible over southern Kuwait and the northern Saudi Arabian Gulf Coast. (see below)

Winds were northwesterly at 10-15 knots. Visibilities in southeastern Iraq and Kuwait were 5-7 kilometers in smoke and haze. High temperatures were 13-16 degrees Celsius; lows, 1-4 degrees Celsius.

Visible Smoke Plumes

Imagery in Gulf War Weather shows smoke plumes clearly visible over southern Kuwait. Plume directions appear to be to the S-SSE.

14 February 1991

High pressure over Iran and Syria resulted in fair weather across most of the region.

Morning skies over northern Iraq were overcast with middle and high clouds; ceilings were as low as 10,000 feet. The clouds moved eastward and were over Iran by 1200Z. Broken low and middle clouds over central and southern Saudi Arabia

produced 5,000 foot ceilings with scattered light rainshowers and 9-km visibilities. The clouds moved southeastward and became scattered after 1200Z. Visibilities in western and southern iraq were as low as 6 km where 20-knot winds resulted in localized suspended and blowing dust.

Cloud cover consisted only of thin scattered high clouds over eastern Iraq and Kuwait: bases were 20,000 feet; tops 25,000 feet. The high clouds moved east into Iran by 1200Z. Winds were light and variable in the early morning, becoming northerly to easterly at 5-15 knots during the day.

Morning visibilities along the Persian Gulf coast near Kuwait were 8 km in fog. Widespread haze over northern Saudi Arabia produced visibilities of 8 km. High temperatures were 16-18 degrees Celsius; lows were 2-5 degrees Celsius.

Visible Smoke Plumes

Imagery in Gulf War Weather shows smoke plumes clearly visible over southern Iraq. Plume directions appear to be to the SE.

15 February 1991

High pressure over Iran and Turkey extended southward across most of the region. Broken high clouds passed through western Iraq to the east during the afternoon, followed in the evening by a large shield of high cloud entering from the west. Scattered to broken high clouds over parts of central and southern Saudi Arabia--with bases between 9,000 and 12,000 feet--dissipated partially during the day. Blowing dust in northern and western Saudi Arabia reduced visibilities to as low as 5 km.

Broken high clouds passed through the area between 1300Z and 2100Z with bases at 24,000 feet and tops to 32,000 feet. There were followed by scattered high clouds that moved into central Iraq from the west by the end of the day. Scattered bases were at 24,000 feet with tops to 32,000 feet.

Winds were northerly at 5-10 knots through the morning, gradually shifting to easterly at 5-15 knots in the afternoon and evening. Smoke that is clearly visible restricted visibility up to 14,000 feet. Evening ground fog developed along the Kuwait coast, dropping visibility to 8 km. High temperatures were near 20 degrees Celsius; lows varied from 2 degrees Celsius in the north to 8 degrees Celsius in the southeast.

Visible Smoke Plumes

DMSP visual imagery in Gulf War Weather shows smoke plumes visible over Kuwait extending to the south over Saudi Arabia.

16 February 1991

High pressure over Iran weakened as a strong frontal system approached from the west. The polar jet stream dipped southward into the eastern Mediterranean as the subtropical jet stream crossed Egypt and brought in upper-level moisture. A new low-pressure center formed on the front over Syria by 1500Z and moved southeast. The low and its accompanying cold front reached western Iraq by 1800Z.

Multiple cloud layers covered the region southward to 25 degrees North with scattered to broken low clouds and broken to overcast middle and high clouds. Light rain and rainshowers lowered ceilings to 1,000 feet and visibilities to 1,100 meters. The blowing dust already present in northwestern Saudi Arabia at 0000Z spread to include much of northern Saudi Arabia, especially south of the rain. Winds up to 30 knots produced duststorms with visibilities as low as 200 meters in northern Saudi Arabia, Syria, and western Iraq.

Cloud cover increased and ceilings lowered during the day. Skies were initially scattered with high clouds from 27,000 to 30,000 feet, but became broken to overcast by morning, with multiple layers between 25,000 and 35,000 feet. Bases lowered to 20,000 feet by 0700Z. Broken middle clouds reached central Iraq at about 1100Z with 12,000 foot bases and 18,000 foot tops. Scattered low clouds moved in by early evening with 2,000 foot bases and 6,000 foot tops; middle-cloud ceilings were down to 8,000 feet by then. Low clouds increased in the evening. Light rain and rainshowers lowered ceilings to 1,000 feet.

Winds varied from easterly to southerly with the approaching frontal system. Initial 5- to 10-knot speeds increased during the day. The highest reported sustained speed was 30 knots.

Visibilities worsened throughout the day. Dense black smoke over the southern half of Kuwait reduced visibilities to 6 km-- some pilots reported certain areas as "unworkable." Duststorms developed as wind speeds reached 20 knots around 0900Z; speeds to 30 knots dropped visibilities to as low as 200 meters later in the day. Local evening visibilities were as low as 1,100 meters. High temperatures increased to 20-25 degrees Celsius as the front brought warm air into the region; lows were 6-8 degrees Celsius.

17 February 1991

A low-pressure area moved northeast from central Iraq across Iran as its cold front moved through most of Iraq. A weak secondary low formed along the front in south-central Iraq near the Saudi Arabian border. The cold front continued southward into central Saudi Arabia and weakened. High pressure intensified behind the front.

Rain fell along the front in northern Saudi Arabia early in the day, but moved into central Saudi Arabia by evening. Visibilities were 8 km, but dropped to 4,700 meters in a 1500Z thunderstorm in west-central Saudi Arabia. Blowing dust ahead of the front reduced visibilities to as low as 1,700 meters. Duststorms behind the front dropped visibility as low as 900 meters in western Iraq. Skies over central Saudi Arabia were scattered as 4,000 feet, and broken to overcast at 10,000 feet.

Cloud cover from 0000Z to 1100Z was broken to overcast with layered low and middle clouds; ceilings were 3,000 feet, tops to 15,000 feet. Skies over southern Iraq and Kuwait were overcast at between 20,000 and 35,000 feet. Skies in Iraq began to clear by 1100Z, leaving scattered low clouds from 3,000 to 6,000 feet that continued moving east and south; all of Iraq, except for its extreme northern border, was clear after 1600Z.

Rain and rainshowers fell over northeastern Saudi Arabia, southeastern Iraq, and Kuwait. The bases of late-morning thunderstorms near the Saudi Arabia border were 3,000 feet, with tops to 35,000 feet. The rain moved eastward by evening.

Winds were southerly to southeasterly at 5-15 knots ahead of the low and cold front, and northerly to northwesterly at 5-20 knots behind it. Speeds diminished to 5-10 knots in the evening.

Visibility in rain was 4,700 meters. Blowing dust in some areas of northeastern Saudi Arabia that had remained dry lowered visibilities to 6 km. Evening fog formed locally where rain had fallen, lowering visibilities to 6 km.

Daytime temperatures were highest (20 degrees Celsius) in the west where skies cleared first, but highs in the east were as low as 14 degrees Celsius. Daily lows were in the evening after the cold front had passed. Lows ranged from 6 degrees Celsius in the north to 12 degrees Celsius in the south.

18 February 1991

A high-pressure cell moved over Iraq and dominated much of the region's weather. Morning fog developed over north-central and northwestern Saudi Arabia but dissipated by early afternoon. Clouds associated with yesterday's cold front were over central Saudi Arabia and the Persian Gulf, where they produced scattered light rain through the morning until moving into the Arabian Sea in the afternoon. Skies were scattered from 3,000 to 6,000 feet, broken from 10,000 to 18,000 feet, and broken from 28,000 to 33,000 feet.

Thick morning ground fog lifted to form 1,000 foot ceilings that dissipated by about 1000Z. Broken middle clouds over southern Kuwait and northeastern Saudi Arabia moved off to the southeast during the first 6 hours of the day; ceilings were 7,000 feet with tops to 12,000 feet. Middle and high clouds moved into the region from the northwest during the second half of the day; scattered to broken middle clouds were from 8,000 to 18,000 feet, and thin broken high clouds were from 29,000 to 35,000 feet.

Winds were generally light and variable in the north, but northerly to northeasterly at 5-10 knots in the south. Visibilities ranged from near zero to 2,000 meters in thick and extensive morning fog across portions of Iraq and Saudi Arabia. The fog, which was concentrated over (and to the west of) the Tigris-Euphrates river valley in Iraq, didn't burn off until about 1000Z. Fog formed again in the evening over northern Saudi Arabia and Kuwait, dropping visibilities to 4,800 meters. High temperatures were 17-20 degrees Celsius; lows ranged from 5 degrees Celsius in clear areas to 11 degrees Celsius under the fog.

19 February 1991

A low-pressure area developed over Syria and moved eastward into northwestern Iraq. A secondary low developed in northwestern Saudi Arabia and moved eastward into northern Saudi Arabia. Two lines of strong thunderstorms--one over northern Saudi Arabia, one over Iraq--developed between 1500 and 1800Z and continued well into the next day.

Scattered low clouds over western Iraq and northern Saudi Arabia early in the day were from 3,000 to 5,000 feet. Thin high clouds moved in that afternoon. Thunderstorm bases were at 3,000 feet, tops to 35,000 feet. Rain and rainshowers began after 1500Z. In central Saudi Arabia, scattered to broken low and middle clouds, with bases at 4,000 and 10,000 feet, produced scattered evening rainshowers.

Cloud cover in the first 6 hours was limited to southeastern Iraq and Kuwait, where skies were scattered at 3,000 and 5,000 feet and thin broken from 20,000 to 25,000 feet. After these had cleared out in the afternoon, a new high thin broken layer at 22,000 to 25,000 feet moved in. Convective activity from the west entered the area at about 1800Z, producing bases that were generally 3,000 feet, but as low as 1,000 feet in thunderstorms; tops were to 35,000 feet. Convective cells consolidated to form a nearly solid, north-south line in central Iraq as another, similar line formed in northern Saudi Arabia. Middle-cloud ceilings outside showers were at 10,000 feet.

Thunderstorms produced localized moderate to heavy rain after 1800Z. Light rain and rainshowers fell outside the areas of strong convection.

Winds were east-southeasterly at 5-10 knots during the first half of the day, increasing to 15-20 knots by afternoon. Isolated gusts to 30 knots occurred with thunderstorms. Visibilities were less than 1,000 meters in rain associated with thunderstorms, but 7 and 9 km elsewhere in rainshowers, black smoke from Kuwait, fog, and/or blowing dust. High temperatures were 19-21 degrees Celsius; lows, 7-11 degrees Celsius.

Visible Smoke Plumes

DMSP visual imagery in Gulf War Weather shows smoke plumes visible over Kuwait and extreme northeastern Saudi Arabia.

20 February 1991

The low over Iraq moved eastward into Iran as the secondary low over northern Saudi Arabia moved southeast along the Persian Gulf coast. Thunderstorm activity that started the day before continued across eastern Iraq, Kuwait, and northeastern Saudi Arabia. Lines of thunderstorms moved gradually eastward as new cells developed on their southwestern ends.

A cold front moved southeast across central and eastern Saudi Arabia, producing scattered rain showers and visibilities as low as 800 meters in blowing dust. Skies were scattered from 4,000 to 6,000 feet and broken from 10,000 to 15,000 feet. Thunderstorms that had been in northern Iraq earlier in the day moved into Iran, followed by broken to overcast low and middle clouds with ceilings at 3,500 feet. Western Iraq remained generally clear.

Thunderstorms moved across the area from west to east. Bases were at 1,000 feet and tops reached 40,000 feet. Cloud cover outside thunderstorms was broken to

overcast, and multilayered from 3,000 to 35,000 feet. Surface moisture helped produce low broken clouds west of the front in central Iraq; ceilings were 3,500 feet, with tops to 6,000 feet. There were also broken middle clouds from 10,000 to 15,000 feet. Parts of south-central Iraq and north-central Saudi Arabia cleared as thunderstorms moved east.

Precipitation was moderate to heavy in thunderstorms, but light away from the strong cells.

Winds were east-southeasterly at 10-20 knots, becoming west-northwesterly at 10-25 knots as the storm moved through. Isolated thunderstorms were above 30 knots.

Visibilities were 9 km outside thunderstorms, but less than 1,000 meters in heavy thundershowers. Blowing dust in areas along the front that had not received much rain lowered visibilities to 7 km. Evening fog formed along the Persian Gulf coast, lowering visibilities to 1,500 meters by 2300Z.

High temperatures ranged from 24 degrees Celsius in the southeast ahead of the cold front to as low as 15 degrees Celsius in the northwest behind it. Lows were 9 degrees Celsius in the north and 14 degrees Celsius in the southeast.

21 February 1991

A low-pressure system moving south along the Persian Gulf neared Dhahran by 0300Z; by 1500Z, it was on the United Arab Emirates coast near 53 degrees East. Its cloudless cold front extended southwest across the Arabian Peninsula. By 0900Z, an area of high pressure had formed in northwestern Saudi Arabia near the Iraqi border.

The low-pressure system spread a wide area of clouds, rain, and isolated thunderstorms over the Persian Gulf and along the coast as it passed. Ceilings were generally 10,000 feet in rainshowers, but ceilings in thunderstorms were reported at 3,000 feet. Inland, the front caused duststorms as it passed, reducing visibilities in some places to 800 meters. Fog blanketed northern Saudi Arabia in the wake of the low-pressure system, but dissipated by 0800Z at most locations; visibilities were as low as 2,800 meters along the coast, but much lower in protected wadis. Along the eastern Saudi Arabian coast, visibilities were 4,800 meters in dense haze. Between 0500 and 1300Z, sporadic duststorms reduced visibilities to 6 km in the Syrian Desert.

An overcast layer of low clouds resulted in 500-foot ceilings over Kuwait and Iraq south of Baghdad. Cloud tops were about 1,200 feet. The clouds lifted to 1,000-3,000 feet by 0500Z and dissipated by 0700Z. South of 29 degrees North, broken

middle clouds with 10,000 foot bases persisted until about 0700Z. Skies were clear after 0900Z.

Winds were northeasterly or northerly at 10 knots in the south, easterly at 10-15 knots in the north. Central Iraq's winds were light and variable. Highest speeds --20 knots along the northeastern Saudi Arabian border-- were reported at 1500Z.

Fog and visibilities of 500 meters were common. The fog dissipated in the northwest first, but lingered until 0800Z in Kuwait and Iraq south of 32 degrees North. Dense smoke reduced visibilities in southern Kuwait and northern Saudi Arabia. The afternoon high temperature was 15 degrees Celsius. Morning lows were 6-11 degrees Celsius, but by evening, temperatures in the north had fallen to about 3 degrees Celsius.

Visible Smoke Plumes

DMSP visual imagery in Gulf War Weather shows smoke plumes in southern Kuwait extending southward into Saudi Arabia.

22 February 1991

High pressure was centered over east-central Saudi Arabia. A cold front extending from a low in the eastern Mediterranean spread scattered to broken high clouds across Syria and northwestern Iraq. The system had moved into eastern Syria by 1600Z. A low-pressure system near the Strait of Hormuz brought low cloudiness and rain to the southeastern Arabian Peninsula.

A dense band of smoke aloft extended from the northern Persian Gulf along the Saudi Arabian coast into the Rub al Khali. Bases were about 10,000 feet, tops to 18,000 feet. Skies were clear to scattered, but scattered to broken middle and high clouds moved over the extreme northeast by 1800Z. Ceilings, where present, were 10,000 feet with tops to 15,000 feet. The middle and high clouds were nearing Baghdad by 2300Z.

Visibilities were unrestricted except for areas affected by smoke, where they were generally about 6 km. Pilots reported smoke tops to about 15,000 feet and inflight visibilities as low as 1,000 feet. Dense smoke over and south of Kuwait.

Winds were light and variable before 1500Z, becoming southeasterly to easterly at 5-10 knots to the east of the front after 1500Z. Elsewhere, winds remained light.

After sunset, winds were nearly calm. High temperatures were 13-18 degrees Celsius; lows, 1-8 degrees Celsius. The lowest temperatures were in the eastern Nafud Desert.

Visible Smoke Plumes

NOAA visual imagery in Gulf War Weather shows smoke plumes visible over Kuwait moving southward over coastal Saudi Arabia.

23 February 1991

High pressure centered over the eastern Arabian Peninsula moved southeastward into the Rub al Khali by 2000Z. Even though the frontal system dissipated as it moved across northwest Saudi Arabia, it still caused isolated light showers and duststorms. The subtropical jet stream brought middle and high clouds eastward over the area after 0900Z. Low pressure formed over the Red Sea.

Fog reduced visibilities along the central Persian Gulf to about 1,000 meters between 0100 and 0400Z and reformed after 2000Z. Scattered to broken low and middle clouds with light isolated rainshowers reduced visibilities to 10 km along the weak low-pressure system in the west. Duststorms caused 4,000 meter visibilities in the Syrian and Nafud Deserts between 0900 and 1700Z. Middle and high clouds produced 10,000 foot ceilings over northwestern Saudi Arabia after 0900Z. Smoke from the Kuwaiti oilfields had reached Qatar; although concentrated at 10,000-12,000 feet, the smoke mixed with haze at lower levels to produce 6-km visibilities.

In the west, the low-pressure system caused scattered to broken clouds at 10,000 feet until about 0600Z, when they became scattered. By 1200Z, middle and high clouds began to move into the area south of 31 degrees North, causing broken to overcast ceilings at 10,000 to 12,000 feet. These clouds were east of 45 degrees East by 1900Z. Between 0400 and 1600Z, another band of middle and high clouds formed along the Iran-Iraq border north of 32 degrees North. Ceilings were about 8,000 feet, with tops to 32,000 feet. Isolated thunderstorms formed over Kuwait by 2000Z, with 2,500 foot bases and tops to 35,000 feet.

Winds were northerly to northwesterly at 10-15 knots east of 45 degrees East. Elsewhere, winds were easterly at 5-10 knots. Duststorms reduced visibilities to 8 km along the Iraq-Saudi Arabia border between 0800 and 1500Z. Dense smoke covered eastern Kuwait and reduced visibilities generally to less than 8 km, with isolated cases as low as 1,000 meters. High temperatures were 13-16 degrees Celsius; lows, 7-13 degrees Celsius.

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24 February 1991

A low-pressure system moved slowly eastward along the Iraq-Saudi Arabia border. High pressure was still centered over the southeastern Arabian Peninsula. The subtropical jet stream's middle and high clouds moved eastward over the Persian Gulf. They were out of the area by about 1900Z, but another upper-level disturbance brought more high and middle clouds eastward. At 1500Z, these clouds were in north-central Saudi Arabia.

Morning fog again blanketed the central Persian Gulf coast between Dhahran and the Strait of Hormuz. Visibility was poorest (2,000 meters) south of Qatar. Gust winds and blowing dust accompanied the low near the northern Saudi Arabian border where 15- to 20-knot winds raised dust that reduced visibilities to 6 km. Broken to overcast middle clouds produced 8,000 foot ceilings over the northern Persian Gulf, but embedded low clouds resulted in isolated ceilings at 3,000 feet. Isolated rainshowers fell near the low, reducing visibilities to 8 km. Isolated thunderstorms, with bases at 2,500 feet and tops to 30,000 feet, developed southwest of Riyadh between 1500 and 2200Z. Smoke reduced visibilities and obscured skies along the Persian Gulf as far south as 23 degrees North.

In Kuwait and southern Iraq, skies were broken to overcast with 8.000 foot ceilings until about 0500Z. Tops of these multilayered clouds reached 35,000 feet. There were isolated 2,500-foot ceilings. By 0500Z, the higher clouds had moved east, leaving scattered to broken low clouds over Kuwait. In the evening, more middle and high clouds began to move into the southern half from the west. They reached western Kuwait by 2000Z, bringing 9,000-foot ceilings and tops to 30,000 feet.

Isolated rainshowers and thunderstorms affected Kuwait and southeastern Iraq until 0600Z. Rain, heavy at times, reduced visibility to 5 km. Winds in Saudi Arabia and western Iraq were southwesterly to westerly at 10-15 knots, increasing to 15-25 knots by 0900Z south of 32 degrees North, with gusts to 30 knots. By 2100Z, speeds had diminished to 10-15 knots. Winds in the Tigris-Euphrates river valley were southeasterly at 10-20 knots, but dropped to 3-5 knots after sunset.

Duststorms reduced visibilities to as low as 1,000 meters in Kuwait and southern Iraq between 0900 and 2100Z. Dense smoke from the Kuwaiti oil fires moved northwestward. Visibilities just south of Baghdad were less than 3,000 meters. Fog formed after 2100Z in Kuwait and southern Iraq, reducing visibilities to less than 4,000 meters. Afternoon high temperatures were 10-21 degrees Celsius; morning lows ranged from 1 degree Celsius in the northeast to 15 degrees Celsius in the southeast.

Visible Smoke Plumes

DMSP visual imagery in Gulf War Weather shows smoke plumes from Kuwait moving westward into Iraq.

(As the ground war began, Iraqi forces set fire to Kuwaiti oil wells, resulting in extremely heavy smoke concentrations over the entire region.)

25 February 1991

An upper-air disturbance moving northeastward spread stormy weather over the northern Arabian Peninsula; by 0900Z, most of the region was covered with clouds. A low-pressure system lingered over northwestern Saudi Arabia as the high-pressure cell in the southeast moved eastward. Low pressure moving east from the northeastern Mediterranean spread clouds southeastward over northern Iraq.

Fog reduced visibilities to as low as 1,500 meters from northeastern Saudi Arabia to the United Arab Emirates coast (and to as low as 500 meters in the Tigris-Euphrates river valley) before 0400Z and again after 2000Z. Broken middle and high multilayered clouds with tops to 30,000 feet spread 9,000-foot ceilings from the northern Red Sea to the northern Persian Gulf and along the Iran-Iraq border. Isolated thunderstorms and rainshowers formed over northwestern Saudi Arabia throughout the day. They were most intense and widespread at about 1600Z northwest of Riyadh, along the southern Iraq-Iran border, and in extreme western Iraq near the Jordan border. Some of these storms were dry, creating intense, localized duststorms that reduced visibilities to well below 1,000 meters. Widespread duststorms were reported in the northern Arabian Peninsula and the Syrian Desert between 0900 and 2000Z with visibilities as low as 4,000 meters. Prevailing winds were as high as 30 knots in northeastern Saudi Arabia.

At 0300Z, broken high clouds with 24,000-foot ceilings prevailed over Iraq and Kuwait; but as denser clouds continued to move in, a solid overcast from 7,000 to 33,000 feet formed throughout southern Iraq and Kuwait. After 1300Z, isolated thunderstorms with tops to 35,000 feet developed in the area's southern half; skies in the heaviest storms were obscured. Conditions over southern Iraq and Kuwait improved after 1800Z. In southwestern Iraq between the Tigris River and the Iranian border, skies were scattered with isolated low clouds from 2,000 to 20,000 feet. South of 30 degrees North, skies were broken to overcast with 20,000-foot ceilings; there were also isolated low clouds from 10,000 to 35,000 feet. Elsewhere, skies remained overcast between 8,000 and 35,000 feet.

At 0500Z, a line of rainshowers spread from west-central Saudi Arabia northeastward to the Saudi Arabia-Iraq border and eastward into southern Kuwait. The line expanded and intensified to cover most of Kuwait, southern Iraq, and north-central Saudi Arabia by 1600Z. Intermittent precipitation fell the rest of the day.

Winds were southeasterly at 5-10 knots until 0900Z. Afternoon winds were stronger at 15-20 knots, with gusts to 40. Fog and smoke reduced visibilities to below 2,000 meters in southern Iraq and Kuwait. Visibilities improved to 8 km by 0600Z, but sporadic duststorms in the afternoon reduced them to 4,000 meters. High temperatures were 14-21 degrees Celsius; lows, 3-16 degrees Celsius.

26 February 1991

As the upper-air disturbance moved northeast, it continued to produce heavy rainshowers and duststorms over the area. A surface trough formed between the low-pressure area in central Saudi Arabia and another moving through southern Turkey. By 2100Z, the trough stretched through Iraq along 43 degrees East. An area of high pressure was located in central Iran and the extreme southeastern Arabian Peninsula.

Several lines of rainshowers and thunderstorms moved through the northern Arabian Peninsula throughout the day. Between 0000 and 0300Z, an area of thunderstorms spread from the Red Sea near 25 degrees North to the Iraq-Saudi Arabia border near 45 degrees East. Another formed in northeastern Iraq near the Iranian border. By 0900Z, a third area had formed over northeastern Saudi Arabia at 28 degrees North, 47 degrees East. Bases were at 2,500 feet and tops reached 35,000 feet. Thunderstorms were embedded in scattered to broken middle clouds west of 45 degrees East. Multilayered clouds were broken to overcast from 8,000 to 33,000 feet north of 25 degrees North. By 1100Z, the northern area had spread southwestward and the southern areas had moved southeastward. Storm intensity and coverage increased throughout the day until 1600Z, when a line of isolated thunderstorms extended from the northern Persian Gulf to southwest of Riyadh. Areas west of 43 degrees East had cleared. Clouds, rainshowers, and thunderstorms spread southeastward again in the evening, reaching as far southwest as 20 degrees North, 44 degrees East, by 1900Z.

Broken to overcast clouds between 8,000 and 20,000 feet covered the entire area before 0300Z. The lower cloud deck gradually dissipated in the northwest, leaving scattered skies over most of Iraq, and high clouds with tops to 32,000 feet over southern Iraq and Kuwait. Scattered to broken clouds between 4,000 and 6,000 feet formed over central Iraq between 0500 and 1600Z. At 1100Z, there were isolated thunderstorms or rainshowers embedded in these clouds in a line from 35 degrees

North, 45 minutes East, to 31 degrees North, 41 minutes East. Thunderstorms also formed over eastern Kuwait and extreme southwestern Iraq after 1500Z. Cloud bases were 3,000 feet and tops reach 35,000 feet.

Intermittent rainshowers and thunderstorms fell southeast of a line extending from 34 degrees North, 46 minutes East, to 31 degrees North, 42 minutes East, throughout the day.

Winds were southeasterly at 10-15 knots, but by 1200Z, speeds in the east reached 20-30 knots. Winds in the west shifted to northwesterly at 10-15 knots as the trough moved eastward. Fog and smoke reduced visibilities to below 2,000 meters from the central Tigris-Euphrates river valley to Kuwait. Visibilities improved to 8 km by 0600Z, but sporadic duststorms in the afternoon reduced visibilities to 4,000 meters. Visibilities in heavy rainshowers may have dropped to as low as 1,000 meters. High temperatures were 17-21 degrees Celsius; lows, 7-16 degrees Celsius.

27 February 1991

A low-pressure cell that had been centered in southeastern Iraq at 1000Z slid southeastward into the Persian Gulf throughout the day. A weak frontal system in the eastern Mediterranean Sea moved onshore and was in central Iraq by the end of the day.

In western Iraq and northwestern Saudi Arabia, skies were scattered with bases at 10,000 feet throughout the morning. Clouds from the front approaching from the Mediterranean began moving in by 1100Z, forming ceilings rapidly. Rain began lowering visibilities to 5 km by 1300Z. Thunderstorms developed in the afternoon as the clouds moved eastward. By the end of the day, clouds and rain were confined to the western Saudi Arabia-Iraq border. In north-central and northeastern Saudi Arabia, broken clouds, multilayered from 3,000 to 25,000 feet with rainshowers and thunderstorms, prevailed. Visibilities were 4,800 meters in ground fog, rain and haze, but near zero in blowing dust from thunderstorms. Clouds moved slowly southeast to east-central Saudi Arabia by day's end.

Broken multilayered clouds from 3,000 to 25,000 feet covered the southern half of the area, but cleared from the northwest by noon, leaving scattered clouds at 3,000 feet and broken clouds at 6,000-8,000 feet over southeast Iraq and Kuwait. These also cleared by 1900Z. A smoke layer at 2,500 feet covered most of central and southern Kuwait throughout the day. A line of broken 4,000-foot clouds associated with the from the Mediterranean invaded the western part of the area by noon. The line was past Baghdad and into north-central Saudi Arabia by the end of the day. Rainshowers

and thunderstorms were widespread in the southern half of the area through the morning. Light rain fell in the western half as the front passed.

Winds were northwesterly to northeasterly at 5-15 knots (but up to 25 knots in thunderstorms) in the southern half of the area. Winds became southwesterly at 5-15 knots as the front approached, and northwesterly at 8-20 knots behind it. Visibilities were near zero in dense fog along the Tigris-Euphrates river basin. There were also near zero in the southern half of the area, where thunderstorms produced blowing dust. Elsewhere, morning visibilities were 5 km in ground fog, rain, and haze. Rain lowered visibilities to 4,800 meters in the western half of the area as the front passed. Smoke limited visibility aloft to 1,600 meters over Kuwait. High temperatures were 13-20 degrees Celsius; lows, 7-16 degrees Celsius.

28 February 1991

Low pressure was centered over the southeastern part of the Saudi Arabian peninsula while high pressure intensified in the rest of the region. Remnants of a weak frontal system remained in northern Saudi Arabia and southern Iraq.

Skies were broken to overcast over north-central, northeastern, east, and east-central Saudi Arabia. Ceiling heights were 3,000-4,000 feet. By evening, skies were mostly clear to scattered. Light rain and drizzle fell over north-central and eastern Saudi Arabia. Thunderstorms with tops to 35,000 feet were observed over east-central Saudi Arabia and the northern part of the Persian Gulf during early morning. Winds were northwesterly at 10-20 knots with gusts to 25 knots. Fog lowered morning visibilities to 4,800 meters in east-central Saudi Arabia. Fog reduced early afternoon visibilities to 3,200 meters in northeastern Saudi Arabia, which improved to 6-8 km in smoke and haze by late afternoon. A sandstorm in east-central Saudi Arabia, with wind speeds of 30-40 knots, reduced late afternoon and early evening visibilities to 1,600-4,000 meters, with isolated reports of 100 meters.

Skies were broken to overcast over southern and southeastern Iraq and Kuwait--ceilings were 3,000 to 4,000 feet, but 800 feet in showers. By early evening, skies were clear to scattered. Isolated afternoon thunderstorms (tops to 35,000 feet) and rainshowers were present over southeastern Iraq and Kuwait.

Winds were northwesterly to northerly at 10-20 knots, with gusts to 35 knots near thunderstorms. In Kuwait, visibilities were less than 3,200 meters in smoke and 2,000 meters in thunderstorms. High temperatures were 13-18 degrees Celsius; lows, 5-10 degrees Celsius.

1 March 1991

High pressure dominated, but a low-pressure system developed over the eastern Mediterranean by the end of the day, sending moisture into western areas. Skies were clear to scattered over most of the area, but scattered to broken at 1,000-2,000 feet over northeast and eastern Saudi Arabia due to smoke. Scattered to broken low clouds at 3,000 feet, with occasionally broken middle and high ceilings, moved into western Iraq and northwestern Saudi Arabia by mid-afternoon. Winds were northwesterly to northerly at 10-15 knots. Visibilities in northeastern Saudi Arabia were 6-8 km in smoke and haze. Blowing sand and dust reduced early morning visibilities to 3,200 meters in east-central and eastern Saudi Arabia. Scattered, occasionally broken, middle clouds at 8,000-10,000 feet moved into central Iraq by mid-afternoon.

Winds were northwesterly at 10-15 knots. Smoke and haze reduced visibilities in Kuwait to 5-7 km, occasionally to 3,200 meters. High temperatures were 15-20 degrees Celsius; lows, 5-10 degrees Celsius.

2 March 1991

High pressure dominated as a low-pressure system moved northeast and brought moisture across Iraq and northern Saudi Arabia. Skies were broken to overcast at 8,000-10,000 feet, but early morning ceilings were 3,000-5,000 feet in showers over western and northern Iraq. Smoke formed a broken layer at 2,000-3,000 feet over northeast and east-central Saudi Arabia during the morning. Skies over the rest of the area were clear to scattered. Isolated rainshowers and thunderstorms with tops to 35,000 feet developed during early morning in northern Iraq. Visibilities were 6-8 km in precipitation. Haze reduced morning visibilities to 4,800 meters in east-central Saudi Arabia. Smoke reduced morning visibilities in eastern Saudi Arabia to 4,800 meters; in the afternoon and evening, to 4,000 meters.

Over central Iraq, skies were broken with middle clouds at 8,000-10,000 feet in the early morning, becoming scattered in early afternoon.. Winds were northwesterly at 10-15 knots. Smoke reduced visibilities in Kuwait to 5-7 km, with isolated areas of less than 1,600 meters. High temperatures were 15-20 degrees Celsius; lows, 5-10 degrees Celsius.

Conclusions

The following facts provide significant evidence that coalition forces were exposed to mixed chemical agents as a result of coalition bombings of Iraqi nuclear, chemical, and biological facilities and that the fallout from these bombings may be contributing to the health problems currently being suffered by Gulf War veterans.

- **Iraqi nuclear, chemical, and biological weapons plants and storage sites were priority targets for U.S. and Coalition forces and were repeatedly bombed.**

- **Chemical alarms began sounding and the servicemen were put on chemical alert simultaneous with the beginning of the air war.**

  The nature of diesel, oil, etc., did not alter during the air war, suddenly causing the alarms to sound. These substances were present before the initiation of the air war, and did not set off the chemical alarms. (The automatic alarms have no sensitivity control.)

  These chemical alarms are battlefield instruments. Battlefields are full of fumes, propellants, explosives, and so forth. It is difficult to believe that they would have been procured if they were ineffective in this environment.

- **U.S. military personnel, and the Czech and French governments have confirmed that the chemical alarms were sounding as the result of nerve agent detection.**

- **The combination of prevailing wind directions, the open terrain, the lack of structural impediments, and other factors listed above, indicate that chemical and possibly nuclear and biological agents from allied bombings became airborne and were being blown and carried across coalition forces emplacements along the Saudi-Iraqi and Saudi-Kuwaiti border.**

- Chemical nerve agents, such as Sarin and others, are known to have a cumulative effect, i.e., they have a slow rate of detoxification. Little is known about the long-term effects of continuous low levels of exposure. Many of the veterans claiming to be suffering from Gulf War Syndrome are exhibiting symptoms of neurophysical disorders.

Chapter 4. Other Identifiable Exposures

Those exposures covered in Chapter 2 and Chapter 3 have received much greater attention in this report than those which are identified in Chapter 4. Since the actual exposures to the materials identified below have been confirmed or are unchallenged, the development of evidence to confirm the exposures is not required.

Chemical/Biological Warfare Pre-Treatment Drug Reaction[1]

Another area in which further research appears to be warranted is the relationship between some Gulf War Syndrome cases and the administration of the nerve agent pretreatment drug given to US troops to protect them against Iraqi gas attacks. It appears possible that the use of this nerve agent pre-treatment drug may have permanently damaged some veterans' health. In addition to research on the effects of the drug itself, the possibility that these drugs might have a synergistic effect either with other drugs, or with chemical agents or other, environmental exposure, should also be thoroughly researched.

Maj. Gen. Ronald Blanck, commander of the Walter Reed Army Medical Center, has said that, "Military intelligence reports indicated there was a real possibility that Iraqi forces would employ biological and chemical weapons; in response to that threat, anthrax vaccine and botulinum vaccine were administered." The Army also gave soldiers a course of pyridostigmine bromide pills, normally used for neuro-muscular disorders. A public interest group, the Public Citizen, had filed a suit to stop experimental drugs being used on soldiers without their consent, but in the patriotic fervor immediately before the war, the suit was dismissed.[2]

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[1]For a detailed discussion of the investigation into the adverse effects of these drugs see Preliminary Staff Findings: Is Military Research Hazardous to Veterans' Health? Lessons from the Persian Gulf. U.S. Senate Committee on Veterans' Affairs staff report to Chairman Jay Rockefeller (May 6, 1994).

[2]Patrick Cockburn, "Gulf War Guinea Pigs Tell Senate of Mystery Illness; Experts Point to Experimental Drugs Given to Troops in Case of Gas Attack," The Independent (July 2, 1993), 13; Brian Christie, "Viewers Question Experts About Vets with Gulf War Illness," Cable News Network Transcript #267-2 (June 10, 1993).

Anthrax and Botulinum Toxoid Vaccines

Maj. General Blanck has advised Committee staff that the anthrax vaccine was administered to 150,000 soldiers and the botulinum vaccine to 8,000 soldiers.[3] Both the anthrax vaccine and the botulinum toxoid vaccine were manufactured by the Michigan Department of Public Health. All of the anthrax vaccine is believed to be the same type of vaccine that has been administered to veterinarians and agricultural workers in the United States since the late 1950s and approved by the Food and Drug Administration in 1971. The botulinum toxoid, manufactured using techniques similar to those employed in the production of the tetanus toxoid, has been administered to medical and laboratory workers since the early 1970s. It is still listed as investigational drug (IND). These vaccines are designed to raise the body's level of antibodies should the individual come into contact with the bacteria or toxin.[4]

While immediate local and some systemic reactions are reportedly experienced with the administration of these drugs, no information was developed by Committee staff that suggests that these vaccinations have widespread long term risks. Nevertheless, the effectiveness of these drugs, their possible long term effects, and the efficacy of manner in which they were administered does merit further study. No other biological warfare defense program immunizations, other than those commonly administered to travellers, have been identified by Committee staff.

Committee staff has received reports of recurring rumors that experimental recombinant DNA (rDNA) biological defense vaccines were used by the military during the Persian Gulf War. No evidence of any rDNA vaccine immunization program has been uncovered thus far. In addition, there has been some concern raised about the fact that soldiers were told that the immunizations they received were "secret." The issue of the secrecy of the vaccines is one that relates to the

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[3]Staff interview with General Blanck.

[4]Committee staff interviews with the Michigan Department of Public Health.

need to deny the enemy knowledge of those materials against which your forces have been protected, rather than to the vaccines themselves.[5]

Pyridostigmine Bromide (Group III)

During House of Representative hearings in 1993, Carol Picou, assigned to a combat support hospital during the Gulf War, recalled that when the ground war began, "we were ordered to take the drug pyridostigmine to protect us against chemical attack. Within one hour of taking the drug, I began to experience serious side-effects, such as uncontrollable twitching eyes, runny nose, excessive frothing from the mouth, neck and shoulder pain."[6] Dr. Sidney Wolfe, director of the Public Citizen's health research group, who filed a suit against use of the drug, said it was administered so sloppily that nobody knew who took it. Maj. Gen. Blanck said that there was a risk of minor side effects, but that these were worthwhile to be "prepared for exposure to deadly biological and chemical warfare agents."[7]

As reported above under Group II disorders, Brian Martin also claimed to have had side effects from the drug pyridostigmine. According to Martin, the drug made him jittery and made his vision "jiggle."

Steve Hudspeth, assigned to the 1454th Transportation Company, also reported getting very sick from the nerve agent pre-treatment pills. He reported severe nausea and diarrhea that did not abate until he stopped taking the pills after two days. He recalled thinking that "if I'm going to feel like this I might as well be dead." Mr. Hudspeth currently suffers from memory loss, fatigue, sore muscles and joints, insomnia, cough, some night sweats, diverticulitis,

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[5]Dr. Edward Martin, Principal Assistant Secretary of Defense for Health Affairs (Acting), "Military Use of Investigational Medical Products," Statement before the Senate Committee of Veterans' Affairs (May 06, 1994).

[6]Patrick Cockburn, "Gulf War Guinea Pigs Tell Senate of Mystery Illness; Experts Point to Experimental Drugs Given to Troops in Case of Gas Attack," The Independent (July 2, 1993), 13

[7]Ibid.

diarrhea, kidney stones, bloody stools, urinary urgency, growth on his eye, rashes, tingling and itching sensations, and depression and irritability.[8]

Chemically related to pesticides, nerve agents such as Sarin, Soman, Tabun, and VX kill by interfering with the metabolic processes, and cause a buildup of a chemical messenger in the human metabolic process called acetylcholine, which operates in the gap between the nerve and the muscle cells. A buildup of acetylcholine may cause drooling, excessive sweating, cramping, vomiting, confusion, irregular heart beat, convulsions, loss of consciousness and coma.[9] Little, however, is known about the consequences of non-lethal exposure to these toxins.

Nerve gas pre-treatment drugs such as pyridostigmine bromide, paradoxically, also meddle with these metabolic processes by creating carbamate-inhibited acetylcholinesterase, which interferes with the actions of nerve gas -- theoretically permitting the process to be partially reversed.[10]

An article concerning a retrospective study conducted by the military on the effects of administration of pyridostigmine bromide appeared in the August 1991 Journal of the American Medical Association. According to the article 30mg of oral pyridostigmine bromide was administered to 41,650 members of the XVIII Airborne Corps, every eight hours for 1 - 7 days while under threat of nerve agent attack during Operation Desert Storm. The study observed that "about half of the population that received the drug noted physiologic changes that were not incapacitating, such as increased flatus, abdominal cramps, soft stools, and urinary urgency." "Approximately 1% of the soldiers believed they had effects that warranted medical attention, but fewer than 0.1% had effects sufficient to discontinue the drug. Non-incapacitating symptoms often occurred; however, the military mission was not impaired." Other symptoms noted in the

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[8]Staff Interviews.

[9]William Booth, "Gas Masks, Antidote Cause Three Deaths and Illness in Israel," Washington Post (January 19, 1991) A20.

[10]Col. Michael A. Dunn, MC, USA, and Frederick R. Sidell, "Progress in Medical Defense Against Nerve Agents," Journal of the American Medical Association (August 4, 1989), 649-652.

article are headaches, rhinorrhea (running nose), diaphoresis (perspiration), nausea, and tingling of the extremities.

The results of this study and the coincidence of symptoms with many of those now being experienced by the veterans of the Gulf War suggests that the raw data and case histories which formed the basis for this study should be made available to researchers. This data can provide valuable information to conduct a second study of possible the possible long term effects of the administration of this drug on otherwise healthy individuals. Further, another independent study of the additive, synergistic, or even possible potentiating effects of pyridostigmine bromide combined with organophosphate pesticides, insect repellents such as DEET, and/or trace amounts of nerve agents on key neurotransmission regulators and secondary regulators must be considered.[11]

Other Identifiable Exposures

Reported Contact with Iraqi Enemy Prisoners of War

On April 4, 1994, several members of the 371st Chemical Company, Army Reserve Center, Greenwood, South Carolina, reported to Committee staff that elements of the unit were deployed on several occasions to decontaminate buses used to transport Iraqi enemy prisoners of war (EPWs) to detention camps inside Saudi Arabia. They were never advised of the reason these decontamination missions were necessary.[12]

A number of military police and other units who guarded the EPWs had close and continuing contact with them. Many individuals in these units are now reporting very high rates of illnesses in their units to Committee staff. The symptoms these Gulf War veterans describe are consistent with those commonly associated with Gulf War Syndrome. Committee staff has also been informed that the 300th Medical Brigade was responsible for the EPW health care during

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[11]Banking Committee staff interview with Dr. James Moss, U.S. Department of Agriculture, March 1994. See also Preliminary Staff Findings: Is Military Research Hazardous to Veterans' Health? Lessons from the Persian Gulf. U.S. Senate Committee on Veterans' Affairs staff report to Chairman Jay Rockefeller (May 6, 1994).

[12]Staff interviews.

and after the war. While the Committee has received anecdotal information regarding the health status of the Iraqis and their symptoms, certainly medical records were established and retained regarding their care while in Coalition custody.

Given the reported high rate of illnesses among these military police units, and the possible relationship between the illnesses being suffered by these veterans and those which were reported by the EPWs, the raw data from the medical units which treated the EPWs should be immediately released to aid independent research into the causes of these illnesses.

Chemical Agent Resistant Coating (CARC)

CARC coatings need to be resistant to chemicals that are required to decontaminate military equipment that has been exposed to chemical and/or biological warfare agents. After cleaning with these decontamination chemicals, vehicles treated with CARC can be placed back into service immediately, without stripping and repainting. There have been several generations of CARC coatings. According to published sources, the military specifications for these coatings vary with the type of equipment to be used. [13]

The first generation of CARC contained lead and hexavalent chrome. Later these items were removed and the CARC was made VOC (volatile organic compound compliant). Prior to the Gulf War, the CARC specification was for a "high solids coating without exempt solvent."[14]

Committee staff has received calls from members of several National Guard and Army Reserve Units in Florida and Michigan who were detailed to apply these coatings to U.S. military vehicles during their service in the Gulf War. According to these veterans, many members of the units are suffering from the symptoms similar to those of other affected veterans. There have also been a number of anecdotal reports received by the Committee suggesting that

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[13]Joe Schrantz, "Excitement Stirs in Aerospace/Military Coatings," Industrial Finishings, Vol. 65, No. 9 (September 1989), 18.

[14]Ibid

unprotected exposures to CARC can have neurotoxological effects similar to exposures to other neurotoxins.

According to a published report in 1993, Dr. William Johnson, formerly of the Eisenhower Army Medical Center at Fort Gordon, Georgia, noted in a report prepared for Congress, that many of these soldiers worked 12 hour days in poorly ventilated enclosures -- initially with no respirators. This report is consistent with information received by Committee staff.

While these duties were certainly necessary to perform, the failure to provide appropriate safety equipment to these individuals should be investigated further, not only for its impact on the health of the individuals but also for its impact on the ultimate readiness of these units to perform their mission. The chemical nature and the hazards associated with exposure to the various CARCs should be easily identified. Further, a study into the rates and types of illnesses being experienced by these units could be easily undertaken since the units would be readily identifiable.

Committee staff has developed no information to date that suggests these coatings represent a hazard once they are applied and cured.

Depleted Uranium Ammunition

Several different armor-penetrating munitions used during Operation Desert Storm were tipped with depleted uranium (DU) and encased in aluminum. The Persian Gulf War marked the first time such shells were used in combat. The penetrators are made of uranium rods from nuclear power plants and according to James Mathews, in an article that appeared in the Journal of the National Cancer Institute in July 1993, the uranium is depleted of the more volatile material, including the potent isotopes U-235 and U-238.[15]

According to Mathews, "When depleted-uranium penetrators strike their target, the aluminum covering is torn away and a large portion of the kinetic

[15]James Mathews, "Radioactive Bullets Raise Cancer Fears, Journal of the National Cancer Institute, Vol. 85 (July 7, 1993), 1029-1030

energy is dissipated as heat. The heat of the impact causes the depleted uranium to oxidize or burn momentarily."[16]

When uranium particles enter the body, they become lodged in bones or major organs, affecting the bone marrow and producing DNA damage. In previous congressional testimony, Mathews reports, Maj. Gen. Ronald R. Blanck, commander of Walter Reed Army Medical Center, Washington, D.C., stated that "careful analysis of [servicemen exposed to] depleted uranium suggests there will be no significant increase in risk to health, either in the short or long-term." Medical evaluations have been conducted by the Boston VA Medical Center on a number of soldiers identified as having the greatest potential for inhaling or ingesting depleted uranium dusts, mainly soldiers that prepared damaged battlefield vehicles for shipment back to the United States.

"The results of those examinations have shown no effects of uranium toxicity, and no uranium residues or byproducts were detected," said Blanck. [17]

The U.S. Armed Forces Radiological Research Institute is conducting a five year study into the hazards associated with U.S. military equipment and munitions that use depleted uranium. The preliminary results of that research should be made available to researchers and physicians to provide a basis for determining if exposure to unexpended or expended depleted uranium munitions is a serious health hazard.

Finally, individual dosimeters were reportedly issued to many of the soldiers who fought in the Persian Gulf War to measure radiological hazards. It has been reported to Committee staff that at least some of these dosimeters were collected from the soldiers who participated in the conflict prior to their leaving the Gulf.[18] In order to facilitate the research currently underway, and to provide information to researchers as to the level of exposure by location, the Department of Defense should release information regarding the readings from these dosimeters. If this information is not readily available, the National

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[16]Ibid.

[17]Ibid.

[18]Staff interviews.

Institute of Standards and Technology could easily assess the level of emission related to these materials, if necessary, to provide information to both scientific and medical researchers attempting to find a cause for the illnesses being experienced to those individuals who may have been exposed to these materials. This information is also vital to ensure that if a danger exists, appropriate safeguards will be taken, whenever possible, in future conflicts.

Environmental Exposures

With the initiation of the "ground war" on February 24, 1991, Iraqi forces set fire to over 600 oil wells located inside Kuwait. The contamination from these fires had a dramatic impact on the environment and the smoke was so thick that often there was darkness. In the areas where the fires were burning, Coalition soldiers were covered with and inhaled oil and soot. Even when they were able to shower, often they had no clean uniforms to replace the oil soaked ones. Other environmental hazards that have been previously considered include heater fuel fumes, pesticides, insect repellent, petrochemicals, and electromagnetic radiation from radars and communications equipment. While many researchers have discounted these exposures as causing Gulf War Syndrome since these exposures are not unique to the Gulf War environment, nevertheless, the results of the research that has been conducted in these areas by the Department of Defense and the Department of Veterans Affairs, including available data sets, case histories and diagnostic breakdown information, must be made available to assist medical researchers in furthering their research, and physicians in treating their patients.

Decontamination of Equipment Returned from the Persian Gulf Theater of Operations

Beginning in November 1993, Committee staff began receiving reports that a number of Department of Defense civilian personnel at the Anniston, Alabama and Sharpsite, California Army Depots were beginning to experience symptoms consistent with those of the Gulf War veterans. These individuals were assigned to clean, repair, and upgrade military vehicles and other equipment returning from the Southwest Asia theater of operations.[19]

[19]Staff interviews.

No further information has been developed regarding these reports. Further investigation, however, appears warranted into what, if any, hazardous substances may have been transported on equipment that would cause these symptoms. This type of information may assist in narrowing the scope of the research in determining the causes of Gulf War Syndrome.

Transmission

Over the past seven months, Committee staff has interviewed in varying detail over 1,000 Gulf War veterans who claim to be suffering from many of the symptoms commonly associated with Gulf War Syndrome. As a result of these interviews, it has been learned that most of the spouses and many of the children of Gulf War veterans are suffering from many of the same symptoms. Several published reports have recently appeared that suggest that Gulf War Syndrome may be transmittable, that it may be causing miscarriages, and that it may be causing birth deficiencies and some birth defects in newborns.[20]

During a February 21, 1994 Gulf War veterans round table meeting held in Lansing, Michigan, Chairman Donald W. Riegle, Jr. met with 9 Gulf War veterans and their wives to discuss their health problems. Of the 9 Gulf War veterans present, 20 additional individuals in their immediate families who were also suffering from many of the same symptoms were also identified.

In an effort to determine the scope and nature of symptom transmission, a survey of those individuals who have contacted the Committee is currently underway. The purpose of the survey is to determine the symptoms currently being suffered by the Gulf War veterans, those being transmitted to family members, and the number and rate of birth deficiencies being experienced within this population. The final results of this survey will not be available until later this year.

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[20]Ron Martz, "Mississippi Vets Blame Gulf War for Sick Kids," The Atlanta Journal and Constitution (January 22, 1994), A5; Simon Tisdale, "Gulf Babies Maimed at Birth," The Guardian (December 23, 1993), 1; Ed Timms and Steve McGonigle, "Gulf Unit Cites Babies' Illnesses at Meeting," The Dallas Morning News (November 23, 1993), 4A; Ed Timms, "Some Active Duty Troops are Suffering in Silence,," The Dallas Morning News (November 14, 1993), 15A; Richard Serrano, "Pentagon Feels Heat Over Gulf War Disease," Chicago Sun Times (November 7, 1993), 28.

The issue of the possible transmission of Gulf War Syndrome is one that recrafts the issue of national security. Surely there are some aspects of the Department of Defense's chemical and biological warfare defense programs that merit secrecy. However, when the secrecy of those programs interfere with the safety of the citizenry, then one must understand that the notion of national security rests primarily in the security of the people and not in the secrecy of vulnerability.

Conclusions

Chemical /Biological Warfare Agent Exposure: Why Wasn't Everyone Affected?

The ability of someone to resist an illness, disease, or the adverse effects of a medication varies with each individual. Not everyone who received nerve agent pre-treatment drugs exhibited adverse effects. According to the Centers for Disease Control not everyone who is exposed to nerve gas will cross a toxic threshold at the same time. Certainly, there is a threshold beyond which such exposure will surely be lethal. This is what has come to be accepted as the effect of nerve gas exposure.

The results of this investigation suggest that there is, in fact, a relationship between dosage and harmful effects. A number of units who believe they suffered a direct chemical weapons attack report illness rates over 50%. The Czech chemical decontamination unit, which suffered only indirect exposure and might be expected to be well prepared against chemical exposure, reports an illness rate of 10%. The extent of exposure in the larger population in the Gulf at the time, and the rate of illnesses, is unknown. The number of Gulf War veterans who have signed up for the Persian Gulf Registry examination is now over 17,000.

Nerve agents like Sarin kill by disrupting the metabolic processes, causing a buildup of a chemical messenger (acetylcholine) by inhibiting the production of acetylcholinesterase, a key regulator of neurotransmission. Nerve agent pre-treatment drugs (NAPP) administered to U.S. servicemen and women, such as pyridostigmine bromide, also disrupt these metabolic processes by creating a carbamate-inhibited acetylcholinesterase, which preempts the action of the nerve agent. Several veterans suffering from Gulf War illnesses have testified before House and Senate Veterans Affairs Committee and believe that these illness are related to the permanent adverse side effects from this drug. Further, the efficacy of the biological warfare defense inoculations merits further research.

Chemical /Biological Warfare Agent Exposure: Did the Military Know or Suspect that Individuals Were Exposed to these Hazardous Substances?

The evidence cited above and the statements of the witnesses will have to be evaluated on their own merits in this regard. During the course of this investigation, a medical questionnaire was received from one of the veterans currently suffering from Gulf War illnesses. This questionnaire like, the other evidence and statements must be weighed on its own merits. The following information is solicited on this document, an overprint to SF600:

1. What diseases of injuries did you have in the Southwest Asia region?

2. Are you receiving any medicine, or other treatment, at the present time?

3. Do you have fever, fatigue, weight loss, or yellow jaundice?

4. Do you have any swelling of lymph nodes, stomach, or other body parts?

5. Do you have any rash, skin infection, or sores?

6. Do you have a cough or sinus infection?

7. Do you have stomach or belly pain, nausea, diarrhea, or bloody bowel movements?

8. Do you have urinary problems such as blood or stones in urine or pain and burning with urination?

9. Have you had nightmares or trouble sleeping?

10. Have you had recurring thoughts about your experiences during Desert Shield/Desert Storm?

11. Do you have any reason to believe that you, or any members of your unit, were exposed to chemical warfare or germ warfare?

Forms such as this suggest that the military expected, for whatever reason, to see symptomologies such as those that are currently being experienced. This

information, as well as the information maintained in the medical records of U.S. Forces and the Iraqi EPWs may provide information that will assist medical researchers in determining causal links. This issue should be further investigated.

The Need for Immediate Primary Scientific Research and Advanced Medical Research

Thousands of veterans of the Gulf War are reporting symptoms of memory loss, muscle and joint pain, intestinal and heart problems, fatigue, rashes, sores, and running noses. A number of veterans who have exhibited these symptoms since returning from the Gulf War have subsequently died. Physicians have been unable to diagnose the cause of the disorders.

The following symptoms have been identified as those most commonly reported by veterans:

- recurring severe headaches
- fatigue
- joint and muscle pain (particularly in knees, ankles, shoulders, and back)
- memory loss (often described as an inability to concentrate)
- recurring rashes (sometimes severe and often causing skin discoloration or described as mosquito bite-like or small with watery pustules)
- lumps at joint areas
- lumps under skin
- depression, irritability
- night sweats
- insomnia
- urinary urgency and frequency
- diarrhea (sometimes bloody) or constipation
- gastrointestinal problems (nausea, swollen stomach, gas)
- dizziness or blackouts
- blurry vision
- photosensitivity (excessive sensitivity to bright lights)
- shortness of breath
- coughing

Symptoms most commonly reported by veterans (cont.):

- abnormal hair loss
- bleeding gums (or other serious dental problems)
- swollen lymph nodes
- sinus infections
- chest pains

female veterans only:

- chronic or recurring vaginal yeast infections
- menstrual irregularities
- excessive bleeding and severe cramping

Little is known about the long-term consequences of exposure to low levels of nerve gas, and even less about complications which might arise from using combined agent weapons. Further, little is known about other difficulties associated with interfering with the neurotransmission process. Non-lethal exposure to pesticides, however, has manifested itself in memory loss. Nearly every bodily process requires a properly functioning nervous system to operate.

The following is a summary, not offered as diagnostic evidence, suggesting how some of the symptoms noted could be rooted in neurotransmission-related disorders:

Memory-loss: Although neuroscience is a long way from explaining the memory functions of the human brain, considerable strides have been made towards understanding how neurons are modified by experience and how those modifications are maintained for extended periods of time. The ability to remember is regulated, however, by neural processing.[21] On August 25, 1993, Dr. Howard Hu, a researcher with Physicians for Human Rights who participated in the investigation of the use of nerve gas by the Iraqi government against the Kurds, suggested that the effects of non-lethal exposures to nerve agents could be similar to those involving non-lethal exposures to pesticides.

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[21]Lloyd D. Partridge and L. Donald Partridge, The Nervous System: Its Function and Interaction with the World (Cambridge, Massachusetts: MIT Press, 1993).

Dr. Hu said these disorders are generally neuropsychological and include memory loss.[22]

Muscle Pains: Myasthenia Gravis is a disease causing progressive muscle weakness. It has been shown that the disease is an autoimmune reaction to the acetylcholine-gated channels in the neuromuscular junction. According to Lloyd D. Partridge and L. Donald Partridge, many drugs and toxins, including pesticides and nerve gas, are known to exhibit their effects through specific actions at the neuromuscular junctions, blocking the action of acetylcholinesterase.[23]

Joint Pains: When the force generated by a muscle acts on a load, there is a requisite exchange of energy between the muscle and the load. A failure of the nervous system to send impulses to effector muscles can result in the failure of effector muscles to provide the resistance necessary to protect joints from excessive torque. This failure, and the resultant joint pain, is consistent with the action of any agent or medication which functions by disrupting the communication process operating in the gap between the nerve and the muscle cells.[24]

Gastrointestinal Disorders: As a combined neural operation, the neural signals that control digestive functions, such as in the complex nervous system of the gut, are largely, but not entirely, independent of the central nervous system (CNS). Many of the control functions are conducted by local nerve networks and the endocrine systems. These digestive functions, however, depend on the ability of the CNS and local nerve networks to function properly.[25]

Heart problems, running noses and virtually every other problem lumped under the heading of Gulf War Illnesses can be explained by neurophysical and neuropsychiatric disorders. Some of the non-chemical warfare related diseases

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[22]Interview with Dr. Howard Hu, Physicians for Human Rights on August 25, 1993.

[23]Lloyd D. Partridge and L. Donald Partridge, The Nervous System: Its Function and Interaction with the World (Cambridge, Massachusetts: MIT Press, 1993)

[24]Ibid.

[25]Ibid.

involving a disruption in the acetylcholine-gated channels in the neuromuscular messenger junctions, such as myasthenia gravis, while treatable, are irreversible. Neurotransmission disorders resulting from disrupted physiological processes, such as those regulating acetylcholines (including toxin acetylcholine and acetylcholinesterase) may be the contributing to the symptomologies observed. Detection of these types of disorders may only be possible using highly sophisticated, computer-read electroencephalograms (EEG). Further, given the possibility that some of these individuals were exposed to biotoxins and other biological agents, scientists and physicians will need to use sophisticated procedures including DNA plasmid screening, bacteriological screening, mycological screening, viral screening, and toxicological screening.

Conclusions

Thousands of American servicemen and women are reportedly suffering from memory loss, muscle and joint pain, intestinal and heart problems, fatigue, rashes, sores, and running noses as a result of their service in the Gulf War. A number of veterans who have exhibited these symptoms since returning from the Gulf War reportedly have died. Members of their immediate families are now beginning to contract some of the illnesses. Physicians have been unable to diagnose or treat the cause of the disorders.

Despite the Department of Defense's position that no evidence exists for exposure to chemical warfare agents during the Gulf War, this investigation is establishing that there is substantial evidence supporting claims that U.S. servicemen and women were exposed to low level chemical warfare agents and possibly biological agents and toxins from a variety of sources. This exposure may account for many of the Gulf War Illness symptoms. Little is known about the long-term consequences of exposure to low levels of nerve gas, although most are known to have cumulative toxic effects.

Even less is known about complications which might arise from exposure to combined agents and combined agent weapons. The combined agent strategy is intended to frustrate efforts at diagnosing these illnesses. Non-lethal exposure to pesticides can result in memory loss, and nerve agents are chemically related to pesticides. Many of the veterans complaining of Gulf War Syndrome illnesses suffer from, among other disorders, memory loss. Many of the identified chemical and biological agents interfere with the body's

neurotransmission processes, affecting the regulation of acetylcholine, neurotoxin acetylcholine, and other necessary enzymes required by nearly every bodily process. In order to detect irregularities such as those which might be caused by exposure to nerve gas, computer-read electroencephalograms are needed; a physician probably would not be able to recognize the abnormalities in during a visual EEG interpretation.

If biotoxins or biological agents were used or released in the Gulf War, detection requires that physicians and scientists have some idea of what they are looking for. Further, if mycotoxins or viruses were used or released, they would be difficult to detect without the aid of advanced laboratory screening methods.

Non-lethal exposure to chemical warfare agents, some biological agents, mixed chemical/biotoxin agents and/or the administration of nerve agent pre-treatment drugs could explain many of the symptoms of the Gulf War illness, as well as the inability to diagnose the disorders. Other possible causes for Gulf War syndrome have been suggested, such as exposure to pesticides, petrochemicals, burning landfills and oil wells, depleted uranium from anti-tank munitions, or exposure to other environmental hazards. Many of these possibilities already have been investigated and discounted. Additionally, these types of exposures are not specific to the Middle East or to the Gulf War and the evidence for these hazards causing the large number of unexplained illnesses is less than compelling. Each of these possible causes of unexplained illnesses, however, should be systematically researched.

Appendix A - Material Safety Data Sheets

Chemical Nerve Agents

Tabun (GA)
Sarin (GB)
Soman (GD)
VX

Blister Agents

Sulfur Mustard (HD), (HDT)
Sulfur Mustard (HT)

Date: 3 Dec 1990

U.S. ARMY CHEMICAL
RESEARCH, DEVELOPMENT
AND ENGINEERING CENTER

Emergency Telephone #s:
CRDEC Safety Office
301-671-4411 0700-1700
EST After normal duty
hours: 301-278-5201
Ask for CRDEC Staff
Duty Officer

MATERIAL SAFETY DATA SHEET

LETHAL NERVE AGENT (GA)

SECTION I - GENERAL INFORMATION

MANUFACTURER'S NAME: Department of the Army

MANUFACTURER'S ADDRESS: U.S. ARMY ARMAMENT, MUNITIONS AND CHEMICAL COMMAND
CHEMICAL RESEARCH DEVELOPMENT AND ENGINEERING
CENTER
ATTN: SMCCR-CMS-E
ABERDEEN PROVING GROUND, MD 21010-5423

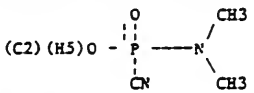
CAS REGISTRY NUMBER: None

CHEMICAL NAME: Ethyl N,N-dimethylphosphoramidocyanidate

TRADE NAME AND SYNONYMS: Ethyl dimethylplosphoramidocyanidate
Dimethylaminoethoxy-cyanophosphine oxide
Dimethylamidoethoxyphosphoryl cyanide
Ethyldimethylaminocyanophosphonate
Ethyl ester of dimethylphosphoroamidocyanidic acid
Ethylphosphorodimethylamidocyanidate
GA
EA1205
Tabun

CHEMICAL FAMILY: Organophosphorus compound

FORMULA/CHEMICAL STRUCTURE: C5 H11 N2 O2 P



NFPA 704 SIGNAL: Health - 4
Flammability - 2
Reactivity - 1

SECTION II - COMPOSITION

INGREDIENTS NAME	FORMULA	PERCENTAGE BY WEIGHT	AIRBORNE EXPOSURE LIMIT (AEL)
GA	C5 H11 N2 O2 P	100	0.0001 mg/m3

SECTION III - PHYSICAL DATA

BOILING POINT DEG F (DEG C): 247.5 DEG C

VAPOR PRESSURE (mm Hg): 0.07 @ 24 DEG C

VAPOR DENSITY (AIR=1): 5.6

SOLUBILITY IN WATER (g/100 g): 9.8 @ 25 DEG C
7.2 @ 20 DEG C

SPECIFIC GRAVITY (H2O=1): Not available

FREEZING (MELTING) POINT: -50 DEG C

AUTOIGNITION TEMPERATURE DEG F (DEG C): Not available

VISCOSITY (CENTISTOKES): 2.18 @ 25 DEG C

PERCENTAGE VOLATILE BY VOLUME: 610 mg/m3 @ 25 DEG C

EVAPORATION RATE: Not available

APPEARANCE & ODOR: Colorless to brown liquid. Faintly fruity; none when pure.

SECTION IV - FIRE AND EXPLOSION DATA

FLASHPOINT: 78 DEG C

FLAMMABILITY LIMITS (% by volume): Not available

EXTINGUISHING MEDIA: Water, fog, foam, CO2 - Avoid using extinguishing methods that will cause splashing or spreading of the GA.

UNUSUAL FIRE & EXPLOSION HAZARDS: Fires involving this chemical may result in the formation of hydrogen cyanide.

SPECIAL FIRE FIGHTING PROCEDURES: All persons not engaged in extinguishing the fire should be immediately evacuated from the area. Fires involving GA should be contained to prevent contamination to uncontrolled areas. When responding to a fire alarm in buildings or areas containing agents, firefighting personnel should wear full firefighter protective clothing (without TAP clothing) during chemical agent firefighting and fire rescue operations. Respiratory protection is required. Positive pressure, full facepiece, NIOSH-approved self-contained breathing apparatus (SCBA) will be worn where there is danger of oxygen deficiency and when directed by the fire chief or chemical accident/incident (CAI) operations officer. The M9 or M17 series mask may be worn in lieu of SCBA when there is no danger of oxygen deficiency. In cases where firefighters are responding to a chemical accident/incident for rescue/reconnaissance purposes vice firefighting, they will wear appropriate levels of protective clothing (see Section 8).

SECTION V - HEALTH HAZARD DATA

AIRBORNE EXPOSURE LIMIT (AEL): The suggested permissible airborne exposure concentration for GA for an 8-hour workday or a 40 hour work week is an 8-hour time weight average (TWA) of 0.0001 mg/m3 (2 X 10-5 ppm). This value is based on the TWA of GA as proposed in the USAEHA Technical Guide 169, "Occupational Health Guidelines for the Evaluation and Control of Occupational Exposure to Nerve Agents GA, GB, GD, and VX". To date, however, the Occupational Safety and Health Administration (OSHA) has not promulgated a permissible exposure concentration for GA.

EFFECTS OF OVEREXPOSURE: GA is an anticholinesterase agent similar in action to GB. Although only about half as toxic as GB by inhalation, GA in

low concentrations is more irritating to the eyes than GB.

The number and severity of symptoms which appear are dependent on the quantity and rate of entry of the nerve agent which is introduced into the body. (Very small skin dosages sometimes cause local sweating and tremors with few other effects.)

Individuals poisoned by GA display approximately the same sequence of symptoms regardless of the route by which the poison enters the body (whether by inhalation, absorption, or ingestion). These symptoms, in normal order of appearance, are: runny nose; tightness of chest; dimness of vision and pin pointing of the eye pupils; difficulty in breathing; drooling and excessive sweating; nausea; vomiting, cramps, and involuntary defecation and urination; twitching, jerking, and staggering; and headache, confusion, drowsiness, coma, and convulsion. These symptoms are followed by cessation of breathing and death.

Onset Time of Symptoms: Symptoms appear much more slowly from skin dosage than from respiratory dosage. Although skin absorption great enough to cause death may occur in 1 to 2 minutes, death may be delayed for 1 to 2 hours. Respiratory lethal dosages kill in 1 to 10 minutes, and liquid in the eye kills almost as rapidly.

Median Lethal Dosage, Animals:

LD50 (monkey, percutaneous) = 9.3 mg/kg (shaved skin)
LCt50 (monkey, inhalation) = 187 mg-min/m3 (t = 10)

Median Lethal Dosage, Man:

LCt50 (man, inhalation) = 135 mg-min/m3 (t = 0.5-2 min) at RMV* of 15 l/min;
200 mg-min/m3 at RMV* of 10 l/min

*Respiratory Minute Volume

GA is not listed by the International Agency for Research on Cancer (IARC), American Conference of Governmental Industrial Hygienists (ACGIH), Occupational Safety and Health Administration (OSHA), or National Toxicology Program (NTP) as a carcinogen.

EMERGENCY AND FIRST AID PROCEDURES:

INHALATION: Hold breath until respiratory protective mask is donned. If severe signs of agent exposure appear (chest tightens, pupil constriction, incoordination, etc.), immediately administer, in rapid succession, all three Nerve Agent Antidote Kit(s), Mark I injectors (or atropine if directed by the local physician). Injections using the Mark I kit injectors may be repeated at 5 to 20 minute intervals if signs and symptoms are progressing until three series of injections have been administered. No more injections will be given unless directed by medical personnel. In addition, a record will be maintained of all injections given. If breathing has stopped, give artificial respiration. Mouth-to-mouth resuscitation should be used when approved mask-bag or oxygen delivery systems are not available. Do not use mouth-to-mouth resuscitation when facial contamination exists. If breathing is difficult, administer oxygen. Seek medical attention IMMEDIATELY.

EYE CONTACT: IMMEDIATELY flush eyes with water for 10 -15 minutes then don respiratory protective mask. Although miosis (pinpointing of the pupils) may be an early sign of agent exposure, an injection will not be administered when miosis is the only sign present. Instead, the individual will be taken IMMEDIATELY to the medical treatment facility for observation.

SKIN CONTACT: Don respiratory protection mask and remove contaminated clothing. Immediately wash contaminated skin with copious amounts of soap and water, 10% sodium carbonate solution, or 5% liquid household bleach. Rinse well with water to remove decontaminate. Administer an intramuscular injection with the MARK I kit injectors only if local sweating and muscular twitching symptoms are observed. Seek medical attention IMMEDIATELY.

INGESTION: Do not induce vomiting. First symptoms are likely to be gastrointestinal. IMMEDIATELY administer 2 mg intramuscular injection of

the MARK I kit auto-injectors. Seek medical attention IMMEDIATELY.

** See Addendum 5 for further First Aid Procedures **

SECTION VI - REACTIVITY DATA

STABILITY: Stable

INCOMPATIBILITY: Not available

HAZARDOUS DECOMPOSITION: Decomposes within 6 months at 60 DEG C. Complete decomposition in 3-1/4 hours at 150 DEG C. May produce HCN. Oxides of nitrogen, oxides of phosphorus, carbon monoxide, and hydrogen cyanide.

HAZARDOUS POLYMERIZATION: Not available

SECTION VII - SPILL, LEAK, AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: If leaks or spills occur, only personnel in full protective clothing (see section 8) will remain in area. In case of personnel contamination see section V "Emergency and First Aid Instructions."

RECOMMENDED FIELD PROCEDURES:
Spills must be contained by covering with vermiculite, diatomaceous earth, clay, fine sand, sponges, and paper or cloth towels. This containment is followed by treatment with copious amounts of aqueous Sodium Hydroxide solution (a minimum 10 wt percent). Scoop up all material and place in a fully removable head drum with a high density polyethylene liner. The decontamination solution must be treated with excess bleach to destroy the CN formed during hydrolysis. Cover the contents with additional bleach before affixing the drum head. After sealing the head, the exterior of the drum shall be decontaminated and then labeled IAW EPA and DOT regulations. All leaking containers shall be overpacked with vermiculite placed between the interior and exterior containers. Decontaminate and label IAW EPA and DOT regulations. Dispose of the material IAW waste disposal methods provided below. Conduct general area monitoring with an approved monitor (see Section 8) to confirm that the atmospheric concentrations do not exceed the airborne exposure limit (see Sections 2 and 8).

If 10 wt percent Sodium Hydroxide is not available then the following decontaminants may be used instead and are listed in order of preference: Decontamination Solution No. 2 (DS2), Sodium Carbonate and Supertropical Bleach Slurry (STB).

RECOMMENDED LABORATORY PROCEDURES:
A minimum of 56 grams of decon solution is required for each gram of GA. The decontamination solution is agitated while GA is added and the agitation is maintained for at least one hour. The resulting solution is allowed to react for 24 hours. At the end of 24 hours, the solution must be titrated to a pH between 10 and 12. After completion of the 24 hour period, the decontamination solution must be treated with excess bleach (2.5 mole OCl-/mole GA) to destroy the CN formed during hydrolysis. Scoop up all material and place in a fully removable head drum with a high density polyethylene liner. Cover the contents with additional bleach before affixing the drum head. All contaminated clothing will be placed in a fully removable head drum with a high density polyethylene liner. Cover the contents of the drum with decontaminating solution as above before affixing the drum head. After sealing the head, the exterior of the drum shall be decontaminated and then labeled IAW state, EPA and DOT regulations. All leaking containers shall be overpacked with vermiculite placed between the interior and exterior containers. Decontaminate and label IAW State, EPA and DOT regulations. Conduct general area monitoring with an approved monitor (see Section 8) to confirm that the atmospheric concentrations do not exceed the airborne exposure limit (see Sections 2 and 8).

WASTE DISPOSAL METHOD: Open pit burning or burying of GA or items contain-

ing or contaminated with GA in any quantity is prohibited. The detoxified GA (using procedures above) can be thermally destroyed by incineration in an EPA approved incinerator in accordance with appropriate provisions of Federal, State and/or local RCRA regulations.

NOTE: Some states define decontaminated surety material as a RCRA Hazardous Waste.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION:

Exposure Potential mg/m3 (8-hour TWA)	Respiratory Protection/Ensemble Required
Less than 0.0001	M9, M17, or M40 series mask shall be available for escape as necessary.
0.0001 to 0.2	M9, or M40 series mask with Level A or Level B protective ensemble (see AMCR 385-131 for determination of appropriate level). Demilitarization Protective Ensemble (DPE), or Toxicological Agent Protective Ensemble Self-Contained (TAPES), used with prior approval from AMC Field Safety Activity.
Greater than 0.2 or unknown	Demilitarization Protective Ensemble (DPE), or Toxicological Agent Protective Ensemble Self-Contained (TAPES), used with prior approval from AMC Field Safety Activity. Note: When DPE or TAPES is not available the M9 or M40 series mask with Level A protective ensemble can be used. However, use time shall be restricted to the extent operationally feasible, and may not exceed one hour. As an additional precaution, the cuffs of the sleeves and the legs of the M3 suit shall be taped to the gloves and boots to reduce aspiration.

VENTILATION: Local Exhaust: Mandatory must be filtered or scrubbed.

Special: Chemical laboratory hoods shall have an average inward face velocity of 100 linear feet per minute + or - 10% with the velocity at any point not deviating from the average face velocity by more than 20%. Laboratory hoods shall be located such that cross drafts do not exceed 20% of the inward face velocity. A visual performance test utilizing smoke producing devices shall be performed in the assessment of the inclosure's ability to contain agent GA. Emergency backup power necessary. Hoods should be tested semi-annually or after modification or maintenance operations. Operations should be performed 20 cm inside hood face.

Other: Recirculation of exhaust air from agent areas is prohibited. No connection between agent areas and other areas through ventilation system.

PROTECTIVE GLOVES: Butyl Glove M3 and M4
Norton, Chemical Protective Glove Set

EYE PROTECTION: Chemical goggles. When there is potential for severe exposure (e.g. sampling pressurized systems, loading & unloading operations) chemical goggles and face shield are recommended.

OTHER PROTECTIVE EQUIPMENT: Full protective clothing will consist of the

M3 Butyl rubber suit with hood, M2A1 boots, M3 gloves, coveralls, fatigues, or similar (with drawers and undershirt) and socks, M9 mask or the Demilitarization Protective Ensemble (DPE). For general lab work, gloves and lab coat shall be worn with M9 or M17 mask readily available.

MONITORING: Available monitoring equipment for agent GA is the Automatic Chemical Agent Detector Alarm (ACADA), bubblers (GC method), Miniature Chemical Agent Monitor (MINICAM) and Chemical Agent Monitor (CAM).

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: In handling, the buddy system will be incorporated. No smoking, eating and drinking in areas containing agent is permitted. Containers should be periodically inspected for leaks (either visually or by a detector kit). Stringent control over all personnel practices must be exercised. Decontamination equip shall be conveniently located. Exits must be designed to permit rapid evacuation. Chemical showers, eye-wash stations, and personal cleanliness facilities be provided. Wash hands before meals and each worker will shower thoroughly with special attention given to hair, face, neck, and hands, using plenty of soap before leaving at the end of the workday.

OTHER PRECAUTIONS: Agents must be double contained in liquid and vapor tight containers when in storage or when outside of ventilation hood.

For additional information see "USAEHA Technical Guide No. 169, Occupational Health Guidelines for the Evaluation and Control of Occupational Exposure to Nerve Agents GA, GB, GD, and VX".

SECTION X - TRANSPORTATION DATA

PROPER SHIPPING NAME: Poisonous liquid, n.o.s.

DOT HAZARD CLASSIFICATION: Poison A

DOT LABEL: Poison gas

DOT MARKING: Poisonous liquid, n.o.s. (Ethyl dimethylphosphoramidocyanidate) NA1955

DOT PLACARD: POISON GAS

PRECAUTIONS TO BE TAKEN IN TRANSPORTATION: Motor vehicles will be placarded regardless of quantity. Driver shall be given full and complete information regarding shipment and conditions in case of emergency. AR 50-6 deals specifically with the shipment of chemical agents. Shipments of agent will be escorted LAW AR 740-32.

EMERGENCY ACCIDENT PRECAUTIONS AND PROCEDURES: See sections IV, VII, and VIII.

ADDENDUM B

First aid procedures.

a. Exposed personnel will be removed immediately to an uncontaminated atmosphere. Personnel handling casualty cases will give consideration to their own safety and will take precautions and employ the prerequisite protective equipment to avoid becoming exposed themselves.

CAUTION: Due to the rapid effects of nerve agents, it is extremely important that decontamination of personnel not be delayed by attempting to blot off excessive agent prior to decontamination with sodium hypochlorite.

b. The casualty will then be decontaminated by washing the contaminated areas with 10 % sodium carbonate solution or 5% household bleach and then flushing well with water to remove excess bleach followed by copious soap and water wash. Mask will be left on the victim until contamination has been completed unless it has been determined that areas of the face were contaminated and the mask must be removed to facilitate decontamination. After decontamination, the contaminated clothing will be removed and skin contamination washed away. If possible, decontamination will be completed before the casualty is taken to the aid station or medical facility.

CAUTION: Care must be taken when decontaminting facial areas to avoid getting the hypochlorite into the eye or mouth. Only clean water shall be used when flushing the eyes or mouth. Skin surfaces decontaminated with bleach should to be thoroughly flushed with water to prevent skin irritation from the bleach.

c. If there is no apparent breathing, artifical resuscitation will be started immediately (mouth-to-mouth, or with mechanical resuscitator). The situation will dictate method of choice, e.g., contaminated face. Do not use mouth-to-mouth resuscitation when facial contamination exists. When appropriate and when trained personnel are available, cardiopulmonary resuscitation (CPR) may be necessary.

d. An individual who has received a known agent exposure or who exhibits definite signs or symptoms of agent exposure shall be given an intramusclar injection immediately with MARK I kit auto-injectors.

(1) Some of the early symptoms of a vapor exposure may be rhinorrhea (runny nose) and/or tightness in the chest with shortness of breath (bronchial constriction).

(2) Some of the early symptoms of percutaneous exposure may be local muscular twitching or sweating at the area of exposure followed by nausea or vomiting.

(3) Although myosis (pin-pointing of the pupils) may be an early sign of agent exposure, an injection shall not be administered when myosis is the only sign present. Instead, the individual shall be taken immediately to the medical facility for observation.

(4) Injections using the MARK I kit injectors (or atropine only if directed by the local physician) may be repeated at 5 to 20 minute intervals if signs and symptoms are progressing until three series of injections have been administered. No more injections will be given unless directed by medical personnel. In addition, a record will maintained of all injections given.

(5) Administer, in rapid succession, all three MARK I kit injectors (or atropine if directed by the local physician) in the case of SEVERE signs of agent exposure.

CAUTION: Atropine does not act as a prophylactic and shall not be administered until an agent exposure has been ascertained.

e. If indicated, CPR should be started immediately. Mouth-to-mouth re-

suscitation should be used when approved mask-bag or oxygen delivery systems are not available. Do not use mouth-to-mouth resuscitation when facial contamination exists.

DATE: 14 September 1988
Last Update: 14 Feb 94

U.S. ARMY EDGEWOOD
RESEARCH, DEVELOPMENT
AND ENGINEERING CENTER

Emergency Telephone #s:
ERDEC, Safety Office
410-671-4411 0700-1700
EST After normal duty
hours: 410-278-5201
Ask for ERDEC Staff
Duty Officer

MATERIAL SAFETY DATA SHEET

LETHAL NERVE AGENT (GB)

SECTION I - GENERAL INFORMATION

MANUFACTURER'S NAME: Department of the Army

MANUFACTURER'S ADDRESS: U.S. ARMY CHEMICAL AND BIOLOGICAL DEFENSE AGENCY
EDGEWOOD RESEARCH, DEVELOPMENT AND ENGINEERING CENTER
ATTN: SCBRD-ODR-S
ABERDEEN PROVING GROUND, MD 21010-5423

CAS REGISTRY NUMBER: 107-44-8 or 50642-23-4

CHEMICAL NAME AND SYNONYMS:

Phosphonofluoridic acid, methyl-, isopropyl ester
Phosphonofluoridic acid, methyl-, 1-methylethyl ester

ALTERNATE CHEMICAL NAMES:

Isopropyl methylphosphonofluoridate
Isopropyl ester of methylphosphonofluoridic acid
Methylisopropoxfluorophosphine oxide
Isopropyl Methylfluorophosphonate
O-Isopropyl Methylisopropoxfluorophosphine oxide
O-Isopropyl Methylphosphonofluoridate
Methylfluorophosphonic acid, isopropyl ester
Isopropoxymethylphosphonyl fluoride

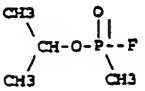
TRADE NAME AND SYNONYMS:

GB Sarin
Zarin

CHEMICAL FAMILY: Fluorinated organophosphorous compound

FORMULA/CHEMICAL STRUCTURE:

C4 H10 FO2 P



NFPA 704 SIGNAL: Health - 4
Flammability - 1
Reactivity - 1

SECTION II - COMPOSITION

INGREDIENTS NAME	FORMULA	PERCENTAGE BY WEIGHT	AIRBORNE EXPOSURE LIMIT (AEL)
GB	C4 H10 FO2 P	100	0.0001 mg/m3

SECTION III - PHYSICAL DATA

BOILING POINT DEG F (DEG C): 316 (158)

VAPOR PRESSURE (mm Hg): 2.9 @ 25 DEG C

VAPOR DENSITY (AIR=1): 4.86

SOLUBILITY IN WATER: Complete

SPECIFIC GRAVITY (H2O=1): 1.0887 @ 25 DEG C

FREEZING/MELTING POINT: -56 DEG C

LIQUID DENSITY (g/cc): 1.0887 @ 25 DEG C
1.102 @ 20 DEG C

PERCENTAGE VOLATILE BY VOLUME: 22,000 m/m3 @ 25 DEG C
16,090 m/m3 @ 20 DEG C

APPEARANCE AND ODOR: Colorless liquid
Odorless in pure form

SECTION IV - FIRE AND EXPLOSION DATA

FLASH POINT (METHOD USED): Did not flash to 280 DEG F

FLAMMABLE LIMIT: Not applicable

LOWER EMPLOSIVE LIMIT: Not available

UPPER EXPLOSIVE LIMIT: Not available

EXTINGUISHING MEDIA: Water mist, fog, foam, CO2 - Avoid using extinguishing methods that will cause splashing or spreading of the GB.

SPECIAL FIRE FIGHTING PROCEDURES: GB will react with steam or water to produce toxic & corrosive vapors. All persons not engaged in extinguishing the fire should be evacuated. Fires involving GB should be contained to prevent contamination to uncontrolled areas. When responding to a fire alarm in buildings or areas containing agents, firefighting personnel clothing (without TAP clothing) during chemical agent firefighting and fire rescue operations. Respiratory protection is required. Positive pressure, full facepiece, NIOSH-approved self-contained breathing apparatus (SCBA) will be worn where there is danger of oxygen deficiency and when directed by the fire chief or chemical accident/incident (CAI) operations officer. In cases where firefighters are responding to a chemical accident/incident for rescue/reconnaissance purposes vice firefighting, they will wear appropriate levels of protective clothing (see Section 8).

UNUSUAL FIRE AND EXPLOSION HAZARDS: Hydrogen may be present.

SECTION V - HEALTH HAZARD DATA

AIRBORNE EXPOSURE LIMIT (AEL): The permissible airborne exposure concentration for GB for an 8-hour workday or a 40 hour work week is an 8-hour time weight average (TWA) of 0.0001 mg/m3. This value is based on the TWA of GB which can be found in "AR 40-8, "Occupational Health Guidelines for the Evaluation and Control of Occupational Exposure to Nerve Agents GA, GB, GD, and VX". To date, however, the Occupational Safety and Health Administration (OSHA) has not promulgated a permissible exposure concentration for GB.

EFFECTS OF OVEREXPOSURE:
It is a lethal anticholinergic agent. Doses which are potentially life-threatening may be only slightly larger than those producing minimal effects.

GB

Route	Form	Effect	Type	Dosage
ocular	vapor	miosis	ECt50	<2 mg-min/m3
inhalation	vapor	runny nose	ECt50	<2 mg-min/m3
inhalation (15 l/min)	vapor	severe incapacitation	ICt50	35 mg-min/m3
inhalation (15 l/min)	vapor	death	LCt50	70 mg-min/m3
percutaneous	liquid	death	LD50	1700 mg/70 kg man

Effective dosages for vapor are estimated for exposure durations of 2-10 minutes.

Symptoms of overexposure may occur within minutes or hours--depending upon dose. They include: miosis (constriction of pupils) and visual effects, headache and pressure sensation, runny nose and nasal congestion, salivation, tightnessin 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.

GB is not listed by the International Agency for Research on Cancer (IARC), American Conference of Governmental Industrial Hygienists (ACGIH), Occupational Safety and Health Administration (OSHA), or National Toxicology Program (NTP) as a carcinogen.

EMERGENCY AND FIRST AID PROCEDURES:

INHALATION: Hold breath until respiratory protective mask is donned. If severe signs of agent exposure appear (chest tightens, pupil constriction, incoordination, etc.), immediately administer, in rapid succession, all three Nerve Agent Antidote Kit(s), Mark I injectors (or atropine if directed by the local physician). Injections using the MarkI kit injectors may be repeated at 5 to 20 minute intervals if signs and symptoms are progressing until three series of injections have been administered. No more injections will be given unless directed by medical personnel. In addition, a record will be maintained of all injections given. If breathing has stopped, give artificial respiration. Mouth-to-mouth resuscitation should be used when approved mask-bag or oxygen delivery systems are not available. Do not use mouth-to-mouth resuscitation when facial contamination exists. If breathing is difficult, administer oxygen. Seek medical attention IMMEDIATELY.

EYE CONTACT: Immediately flush eyes with water for 10-15 minutes, then

don respiratory protective mask. Although miosis (pinpointing of the pupils) may be an early sign of agent exposure, an injection will not be administered when miosis is the only sign present. Instead, the individual will be taken IMMEDIATELY to the medical treatment facility for observation.

SKIN CONTACT: Don respiratory protective mask and remove contaminated clothing. Immediately wash contaminated skin with copious amounts of soap and water, 10% sodium carbonate solution, or 5% liquid household bleach. Rinse well with water to remove decontaminant. Administer an intramuscular injection with the MARK I kit injectors only if local sweating and muscular twitching symptoms are observed. SEEK MEDICAL ATTENTION IMMEDIATELY.

INGESTION: Do not induce vomiting. First symptoms are likely to be gastrointestinal. Immediately administer an intramuscular injection of the MARK I kit auto-injectors. SEEK MEDICAL ATTENTION IMMEDIATELY.

SECTION VI - REACTIVITY DATA

STABILITY: Stable when pure.

INCOMPATIBILITY: Attacks tin, magnesium, cadmium plated steel, some aluminums. Slight attack on copper, brass, lead, practically no attack on 1020 steel, Inconel & K-monel.

Hydrolyzes to form HF under acid conditions and isopropyl alcohol & polymers under basic conditions.

SECTION VII - SPILL, LEAK AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: If leak or spills occur, only personnel in full protective clothing (see section 8) will remain in area. In case of personnel contamination see section V "Emergency and First Aid Instructions".

RECOMMENDED FIELD PROCEDURES: Spills must be contained by covering with vermiculite, diatomaceous earth clay, fine sand, sponges, and paper or cloth towels. Decontaminate with copious amounts of aqueous Sodium Hydroxide solution (a minimum 10 wt percent). Scoop up all material and place in a fully removable head drum with a high density polyethylene liner. Cover the contents of the drum with decontaminating solution as above before affixing the drum head. After sealing the head, the exterior of the drum shall be decontaminated and then labeled IAW EPA and DOT regulations. All leaking containers shall be overpacked with vermiculite placed between the interior and exterior containers. Decontaminate and label IAW EPA and DOT regulations. Dispose of the material IAW waste disposal methods provided below. Dispose of material used to decontaminate exterior of drum IAW Federal, state and local regulations. Conduct general area monitoring with an approved monitor (see Section 8) to confirm that the atmospheric concentrations do not exceed the airborne exposure limit (see Sections 2 and 8).

If 10 wt percent aqueous Sodium Hydroxide solution is not available then the following decontaminants may be used instead and are listed in the order of preference: Decontamination Solution No. 2 (DS2), Sodium Carbonate, and Supertropical Bleach Slurry (STB).

RECOMMENDED LABORATORY PROCEDURES: A minimum of 56 grams of decon solution is required for each gram of GB. Decontaminant/agent solution is allowed to agitate for a minimum of one hour. Agitation is not necessary following the first hour. At the end of the one hour, the resulting solution should be adjusted to a pH greater than 11.5. If the pH is below 11.5, NaOH should be added until a pH above 11.5 can be maintained for 60 minutes.

An alternate solution for the decontamination of GB is 10 wt percent Sodium Carbonate in place of the 10 percent Sodium Hydroxide solution above. Continue with 5% grams of decon to 1 gram of agent. Agitate for one hour but allow three (3) hours for the reaction. The final pH should be adjusted to above 10. It is also permitted to substitute 5.25% Sodium Hypochlorite or 25 wt percent Monoethylamine (MEA) for the 10% Sodium Hydroxide solution above MEA must be completely dissolved in water prior to addition of the agent. Continue with 5% grams of decon for each gram of GB and provide agitation for one hour. Continue with same ratios and time stipulations.

Scoop up all material and place in a fully removable head drum with a high density polyethylene liner. Cover the contents of the drum with decontaminating solution as above before affixing the drum head. After sealing the head, the exterior of the drum shall be decontaminated and then labeled IAW EPA and DOT regulations. All leaking containers shall be overpacked with vermiculite placed between the interior and exterior containers. Decontaminate and label IAW EPA and DOT regulations. Dispose of the material IAW waste disposal methods provided below. Dispose of material used to decontaminate exterior of drum IAW Federal, state and local regulations. Conduct general area monitoring with an approved monitor (see Section 8). to confirm that the atmospheric concentrations do not exceed the airborne exposure limit (see Sections 2 and 8).

WASTE DISPOSAL METHOD: Open pit burning or burying of GB or items containing or contaminated with GB in any quantity is prohibited. The detoxified GB using procedures above) can be thermally destroyed by incineration in an EPA approved incinerator in accordance with appropriate provisions of Federal, state and local RCRA regulations.

NOTE: Some states define decontaminated surety material as a RCRA Hazardous waste.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION:

Concentration	Respiratory Protective Equipment
< 0.0001 mg/m3	A full facepiece, chemical canister, air-purifying protective mask will be onhand for escape. (The M9-, M17-, or M40-series masks are acceptable for this purpose)
0.0001 to 0.2 mg/m3	A NIOSH/MSHA approved pressure demand full facepiece SCBA or supplied air respirator with escape air cylinder may be used. Alternatively, a full facepiece, chemical canister air-purifying protective mask is acceptable for this purpose (for example, M9-, M17-, or M40-series mask or other mask certified as equivalent) is acceptable. (See DA PAM 385-61 for determination of appropriate level)
> 0.2 mg/m3 or unknown	NIOSH/MSHA approved pressure demand full facepiece SCBA suitable for use in high agent concentrations with protective ensemble (See DA PAM 385-61 for examples).

VENTILATION: Local Exhaust: Mandatory must be filtered or scrubbed to limit exit concentration to < 0.0001 mg/m3 averaged over 8 hr/day indefinitely. Air emissions shall meet local, state and federal regulations.

SPECIAL: Chemical laboratory hoods shall have an average inward face velocity of 100 linear feet per minute (lfpm) plus or minus 10% with the velocity at any point not deviating from the average face velocity by more than 20%. Existing laboratory hoods shall have an inward face velocity of 150 lfpm plus or minus 20 percent. Laboratory hoods shall be located such that cross drafts do not exceed 20 percent of the inward face velocity. A visual performance test utilizing smoke producing devices shall be performed in the assessment of the hood's ability to contain agent GB. Emergency backup power necessary. Hoods should be tested semi-annually or after modification or maintenance operations. Operations should be performed 20 cm inside hood face.

Other: Recirculation of exhaust air from agent areas is prohibited. No connection is allowed between agent areas and other areas through ventilation system.

PROTECTIVE GLOVES: Butyl Glove M3 and M4
Norton, Chemical Protective Glove Set

EYE PROTECTION: Chemical goggles. For splash hazards use goggles and faceshield.

OTHER PROTECTIVE EQUIPMENT: For general lab work, gloves and lab coat shall be worn with M9, M17 or M40 mask readily available.

MONITORING: Available monitoring equipment for agent GB is the M8/M9 Detector paper, detector ticket, blue hand tube, M256/M256A1 kits, bubbler, Depot Area Air Monitoring System (DAAMS), Automatic Continuous Air Monitoring System (ACAMS), real time monitoring (RTM), Demilitarization Chemical Agent Concentrator (DCAC), M8/M43, M8A1/M43A2, Hydrogen Flame Photometric Emission Detector (HYFED), CAM-M1, Miniature Chemical Agent Monitor (MINICAM) and the Real Time Analytical Platform (RTAP).

Real-time, low-level monitors (with alarm) are required for GB operations. In their absence, an IDLH atmosphere must be presumed. Laboratory operations conducted in appropriately maintained and alarmed engineering controls require only periodic low-level monitoring.

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING:
In handling, the buddy system will be incorporated. No smoking, eating and drinking in areas containing agent is permitted. Containers should be periodically inspected for leaks (either visually or by a detector kit). Stringent control over all personnel practices must be exercised. Decontamination equip shall be conveniently located. Exits must be designed to permit rapid evacuation. Chemical showers, eye-wash stations, and personal cleanliness facilities must be provided. Wash hands before meals and each worker will shower thoroughly with special attention given to hair, face, neck, and hands, using plenty of soap before leaving at the end of the work day.

OTHER PRECAUTIONS: Agents must be double contained in liquid and vapor tight containers when in storage or when outside of ventilation hood.

For additional information see "AR 385-61, The Army Toxic Chemical Agent Safety Program", "DA PAM 385-61, Toxic Chemical Agent Safety Standards", and "AR 40-8, Occupational Health Guidelines for the Evaluation and Control of Occupational Exposure to Nerve Agents GA, GB, GD, and VX".

SECTION X - TRANSPORTATION DATA

PROPER SHIPPING NAME: Poisonous liquids, n.o.s.

DOT HAZARD CLASSIFICATION: 6.1 Packing Group I Hazard Zone A

DOT LABEL: Poison

DOT MARKING: Poisonous liquid, n.o.s. (Isopropyl methylphosphonofluoridate) UN2810

DOT PLACARD: POISON

PRECAUTIONS TO BE TAKEN IN TRANSPORTATION: Motor vehicles will be placarded regardless of quantity. Driver shall be given full and complete information regarding shipment and conditions in case of emergency.

AR 50-6 deals specifically with the shipment of chemical agents. Shipments of agent will be escorted in accordance with AR 740-32.

EMERGENCY ACCIDENT PRECAUTIONS AND PROCEDURES: See sections IV, VII, and VIII.

While the Edgewood Research, Development and Engineering Center, Dept. of the Army believes that the data contained herein are factual and the opinion expressed are those of qualified experts regarding the results of the tests conducted, the data are not to be taken as a warranty or representation for which the Department of the Army or Edgewood Research, Development and Engineering Center assumes legal responsibility. They are offered solely for your consideration, investigation, and verification. Any use of these data and information must be determined by the user to be in accordance with applicable Federal, State, and local laws and regulations.

/POISON\
\ GAS /

U.S. ARMY CHEMICAL
RESEARCH, DEVELOPMENT
AND ENGINEERING CENTER

MATERIAL SAFETY DATA SHEET

DATE: 3 Dec 1990

Emergency Telephone #s:
CRDEC Safety Office
301-671-4411 0700-1700
EST After normal duty
hours: 301-278-5201
Ask for CRDEC Staff
Duty Officer

LETHAL NERVE AGENTS
GD AND THICKENED GD (See Addendum C)

SECTION I - GENERAL INFORMATION

MANUFACTURER'S ADDRESS: U.S. ARMY ARMAMENT, MUNITIONS AND CHEMICAL COMMAND
CHEMICAL RESEARCH DEVELOPMENT AND ENGINEERING CENTER
ATTN: SMCCR-CMS-E
ABERDEEN PROVING GROUND, MD 21010-5423

CAS REGISTRY NUMBER: 96-64-0 or 50642-24-5

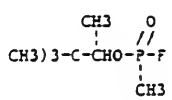
CHEMICAL NAME: Phosphonofluoridic acid, methyl-,1,2,2-trimethylpropyl ester

Alternate chemical names: Pinacolyl methylphosphonofluoridate
1,2,2-Trimethylpropyl methylphosphonofluoridate
Methylpinacolyloxyfluorophosphine oxide
Pinacolyloxymethylphosphonyl fluoride
Pinacolyl methanefluorophosphonate
Methylfluoropinacolylphosphonate
Fluoromethylpinacolyloxyphosphine oxide
Methylpinacolyloxyphosphonyl fluoride
Pinacolyl methylfluorophosphonate
1,2,2-Trimethylpropoxyfluoromethylphosphine oxide

TRADE NAME AND SYNONYMS: GD, EA 1210, Soman, Zoman, PFMP

CHEMICAL FAMILY: Fluorinated organophosphorus compound

FORMULA/CHEMICAL STRUCTURE:



Empirical:

C7H16FO2P

NFPA 704 SIGNAL: Health - 4
Flammability - 1
Reactivity - 1

SECTION II - HAZARDOUS INGREDIENTS

INGREDIENTS	FORMULA	PERCENTAGE BY WEIGHT	AIRBORNE EXPOSURE LIMIT
GD	C7 H16 FOP	100	0.00003 mg/m3

SECTION III - PHYSICAL DATA

BOILING POINT DEG F (DEG C): (198 DEG C) 388 DEG F

VAPOR PRESSURE: 0.40 mm Hg @ 25 DEG C

VAPOR DENSITY (AIR=1): 6.3

SOLUBILITY IN WATER: Moderate

SPECIFIC GRAVITY (H2O=1): 1.022 @ 25 DEG C

VOLATILITY: 3900 mg/m3 @ 25 DEG C

MELTING POINT: -42 DEG C

APPEARANCE AND ODOR: When pure, colorless liquid with fruity odor. With impurities, amber or dark brown, with oil of camphor odor

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SECTION IV - FIRE AND EXPLOSION DATA

FLASHPOINT: 121 DEG C (Open cup)

FLAMMABILITY LIMITS: Unknown

LOWER EXPLOSIVE LIMIT: Not applicable

UPPER EXPLOSIVE LIMIT: Not applicable

EXTINGUISHING MEDIA: Water, fog, foam, CO2. Avoid using extinguishing methods that will cause splashing or spreading of the GD.

SPECIAL FIRE FIGHTING PROCEDURES: Fires involving GD should be contained to prevent contamination of uncontrolled areas. All persons not engaged in extinguishing the fire should be evacuated immediately. Contact with GD or its vapors can be fatal. When responding to a fire alarm in buildings or areas containing agents, firefighting personnel should wear full firefighter protective clothing (without TAP clothing) during chemical agent firefighting and fire rescue operations. Respiratory protection is required. Positive pressure, full facepiece, NIOSH-approved self-contained breathing apparatus (SCBA) will be worn where there is danger of oxygen deficiency and when directed by the fire chief or chemical accident/incident (CAI) operations officer. The M9 or M17 series mask may be worn in lieu of SCBA when there is no danger of oxygen deficiency. In cases where firefighter are responding to a chemical accident/incident for rescue/reconnaissance purposes vice firefighting, they will wear appropriate levels of protective clothing (see Section 8).

UNUSUAL FIRE AND EXPLOSION HAZARDS: Hydrogen produced by the corrosive vapors reacting with metals, concrete, etc., may be present.

SECTION V - HEALTH HAZARD DATA

AIRBORNE EXPOSURE LIMIT (AEL): The suggested permissible airborne exposure concentration of GD for an 8-hour workday or a 40 hour work week is an 8-hour time weighted average (TWA) of 0.00003 mg/m3 (2 x 10-5 ppm). This value is based on the TWA of GB as proposed in the USAEHA Technical Guide No. 169, "Occupational Health Guidelines for the Evaluation and Control of Occupational Exposure to Nerve Agents GA, GB, GD, and VX". To date, however, the Occupational Safety and Health Administration (OSHA) has not promulgated permissible exposure concentration for GD.

EFFECTS OF OVEREXPOSURE: GD is a lethal anticholinesterase agent with the median lethal dose in man being: LCt50 (inhalation) = 70 mg min/m3 (t = 10 min); LD50 (PC, bare skin) = 0.35 g/man (70 kg).

1. One to several minutes after overexposure to airborne GD, the

a. LOCAL EFFECTS (lasting 1 - 15 days, increase with dose):

(1) On eyes: Miosis (constriction of pupils); redness, pressure sensation on eyes.

(2) By inhalation: Rhinorrhea (runny nose), nasal congestion, tightness in chest, wheezing, salivation, nausea, vomiting.

b. SYSTEMIC EFFECTS (increases with dose): When inhaled, GD will cause excessive secretion causing coughing/breathing difficulty; salivation and sweating; vomiting, diarrhea; stomach cramps; involuntary urination/defecation; generalized muscle twitching/muscle cramps; CNS depression including anxiety, restlessness, giddiness, insomnia, excessive dreaming and nightmares. With more severe exposure, also headache, tremor, drowsiness, concentration difficulty, memory impairment, confusion, unsteadiness on standing or walking, and progressing to death.

2. After exposure to liquid GD, the following acute symptoms appear:

a. LOCAL EFFECTS:

(1) On eyes: Miosis (constriction of pupils); redness, pressure sensation on eyes.

(2) By ingestion: Salivation, anorexia, nausea, vomiting, abdominal cramps, diarrhea, involuntary defecation, heartburn.

(3) On skin: Sweating, muscle twitching.

b. Chronic exposure to GD causes forgetfulness, thinking difficulty, vision disturbances, muscular aches/pains. Although certain organophosphate pesticides have been shown to be teratogenic in animals, these effects have not been documented in carefully controlled toxicological evaluations for GD.

GD presently is not listed by the International Agency for Research on Cancer (IARC), National Toxicology Program (NTP), Occupational Safety and Health Administration (OSHA), or American Conference of Governmental Industrial Hygienists (ACGIH) as a carcinogen.

** See addendum A for detailed information. **

EMERGENCY AND FIRST AID PROCEDURES:

INHALATION: Hold breath until respiratory protective mask is donned. If severe signs of agent exposure appear (chest tightens, pupil constriction, incoordination, etc.), immediately administer, in rapid succession, all three Nerve Agent Antidote Kit(s), Mark I injectors (or atropine if directed by the local physician). Injections using the Mark I kit injectors may be repeated at 5 to 20 minute intervals if signs and symptoms are progressing until three series of injections have been administered. No more injections will be given unless directed by medical personnel. In addition, a record will be maintained of all injections given. If breathing has stopped, give artificial respiration. Mouth-to-mouth resuscitation should be used when approved mask-bag or oxygen delivery systems are not available. Do not use mouth-to-mouth resuscitation when facial contamination exists. If breathing is difficult, administer oxygen. Seek medical attention IMMEDIATELY.

EYE CONTACT: IMMEDIATELY flush eyes with water for 10-15 minutes, then don respiratory protective mask. Although miosis (pinpointing of the pupils) may be an early sign of agent exposure, an injection will not be administered when miosis is the only sign present. Instead, the individual will be taken IMMEDIATELY to the medical treatment facility for observation.

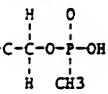
SKIN CONTACT: Don respiratory protective mask and remove contaminated clothing. Immediately wash contaminated skin with copious amounts of soap and water, 10% sodium carbonate solution, or 5% liquid household bleach. Rinse well with water to remove decontaminant. Administer nerve agent antidote kit Mark I, only if local sweating and muscular twitching symptoms are

INGESTION: Do not induce vomiting. First symptoms are likely to be gastrointestinal. IMMEDIATELY administer Nerve Agent Antidote Kit, MARK I. Seek medical attention immediately.

** See Addendum B for detailed instructions. **

SECTION VI - REACTIVITY DATA

STABILITY: Stable after storage in steel for 3 months at 65 Deg C. GD corrodes steel at the rate of 1 x 10-5 inch/month.

GD will hydrolyze to form HF and 

HAZARDOUS POLYMERIZATION: Will not occur.

SECTION VII - SPILL, LEAK AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: If leak or spills occur, only personnel in full protective clothing (see Section 8) will remain in area. In case of personnel contamination, see Section V "Emergency and First Aid Procedures".

RECOMMENDED FIELD PROCEDURES: Spills must be contained by covering with vermiculite, diatomaceous earth, clay, fine sand, sponges, and paper or cloth towels. This containment is followed by treatment with copious amounts of aqueous Sodium Hydroxide solution (a minimum of 10 percent). Scoop up all material and place in a fully removable head drum with a high density polyethylene liner. Cover the contents of the drum with decontaminating solution as above before affixing the drum head. After sealing the head, the exterior of the drum shall be decontaminated and then labeled IAW EPA and DOT regulations. All leaking containers shall be overpacked with vermiculite placed between the interior and exterior containers. Decontaminate and label IAW EPA and DOT regulations. Dispose of the material IAW waste disposal methods provided below. Dispose of material used to decontaminate exterior of drum IAW Federal, state and local regulations. Contaminated clothing will be placed in a fully removable head drum with a high density polyethylene liner and the contents shall be covered with decontaminating solution as above before affixing the drum head. Conduct general area monitoring to confirm that the atmospheric concentrations do not exceed the exposure limits (see Section 8).

If 10 wt percent aqueous Sodium Hydroxide solution is not available then the following decontaminants may be used instead and are listed in the order of preference: Decontaminating Solution No. 2 (DS2), Sodium Carbonate, and Supertropical Tropical Bleach Slurry (STB).

RECOMMENDED LABORATORY PROCEDURES: A minimum of 55 grams of decon solution is required per gram of GD. Decontaminant/agent solution is allowed to agitate for a minimum of one hour. Agitation is not necessary following the first hour provided a single phase is obtained. At the end of the first hour the pH should be checked and adjusted up to 11.5 with additional NaOH as required.

An alternate solution for the decontamination of GD is 10 percent Sodium Carbonate in place of the 10 percent Sodium Hydroxide solution above. Continue with 55 grams of decon per gram of GD. Agitate for one hour and allow to react for 3 hours. At the end of the third hour adjust the pH to above 10. It is also permitted to substitute 5.25 % Sodium Hypochlorite for the 10% Sodium Hydroxide solution above. Continue with 55 grams of decon per gram of GD. Agitate for one hour and allow to react for 3 hours then adjust the pH to above 10.

... removable head and a high den-

sity polyethylene liner. Cover the contents with additional decontaminating solution before affixing the drum head. After sealing the head, the exterior of the drum shall be decontaminated and then labeled IAW EPA and DOT regulations. All contaminated clothing will be placed in a fully removable head drum with a high density polyethylene liner. Cover the contents of the drum with decontaminating solution as above before affixing the drum head. After sealing the head, the exterior of the drum shall be decontaminated and then labeled IAW EPA and DOT regulations. All leaking containers shall be overpacked with vermiculite placed between the interior and exterior containers. Decontaminate and label IAW EPA and DOT regulations. Dispose of the material IAW waste disposal methods provided below. Conduct general area monitoring to confirm that the atmospheric concentrations do not exceed the exposure limits (see Section 8).

WASTE DISPOSAL METHOD: Open pit burning or burying of GD or items containing or contaminated with GD in any quantity is prohibited. The detoxified GD (using procedures above) can be thermally destroyed by incineration in an EPA approved incinerator in accordance with appropriate provisions of Federal, state and local RCRA regulations.

NOTE: Some states define decontaminated surety material as a RCRA Hazardous Waste.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION:

GD Concentration	Respiratory Protective Equipment
Less than 0.00003 mg/m3	M9, M17, or M40 series mask shall be available for escape as necessary.
0.00003 mg/m3 to 0.06 mg/m3	M9, or M40 series mask with Level A or Level B ensemble (see AMCR 385-131 for determination of appropriate level).
	Demilitarization Protective Ensemble (DPE), or Toxicological Agent Protective Ensemble Self-Contained (TAPES), used with prior approval from AMC Field Safety Activity.
Greater than 0.06 mg/m3 or unknown	DPE or TAPES used with prior approval from AMC Field Safety Activity.
	NOTE: When DPE or TAPES is not available the M9 or M40 series mask with Level A protective ensemble can be used. However, use time shall be restricted to the extent operationally feasible, and may not exceed one hour.
	As an additional precaution, the cuffs of the sleeves and the legs of the M3 suit shall be taped to the gloves and boots respectively to reduce aspiration.

Local Exhaust: Mandatory. Must be filtered or scrubbed to limit exit conc. to < .00001 mg/m3 (averaged over 8 hr/day, indefinitely).

Special: Chemical laboratory hoods shall have an average inward face velocity of 100 linear feet per minute (lfpm) ± 10 percent with the velocity at any point not deviating from the average face velocity by more than 20 percent. Laboratory hoods shall be located such that cross-drafts do not exceed 20 percent of the inward face velocity. A visual performance test utilizing smoke-producing devices shall be performed in assessing the ability of the hood to contain agent GD.

Emergency back-up power necessary. Hoods should be tested semi-annually or [illegible] Operations should be per-

formed 20 cm inside hood face.

Other: Recirculation of exhaust air from agent areas is prohibited. No connection between agent areas and other areas through ventilation system is permitted.

PROTECTIVE GLOVES: Butyl Glove M3 and M4
Norton, Chemical Protective Glove Set

EYE PROTECTION: Chemical Goggles. For splash hazards, use goggles and face-shield.

OTHER PROTECTIVE EQUIPMENT: Full protective clothing will consist of M9 mask and hood, butyl rubber suit (M3), M2A1 butyl boots, M3 or M4 gloves, unimpregnated underwear, or demilitarization protective ensemble (DPE). For laboratory operations, wear lab coats and have a protective mask readily available.

MONITORING: Available monitoring equipment for agent GD is the Automatic Chemical Agent Detector Alarm (ACADA), bubblers (GC method), and Chemical Agent Monitor (CAM).

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: In handling GD, the buddy system will be incorporated. No smoking, eating or drinking is premitted in areas containing agent GD. Containers should be periodically inspected for leaks (either visually or by a detector kit) and prior to transferring the containers from storage to work areas. Stringent control over all personnel practices must be exercised. Decontamination equipment shall be conveniently located. Exits must be designed to permit rapid evacuation. Chemical showers, eyewash stations, and personal cleanliness facilities shall be provided. Wash hands before meals and each worker will shower thoroughly with special attention given to hair, face, neck, and hands, using plenty of soap before leaving at the end of the workday.

OTHER PRECAUTIONS: Agent must be double-contained in liquid and vapor-tight containers when in storage or when outside of the ventilation hood.

For additional information, see AMC-R 385-131, "Safety Regulations for Chemical Agents H, HD, HT, GB, and VX" and USAEHA Technical Guide No. 169, "Occupational Health Guidelines for the Evaluation and Control of Occupational Exposure to Nerve Agents GA, GB, GD, and VX".

SECTION X - TRANSPORTATION DATA

PROPER SHIPPING NAME: Poisonous liquid, n.o.s.

DOT HAZARD CLASSIFICATION: Poison A

DOT LABEL: Poison gas

DOT MARKING: Poisonous liquid, n.o.s. (Pinacolyl methylphosphonofluoridate)
NA 1955

DOT PLACARD: POISON GA

EMERGENCY ACCIDENT PRECAUTIONS AND PROCEDURES: See Section IV, VII and VIII.

PRECAUTIONS TO BE TAKEN IN TRANSPORTATION: Motor vehicles will be placarded regardless of quantity. Driver shall be given full and complete information regarding shipment and conditions in case of emergency.

AR 50-6 deals specifically with the shipment of chemical agents. Shipments [illegible] in accordance with AR 740-32.

While the Chemical Research Development and Engineering Center, Department of the Army believes that the data contained herein are factual and the opinions expressed are those of qualified experts regarding the results of the tests conducted, the data are not to be taken as a warranty or representation for which the Department of the Army or Chemical Research Development and Engineering Center assumes legal responsibility. They are offered solely for your consideration, investigation, and verification. Any use of these data and information must be determined by the user to be in accordance with applicable Federal, State, and local laws and regulations.

ADDENDUM A

1. Acute Physiological Effects:

Site of Action	Signs and Symptoms Following Local Exposure
Muscarine-like-	
Pupils	Miosis, marked, usually maximal (pinpoint), sometimes unequal.
Ciliary body	Frontal headache, eye pain on focusing, slight dimness of vision, occasional nausea and vomiting.
Conjunctivae	Hyperemia.
Nasal mucous membranes	Rhinorrhea, hyperemia.
Bronchial tree	Tightness in chest, sometimes with prolonged wheezing expiration suggestive of broncho-constriction or increased secretion, cough.
	Following Systemic Absorption
Bronchial tree	Tightness in chest, with prolonged wheezing, expiration suggestive of broncho-constriction or increased secretion, dyspnea, slight pain in chest, increased bronchial secretion, cough, pulmonary edema, cyanosis.
Gastrointestinal	Anorexia, nausea, vomiting, abdominal cramps, epigastric and substernal tightness (cardiospasm) with "heartburn" and eructation, diarrhea, tenesmus, involuntary defecation.
Sweat glands	Increased sweating.
Salivary glands	Increased salivation.
Lacrimal glands	Increased lacrimation.
Heart	Slight bradycardia.
Pupils	Slight miosis, occasionally unequal, later maximal miosis (pinpoint).

Ciliary body	Blurring of vision.
Bladder	Frequent, involuntary micturition
Nicotine-like-	
Striated muscle	Easy fatigue, mild weakness, muscular twitching, fasciculations, cramps, generalized weakness, including muscles of respiration, with dyspnea and cyanosis.
Sympathetic ganglia	Pallor, occasional elevation of blood pressure.
Central nervous system	Giddiness, tension, anxiety, jitteriness, restlessness, emotional lability, excessive dreaming, insomnia, nightmares, headaches, tremor, withdrawal and depression, bursts of slow waves of elevated voltage in EEG, especially on overventilation, drowsiness, difficult concentration, slowness on recall, confusion, slurred speech, ataxia, generalized weakness, coma, with absence of reflexes, Cheyne-Stokes respirations, convulsions, depression of respiratory and circulatory centers, with dyspnea, cyanosis, and fall in blood pressure.

2. Chronic Physiological Effects:

a. Acute Exposure.

If recovery from nerve agent poisoning occurs, it will be complete unless anoxia or convulsions have gone unchecked so long that irreversible central nervous system changes due to anoxemia have occurred.

b. Chronic Exposure.

The inhibition of cholinesterase enzymes throughout the body by nerve agents is more or less irreversible so that their effects are prolonged. Until the tissue cholinesterase enzymes are restored to normal activity, probably by very slow regeneration over a period of weeks or 2 to 3 months if damage is severe there is a period of increased susceptibility to the effects of another exposure to any nerve agent. During this period the effects of repeated exposures are cumulative; after a single exposure, daily exposure to concentrations of a nerve agent insufficient to product symptoms may result in the onset of symptoms after several days. Continued daily exposure may be followed by increasingly severe effects. After symptoms subside, increased susceptibility persists for one to serveral days. The degree of exposure required to produce recurrence of symptoms, and the severity of these symptoms, depend on duration of exposure and time intervals between exposures. Increased susceptibility is not limited to the particular nerve agent initially absorbed.

Estimates have been made for the times as which 50% of exposed subjects would be affected (Et50's) at median incapacitating doses. These are presented below.

Et50	Degree of Effectiveness	ICt50	Exposure Time
min		mg min/m3	min

1.5	Moderate	27	0.5
3.0	Incap.	27	2.0
6.0		40	10.0
1.0	Severe	37	0.5
3.8	Incap.	37	2.0
7.8		56	10.0
2.0	Very	47	0.5
4.5	Severe	47	2.0
9.5	Incap.	72	10.0
6.5	Death	70	0.5
9.0		70	2.0
13.5		103	10.0

Exposure to high concentrations of nerve agent may bring on incoordination, mental confusion and collapse so rapidly that the casualty cannot perform self-aid. If this happens, the man nearest to him will give first aid.

Onset Time of Symptons.

Types of Effects	Route of Absorption	Description of Effects	When Effects Appear After Exposure
Vapor Local	Lungs	Rhinorrhea, nasal hyperemia tightness in chest, wheezing	One to several minutes
Vapor Local	Eyes	Miosis, Conjectival hyperemia eye pain, frontal headache.	One to several minutes
Vapor Systemic	Lungs or eyes	Muscarine-like, nicotine-like and central nervous system effects. (See 2a above)	Less than 1 min. to a few min after moderate or marked exposoure: about 30 min after mild exposure.
Liquid Local	Eyes	Same as vapor effects.	Instantly
Liquid Local	Ingestion	Gastrointestinal. (See 2a above).	About 30 min. after ingestion.
Liquid Local	Skin	Local sweating and muscular twitching.	3 min to 2 hours
Liquid Systemic	Lungs	See 2a above.	Several minutes
Liquid Systemic	Eyes	Same as for vapor	Several minutes
Liquid Systemic	Skin	Generalized sweating.	15 minutes to 2 hours
Liquid Systemic	Ingestion	Gastrointestinal (See 2a above).	15 minutes to 2 hours

Duration of Effects After

Types of Effects	Route of Absorption	Mild Exposure	Severe Exposure
Vapor Local	Lungs	A few hours	1 to 2 days
Vapor Local	Eyes	Miosis - 24 hours	3 to 14 days 2 to 5 days
Vapor Systemic	Lungs or eyes	Several hours	8 days
Liquid Local	Eyes	Similar to effects of vapor	
Liquid Local	Ingestion	3 days	5 days
Liquid Local	Skin	3 days	5 days
Liquid Systemic	Lungs		1 to 5 days
Liquid Systemic	Eyes		2 to 4 days
Liquid Systemic	Skin		2 to 5 days
Liquid Systemic	Ingestion		3 to 5 days

ADDENDUM B

First aid procedures.

a. Exposed personnel will be removed immediately to an uncontaminated atmosphere. Personnel handling casualty cases will give consideration to their own safety and will take precautions and employ the prerequisite protective equipment to avoid becoming exposed themselves.

CAUTION: Due to the rapid effects of nerve agents, it is extremely important that decontamination of personnel not be delayed by attempting to blot off excessive agent prior to decontamination with sodium hypochlorite.

b. The casualty will then be decontaminated by washing the contaminated areas with commercial liquid household bleach (nominal 5% solution hyprchlorite or 10 percent sodium carbonate solution) and flushing with clean water. Mask will be left on the victim until decontamination has been completed unless it has been determined that areas of the face were contaminated and the mask must be removed to facilitate decontamination. After decontamination, the contaminated clothing will be removed and skin contamination washed away. If possible, decontamination will be completed before the casualty is taken to the aid station or medical facility.

CAUTION: Care must be taken when decontaminating facial areas to avoid getting the hypochlorite into the eye or mouth. Only clean water shall be used when flushing the eyes or mouth. Skin surfaces decontaminated with bleach should be thoroughly flushed with water to prevent skin irritation from the bleach.

c. If there is no apparent breathing, artifical resuscitation will be started immediately (mouth-to-mouth, or with mechanical resuscitator). The situation will dictate method of choice, e.g., contaminated face. Do not

use mouth-to-mouth resuscitation when facial contamination exists. When appropriate and trained personnel are available, cardiopulmonary resuscitation (CPR) may be necessary.

d. An individual who has received a known agent exposure or who exhibits definite signs or symptoms of agent exposure shall be given an intramuscular injection immediately with the MARK I kit auto-injectors.

(1) Some of the early symptoms of a vapor exposure may be rhinorrhea (runny nose) and/or tightness in the chest with shortness of breath (bronchial constriction).

(2) Some of the early symptoms of a percutaneous exposure may be local muscular twitching or sweating at the area of exposure followed by nausea or vomiting.

(3) Although myosis (pin-pointing of the pupils) may be an early sign of agent exposure, an injection shall not be administered when myosis is the only sign present. Instead, the individual shall be taken immediately to the medical facility for observation.

(4) Injections using the MARK I kit injectors (or atropine only if directed by the local physician) may be repeated at 5 to 20 minute intervals if signs and symptoms are progressing until three series of injections have been administered. No more injections will be given unless directed by medical personnel. In addition, a record will maintained of all injections given.

(5) Administer, in rapid succession, all three MARK I Kit injectors (or atropine if directed by the local physician) in the case of SEVERE signs of agent exposure.

e. If indicated, CPR should be started immediately. Mouth-to-mouth resuscitation should be used when approved mask-bag or oxygen delivery systems are not available. Do not use mouth-to-mouth resuscitation when facial contamination exists.

CAUTION: Atropine does not act as a prophylactic and shall not be administered until an agent exposure has been ascertained.

ADDENDUM C
ADDITIONAL INFORMATION FOR THICKENED GD

TRADE NAME AND SYNONYMS: Thickened GD, TGD.

HAZARDOUS INGREDIENTS:
K125 (acryloid copolymer, 5%) is used to thicken the GD. K125 is not known to be a hazardous material except in a finely-divided, powder form.

PHYSICAL DATA:
Essential the same as GD except for viscosity. The viscosity of TGD is approximately 1180 centistokes.

FIRE AND EXPLOSION DATA: Same as GD.

HEALTH HAZARD DATA:
Same as GD except for skin contact. For skin contact, don respiratory protective mask and remove contaminated clothng. Immediately scrape the TGD from the skin surface, then wash the contaminated surface with acetone. Administer Nerve Agent Antidote Kit, MARK I, only if local sweating and muscular twitching symptoms are observed. Seek medical attention IMMEDIATELY.

SPILL, LEAK AND DISPOSAL PROCEDURES:
If spills or leaks of TGD occur, follow the same procedure as those for GD.

but add the following step: Since TGD is not water soluble, dissolve the TGD in acetone prior to introducing any decontaminating solution. Containment of TGD is generally not necessary. Spilled TGD can be carefully scraped off the contaminated surface and placed in a drum with a fully removable head and a high density, polyethylene lining. The TGD can then be decontaminated after it has been dissolved in acetone, using the same precedures as for GD. Contaminated surfaces should be treated with acetone, then decontaminated using the same procedures as for GD.

SPECIAL PROTECTION INFORMATION: Same as GD.

SPECIAL PRECAUTIONS:
Same as GD with the following addition: Handling the TGD requires careful observation of the "stringers" (elastic, thread-like attachments) formed when the agents are transferred or dispensed. These stringers must be broken cleanly before moving the contaminating device or dispensing device to another location, or unwanted contamination of a working surface will result.

TRANSPORTATION DATA: Same as GD.

U.S. ARMY CHEMICAL
RESEARCH, DEVELOPMENT
AND ENGINEERING CENTER

MATERIAL SAFETY DATA SHEET

DATE: 3 Dec 1990

Emergency Telephone #s:
CRDEC Safety Office
301-671-4411 0700-1700
EST After normal duty
hours: 301-278-5201
Ask for CRDEC Staff
Duty Officer

LETHAL NERVE AGENT (VX)

SECTION I - GENERAL INFORMATION

MANUFACTURER'S ADDRESS: U.S. ARMY ARMAMENT, MUNITIONS AND CHEMICAL COMMAND
CHEMICAL RESEARCH DEVELOPMENT AND ENGINEERING CENTER
ATTN: SMCCR-CMS-E
ABERDEEN PROVING GROUND, MD 21010-5423

CAS REGISTRY NUMBER: 50782-69-9, 51848-47-6, 53800-40-1, 70938-84-0

CHEMICAL NAME:
Phosphonothioic acid, methyl-, S-(2-bis(1-methylethylamino)ethyl) O-ethyl ester
O-ethyl S-(2-diisopropylaminoethyl) methylphosphonothioate
S-2-Diisopropylaminoethyl O-ethyl methylphosphonothioate
S-2(2-Diisopropylamino)ethyl) O-ethyl methylphosphonothiolate
O-ethyl S-(2-diisoproplyaminoethy) methylphosphonothioate
O-ethyl S-(2-diisoproplyaminoethy) methylthiolphosphonoate

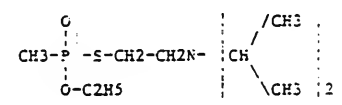
TRADE NAME AND SYNONYMS:

VX
EA 1701
TX60

CHEMICAL FAMILY: sulfinated organophosphorus compound

FORMULA/CHEMICAL STRUCTURE:

C11 H26 N O2 P S



NFPA 704 SIGNAL: Health - 4
Flammability - 1
Reactivity- 1

SECTION II - COMPOSITION

INGREDIENTS NAME	FORMULA	PERCENTAGE BY WEIGHT	AIRBORNE EXPOSURE LIMIT
VX	C11H26NO2PS	100%	.00001 mg/m3

SECTION III - PHYSICAL DATA

BOILING POINT DEG F (DEG C): 568 (298)

VAPOR PRESSURE (mm Hg): 0.0007 @ 25 Deg C

VAPOR DENSITY (AIR=1): 9.2

SOLUBILITY IN WATER: moderate

APPEARANCE AND ODOR: Colorless to straw colored liquid & odorless, similar in appearance to motor oil.

SECTION IV - FIRE AND EXPLOSION DATA

FLASHPOINT: 159 Deg C (McCutchan - Young)

FLAMMABILITY LIMITS (% by volume): Not Available

LOWER EXPLOSIVE LIMIT: Not Applicable

UPPER EXPLOSIVE LIMIT: Not Applicable

EXTINGUISHING MEDIA: Water mist, fog, foam, CO2. Avoid using extinguishing methods that will cause splashing or spreading of the VX.

SPECIAL FIRE FIGHTING PROCEDURES: All persons not engaged in extinguishing the fire should be immediately evacuated from the area. Fires involving VX should be contained to prevent contamination to uncontrolled areas. When responding to a fire alarm in buildings or areas containing agents, firefighting personnel should wear full firefighter protective clothing (without TAP clothing) during chemical agent firefighting and fire rescue operations. Respiratory protection is required. Positive pressure, full facepiece, NIOSH-approved self-contained breathing apparatus (SCBA) will be worn where there is danger of oxygen deficiency and when directed by the fire chief of chemical accident/incident (CAI) operations officer. The M9 or M17 series mask may be worn in lieu of SCBA when there is no danger of oxygen deficiency. In cases where firefighters are responding to a chemical accident/incident for rescue/reconnaissance purposes vice firefighting, they will wear appropriate levels of protective clothing (see Section 8).

Do not breathe fumes. Skin contact with V-agents must be avoided at all times. Although the fire may destroy most of the agent, care must still be taken to assure the agent or contaminated liquids do not further contaminated other areas or sewers. Contact with VX or VX vapors can be fatal.

UNUSUAL FIRE AND EXPLOSION HAZARDS: None known.

SECTION V - HEALTH HAZARD DATA

RECOMMENDED EXPOSURE LIMIT (REL):
The suggested permissible airborne exposure concentration for VX for an 8-hour workday of a 40-hour work week is an 8-hour time weighted average (TWA) of 0.00001 mg/m3 (9X10-7 ppm). This value is based on the TWA of VX as proposed in the USAEHA Technical Guide 169, "Occupational Health Guidelines for the Evaluation and Control of Occupational Exposure to Nerve Agents GA, GB, GD, and VX". To date, however, the Occupational Safety and Health Administration (OSHA) has not promulgated permissible exposure concentration for VX.

VX is not listed by the International Agency for Research on Cancer (IARC), American Conference of Governmental Industrial Hygienists (ACGIH), Occupational Safety and Health Administration (OSHA), or National Toxicology Program (NTP) as a carcinogen.

EFFECTS OF OVEREXPOSURE: VX is a lethal anticholinergic agent with median dose in man being: LD50 (Skin) = 0.135 mg/kg; ID50 (Skin) - 0.07 - 0.71 mg/kg; LCt50 (inhalation) = 30 mg min/m3; LCt50 (inhalation) - 24 mg min/m3.

a. One to several minutes after overexposure to airborne VX, the

following acute symptoms appear:

(1) Local effects (lasting 1-15 days, increases with dose):

(a) On Eyes: Miosis (constriction of pupils); redness, pressure sensation on eyes.

(b) By Innalation: Rhinorrhea (runny nose), nasal congestion, tightness in chest, wheezing, salivation, nausea, vomiting.

(2) Systemic Effects (increases with dose): By Innalation - excessive secretion causing coughing/breathing difficulty; salivation and sweating; vomiting, diarrhea; stomach cramps; involuntary urination/defecation; generalized muscle twitching/muscle cramps; CNS depression including anxiety, restlessness, giddiness, insomnia, excessive dreaming and nightmares. With more severe exposure, also headache, tremor, drowsiness, concentration difficulty, memory impairment, confusion, unsteadiness on standing or walking.

b. After overexposure to liquid VX, the following acute symptoms appear:

(1) Local Effects

(a) On Eyes: Miosis, redness, pressure sensation on eyes.

(b) By Ingestion: Salivation, anorexia, nausea, vomiting, abdominal cramps, diarrhea, involuntary defecation, heartburn.

(c) On Skin: sweating, muscle twitching.

(2) Systemic Effects: similar to generalized effects from exposure to airborne VX.

c. Chronic overexposure to VX causes forgetfulness, thinking difficulty, vision disturbances, muscular aches/pains. Although cer- organophosphate pesticides have been shown to be teratogenic in animals, these effects have not been documented in carefully controlled toxicological evaluations for VX.

** See Addendum A for detailed information. **

EMERGENCY AND FIRST AID PROCEDURES:

INHALATION: Hold breath until respiratory protective mask is donned. If severe signs of agent exposure appear (chest tightens, pupil constriction, incoordination, etc.), immediately administer, in rapid succession, all three Nerve Agent Antidote Kit(s), Mark I injectors (or atropine if directed by the local physician). Injections using the Mark I kit injectors may be repeated at 5 to 20 minute intervals if signs and symptoms are progressing until three series of injections have been administered. No more injections will be given unless directed by medical personnel. In addition, a record will be maintained of all injections given. If breathing has stopped, give artificial respiration. Mouth-to-mouth resuscitation should be used when approved mask-bag or oxygen delivery systems are not available. Do not use mouth-to-mouth resuscitation when facial contamination exists. If breathing is difficult, administer oxygen. Seek medical attention IMMEDIATELY.

EYE CONTACT: IMMEDIATELY flush eyes with water for 10-15 minutes, then don respiratory protective mask. Although miosis (pinpointing of the pupils) may be an early sign of agent exposure, an injection will not be administered when miosis is the only sign present. Instead, the individual will be taken IMMEDIATELY to the medical treatment facility for observation.

SKIN CONTACT: Don respiratory protective mask and remove contaminated clothing. Immediately wash contaminated skin with a solution of 5% household bleach, rinse well with water to remove excess bleach followed by copious soap and water wash. Administer nerve agent antidote kit, Mark I, only if local sweating and muscular twitching symptoms are observed. Seek medical attention IMMEDIATELY.

INGESTION: Do not induce vomiting. First symptoms are likely to be gastrointestinal. IMMEDIATELY administer Nerve Agent Antidote Kit, Mark I. Seek medical attention IMMEDIATELY.

** See Addendum B for detailed instructions. **

SECTION VI - REACTIVITY DATA

STABILITY: Relatively stable at room temperature. Unstabilized VX of 95% purity decomposed at a rate of 5% a month at 71 Deg C.

HAZARDOUS DECOMPOSITION PRODUCTS: During basic hydrolysis of VX up to about 10% of the agent is converted to EA2192 (diisopropylaminoethyl methylphosphonothioic acid). Based on the concentration of EA2192 expected to be formed during hydrolysis and its toxicity (1.4 mg/kg dermal in rabbit at 24 hours in a 10/90 wt% ethanol/water solution), a Class B poison would result.

The large scale decon procedure, which uses both HTH and NaOH, destroys VX by oxidation and hydrolysis. Typically the large scale product contains 0.2 - 0.4 wt% EA2192 at 24 hours. At pH 12, the EA2192 in the large scale product has a half-life of about 14 days. Thus the 90 day holding period at pH 12 results in about a 64-fold reduction of EA2192 (six half-lives). This holding period has been shown to be sufficient to reduce the toxicity of the product below that of a Class B poison.

Other less toxic products are ethyl methylphosphonic acid, methylphosphinic acid, diisopropylaminoethyl mercaptan, diethyl methylphosphonate, and ethanol.

The small scale decontamination procedure uses sufficient HTH to oxidize all VX thus no EA2192 is formed.

HAZARDOUS POLYMERIZATION: Will not occur.

SECTION VII - SPILL, LEAK, AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:
If leaks or spills occur, only personnel in full protective clothing (See Section 8) will remain in area. In case of personnel contamination see Section V "Emergency and First Aid Instructions". Spills must be contained by covering with vermiculite, diatomaceous earth, clay or fine sand. This containment is followed by the following treatment:

RECOMMENDED LABORATORY PROCEDURES (For Quantities less than 50 grams):
If the active chlorine of the Calcium Hypochlorite (HTH) is at least 55 percent, then 80 grams of a 10 percent slurry is required for each gram of VX. Proportionally more HTH is required if the chlorine activity of the HTH is lower than 55 percent. The mixture is agitated as the VX is added and the agitation is maintained for a minimum of one hour. If phasing of the VX/decon solution continues after 5 minutes, an amount of denatured ethanol equal to a 10 wt percent of the total agent/decon shall be added to assist miscibility. NOTE: ETHANOL SHOULD BE MINIMIZED TO PREVENT THE FORMATION OF A HAZARDOUS WASTE. Upon completion of the one hour agitation the decon mixture shall be adjusted to a pH between 10 and 11. Conduct general area monitoring to confirm that the atmospheric concentrations do not exceed the airborne exposure limit (see Sections 2 and 8).

RECOMMENDED FIELD PROCEDURES (For Quantities greater than 50 grams):
(NOTE: These proceoures can only be used with the approval of the CRDEC Safety Office.)

An alcoholic HTH mixture is prepared by adding 100 milliliters of denatured ethanol to a 900 milliliter slurry of 10 percent HTH in water. This mixture should be make just prior to use since the HTH can react with the ethanol. Fourteen grams of alcoholic HTH solution is used for each gram of VX. Agi-

tate the decontamination mixture as the VX is added. Continue the agitation for a minimum of one hour. This reaction is reasonable exothermic and evolves substantial off gassing. The evolved reaction gases should be routed through a decontaminate filled scrubber prior to release through filtration systems. After completion of the one hour minimum agitation, 10 percent Sodium Hydroxide is added in a quantity equal to that necessary to assure that a pH of 12.5 is maintained for a period not less than 24 hours. Hold the material at a pH between 10 and 12 for a period not less than 90 days to ensure that a hazardous intermediate material is not formed.

After sealing the head, the exterior of the drum shall be decontaminated and then labeled IAW EPA and DOT regulations. All leaking containers shall be overpacked with vermiculite placed between the interior and exterior containers. Decontaminate and label IAW EPA and DOT regulations. Dispose of the material IAW waste disposal methods provided below. Conduct general area monitoring to confirm that the atmospheric concentrations do not exceed the airborne exposure limit (see Sections 2 and 8).

If the alcoholic Calcium Hypochlorite (HTH) mixture is not available then the following decontaminants may be used instead and are listed in the order of preference: Decontamination solution No. 2 (DS2), Supertropical Bleach Slurry (STB), and Sodium Hypochlorite.

WASTE DISPOSAL METHOD: Open pit burning or burying of VX or items containing or contaminated with VX in any quantity is prohibited. The detoxified VX (using procedures above) can be thermally destroyed by incineration in an EPA approved incinerator in accordance with appropriate provisions of Federal, State and/or local RCRA regulations.

NOTE: Some states define decontaminated surety material as a RCRA Hazardous Waste.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION:

VX CONCENTRATION	RESPIRATORY PROTECTIVE EQUIPMENT
Less than 0.00001 mg/m3	M9, M17, or M40 series mask shall be available for escape as necessary.
0.00001 mg/m3 to 0.02 mg/m3	M9 or M40 series mask with Level A or Level B protective ensemble (see AMCR 385-131 for determination of appropriate level). Demilitarization Protective Ensemble (DPE) or Toxicological Agent Protective Ensemble Self-Contained (TAPES), used with prior approval from AMC Field Safety Activity.
Greater than 0.02 mg/m3 or unknown	DPE or TAPES used with prior approval from AMC Field Safety Activity. NOTE: When DPE or TAPES is not available the M9 or M40 series mask with Level A protective ensemble can be used. However, use time shall be restricted to the extent operationally feasible, and may not exceed one hour. As an additional precaution, the cuffs of the sleeves and the legs of the M3 suit shall be taped to the gloves and boots to reduce aspiration.

Local exhaust: Must be filtered or scrubbed to limit exit conc. to .00001 mg/m3.

Special: Chemical laboratory hoods shall have an average inward face velocity of 100 linear feet per minute (lfpm) ± 10 percent with the velocity at any point not deviating from the average face velocity by more than 20 percent. Laboratory hoods shall be located such that cross-drafts do not exceed 20 percent of the inward face velocity. A visual performance test utilizing smoke-producing devices shall be performed in assessing the ability of the hood to contain agent VX.

Emergency backup power necessary. Hoods should be tested semi-annually or after modification or maintenance operations. Operations should be performed 20 cm inside hood face.

Other: Recirculation or exhaust air from agent areas is prohibited. No connection between agent areas and other areas through ventilation system is permitted.

PROTECTIVE GLOVES: Butyl glove M3 and M4
Norton, Chemical Protective Glove Set

EYE PROTECTION: Chemical goggles. For splash hazards use goggles and face-shield.

OTHER PROTECTIVE EQUIPMENT: Full protective clothing will consist of M9 mask and hood, M3 butyl rubber suit, M2A1 butyl boots, M3 or M4 gloves, unimpregnated underwear; or demilitarization protective ensemble (DPE). For laboratory operations, wear lab coats, gloves and mask readily available.

In addition, daily clean smock, foot covers, and head covers will be required when handling contaminated lab animals.

MONITORING: Available monitoring equipment for agent HD is the M8/M9 detector paper, detector ticket, M256/M256A1 kits, bubbler, Depot Area Air Monitoring System (DAMMS), Automated Continuous Air Monitoring System (ACAMS), Real-Time Monitor (RTM), Demilitarization Chemical Agent Concentrator (DCAC), M8/M43, M8A1/M43A1, CAM-M1, Hydrogen Flame Photometric Emission Detector (HYFED), and the Miniature Chemical Agent Monitor (MINICAM).

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING:
In handling, the buddy system will be incorporated. No smoking, eating, and drinking in areas containing agent is permitted. Containers should be periodically inspected for leaks (either visually or by a detector kit). Stringent control over all personnel practices must be exercised. Decontamination equipment shall be conveniently located. Exits must be designed to permit rapid evacuation. Chemical showers, eye-wash stations and personal cleanliness facilities must be provided. Wash hands before meals and each worker will shower thoroughly with special attention given to hair, face, neck, and hands, using plenty of soap before leaving at the end of the workday.

OTHER PRECAUTIONS: Agent must be double contained in liquid and vapor tight container when in storage or when outside of ventilation hood.

For additional information see AMC-R 385-131, "Safety Regulations for Chemical Agents H, HD, HT, GB and VX" and "USAEHA Technical Guide No. 169, Occupational Health Guidelines for the Evaluation and Control of Occupational Exposure to Nerve Agents GA, GB, GD, and VX".

SECTION X - TRANSPORTATION DATA

PROPER SHIPPING NAME: Poisonous liquid, n.o.s.

DOT HAZARD CLASS: Poison A

DOT LABEL: Poison gas

DOT MARKING: Poisonous liquid, n.o.s. (O-ethyl S-(2-diisopropylaminoethyl) methyl phosphonothioate) NA 1955

DOT PLACARD: POISON GAS

EMERGENCY ACCIDENT PRECAUTIONS AND PROCEDURES: See Sections IV, VII and VIII.

PRECAUTIONS TO BE TAKEN IN TRANSPORTATION: Motor vehicles will be placarded, regardless of quantity. Driver shall be given full and complete information regarding shipment and conditions in case of emergency. AR50-6 deals specifically with the shipment of chemical agents. Shipments of agent shall be escorted IAW AR740-32.

ADDENDUM A

1. Acute Physiological Effects:

Site of Action	Signs and Symptoms
	Following Local Exposure
Muscarine-like-	
Pupils	Miosis, marked, usually maximal (pinpoint), sometimes unequal.
Ciliary body	Frontal headache, eye pain on focusing, slight dimness of vision, occasional nausea and vomiting.
Conjunctivae	Hyperemia.
Nasal mucous membranes	Rhinorrhea, hyperemia.
Bronchial tree	Tightness in chest, sometimes with prolonged wheezing expiration suggestive of broncho-constriction or increased secretion, cough.
	Following Systemic Absorption
Bronchial tree	Tightness in chest, with prolonged wheezing, expiration suggestive of broncho-constriction or increased secretion, dyspnea, slight pain in chest, increased bronchial secretion, cough, pulmonary ecema, cyanosis.

Gastrointestinal	Anorexia, nausea, vomiting, abdominal cramps, epigastric and suosternal tightness (cardiospasm) with "heart-burn" and eructation, diarrhea, tenesmus, involuntary defecation.
Sweat glands	Increased sweating.
Salivary glands	Increased salivation.
Lacrimal glands	Increased lacrimation.
Heart	Slight bradycardia.
Pupils	Slight miosis, occasionally unequal, later maximal miosis (pinpoint).
Ciliary body	Blurring of vision.
Bladder	Frequent, involuntary micturition
Nicotine-like-	
Striated muscle	Easy fatigue, mild weakness, muscular twitching, fasciculations, cramps, generalized weakness, including muscles of respiration, with dyspnea and cyanosis.
Sympathetic ganglia	Pallor, occasional elevation of blood pressure.
Central nervous system	Giddiness, tension, anxiety, jitteriness, restlessness, emotional lability, excessive dreaming, insomnia, nightmares, headaches, tremor, withdrawal and depression, bursts of slow waves of elevated voltage in EEG, especially on overventilation, drowsiness, difficult concentration, slowness on recall, confusion, slurred speech, ataxia, generalized weakness, coma, with absence of reflexes, Cheyne-Stokes respirations, convulsions, depression of respiratory and circulatory centers, with dyspnea, cyanosis, and fall in blood pressure.

2. Chronic Physiological Effects:

a. Acute Exposure.

If recovery from nerve agent poisoning occurs, it will be complete unless anoxia or convulsions have gone unchecked so long that irreversible central nervous system changes due to anoxemia have occurred.

b. Chronic Exposure.

The inhibition of cholinesterase enzymes throughout the body by nerve agents is more or less irreversible so that their effects are prolonged. Until the tissue cholinesterase enzymes are restored to normal activity, probably by very slow regeneration over a period of weeks or 2 to 3 months if damage is severe there is a period of increased susceptibility to the effects of another exposure to any nerve agent. During this period the effects of repeated exposures are cumulative; after a single exposure, daily exposure to concentrations of a nerve agent insufficient to product symptoms may result in the onset of symptoms after several days. Continued daily exposure may be followed by increasingly severe effects. After symptoms subside, increased susceptibility persists for one to serveral days. The degree of exposure required to produce recurrence of symptoms, and the severity of these

symptoms, depend on duration of exposure and time intervals between exposures. Increased susceptibility is not limited to the particular nerve agent initially absorbed.

Estimates have been made for the times at which 50% of exposed subjects would be affected (Et50's) at median incapacitating doses. These are presented below.

Et50	Degree of Effectiveness	ICt50	Exposure Time
min		mg min/m3	min
1.5	Moderate	27	0.5
3.0	Incap.	27	2.0
6.0		40	10.0
1.0	Severe	37	0.5
3.8	Incap.	37	2.0
7.8		56	10.0
2.0	Very	47	0.5
4.5	Severe	47	2.0
9.5	Incap.	72	10.0
6.5	Death	70	0.5
9.0		70	2.0
13.5		103	10.0

Exposure to high concentrations of nerve agent may bring on incoordination, mental confusion and collapse so rapidly that the casualty cannot perform self-aid. If this happens, the man nearest to him will give first aid.

Onset Time of Symptoms.

Types of Effects	Route of Absorption	Description of Effects	When Effects Appear After Exposure
Vapor Local	Lungs	Rhinorrhea, nasal hyperemia tightness in chest, wheezing	One to several minutes
Vapor Local	Eyes	Miosis, Conjectival hyperemia eye pain, frontal headache.	One to several minutes
Vapor Systemic	Lungs or eyes	Muscarine-like, nicotine-like and central nervous system effects. (See 2a above)	Less than 1 min to a few min after moderate or marked exposure; about 30 min after mild exposure.
Liquid Local	Eyes	Same as vapor effects.	Instantly
Liquid Local	Ingestion	Gastrointestinal. (See 2a above).	About 30 min. after ingestion.

Liquid Local	Skin	Local sweating and muscular twitching.	3 min to 2 hours
Liquid Systemic	Lungs	See 2a above.	Several minutes
Liquid Systemic	Eyes	Same as for vapor	Several minutes
Liquid Systemic	Skin	Generalized sweating.	15 minutes to 2 hours
Liquid Systemic	Ingestion	Gastrointestinal (See 2a above).	15 minutes to 2 hours

Onset Time of Symptoms. (cont'd)

Types of Effects	Route of Absorption	Duration of Effects After Mild Exposure	Duration of Effects After Severe Exposure
Vapor Local	Lungs	A few hours	1 to 2 days
Vapor Local	Eyes	Miosis - 24 hours	3 to 14 days 2 to 5 days
Vapor Systemic	Lungs or eyes	Several hours	8 days
Liquid Local	Eyes	Similar to effects of vapor	
Liquid Local	Ingestion	3 days	5 days
Liquid Local	Skin	3 days	5 days
Liquid Systemic	Lungs		1 to 5 days
Liquid Systemic	Eyes		2 to 4 days
Liquid Systemic	Skin		2 to 5 days
Liquid Systemic	Ingestion		3 to 5 days

ADDENDUM B

First Aid Procedures.

a. Exposed personnel will be removed immediately to an uncontaminated atmosphere. Personnel handling casualty cases will give consideration to their own safety and will take precautions and employ the prerequiste protective equipment to avoid becoming exposed themselves.

CAUTION: Due to the rapid effects of nerve agents, it is extremely important that decontamination of personnel not be delayed by attempting to blot off excessive agent prior to decontamination.

b. The casualty will then be decontaminated by immediately removing any contaminated clothing and washing the contaminated areas with copious amounts of soap and water. 5% sodium hypochlorite solution, or liquid household bleach (nominal 5% solution sodium hypochlorite) and flushing with clean water. Mask will be left on the victim until decontamination has been completed unless it has been determined that areas of the face were contaminated and the mask must be removed to facilitate decontamination. After decontamination, the contaminated clothing will be removed and skin contamination washed away. If possible, decontamination will be completed before the casualty is taken to the aid station or medical facility.

CAUTION: Care must be taken when decontaminating facial areas to avoid getting the hypochlorite into the eyes or mouth. Only clean water shall be used when flushing the eyes or mouth. Skin surfaces decontaminated with bleach should be thoroughly flushed with water to prevent skin irritation from the bleach.

c. If there is no apparent breathing, artifical resuscitation will be started immediately (mouth-to-mouth, or with mechanical resuscitator). The situation will dictate method of choice, e.g., contaminated face. Do not use mouth-to-mouth resuscitation when facial contamination exists. When appropriate, and when trained personnel are available, cardio-pulmonary resuscitation (CPR) may be necessary.

d. An individual who has received a known agent exposure or who exhibits definite signs or symptoms of agent exposure shall be injected immediately with the Nerve Agent Antidote Kit, MARK I.

(1) Some of the early symptoms of a vapor exposure may be rhinorrhea (runny nose) and/or tightness in the chest with shortness of breath (bronchial constriction).

(2) Some of the early symptomsi of percutaneous exposure may be local muscular twitching or sweating at the area of exposure followed by nausea or vomiting.

(3) Although myosis (pin-pointing of the pupils) may be an early sign of agent exposure, a MARK I Kit shall not be administered when myosis is the only sign present. Instead, the individual shall be taken immediately to the medical facility for observation.

(4) Injections using the MARK I kit injectors (or atropine only if directed by the local physician) may be repeated at 5 to 20 minute intervals if signs and symptoms are progressing until three series of injections have been administered. No more injections will be given unless directed by medical personnel. In addition, a record will maintained of all injections given.

(5) Administer, in rapid succession, all three MARK I kit injectors (o atropine if directed by the local physician) in the case of SEVERE signs o agent exposure.

CAUTION: The Nerve Agent Antidote Kit, MARK I does not act as prophylactic and shall not be administered until an agent exposure has be ascertained.

e. If indicated, CPR should be started immediately. Mouth-to-mouth resi citation should be used when approved mask-bag or oxygen delivery syst are not available. Do not use mouth-to-mouth resuscitation when facial c tamination exists.

U.S. ARMY CHEMICAL
RESEARCH, DEVELOPMENT
AND ENGINEERING CENTER

DATE: 3 Dec 1990
MCSDS NO: 20058A

Emergency Telephone #s:
CRDEC Safety Office
301-671-4411 0700-1700
EST After normal duty
hours: 301-278-5201
Ask for CRDEC Staff
Duty Officer

HD, AND THD (See Addendum A)

MATERIAL SAFETY DATA SHEET

SECTION I - GENERAL INFORMATION

MANUFACTURER'S NAME: Department of the Army

MANUFACTURER'S ADDRESS: U.S. ARMY ARMAMENT, MUNITIONS AND CHEMICAL COMMAND
CHEMICAL RESEARCH DEVELOPMENT AND ENGINEERING
CENTER
ATTN: SMCCR-CMS-E
ABERDEEN PROVING GROUND, MD 21010-5423

CAS REGISTRY NUMBER: 505-60-2, 39472-40-7, 68157-62-0

CHEMICAL NAME AND SYNONYMS:

Sulfide, bis (2-chloroethyl)
Bis(beta-chloroethyl)sulfide
Bis(2-chloroethyl)sulfide
1-chloro-2(beta-chloroethylthio)ethane
beta, beta'-dichlorodiethyl sulfide
2,2'dichlorodiethyl sulfide
Di-2-chloroethyl sulfide
beta, beta'-dichloroethyl sulfide
2,2'-dichloroethyl sulfide

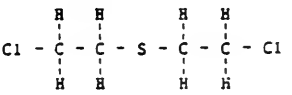
TRADE NAME AND SYNONYMS:

HD	Senfgas	H
Sulfur mustard	S-lost	HS
Iprit	Sulphur mustard gas	
Kampstoff "Lost"	S-yperite	
Lost	Yellow Cross Liquid	
Mustard Gas	Yperite	

CHEMICAL FAMILY: chlorinated sulfur compound

FORMULA/CHEMICAL STRUCTURE:

C4(H8)C12(S)



NFPA 704 SIGNAL: Health - 4
Flammability- 1
Reactivity- 1

SECTION II - COMPOSITION

INGREDIENTS NAME	FORMULA	PERCENTAGE BY WEIGHT	AIRBORNE EXPOSURE LIMIT (AEL)

Sulfur Mustard	C4(H8)C12(S)	100	0.003 mg/m3 (8 hr-TWA)

SECTION III - PHYSICAL DATA

BOILING POINT DEG F (DEG C): 422 DEG F (217 DEG C)

VAPOR PRESSURE (mm Hg): 0.072 mm Hg @ 20 DEG C (0.11 mm Hg @ 25 DEG C)

VAPOR DENSITY (AIR=1): 5.5

SOLUBILITY IN WATER: Negligible. Soluble in acetone, CH3(C1), tetrachloroethane, ethylbenzoate, and ether.

SPECIFIC GRAVITY (H2O=1): 1.27 @ 20 DEG C

VOLATILITY: 610 mg/m3 @ 20 DEG C
920 mg/m3 @ 25 DEG C

APPEARANCE AND ODOR: Water clear if pure. Normally pale yellow to black. Slight garlic type odor. The odor threshold for HD is 0.0006 mg/m3

SECTION IV - FIRE AND EXPLOSION DATA

FLASHPOINT (METHOD USED): 105 DEG C (ignited by large explosive charges)

FLAMMABILITY LIMITS (% by volume): Unknown

EXTINGUISHING MEDIA: Water, fog, foam, CO2. Avoid use of extinguishing methods that will splash or spread mustard.
SPECIAL FIRE FIGHTING PROCEDURES: All persons not engaged in extinguishing the fire should be immediately evacuated from the area. Fires involving HD should be contained to prevent contamination to uncontrolled areas. When responding to a fire alarm in buildings or areas containing agents, fire-fighting personnel should wear full firefighter protective clothing (without TAP clothing) during chemical agent firefighting and fire rescue operations. Respiratory protection is required. Positive pressure, full facepiece. NIOSH-approved self-contained breathing apparatus (SCBA) will be worn where there is danger of oxygen deficiency and when directed by the fire chief or chemical accident/incident (CAI) operations officer. The M9 or M17 series mask may be worn in lieu of SCBA when there is no danger of oxygen deficiency. In cases where firefighters are responding to a chemical accident/incident for rescue/reconnaissance purposes vice firefighting, they will wear appropriate levels of protective clothing (see Section 8).

SECTION V - HEALTH HAZARD DATA

AIRBORNE EXPOSURE LIMIT (AEL): The AEL for HD is 0.003 mg/m3 as proposed in the USAEHA Technical Guide No. 173, " Occupational Health Guidelines for the Evaluation and Control of Occupational Exposure to Mustard Agents H, HD, and HT". No individual should be intentionally exposed to any direct skin or eye contact.

EFFECTS OF OVEREXPOSURE: HD is a vesicant (causing blisters) and alkylating agent producing cytotoxic action on the hematopoietic (blood-forming) tissues which are especially sensitive. The rate of detoxification of HD in the body is very slow and repeated exposures produce a cumulative effect. HD has been found to be a human carcinogen by the International Agency for Research on Cancer (IARC).

Median doses of HD in man are:

LD50 (skin) = 100 mg/kg
[illegible] = 2000 mg-min/m3 at 70 - 80 DEG F (humid environment)

= 1000 mg-min/m3 at 90 DEG F (dry environment)
ICt50 (eyes) = 200 mg-min/m3
ICt50 (inhalation) = 1500 mg-min/m3 (Ct unchanged with time)
LD50 (oral) = 0.7 mg/kg

Maximum safe Ct for skin and eyes are 5 and 2 mg-min/m3, respectively.

ACUTE PHYSIOLOGICAL ACTION OF HD IS CLASSIFIED AS LOCAL AND SYSTEMIC.

LOCALLY, HD affects both the eyes and the skin. SKIN damage occurs after percutaneous resorption. Being lipid soluble, HD can be resorbed into all organs. Skin penetration is rapid without skin irritation. Swelling (blisters) and reddening (erythema) of the skin occurs after a latency period of 4-24 hours following the exposure, depending on degree of exposure and individual sensitivity. The skin healing process is very slow. Tender skin, mucous membrane and perspiration covered skin are more sensitive to the effects of HD. HD's effect on the skin, however, is less than on the eyes. Local action on the eyes produces severe necrotic damage and loss of eyesight. Exposure of eyes to HD vapor or aerosol produces lacrimation, photophobia, and inflammation of the conjunctiva and cornea.

SYSTEMIC ACTIONS occur primarily through inhalation and ingestion. The HD vapor or aerosol is less toxic to the skin or eyes than the liquid form. When inhaled, the upper respiratory tract (nose, throat, trachea) is inflamed after a few hours latency period, accompanied by sneezing, coughing, and bronchitis, loss of appetite, diarrhea, fever, and apathy. Exposure to nearly lethal dose of HD can produce injury to bone marrow, lymph nodes, and spleen as indicated by a drop in WBC count and, therefore, results in increased susceptibility to local and systemic infections. Ingestion of HD will produce severe stomach pains, vomiting, and bloody stools after a 15-20 minute latency period.

CHRONIC EXPOSURE to HD can cause sensitization, chronic lung impairment, (cough, shortness of breath, chest pain), and cancer of the mouth, throat, respiratory tract, skin, and leukemia. It may also cause birth defects.

EMERGENCY AND FIRST AID PROCEDURES:

INHALATION. Remove from the source IMMEDIATELY. If breathing has stopped, give artificial respiration. If breathing is difficult, administer oxygen. Seek medical attention IMMEDIATELY.

EYE CONTACT. Speed in decontaminating the eyes is absolutely essential. Remove person from the liquid source, flush the eyes immediately with water by tilting the head to the side, pulling the eyelids apart with the fingers and pouring water slowly into the eyes. Do not cover eyes with bandages out, if necessary, protect eyes by means of dark or opaque goggles. Transfer the patient to a medical facility IMMEDIATELY.

SKIN CONTACT. Don respiratory protective mask and gloves; remove victim from agent source immediately. Flush skin and clothes with 5 percent solution of sodium hypochlorite or liquid household bleach within one minute. Cut and remove contaminated clothing, flush contaminated skin area again with 5 percent sodium hypochlorite solution, then wash contaminated skin area with soap and water. If shower facilities are available, wash thoroughly and transfer to medical facility. If the skin becomes contaminated with a thickened agent, blot/wipe the material off immediately with an absorbent pad/paper towel prior to using decontaminating solution.

INGESTION. Do not induce vomiting. Give victim milk to drink. Seek medical attention IMMEDIATELY.

SECTION VI - REACTIVITY DATA

STABILITY: Stable at ambient temperatures. Decomposition temperature is 149 DEG C to 177 DEG C. Mustard is a persistent agent depending on pH and moisture, and has been known to remain active for up to three years in soil.

INCOMPATIBILITY: Conditions to avoid. Rapidly corrosive to brass @ 65 DEG

C. Will corrode steel at a rate of .0001 in. of steel per month @ 65 DEG C.

HAZARDOUS DECOMPOSITION: Mustard will hydrolyze to form HCl and thiodiglycol.

HAZARDOUS POLYMERIZATION: Will not occur.

SECTION VII - SPILL, LEAK, AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Only personnel in full protective clothing (see Section 8) will be allowed in an area where mustard is spilled.

RECOMMENDED FIELD PROCEDURES:
The mustard should be contained using vermiculite, diatomaceous earth, clay or fine sand and neutralized as soon as possible using copious amounts of 5.25 percent Sodium Hypochlorite solution.

Scoop up all material and place in an approved DOT container. Cover the contents of the drum with decontaminating solution as above. The exterior of the drum shall be decontaminated and then labeled IAW EPA and DOT regulations. All leaking containers shall be overpacked with vermiculite placed between the interior and exterior containers. Decontaminate and label IAW EPA and DOT regulations. Dispose of the material IAW waste disposal methods provided below. Dispose of the material used to decontaminate exterior of drum IAW Federal, state and local regulations. Conduct general area monitoring with an approved monitor (see Section 8) to confirm that the atmospheric concentrations do not exceed the airborne exposure limit (see Sections 2 and 8).

If 5.25 percent Sodium Hypochlorite solution is not available then the following decontaminants may be used instead and are listed in the order of preference: Calcium Hypochlorite, Decontamination Solution No. 2 (DS2), and Super Tropical Bleach Slurry (STB). WARNING: Pure, undiluted Calcium Hypochlorite (HTH) will burn on contact with liquid blister agent.

RECOMMENDED LABORATORY PROCEDURES:
A minimum of 65 grams of decon solution per gram of HD is allowed to agitate for a minimum of one hour. Agitation is not necessary following the first hour if a single phase is obtained. At the end of 24 hours, the resulting solution shall be adjusted to a pH between 10 and 11. Test for presence of active chlorine by use of acidic potassium iodide solution to give free iodine color. Place 3 ml of the decontaminate in a test tube. Add several crystals of Potassium Iodine and swirl to dissolve. Add 3 ml of 50 wt percent Sulfuric Acid:water and swirl. IMMEDIATE Iodine color indicates the presence of active chlorine. If negative, add additional 5.25 percent Sodium Hypochlorite solution to the decontamination solution, wait two hours, then test again for active chlorine. Continue procedure until positive chlorine is given by solution.

A 10 wt percent Calcium hypochlorite (HTH) mixture may be substituted for Sodium Hypochlorite. Use 65 grams of decon per gram of HD and continue the test as described for Sodium Hypochlorite.

Scoop up all material and place in approved DOT containers. Cover the contents of the drum with decontaminating solution as above. The exterior of the drum shall be decontaminated and then labeled IAW EPA and DOT regulations. All leaking containers shall be overpacked with vermiculite placed between the interior and exterior containers. Decontaminate and label IAW EPA and DOT regulations. Dispose of the material IAW waste disposal methods provided below. Dispose of the material used to decontaminate exterior of drum IAW Federal, state and local regulations. Conduct general area monitoring with an approved monitor (see Section 8) to confirm that the atmospheric concentrations do not exceed the airborne exposure limits (see Section 8).

NOTE: Surfaces contaminated with HD and then rinse-decontaminated may evolve sufficient mustard vapor to produce a physiological response.

... decontaminated material should be collected, ...

contained and chemically decontaminated or thermally decomposed in an EPA approved incinerator, which will filter or scrub toxic by-products from effluent air before discharge to the atmosphere. Any contaminated protective clothing should be decontaminated using HTH or bleach and analyzed to assure it is free of detectable contamination (3X) level. The clothing should then be sealed in plastic bags inside properly labeled drums and held for shipment back to the DA issue point. Decontamination of waste or excess material shall be accomplished in accordance with the procedures outlined above with the following exception:

---- HD on laboratory glassware may be oxidized by its vigorous reaction with concentrated nitric acid.

Open pit burning or burying of HD or items containing or contaminated with HD in any quantity is prohibited.

NOTE: Some states define decontaminated surety material as a RCRA hazardous waste.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION:

Concentration mg/m3	Respiratory Protection/Ensemble Required
Less than or equal to 0.003 as an 8-hr TWA	Protective mask not required provided that: (a) Continuous real-time monitoring (with alarm capability) is conducted in the work area at the 0.003 mg/m3 level of detection. (b) M9, M17 or M40 mask is available and donned if ceiling concentrations exceed 0.003 mg/m3. (c) Exposure has been limited to the extent practicable by engineering controls (remote operations, ventilation, and process isolation) or work practices. If these conditions are not met then the following applies: Full facepiece, chemical canister, air-purifying respirators. (The M9, M17, or M40 series or other certified equivalent masks are acceptable for this purpose in conjunction with the M3 toxicological agent protective (TAP) suit for dermal protection.)
Greater than 0.003 as an 8-hr TWA	The Demilitarization Protective Ensemble (DPE), 30 mil, may be used with prior approval from the AMC Field Safety Activity Use time for the 30 mil DPE must be restricted to two hours or less. NOTE: When 30 mil DPE is not available the M9 or M40 series mask with Level A protective ensemble including impregnated innerwear can be used. However, use time shall be restricted to the extent operationally feasible, and may not exceed one hour. As an additional precaution, the cuffs of the sleeves and the legs of the M3 suit shall be taped to the gloves and boots respectively to reduce aspiration.

VENTILATION:

Local Exhaust. Mandatory. Must be filtered or scrubbed.

Special. Chemical laboratory hoods shall have an average inward face velocity of 100 linear feet per minute (lfpm) plus or minus 10% with the velocity at any point not deviating from the average face velocity by more that 20%. Laboratory hoods shall be located such that cross drafts do not exceed 20% of the inward face velocity. A visual performance test utilizing smoke producing devices shall be performed in assessing the ability of the hood to contain agent HD.

Other. Recirculation of exhaust air from agent areas is prohibited. No connection between agent area and other areas through the ventilation system is permitted. Emergency backup power is necessary. Hoods should be tested semi-annually or after modification or maintenance operations. Operations should be performed 20 cm inside hoods.

PROTECTIVE GLOVES: MANDATORY. Butyl toxicological agent protective gloves (M3, M4, gloveset).

EYE PROTECTION: As a minimum, chemical goggles will be worn. For splash hazard use goggles and face-shield.

OTHER PROTECTIVE EQUIPMENT: Full protective clothing will consist of the M3 butyl rubber suit with hood, M2A1 boots, M3 gloves, impregnated underwear, M9 series mask and coveralls (if desired), or the Demilitarization Protective Ensemble (DPE). For general lab work, gloves and lab coat shall be worn with M9 or M17 mask readily available.

In addition, when handling contaminated lab animals, a daily clean smock, foot covers, and head covers are required.

MONITORING: Available monitoring equipment for agent HD is the M8/M9 detector paper, blue band tube, M256/M256A1 kits, bubbler, Depot Area Air Monitoring System (DAMMS), Automated Continuous Air Monitoring System (ACAMS), CAM-M1, Hydrogen Flame Photometric Emission Detector (HYFED), and the Miniature Chemical Agent Monitor (MINICAM).

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING:
During handling, the "buddy" (two-man) system will be used. Containers should be periodically inspected for leaks, either visually or using a detector kit, and prior to transfering the containers from storage to work areas. Stringent control over all personnel handling HD must be exercised. Chemical showers, eyewash stations, and personal cleanliness facilities must be provided. Each worker will wash their hands before meals and shower thoroughly with special attention given to hair, face, neck, and hands using plenty of soap before leaving at the end of the work day. No smoking, eating, or drinking is permitted at the work site. Decontaminating equipment shall be conveniently located. Exits must be designed to permit rapid evacuation. HD should be stored in containers made of glass for Research, Development, Test and Evaluation (RDTE) quantities or one-ton steel containers for large quantities. Agent shall be double-contained in liquid-tight containers when in storage.

OTHER PRECAUTIONS: For additional information see AMC-R 385-131, "Safety Regulations for Chemical Agents H, HD, HT, GB and VX" and USAEHA Technical Guide No.173, "Occupational Health Guidelines for the Evaluation and Control of Occupational Exposure to Mustard Agents H, HD, and HT".

SECTION X - TRANSPORTATION DATA

PROPER SHIPPING NAME: Poisonous liquid, n.o.s.

DOT Hazard Class: Poison A

DOT LABEL: Poison Gas

DOT MARKING: Poisonous liquic, n.o.s. (Sulfide, bis 2-chloroethyl)) NA 1955

DOT PLACARD: POISON GAS

EMERGENCY ACCIDENT PRECAUTIONS AND PROCEDURES: See Sections IV and VIII.

PRECAUTIONS TO BE TAKEN IN TRANSPORTATION: Motor vehicles will be placarded regardless of quantity. Driver shall be given full and complete information regarding shipment and conditions in case of emergency. AR 50-6 deals specifically with the shipment of chemical agents. Shipment of agents will be escorted in accordance with AR 740-32.

ADDENDUM A
ADDITIONAL INFORMATION FOR THICKENED HD

TRADE NAME AND SYNONYMS: Thickened HD, THD

HAZARDOUS INGREDIENTS: K125 (acryloid copolymer, 5%) is used to thicken HD. K125 is not known to be hazardous except in a finely-divided, powder form.

PHYSICAL DATA: Essentially the same as HD except for viscosity. The viscosity of HV is between 1000 and 1200 centistokes @ 25 DEG C.

FIRE AND EXPLOSION DATA: Same as HD.

HEALTH HAZARD DATA: Same as HD except for skin contact. For skin contact, don respiratory protective mask and remove contaminated clothing IMMEDIATELY. IMMEDIATELY scrape the HV form the skin surface, then wash the contaminated surface with acetone. Seek medical attention IMMEDIATELY.

SPILL, LEAK, AND DISPOSAL PROCEDURES: If spills or leaks of HV occur, follow the same procedures as those for HD, but dissolve the THD in acetone prior to introducing any decontaminating solution. Containment of THD is generally not necessary. Spilled THD can be carefully scraped off the contaminated surface and placed in a fully removable head drum with a high density, polyethylene lining. The THD can then be decontaminated, after it has been dissolved in acetone, using the same procedures used for HD. Contaminated surfaces should be treated with acetone, then decontaminated using the same procedures as those used for HD.

NOTE: Surfaces contaminated with THD or HD and then rinse-decontaminated may evolve sufficient mustard vapor to produce a physiological response.

SPECIAL PROTECTION INFORMATION: Same as HD.

SPECIAL PRECAUTIONS: Same as HD with the following addition. Handling the THD requires careful observation of the "stringers" (elastic, thread-like attachments) formed when the agents are transferred or dispensed. These stringers must be broken cleanly before moving the contaminating device or dispensing device to another location, or unwanted contamination of a

working surface will result.

TRANSPORTATION DATA: Same as HD.

DATE: 3 Dec 1990

U.S. ARMY CHEMICAL
RESEARCH, DEVELOPMENT
AND ENGINEERING CENTER

Emergency Telephone #s:
CRDEC Safety Office
301-671-4411 0700-1700
EST After normal duty
hours: 301-278-5201
Ask for CRDEC Staff
Duty Officer

HT

MATERIAL SAFETY DATA SHEET

SECTION I - GENERAL INFORMATION

MANUFACTURER'S NAME: Department of the Army

MANUFACTURER'S ADDRESS: U.S. ARMY ARMAMENT, MUNITIONS AND CHEMICAL COMMAND
CHEMICAL RESEARCH, DEVELOPMENT AND ENGINEERING CENTER
ATTN: SMCCR-CMS-E
ABERDEEN PROVING GROUND, MD 21010-5423

CAS REGISTRY NUMBER: Not Available

CHEMICAL NAME:

HD : Bis-(2-chloroethyl) sulfide
T : Bis-[2-(2-chloroethylthio)-ethyl] ether

Alternate chemical names:

See components (HD, T)

TRADE NAME AND SYNONYMS:

HT
Sulfur - Mustard (Vesicant)

CHEMICAL FAMILY: Chlorinated sulfur compound

FORMULA/CHEMICAL STRUCTURE: Mixture of 60% Sulfur Mustard (HD) and 40% Sulfur Mustard (T) by weight
HD: C4 H8 Cl2 S
T: C8 H16 Cl2 O S2

NFPA 704 SIGNAL: Health - 4
Flammability - 1
Reactivity - 1

SECTION II - COMPOSITION

INGREDIENTS NAME	FORMULA	PERCENTAGE BY WEIGHT	AIRBORNE EXPOSURE LIMIT (AEL)
HT	*	100	0.003 mg/m3

* See Section I

SECTION III - PHYSICAL DATA

BOILING POINT: No constant boiling point. Above 228 DEG C

VAPOR PRESSURE (torr): 0.104 @ 25 DEG C

VAPOR DENSITY (AIR=1): 6.92

SOLUBILITY IN WATER: Practically insoluble.

SPECIFIC GRAVITY (H2O=1): 1.265 at 20 DEG C

FREEZING (MELTING) POINT: 0.0 to 1.3 DEG C

AUTOIGNITION TEMPERATURE DEG F (DEG C): Data not available

VISCOSITY (CENTISTOKES): 6.05 @ 20 DEG C

VOLATILITY (mg/m3): 831 @ 25 DEG C

EVAPORATION RATE: Data not available

APPEARANCE & ODOR: Odor: Garlic-like
Appearance: Highly viscous clear to pale yellow liquid

SECTION IV - FIRE AND EXPLOSION DATA

FLASHPOINT: (METHOD USED): approximately 100 DEG C (method unknown)

FLAMMABILITY LIMITS (% by volume): Data not available

EXTINGUISHING MEDIA: Water, fog, foam, CO2. Avoid use of extinguishing methods that will splash or spread mustard.

UNUSUAL FIRE & EXPLOSION HAZARDS: May produce hydrogen chloride and sulfur oxides in a fire. Unburned agent vapors may be present and can cause toxic and vesicant effects.

SPECIAL FIRE FIGHTING PROCEDURES: All persons not engaged in extinguishing the fire should be immediately evacuated from the area. Fires involving HT should be contained to prevent contamination to uncontrolled areas. When responding to a fire alarm in buildings or areas containing agents, fire-fighting personnel should wear full firefighter protective clothing (without TAP clothing) during chemical agent firefighting and fire rescue operations. Respiratory protection is required. Positive pressure, full facepiece, NIOSH-approved self-contained breathing apparatus (SCBA) will be worn where there is danger of oxygen deficiency and when directed by the fire chief or chemical accident/incident (CAI) operations officer. The M9 or M17 series mask may be worn in lieu of SCBA when there is no danger on oxygen deficiency. In cases where firefighters are responding to a chemical accident/incident for rescue/reconnaissance pruposes vice firefighting, they will wear appropriate levels of protective clothing (see Section 8).

SECTION V - HEALTH HAZARD DATA

AIRBORNE EXPOSURE LIMIT (AEL): The AEL for HT is 0.003 mg/m3 as proposed in the USAEHA Technical Guide No. 173, "Occupational Health Guidelines for the Evaluation and Control of Occupational Exposure to Mustard Agents H, HD, and HT". No individual should be intentionally exposed to any direct skin or eye contact.

HD, a component of HT, is recognized as a human carcinogen by the International Agency for Research on Cancer (IARC).

EFFECTS OF OVEREXPOSURE: HT is a vesicant (causing blisters). Since HT contains HD, HT is an alkylating agent producing cytotoxic action on the hematopoietic (blood-forming) tissues which are especially sensitive. The [illegible] in the body is very slow and repeated exposure

produce a cumulative effect. Median lethal and incapacitating doses of HT in man have not been established. However, the inhalation LCt50s in certain animal species have been established as follows:

Dog:	100 - 200 mg-min/m3
Guinea Pig:	3000 - 6000 mg-min/m3
Rabbit:	3000 - 6000 mg-min/m3
Mouse:	820 mg-min/m3

Maximum safe Ct for HD for skin and eyes are 5 and 2 mg-min/m3, respectively.

ACUTE PHYSIOLOGICAL ACTION OF HT IS CLASSIFIED AS LOCAL AND SYSTEMIC.

LOCALLY, HT affects both the eyes and the skin. SKIN damage occurs after percutaneous resorption. Being lipid soluble, HT can be resorbed into all organs. Skin penetration is rapid without skin irritation. Swelling (blisters) and reddening (erythema) of the skin occurs after a latency period of 4-24 hours following the exposure, depending on the degree of exposure and individual sensitivity. The skin healing process is very slow. Tender skin, mucous membranes, and perspiration covered skin are more sensitive to the effects of HT. HT's effect on the skin, however, is less than on the eyes. Local action on the eyes produces severe necrotic damage and loss of eyesight. Exposure of eyes to HT vapor or aerosol produces lacrimation, photophobia, and inflammation of the conjunctiva and cornea.

SYSTEMIC ACTIONS occur primarily through inhalation and ingestion. The HT vapor or aerosol is less toxic to the skin or eyes than the liquid form. When inhaled, the upper respiratory tract (nose, throat, trachea) is inflamed after a few hours latency period, accompanied by sneezing, coughing and bronchitis, loss of appetite, diarrhea, fever, and apathy. Exposure to nearly lethal doses of HT can produce injury to bone marrow, lymph nodes, and spleen as indicated by a drop in WBC count and, therefore, results in an increased susceptability to local and systemic infections. Ingestion of HT will produce severe stomach pains, vomiting, and bloody stools after a 15-20 minute latency period.

CHRONIC EXPOSURE to HT can cause sensitization, chronic lung impairment. (cough, shortness of breath, chest pain) and cancer of the mouth, throat, respiratory tract, and skin, and leukemia. It may also cause birth defects.

EMERGENCY AND FIRST AID PROCEDURES:

INHALATION: Remove from the source IMMEDIATELY. If breathing has stopped, give artifical respiration. If breathing is difficult, administer oxygen. Seek medical attention IMMEDIATELY.

EYE CONTACT: Speed in decontaminating the eyes is absolutely essential. Remove person from the liquid source, flush the eyes immediately with water by tilting the head to the side, pulling the eyelids apart with the fingers and pouring water slowly into the eyes. Do not cover eyes with bandages but, if necessary, protect eyes by means of dark or opaque goggles. Transfer the victim to the medical facility IMMEDIATELY.

SKIN CONTACT: Don respiratory protection mask and gloves; remove victim from agent source immediately. Flush skin and clothes with 5 percent sodium hypochlorite solution or liquid household bleach, then wash contaminated skin area with soap and water. If shower facilities are available, wash thoroughly and transfer to medical facility IMMEDIATELY.

INGESTION: Do not induce vomiting. Give victim milk to drink. Seek medical attention IMMEDIATELY.

SECTION VI - REACTIVITY DATA

STABILITY: Stable at ambient temperatures. Decomposition temperature is 165 DEG C to 185 DEG C. HT is a persistent agent depending on pH and moisture, and has been known to remain active for up to three years in soil.

INCOMPATIBILITY: Conditions to avoid. Rapidly corrosive to brass @ 65 DEG

fluent air before discharge to the atmosphere. Any contaminated protec clothing should be decontaminated using HTH or bleach and analyzed to as it is free of detectable contamination (3X) level. The clothing should be sealed in plastic bags inside properly labeled drums and held for s ment back to the DA issue point. Decontamination of waste or excess mate shall be accomplished in accordance with the following procedure outlined bove with the following exception:

--- HT on laboratory glassware may be oxidized by its vigorous reac with concentrated nitric acid.

Open pit burning or burying of HT or items containing or contaminated wit in any quantity is prohibited.

Note: Some states consider certain decontaminated surety agents as RCRA ardous waste. Local regulations must be considered before disposal actio taken.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION:

Concentration (mg/m3)	Respiratory Protection/Ensemble Required
Less than or equal to 0.003 as an 8-hr TWA	Protective mask not required provided that: (a) Continuous real-time monitoring (with alarm capability) is conducted in the work area at the 0.003 mg/m3 level of detection. (b) M9, M17 or M40 mask is available and donned if concentrations exceed 0.003 mg/m3. (c) Exposure has been limited to the extent practicable by engineering controls (remote operations, ventilation, and process isolation) or work practices. If these conditions are not met then the following applies: Full facepiece, chemical canister, air-purifying respirators. (The M9, M17, or M40 series or other certified equivalent masks acceptable for this purpose in conjunction with the M3 toxicological agent protective (TAP) suit for dermal protection.
Greater than 0.003 as an 8-hr TWA	The Demilitarization Protective Ensemble (DPE), 30 mil, may be used with prior approval from the AMC Field Safety Activity Use time for the 30 mil DPE must restricted to two hours or less. NOTE: When 30 mil DPE is not available the M9 or M40 series mask with Level A protective ensemble including impregnated innerwear can be used. However, use time shall be restrict to the extent operationally feasible, and may not exceed one hour. As an additional precaution, the cuffs of the sleeves and the legs of the M3 suit shall be taped to the gloves and boots to reduce aspiration.

VENTILATION:

C: Will corrode steel at a rate of .0001 in. of steel per month @ 65 DEG C.

HAZARDOUS DECOMPOSITION: HT will hydrolyze to form HCl, thiodiglycol, and bis-(2-(2-hydroxyethylthio) ethyl ether.

HAZARDOUS POLYMERIZATION: Will not occur.

SECTION VII - SPILL, LEAK, AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Only personnel in full protective clothing will be allowed in an area where HT is spilled (See section 8). In case of personnel contamination see section V "Emergency and First Aid Instructions."

RECOMMENDED FIELD PROCEDURES: Spills of HT must be contained by using vermiculite, diatomaceous earth, clay or fine sand and neutralized as possible using copious amounts of 5.25 percent Sodium Hypochlorite solution. Scoop up all material and place in approved DOT containers. Cover the contents of the drum with decontaminating solution as above. The exterior of the drum shall be decontaminated and then labeled IAW EPA and DOT regulations. All leaking containers shall be overpacked with vermiculite placed between the interior and exterior containers. Decontaminate and label IAW EPA and DOT regulations. Dispose of the material used to decontaminate exterior of drum IAW Federal, state and local regulations. Conduct general area monitoring with an approved monitor (see Section 8) to confirm that the atmospheric concentrations do not exceed the airborne exposure limit (see Sections 2 and 8).

If 5.25 percent Sodium Hypochlorite solution is not available then the following decontaminants may be used instead and are listed in the order of preference: Calcium Hypochlorite, Decontamination Solution No. 2 (DS2) and Super Tropical Bleach Slurry (STB). WARNING: Pure, undiluted Calcium Hypochlorite (HTH) will burn on contact with liquid blister agent.

RECOMMENDED LABORATORY PROCEDURES: A minimum of 65 grams of decon solution is allowed to agitate for a minimum of one hour. Agitation is not necessary following the first hour if a single phase is obtained. At the end of 24 hours, the resulting solution shall be adjusted to a pH between 10 and 11. Test for presence of active chlorine by use of acidic potassium iodide solution to give free iodine color. Place 3 ml of the decontaminate in a test tube. Add several crystals of Potassium Iodine and swirl to dissolve. Add 3 ml of 50 wt percent Sulfuric Acid:water and swirl. IMMEDIATE Iodine color indicates the presence of active chlorine. If negative, add additional 5.25 percent Sodium Hypochlorite solution to the decontamination solution. wait two hours, then test again for active chlorine. Continue procedure until positive chlorine is given by solution.

A 10 wt percent HTH (calcium hypochlorite) mixture may be substituted for Sodium Hypochlorite. Use 65 grams of decon per gram of HT and continue the test as described for Sodium Hypochlorite.

Scoop up all material and place in approved DOT containers. Cover the contents of the drum with decontaminating solution as above. The exterior of the drum shall be decontaminated and then labeled IAW EPA and DOT regulations. All leaking containers shall be overpacked with vermiculite placed between the interior and exterior containers. Decontaminate and label IAW EPA and DOT regulations. Dispose of the material IAW waste disposal methods provided below. Dispose of the material used to decontaminate exterior of drum IAW Federal, state and local regulations. Conduct general area monitoring with an approved monitor to confirm that the atmospheric concentrations do not exceed the airborne exposure limits (see Section 8).

NOTE: Surfaces contaminated with HT and then rinse-decontaminated may evolve sufficient HT vapor to produce a physiological response.

WASTE DISPOSAL METHOD: All neutralized material should be collected, contained and thermally decomposed in an EPA permitted incinerator for decontaminated HT (see note), which will filter or scrub toxic by-products from ef-

Special. Chemical laboratory hoods shall have an average inward face velocity of 100 linear feet per minute (lfpm) plus or minus 10% with the velocity at any point not deviating from the average face velocity by more than 20%. Laboratory hoods shall be located such that cross drafts do not exceed 20% of inward face velocity. A visual performance test utilizing smoke producing devices shall be performed in assessing the ability of the hood to contain agent HT.

Other. Recirculation of exhaust air from agent areas is prohibited. No connection between agent area and other areas through the ventilation system is permitted. Emergency backup power is necessary. Hoods should be tested semi-annually or after modification or maintenance operations. Operations should be performed 20 cm inside hoods.

PROTECTIVE GLOVES: MANDATORY. Butyl Toxicological Agent Protective gloves (M3, M4, gloveset).

EYE PROTECTION: As a minimum, chemical goggles will be worn. For splash hazard use goggles and face-shield.

OTHER PROTECTIVE EQUIPMENT: Full protective clothing will consist of the M3 butyl rubber suit with hood, M2A1 boots, M3 gloves, impregnated underwear, M9 series mask and coveralls (if desired), or the Demilitarization Protective Ensemble (DPE). For general lab work, gloves and lab coat shall be worn with M9 or M17 mask readily available.

In addition, when handling contaminated lab animals, a daily clean smock, foot covers, and head covers are required.

MONITORING: Available monitoring equipment for agent HT is the M8/M9 detector paper, blue band tube, M256/M256A1 kits, bubbler, Depot Area Air Monitoring System (DAMMS), Automated Continuous Air Monitoring System (ACAMS), CAM-M1, Hydrogen Flame Photometric Emission Detector (HYFED), and the Miniature Chemical Agent Monitor (MINICAM).

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING:
During handling, the "buddy" (two-man) system will be used. Containers should be periodically inspected for leaks, either visually or using a detector kit, and prior to transferring the containers from storage to work areas. Stringent control over all personnel handling HT must be exercised. Chemical showers, eyewash stations, and personal cleanliness facilities must be provided. Wash hands before meals and each worker will shower thoroughly with special attention given to hair, face, neck, and hands, using plenty of soap before leaving at the end of the workday. No smoking, eating, or drinking is permitted at the work site. Decontamination equipment shall be conveniently located. Exits must be designed to permit rapid evacuation. HT should be stored in containers made of glass for Research Development Test and Evaluation (RDTE) quantities or one-ton steel containers for large quantities. Agent shall be double-contained in liquid-tight containers when in storage.

OTHER PRECAUTIONS: See AMC-R 385-131, "Safety Regulations for Chemical Agents H, HD, and HT, GB and VX," 9 Oct 1987 and USAEHA Technical Guide No. 173, "Occupational Health Guidelines for the Evaluation and Control of Occupational Exposure to Mustard Agents H, HD, and HT," for additional information.

SECTION X - TRANSPORTATION DATA

PROPER SHIPPING NAME: Poisonous liquid, n.o.s.

DOT HAZARD CLASSIFICATION: Poison A

DOT LABEL: Poison Gas

DOT MARKING: Poisonous liquid, n.o.s. (Bis-(2-chloroethyl) sulfide, and Bis-[2-(2-chloroethylthio)-ethyl] ether) NA 1955

DOT PLACARD: POISON GAS

PRECAUTIONS TO BE TAKEN IN TRANSPORTATION: Motor vehicles will be placarded regardless of quantity. Driver shall be given full and complete information regarding shipment and conditions in case of emergency. AR 50-6 deals specifically with the shipment of chemical agents. Shipment of agents will be escorted in accordance with AR 740-32.

EMERGENCY ACCIDENT PRECAUTIONS AND PROCEDURES: See sections IV, VII, and VIII.

103d Congress
2d Session } SENATE {

U.S. CHEMICAL AND BIOLOGICAL WARFARE-RELATED DUAL USE EXPORTS TO IRAQ AND THEIR POSSIBLE IMPACT ON THE HEALTH CONSEQUENCES OF THE PERSIAN GULF WAR

COMMITTEE STAFF REPORT (No. 3)
TO
CHAIRMAN DONALD W. RIEGLE, JR.
OF THE
COMMITTEE ON BANKING, HOUSING
AND URBAN AFFAIRS
WITH RESPECT TO
EXPORT ADMINISTRATION:
CHEMICAL WARFARE AGENT IDENTIFICATION, CHEMICAL INJURIES, AND OTHER FINDINGS

UNITED STATES SENATE

October 7, 1994

U.S. Chemical and Biological Exports to Iraq and Their Possible Impact on the Health Consequences of the Persian Gulf War

Committee Staff Report No. 3: Chemical Warfare Agent Identification, Chemical Injuries, and Other Findings.

A. BACKGROUND

The Senate Committee on Banking, Housing, and Urban Affairs is responsible for U.S. government legislation and oversight as it effects "dual use" exports -- those materials and technologies that can be converted to military uses.

During the Cold War, United States export policy focused primarily on restricting the export of sensitive "dual use" materials and technologies to the Soviet Union and its allies. This myopic approach to the non-proliferation of these materials ultimately resulted in the acquisition of unconventional weapons and missile-system technologies by several "pariah nations" with aggressive military agendas. For the United States, the reality of the dangers associated with these types of policies were realized during the Persian Gulf War. Recognizing the shortcomings of existing policies, and with the dissolution of the Soviet empire, an inquiry was initiated by the Committee into the contributions that exports from the United States played in the weapons of mass destruction programs that have flourished under the direction of Iraqi President Saddam Hussein.

On October 27, 1992, the Committee on Banking, Housing and Urban Affairs held hearings that revealed that the United States had exported chemical, biological, nuclear, and missile-system equipment to Iraq that was converted to military use in Iraq's chemical, biological, and nuclear weapons program. Many of these weapons -- weapons that the U.S. and other countries provided critical materials for -- were used against us during the war.

On June 30, 1993, several veterans testified at a hearing of the Senate Committee on Armed Services. There, they related details of unexplained events that took place during the Persian Gulf War which they believed to be chemical warfare agent attacks. After these unexplained events, many of the veterans present reported symptoms consistent with exposure to a mixed agent attack. Then, on July 29, 1993, the Czech Minister of Defense announced that a Czechoslovak chemical decontamination unit had detected the chemical warfare agent Sarin in areas of northern Saudi Arabia during the

early phases of the Gulf War. They had attributed the detections to fallout from coalition bombing of Iraqi chemical warfare agent production facilities.

In August 1993, Senate Banking Committee Chairman Donald W. Riegle Jr. began to research the possibility that there may be a connection between the Iraqi chemical, biological, and radiological warfare research and development programs and a mysterious illness which was then being reported by thousands of returning Gulf War veterans. In September 1993, Senator Riegle released a staff report on this issue and introduced an amendment to the Fiscal Year 1994 National Defense Authorization Act that provided preliminary funding for research of the illnesses and investigation of reported exposures.

When this first staff report was released by Senator Riegle, the estimates of the number of veterans suffering from these unexplained illnesses varied from hundreds, according to the Department of Defense, to thousands, according to the Department of Veterans Affairs. It is now believed that tens of thousands of U.S. Gulf War veterans are suffering from a myriad of symptoms collectively labelled either Gulf War Syndrome, Persian Gulf Syndrome, or Desert War Syndrome. Hundreds and possibly thousands of servicemen and women still on active duty are reluctant to come forward for fear of losing their jobs and medical care. These Gulf War veterans are reporting muscle and joint pain, memory loss, intestinal and heart problems, fatigue, nasal congestion, urinary urgency, diarrhea, twitching, rashes, sores, and a number of other symptoms.

They began experiencing these multiple symptoms during and after -- often many months after -- their tour of duty in the Gulf. A number of the veterans who initially exhibited these symptoms have died since returning from the Gulf. Perhaps most disturbingly, members of veteran's families are now suffering these symptoms to a debilitating degree. The scope and urgency of this crisis demands an appropriate response.

This investigation into Gulf War Syndrome, which was initiated by the Banking Committee under the direction of Chairman Riegle, has uncovered a large body of evidence linking the symptoms of the syndrome to the exposure of Gulf War participants to chemical and biological warfare agents, chemical and biological warfare pre-treatment drugs, and other hazardous materials and substances. Since the release of the first staff report on September 9, 1993, this inquiry has continued. Thousands of government officials, scientists, and veterans have been interviewed or consulted, and additional

evidence has been compiled. This report will detail the findings of this ongoing investigation.

On February 9, 1994, Chairman Donald W. Riegle, Jr. disclosed on the U.S. Senate floor that the U.S. government actually licensed the export of deadly microorganisms to Iraq. It was later learned that these microorganisms exported by the United States were identical to those the United Nations inspectors found and recovered from the Iraqi biological warfare program.

Throughout this investigation, the Department of Defense has assured the Committee that our troops were never exposed to chemical or biological agents during the Persian Gulf War. They have repeatedly testified in hearings and have made public statements that, at no time, were chemical and biological agents ever found in the Kuwaiti theater of operations.

In February of this year, the Chairman wrote a letter asking them to declassify all information on the exposure of U.S. forces to chemical and biological agents.

Then on May 4, 1994, the Chairman received assurances in a joint letter from Secretary Perry, Secretary Brown, and Secretary Shalala, that

> **"there is no classified information that would indicate any exposures to or detections of chemical or biological weapons agents."**[1]

Also in May, Undersecretary of Defense Edwin Dorn in sworn testimony in a hearing before the Committee on Banking, Housing, and Urban Affairs, claimed that all chemical agents were discovered

> **"a great distance from the Kuwait theater of operations."**[2]

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[1]Letter to Chairman Donald W. Riegle Jr., Committee on Banking, Housing, and Urban Affairs from Secretary of Defense William J. Perry, Secretary of Veterans Affairs Jesse Brown, and Secretary of Health and Human Services Donna Shalala, dated May 4, 1994. (Appendix A-1)

[2]Testimony of Dr. Edwin Dorn, Undersecretary of Defense for Personnel and Readiness before the U.S. Senate Committee on Banking, Housing, and Urban Affairs during a hearing convened on U.S. Export Policies to Iraq and Their Possible Impact on the Health Consequences of the Persian Gulf War, on May 25, 1994. (Appendix A-2)

During the same hearing, another senior Defense Department official was forced to recant part of the statement when confronted with the highly publicized discovery of chemical agents by U.N. inspectors near An Nassiriyah, which was very close to areas in which U.S. forces were deployed.[3]

In fact, we have received reports from Persian Gulf War veterans that U.S. forces actually secured this chemical weapons storage area.

Also during the hearing, a joint memorandum for Persian Gulf War veterans from Secretary of Defense Perry and the Chairman of the Joint Chiefs of Staff was presented. The memorandum stated, in part

> **"there is no information, classified or unclassified, that indicated that chemical or biological weapons were used in the Gulf."[4]**

Then, the Department of Defense announced on June 23, 1994, that the Defense Science Board found that

> **"there is no evidence that either chemical or biological warfare was deployed at any level, or that there was any exposure of U.S. service members to chemical or biological warfare agents."[5]**

This report raises serious questions about the integrity of the Department of Defense position. It describes events for which the Department of Defense explanations are inconsistent with the facts as related by the soldiers who were present, and with official government documents prepared by those who were present and with experts who have examined the facts.

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[3]Department of Defense testimony before the U.S. Senate Committee on Banking, Housing, and Urban Affairs during a hearing convened on U.S. Export Policies to Iraq and Their Possible Impact on the Health Consequences of the Persian Gulf War, on May 25, 1994. (Appendix A-3)

[4]Memorandum for Persian Gulf War Veterans, Persian Gulf War Health Issues, from John M. Shalikashvili, Chairman of the Joint Chiefs of Staff and William J. Perry, Secretary of Defense, dated 25 May 1994. (Appendix A-4)

[5]Report of the Defense Science Board Task Force on Persian Gulf War Health Effects, Office of the Undersecretary of Defense for Acquisition and Technology, (Washington, D.C.: Department of Defense, June 1994); and Department of Defense Press Release, June 23, 1994.

B. RECOVERY OF CHEMICAL AGENTS IN KUWAIT
August 1991 - Sabahiyah High School for Girls

The Committee staff has obtained British and U.S. Army reports which document in detail the discovery of more than 250 gallons of dangerous chemical agents. According to the units that were present, mustard gas and another blister agent were found in a storage tank in southeastern Kuwait.

These chemical agents were recovered in Kuwait, well inside the Kuwaiti theater of operations, well inside areas occupied by U.S. and British forces. According to the reports, they had been placed there by Iraqi forces during the occupation of Kuwait. The liquid was tested and over 20 times the presence of chemical agents was confirmed.

The Committee staff has obtained a copy of a recommendation for an Army Commendation Medal that was presented to Sergeant James Warren Tucker for among other things "participating in the mission that located stores of chemical agents" while deployed in Southwest Asia.[6]

Committee staff has also identified the commander of that unit, Captain Michael F. Johnson, currently with the U.S. Army at The Infantry School at Fort Benning, Georgia -- who was awarded a Meritorious Service Medal for his actions.[7]

These two soldiers and as many as six others from the 54th Chemical Troop of the United States Army's 11th Armored Cavalry Regiment were given Army medals for "the positive identification of suspected chemical agent," according to the citation presented to Captain Johnson. [8]

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[6]Recommendation for Award of Army Commendation Medal, Sergeant James Warren Tucker, Decontamination Platoon Squad Leader, 54th Chemical Troop, 11th Armored Cavalry Regiment, dated July 1993. (Appendix B-1)

[7]Recommendation for and Award of Meritorious Service Medal, Captain Michael F. Johnson, Troop Commander, 54th Chemical Troop, 11th Armored Cavalry Regiment, dated January 1993. (Appendix B-2)

[8]Ibid.

We have obtained the actual reports from two NATO countries who were Coalition members during the Persian Gulf War.[9]

This is a step-by-step analysis of the event as recorded in documents and the testimony of Nuclear Biological and Chemical, or NBC, officers who were there.

A container suspected of containing chemical agents was located in southeastern Kuwait in an area about 50 kilometers north of Saudi Arabia and 4 kilometers west of the Persian Gulf. The precise coordinates are **TN18832039** (Magellan)[10] Maps showing the precise location in which this container was found is attached.[11]

According to the British report, on August 5, 1991, several months after the end of the Persian Gulf War, Major J.P Watkinson of the British Army received orders to investigate a container that was believed to be leaking mustard gas.[12]

According to the official report prepared by Major Watkinson on 7 August 1991, the request to investigate the leaking container was made by Lt. Colonel Saleh Al Ostath of the Kuwaiti Army and agreed to by Mr. Lucas of the Royal Ordinance Corps.[13]

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[9]Memorandum for Director, CATD, Iraqi Chemical Agents–Information Paper: To Present First Hand Knowledge of Iraqi Chemical Agents Identified in Kuwait, prepared by Michael F. Johnson, Captain, CM NBC Branch, January 4, 1994. - FOR OFFICIAL USE ONLY - (Appendix B-3). Initial Report: Suspected Chemical Container, prepared by Major J.P. Watkinson, Officer Commanding, 21st EOD Squadron Group, Royal Ordinance (United Kingdom), dated 7 August 1991 - RESTRICTED: MANAGEMENT IN CONFIDENCE - (Appendix B-4).

[10]Ibid.

[11]From Initial Report: Suspected Chemical Container, prepared by Major J.P. Watkinson, Officer Commanding, 21st EOD Squadron Group, Royal Ordinance (United Kingdom), dated 7 August 1991 - RESTRICTED: MANAGEMENT IN CONFIDENCE - (Appendix B-5, B-6).

[12] Initial Report: Suspected Chemical Container, prepared by Major J.P. Watkinson, Officer Commanding, 21st EOD Squadron Group, Royal Ordinance (United Kingdom), dated 7 August 1991 - RESTRICTED: MANAGEMENT IN CONFIDENCE - (Appendix B-4).

[13]Ibid.

Major Watkinson and his unit, the 21st Explosive Ordinance Disposal Squadron, were taken to the site of the Sabahiyah High School for Girls and directed to a metal storage tank with a capacity of approximately 2,000 liters. According to the report, there appeared to be entry and exit bullet holes of approximately 7.62 caliber in the container.[14]

A photograph of the schoolyard with some of the chemical specialists approaching the tank that contained the chemical agents is attached.[15]

According to Major Watkinson's report, the container was leaking a brown vapor from both holes. The school was not in use and there were U.S. civilian contractors clearing explosives and rubbish from the area.[16]

The school security guard told the British that the tank was not there before the war. He first noticed the tank when he returned to the school after the war on March 20, 1991 -- four and a half month prior to these tests. The British report notes that the school was used as an Iraqi defensive position during the war.[17]

Major Watkinson ordered all personnel to move up wind, and after putting on his chemical protective clothing, approached the container and tested the brown colored vapor with a Chemical Agent Monitor (CAM).[18]

The Chemical Agent Monitor gave a reading of eight (8) bars on H, for mustard agent -- a maximum reading indicating a highly concentrated agent -- and no bars on G, indicating no nerve agent present.[19]

This was the first positive test for chemical mustard agent at this location.

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[14]Ibid.

[15]Appendix B-7.

[16]Initial Report: Suspected Chemical Container, prepared by Major J.P. Watkinson, Officer Commanding, 21st EOD Squadron Group, Royal Ordinance (United Kingdom), dated 7 August 1991 - RESTRICTED. MANAGEMENT IN CONFIDENCE - (Appendix B-4).

[17]Ibid.

[18]Ibid

[19]Ibid.

Distilled mustard is described in the Merck Index, a handbook for chemists, as an oily substance. It is also described as being amber brown in color -- remember Watkinson's report describes it as a brown substance.[20]

A photo and diagram of a Chemical Agent Monitor or CAM in use showing the types of displays that a chemical detection specialist would observe is attached.[21]

An [illegible] reading indicates a highly concentrated agent. These monitors are still in use by both U.S. and British forces.

Watkinson then tested the vapor with one color detector paper and nothing happened. He used three color detector paper and it turned pink indicating the presence of mustard agent.[22] This was the second positive test for mustard agent.

On a second visit to the container, according to the report, he inserted a wire into one of the bullet holes, and according to his report,

"wiped the oily substance on both types of detector paper."[23]

Again the oily nature of the substance indicates a property that is consistent with the properties of mustard agent.

The one color paper turned brown and the three colored paper turned pink, the latter again indicating the presence of mustard agent. This was the

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[20]Susan Budavari, ed., The Merck Index: An Encyclopedia of Chemicals, Drugs, and Biologicals, Eleventh Edition (Rahway, N.J.: Merck and Co., Inc., 1989), pp. 995-996. (Appendix B-8) James A.F. Comptom, Military Chemical and Biological Agents: Chemical and Toxicological Properties (Caldwell, N.J.: The Telford Press, (September 1987), 9-17. (Appendix B-9)

[21]Jane's NBC Protection Equipment, 1990-91, (London, U.K.: Jane's Information Group, 1991). Appendix B-10.

[22]Initial Report: Suspected Chemical Container, prepared by Major J.P. Watkinson, Officer Commanding, 21st EOD Squadron Group, Royal Ordinance (United Kingdom), dated 7 August 1991 - RESTRICTED: MANAGEMENT IN CONFIDENCE - (Appendix B-4).

[23]Ibid.

third positive test for mustard agent. Major Watkinson then sealed both holes in the container with masking tape.[24]

On yet a third visit to the container, the holes were uncovered and the vapor was tested using an M18A2 chemical detector kit. This test was repeated six times. On four of the tests the color indicator immediately turned blue indicating mustard (or "H") agent.[25]

For the remaining two tests, the color indicator went yellow but later turned blue.[26] These were the fourth through the ninth positive tests for mustard agent.

Another wire dip test was conducted using the three color detector paper from the M18A2 kit and the paper turned pinkish/orange indicating mustard agent for the tenth time. The bullet holes were resealed using industrial silicone filler and plaster of paris bandages. The container was checked with the Chemical Agent Monitor for leaks and the area was secured.[27]

On August 7, 1991, the Commander of the 11th Armored Cavalry Regiment was asked to send two FOX chemical reconnaissance vehicles, in support of the Kuwaiti Ministry of Defense and the Royal Ordinance Corps, to assist Major Watkinson in confirming the presence of a chemical agent.[28]

Since this was a joint and combined live agent chemical detection mission, involving both U.S. and British forces, detailed rehearsals occurred to ensure that no mistakes were made. The unit then travelled to the Sabahiyah High School for Girls in southeastern Kuwait.[29]

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[24]Ibid.

[25]Ibid.

[26]Ibid.

[27]Ibid.

[28]Memorandum for the Commander, 11th ACR, Tasking Number 91-047, dated 7 August 1991 from Joseph W. Miller, Lieutenant Colonel, GS, ACofs, G-3. (Appendix B-11)

[29]Memorandum for Director, CATD, Iraqi Chemical Agents–Information Paper: To Present First Hand Knowledge of Iraqi Chemical Agents Identified in Kuwait, prepared by Michael F. Johnson, Captain, CM NBC Branch, January 4, 1994. - FOR OFFICIAL USE ONLY - (Appendix B-3).

On August 8, 1991, one FOX team moved to the area near the container and began to conduct point surveys inserting the detection probe of the FOX vehicle into the ground to a depth of about four centimeters. The mass spectrometer showed microdoses of chemical mustard agent in the ground.[30] This was the eleventh confirmation.

At the same time another collection team in full chemical protective clothing walked to the container, estimated to contain between 800-1000 liters, or about 250 gallons of liquid, with Chemical Agent Monitors and other assorted chemical detection equipment. This team removed the storage container's seals and there was a discharge of pressurized vapor into the air.[31]

Captain Johnson's report confirms that he saw a light copper to amber colored vapor exit from the hole.[32] Again, mustard agent is described as an amber brown liquid.[33]

Tests were conducted with both the Chemical Agent Monitor and chemical detection paper. The detection paper confirmed the presence of chemical mustard agent; the twelfth confirmation. The Chemical Agent Monitor registered eight bars, again confirming highly concentrated mustard agent. This was the thirteenth confirmation of mustard agent by the specialists present.[34]

Captain Johnson's unit then inserted a medical syringe with a catheter tube into the container to extract liquid agent for detection paper, Chemical Agent Monitor, and FOX testing.[35]

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[30]Ibid.

[31]Ibid.

[32]Ibid.

[33] James A.F. Comptom, Military Chemical and Biological Agents: Chemical and Toxicological Properties (Caldwell, N.J.: The Telford Press, (September 1987), 9-17. (Appendix B-9)

[34]Memorandum for Director, CATD, Iraqi Chemical Agents–Information Paper: To Present First Hand Knowledge of Iraqi Chemical Agents Identified in Kuwait, prepared by Michael F. Johnson, Captain, CM NBC Branch, January 4, 1994. - FOR OFFICIAL USE ONLY - (Appendix B-3).

[35]Ibid.

The sample was placed into a metal dish. By the time a ground team member moved to the rear of the FOX to the probe, there was not enough liquid available to get a reliable reading.[36]

Another attempt was made and the ground team extracted a larger sample of liquid and placed it into the metal dish. The dish was moved to the FOX probe and the liquid was drawn for analysis -- not random vapors -- not oil fumes -- but the actual liquid chemical agent. Within six seconds, the mass spectrometer detected and identified the liquid as highly concentrated mustard agent.[37] Both four point and full spectrum readings were obtained, according to Captain Johnson, in each of the mass spectrometer analyses.[38] This therefore was the fourteenth (4 point) and fifteenth (full spectrum) confirmation of mustard agent.

Further analysis by the system also indicated the presence of traces phosgene, a non-persistent choking agent, and phosgene oxime, a blister agent. Another test was conducted to validate the findings. Again the FOX vehicle confirmed the presence of mustard agent for the sixteenth and seventeenth time, and again phosgene, and phosgene oxime were confirmed.[39]

Captain Johnson ordered yet another mass spectrometer test, utilizing the second FOX vehicle. The team in the second vehicle was not informed of the findings of the first vehicle, to rule out any possibility of biased readings from the team in the second vehicle. The team in the second FOX vehicle repeated the test and reported the same findings except that this time the reported levels of phosgene oxime were much higher. They also performed a second test to confirm their results. Again both 4-point and full spectrum analysis was conducted during each of these tests.[40] These were the eighteenth through twenty-first confirmations.

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[36]Ibid.

[37]Ibid.

[38]Staff interviews with Captain Johnson and Sergeant Tucker.

[39]Memorandum for Director, CATD, Iraqi Chemical Agents–Information Paper: To Present First Hand Knowledge of Iraqi Chemical Agents Identified in Kuwait, prepared by Michael F. Johnson, Captain, CM NBC Branch, January 4, 1994. - FOR OFFICIAL USE ONLY - (Appendix B-3).

[40]Ibid.

While the Chemical Agent Monitor and many other chemical detection kits available to military forces only detect H, or mustard agents, and G and V nerve agents, the FOX chemical reconnaissance vehicle accurately detects 60 known chemical agents using a computerized mobile mass spectrometer.[41]

It is capable of identifying the individual component chemical elements, such as sulfur, hydrogen, chlorine, and so forth; their molecular composition; and their molecular weight. This provides a scientific means to precisely identify substances.

In response to a request by the Committee for an explanation from the Department of Defense, Dr. Theodore Prociv, Deputy Assistant for Chemical and Biological Matters (Atomic Energy), replied on July 26 that the Department of Defense analysis of the FOX tapes revealed that the ions matched in three of four categories for a mustard agent, but matched nitric acid in all four categories.[42]

Committee staff solicited an opinion from the National Institute of Standards and Technology regarding the accuracy of this explanation.[43]

On September 6, in response to several specific questions, Dr. Stephen Stein, of the Institute, replied that "HD [mustard] has no major peaks in common with those expected to arise directly from fuming nitric acid," and that it is "highly unlikely that a properly functioning mass spectrometer would produce any of the major peaks of nitric acid or nitrogen oxides from HD." Furthermore, "if fuming red nitric acid did not decompose prior to detection (ionization) there would be no possibility of mistaking it for HD."[44]

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[41]Memorandum for Director, CATD, Iraqi Chemical Agents--Information Paper: To Present First Hand Knowledge of Iraqi Chemical Agents Identified in Kuwait, prepared by Michael F. Johnson, Captain, CM NBC Branch, January 4, 1994. - FOR OFFICIAL USE ONLY - (Appendix B-3).

[42]Letter to Chairman Donald W. Riegle, Jr., Committee on Banking, Housing, and Urban Affairs, from Dr. Theodore M. Prociv, Deputy for Chemical and Biological Matters, Office of the Assistant Secretary of Defense for Atomic Energy, dated July 26, 1994. (Appendix B-12)

[43]Committee inquiry to the National Institute of Standards and Technology, dated August 1, 1994. (Appendix B-13)

[44]Letter to Committee staff from Dr. Stephen E. Stein, Ph.D., Director, National Institute for Standards and Technology, Director, Mass Spectrometry Data Center, Chemical Science and Technology Laboratory, dated September 6, 1994. (Appendix B-14)

The commander of the unit said that the tests were run using both the four principle mass peaks and full spectrum analysis on the substance in question. The tests were run twice each by two FOX vehicles. The mass spectrometers were checked for calibration before and after each test, with no problems noted.

Each of the four tests identified identical substances-namely; mustard agent and phosgene oxime. When asked specifically, "how likely is it that under these circumstances that the computer algorithm identified nitric acid as these substances," Dr. Stein responded that "if fuming red nitric acid did not react prior to detection, there is no likelihood that either the four peak analysis or the full spectrum analysis would lead to false identification of mustard."[45]

And, "if nitric acid did react, the reaction products might generate a large number of peaks. Some of these might fortuitously be those characteristic of HD or other chemical agents and therefore might produce a false positive 4-peak identification of HD. A robust full spectrum matching algorithm, however, would not be expected to falsely identify mustard."[46]

The ground collection team then extracted a larger sample from the container and prepared it for transport from the area for further testing and evaluation.[47]

According to Captain Johnson's report and other eyewitness testimony, a member of the British team was injured while collecting a sample of the chemical agent. Some of the liquid agent made contact with the soldiers left wrist. The soldier immediately reacted to the liquid and was in severe pain and was believed to be going into shock.[48]

The injured soldier was quickly taken to a decontamination site and covered with decontamination powder and cut out of his chemical protective

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[45]Ibid.

[46]Ibid.

[47]Memorandum for Director, CATD, Iraqi Chemical Agents–Information Paper: To Present First Hand Knowledge of Iraqi Chemical Agents Identified in Kuwait, prepared by Michael F. Johnson, Captain, CM NBC Branch, January 4, 1994. - FOR OFFICIAL USE ONLY - (Appendix B-3).

[48]Ibid.

clothing.[49] A photograph of the British soldier on the FOX vehicle and his clothing laying in a pile beside the vehicle is attached.[50]

Dr. Prociv in his July 26, 1994 letter to the Committee reported that the injured soldiers clothing had been found by the British government to have been burned by fuming nitric acid in tests conducted at Porton Down.[51] Previously, in response to direct questioning by Committee staff, Captain Johnson stated that the contaminated suit was burned, that is, incinerated, at the site.[52]

The decontamination team then doused the soldier with a decontamination solution. Within one minute, a small blister was observed forming on his left wrist the size of a pinhead. About five minutes later, the blister had already reached the size of a U.S. fifty cent piece coin. Medics on the scene screened the victim for residual liquid contamination and sent him to the hospital for further treatment. After the casualty was evacuated, the rest of the unit and equipment was decontaminated.[53]

According to Military Chemical and Biological Agents: Chemical and Toxicological Properties, mustard agents acting alone may take hours to form blisters, but phosgene oxime acts within 30 seconds leaving a blanched area and immediately forms a red rash-like ring. With phosgene oxime, instant death from systemic shock or trauma is possible from exposure.[54]

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[49]Ibid.

[50]Appendix B-15

[51]Letter to Chairman Donald W. Riegle, Jr., Committee on Banking, Housing, and Urban Affairs, from Dr. Theodore M. Prociv, Deputy for Chemical and Biological Matters, Office of the Assistant Secretary of Defense for Atomic Energy, dated July 26, 1994. (Appendix B-10).

[52]Committee staff interviews with Captain Michael F. Johnson.

[53]Memorandum for Director, CATD, Iraqi Chemical Agents--Information Paper: To Present First Hand Knowledge of Iraqi Chemical Agents Identified in Kuwait, prepared by Michael F. Johnson, Captain, CM NBC Branch, January 4, 1994. - FOR OFFICIAL USE ONLY - (Appendix B-3).

[54]James A.F. Comptom, Military Chemical and Biological Agents: Chemical and Toxicological Properties (Caldwell, N.J.: The Telford Press, (September 1987), 9-17 (Appendix B-7), 64-69. (Appendix B-16)

The reported reaction of the British casualty was as might have been predicted when exposed to the identified agents. The fate of this injured British soldier is unknown.

After completing their testing, the U.S. FOX team leaders were ordered to remove the tapes from the mass spectrometer of the FOX vehicles by Lieutenant Colonel Killgore, the chemical officer for Task Force Victory.[55] These tapes are the paper records of the chemical breakdown of the liquid or vapors and are produced by the mobile mass spectrometer in the FOX vehicle.

The tapes and the collected samples were reportedly turned over to personnel wearing desert camouflage uniforms with no rank or distinguishing patches.[56] Captain Johnson does not know what happened to the tapes or samples as he was ordered from the scene after his unit's mission was completed.[57]

Dr. Prociv in his written response to the Committee stated that these were U.N. personnel. According to Lt. Colonel Killgore, while they were United Nations personnel, they were assigned to the U.N. team from the British Chemical and Biological Defence Establishment at Porton Down -- British Ministry of Defence employees.[58] In a subsequent inquiry, the U.N. could produce no written records of the findings of the U.N. team at the site.

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[55]Memorandum for Director, CATD, Iraqi Chemical Agents–Information Paper: To Present First Hand Knowledge of Iraqi Chemical Agents Identified in Kuwait, prepared by Michael F. Johnson, Captain, CM NBC Branch, January 4, 1994. - FOR OFFICIAL USE ONLY - (Appendix B-3).

[56]Ibid.

[57]Staff interviews.

[58]Memorandum for the Office of the Assistant Secretary of Defense for Chemical Biological Matters (OASD(CBM)), Suspect Chemical Container Found in Kuwait City, Kuwait, in August 1991, Don W. Killgore, Lieutenant Colonel, Technical Inspections Branch, Office of the Inspector General, Department of the Army, July 29, 1994 – FOR OFFICIAL USE ONLY – (Appendix B-17)

Conclusions

Chemical mustard agent was detected by:

- chemical specialists from the British Army using a Chemical Agent Monitor, M18A2 chemical agent detector, and detector paper; and,

- chemical specialists from the United States Army using a Chemical Agent Monitor, detector paper, and two mass spectrometers.

Phosgene oxime was detected by:

- two sophisticated FOX vehicles' mass spectrometers.

These were direct samples -- not random vapors collected by the vehicle -- as in previously reported cases.

As cited above, mass spectrometry is capable of identifying the individual chemical elements, such as sulfur, hydrogen, chlorine, and so forth; their molecular composition; and, their molecular weight. This provides a means to precisely identify substances. This was not an intake of random fumes by a moving vehicle in heavy smoke, it was a direct analysis of liquid agent drawn from the container.

This was not the only confirmation of the identity of the chemical agents present -- the results were confirmed by nearly every detector deployed with U.S. and British forces -- in a controlled setting.

A British soldier who came into contact with the liquid blistered immediately and appeared to be going into shock -- as might be predicted from the nature of the agents present.

The tapes were ordered removed from the vehicle and forward with a sample of the chemical agents. The soldiers were ordered to give the materials to individuals in unmarked uniforms and Captain Johnson, who earlier this year, after hearing that the Department of Defense was denying the presence of chemical agents in Kuwait, forwarded the report on this incident through his chain of command, and had the report returned to him. It was not forwarded to the Department of Defense.

The Kuwaiti, U.S., and British governments all received reports on this recovery of bulk chemical agents.

While these reports are not classified, the Department of Defense has consistently maintained that no chemical agents were located in areas occupied by U.S. forces -- including in testimony before committees of both the House of Representatives and the Senate.

The Department of the Army originally told Committee staff that prior to releasing Captain Johnson's report they must obtain clearance from the Department of Defense, and that an intelligence review must be conducted.[59] That would seem to contradict the claim that there is no classified information on this subject. They claimed that prior to releasing the British report, they must get the permission of the British.[60] However, when British report was received, it was dated July 14, 1994, indicating that it had been prepared in response to the Committee request, in coordination with the Department of Defense.[61]

The Committee was not provided with an official British report dating from the time of the incident by the Department of Defense as requested. A copy of that report was obtained by the Committee outside of Department of Defense channels. This official report, dated August 7, 1991, confirms that mustard agent was detected, and that the substance was oily, like mustard agent.[62] Nitric acid is not oily.

The U.S. report, prepared by Captain Johnson, confirms that not only was mustard agent detected in the container using a mass spectrometer, but

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[59]Staff interviews with Office of Legislative Affairs, U.S. Department of the Army.

[60]Ibid.

[61]Memorandum to Lieutenant Colonel Vicki Merriman, Office of the Deputy Assistant to the Secretary of Defense for Chemical and Biological Matters from Dr. Graham S. Pearson, Director General, Chemical and Biological Defence Establishment, Ministry of Defence, Porton Down, Salisbury, Wilts, U.K., Suspect Chemical Container: Kuwait City: August 1991. (Appendix B-18)

[62]Initial Report: Suspected Chemical Container, prepared by Major J.P. Watkinson, Officer Commanding, 21st EOD Squadron Group, Royal Ordinance (United Kingdom), dated 7 August 1991 - RESTRICTED: MANAGEMENT IN CONFIDENCE - (Appendix B-4).

also in microdoses on the ground.[63] This would eliminate the explanation that the container held fuming nitric acid -- rocket fuel oxidizer -- so concentrated that it reacted with materials in the mass spectrometer causing false readings when the material was examined. The mass spectrometers in both FOX vehicles were also successfully calibrated before and after this detection event.

There is also the issue of how the Department of Defense has handled this and other investigations into reported chemical agent detection events. Committee staff continues to receive reports from individuals, many of whom are no longer in the military -- civilians who have been contacted by high ranking military officers assigned to work with the Defense Science Board Task Force investigating this issue. We have received complaints from veterans that rather than trying to seek other witnesses or corroborate their reports, these officers have called to convince them that they were mistaken. That their findings were not credible -- that their statements made to Congress would be refuted.[64] Most recently, an individual associated with this detection of chemical agents was contacted by one of these officers. This officer specifically told the individual that these findings would be refuted by the Department of Defense -- even before the Department received the report from the British that was eventually forwarded to the Committee.

In this case there were 21 field tests conducted on this substance which were positive for mustard agent; both U.S. and British Chemical Agent Monitor readings confirmed 8 bars for mustard gas, a maximum reading indicating the presence of highly concentrated agent; 8 of 8 mobile mass spectrometer tests, using two separate FOX vehicles and liquid agent in a controlled setting identified identical substances -- mustard agent, and phosgene oxime; it was the same color as mustard agent; it was oily like mustard agent; a mobile mass spectrometer reading indicated that microdoses of mustard agent were present in the soil; a British soldier suffered a chemical injury consistent with what would be expected when exposed to these agents, particularly to phosgene oxime; and the Department of Defense explanation

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[63]Memorandum for Director, CATD, Iraqi Chemical Agents–Information Paper: To Present First Hand Knowledge of Iraqi Chemical Agents Identified in Kuwait, prepared by Michael F. Johnson, Captain, CM NBC Branch, January 4, 1994. - FOR OFFICIAL USE ONLY - (Appendix B-3).

[64]Letter of complaint from Mr. Randall Vallee, September 23, 1994 (Appendix B-19) and staff interviews.

was described by the National Institute for Standards and Technology variously as "highly unlikely," "no likelihood," and "not possible."

C. CHEMICAL INJURY AND CHEMICAL STORAGE BUNKER

Iraqi Bunker Complex - Southeastern Iraq (between Kuwaiti border and Basra) March 1, 1991

This case involves the experiences of former Sergeant David Allen Fisher, who also discovered what appears to have been a cache of chemical weapons where the Department of Defense says none were deployed.

While searching an Iraqi ammunition bunker in Iraq in an area south of Basra, Mr. Fisher brushed up against some wooden crated marked with skulls and crossbones. Within 8 hours his arm had reddened and began to sting. Several hours later, he noticed painful blisters on his upper arm.[65]

In his report of the incident, in a Question and Answer Brief prepared for the U.S. Central Command (CENTCOM) Public Affairs Office, and in a subsequent journal article, Colonel Michael Dunn, who would later become the commander of the U.S. Army Medical Research Institute for Chemical Defense confirmed that Fisher's injuries were the result of exposure to chemical agents.[66]

In this case, as in the other cases like it, it seems impossible to obtain an explanation from the Department of Defense that is consistent with the events as reported by the soldiers present. In August, a pentagon spokesperson stated that whatever chemicals were encountered in the bunker must have been left over from earlier fighting between Iraq and Iran.[67]

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[65]Information Paper: Chemical Agent Exposure - Operation Desert Storm, prepared and authenticated by Colonel Michael A. Dunn, March 5, 1991. (Appendix C-1)

[66]Information Paper: Chemical Agent Exposure - Operation Desert Storm, prepared and authenticated by Colonel Michael A. Dunn, March 5, 1991. (Appendix C-1), Question and Answer Brief prepared for the U.S. Central Command (CENTCOM) Public Affairs Office, March 1991 (Appendix C-2), Lieutenant Colonel John V. Wade, Major Robert M. Gum, and Colonel Michael A. Dunn, "Medical Chemical Defense in Operation Desert Shield and Desert Storm," Journal of the U.S. Army Medical Department, (January-February 1992), pp. 34-36. (Appendix C-3)

[67]Thomas D. Williams, "Veteran's Story Counters Official One on Gas War," The Hartford Courant (September 21, 1994) A2. (Appendix C-4)

However, in September 1994, that same spokesperson said that he was not aware that any chemical weapons crates were discovered by Mr. Fisher, despite Colonel Dunn's report and despite the fact that Mr. Fisher received a Purple Heart for his injuries.[68] Others who were present that date including the FOX vehicle operators, one of whom received a bronze star, and Colonel Dunn corroborate these events. Further, according to Mr. Fisher, this was an active bunker complex with artillery pieces present and their mission there was to go from bunker to bunker searching for Iraqi soldiers.[69] Old chemical weapons, left over from a previous war, would be stored in a separate storage facility; if they were present at an active artillery position, they were deployed with the intention of using them.

D. CHEMICAL DETECTION AND CHEMICAL INJURIES

Breaching Operations - Second Marine Division - Southwestern Kuwait
February 24, 1991

The following is an excerpt taken directly from "U.S. Marines in the Persian Gulf, 1990-1991: With the 2D Marine Division in Desert Shield and Desert Storm," an official report published in 1993 by the History and Museums Division, Headquarters, United States Marine Corps, Washington, D.C.

> "The use of chemical munitions by the Iraqis had been expected, but happily had not yet occurred. At approximately 0656, the "Fox" chemical reconnaissance vehicle at Red 1 detected a "trace" of mustard gas, originally thought to be from a chemical mine. The alarm was quickly spread throughout the division. Since everyone had been to don his protective outer garments and boots the previous evening, it was only necessary to hurriedly pull on a gas-mask and protective gloves to attain MOPP level 4. A second "Fox" vehicle was sent to the area, and confirmed the presence of an agent that had probably been there a long time. Unknown in its origin, it was still sufficiently strong to cause blistering on the exposed arms of two AAV crewmen. Work continued

[68]Ibid.

[69]Staff interviews

on the clearance of the lanes, and MOPP level was reduced to 2 after about a half-hour."[70]

Several issues are raised by this report. First, chemical mustard agent was detected by the FOX vehicles with the unit. Second, two marines were reportedly injured as a result of exposure to these agents. Third, it is highly unlikely that the chemical agents could have been there "a long time." These detections were made in southwestern Kuwait, an area not occupied by Iraq until after the invasion of Kuwait on August 2, 1990. Investigation by the Committee into this incident continues.

E. CHEMICAL AND BIOLOGICAL ANALYSIS OF EQUIPMENT

The Committee has submitted samples for analysis to several renowned laboratories, including the Lawrence Livermore National Laboratory's Forensic Science Center.[71]

In biological analyses, based on preliminary testing using advanced DNA analyses and screening techniques, unique DNA sequences were detected. Q-fever and Brucella were indicated on the inside of a gas mask carrying case, the top of a gas mask filter, and under the rubber seal of a mask submitted to the Committee for analysis by U.S. Persian Gulf War veterans who brought them back from the Middle East.[72]

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[70]Lieutenant Dennis P. Mroczkowski, U.S. Marines in the Persian Gulf, 1991: With the 2d Marine Division in Desert Shield and Desert Storm, (Washington, D.C.: History and Museums Division, Headquarters, U.S. Marine Corps , 1993), p. 41 (Appendix D-1), p. 45 (Appendix D-2).

[71]Laboratory analysis request from Chairman Donald W. Riegle, Jr., Committee on Banking, Housing, and Urban Affairs to the Lawrence Livermore National Laboratory Forensic Science Center, dated April 15, 1994. (Appendix E-1)

[72]Brian Andresen, Ph.D., Jackie Stilwell, M.S., Patrick Grant, Ph.D., Jeff Haas, M.S., Richard Whipple, B.A., and Armando Arcaraz, M.S., "Preliminary Results of Gas Masks and Exposure-Monitoring Equipment Associated with Desert Storm: Chemical and Biological Analyses of First Samples Sent," Forensic Science Center, J Division/NAI Directorate, Lawrence Livermore National Laboratory, June 1994 (Appendix E-2); Staff interviews with laboratory personnel.

When additional primer pairs were compared, the findings were negative. These tests were repeated with identical findings -- that is, the same identical unique DNA primer pairs were indicated.[73]

While false positive DNA testing can occur with only a single primer pair analysis, these results can also be indicative of the presence of only a single strand -- perhaps due to the presence of another genetically-altered biological warfare-related microorganism.[74]

We do know that the U.S. licensed the export of genetic materials capable of being used to create these types of genetically-altered biological warfare agents to the Iraqi Atomic Energy Commission -- an Iraqi governmental agency that conducted biological warfare-related research -- prior to the war.[75] One method of creating these genetically altered micro-organisms is by exposing them to radiation. The U.S. also licensed the export of several species of brucella to Iraqi governmental agencies.[76] Both Q-fever and Brucellosis are also endemic to the region.[77]

This study is far from conclusive but points to the need for further research in this area. According to the Lawrence Livermore National Laboratory, biological studies need further attention. Cultures need to be investigated more closely. Experiments to amplify the whole genome and to allow for the manipulation of increased concentrations of DNA by advanced testing would likely be more precise in identifying threat organisms -- organisms that may be causing Gulf War Syndrome.

In addition many chemical compounds were present in the samples. The scientists at Lawrence Livermore National Laboratory Forensic Science Center believe that additional analysis of more samples may isolate and identify unusual hazardous chemical compounds, chemicals that in combination may be hazardous, chemical warfare agent compounds, or

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[73]Ibid.

[74]Ibid.

[75]American Type Culture Collection, Rockville, Maryland (January 21, 1994).

[76]American Type Culture Collection, Rockville, Maryland (January 21, 1994).

[77]Robert Berkow, M.D., Editor-in-Chief, The Merck Manual of Diagnosis and Therapy, Sixteenth Edition (Rahway, N.J.: Merck and Co., Inc., 1992). Q-fever (Appendix E-3) and Brucellosis (Appendix E-4) summaries attached.

biological pathogens on the surface of collected items -- and that much more study is warranted.[78]

While these results are preliminary they are also very important. They show that we have the tools to get to the bottom of this problem if we simply choose to use them.

F. COMMITTEE STAFF REMARKS

What seems to be emerging is a troubling pattern of events involving individuals who have received medals -- Bronze Stars, Meritorious Service Medals, Army Commendation Medals, and Purple Hearts -- in the course of coming into contact with unconventional weapons that the Department of Defense continues to insist were not even present in theater. Chemical and biological weapons were either present, or they were not present. If weapons such as these were present, they were deployed doctrinally, as a matter of Iraqi Army practice, not in isolated instances. These events raise serious concerns about the veracity of the Department of Defense's claims as well as their motives. These reports call into question each and every Department of Defense refutation of previously reported detections and each and every triggered chemical agent detection alarm.

We know that there were chemicals found near An Nasiriyah, in an area that was secured by elements of the 18th Airborne Corps. The U.N. confirms that they were there, and a Defense Department official testifying before the Senate Banking Committee confirmed that troops were close to this facility -- contradicting previous testimony in the same hearing by another senior Defense Department official.

Careful scrutiny leads us to conclude that they were found in a container in southeastern Kuwait in an area tested by Kuwaiti, British, and American soldiers from the 11th Armored Cavalry Regiment.

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[78]Brian Andresen, Ph.D., Jackie Stilwell, M.S., Patrick Grant, Ph.D., Jeff Haas, M.S., Richard Whipple, B.A., and Armando Arcaraz, M.S., "Preliminary Results of Gas Masks and Exposure-Monitoring Equipment Associated with Desert Storm: Chemical and Biological Analyses of First Samples Sent," Forensic Science Center, J Division/NAI Directorate, Lawrence Livermore National Laboratory, June 1994 (Appendix E-2); Staff interviews with laboratory personnel.

We know from the reports on Sergeant Fisher that they were found in an Iraqi bunker complex south of Basra in an area that was secured by elements of the 3rd Armored Division.

Two U.S. Marines were injured by chemical agents in breaching operations during the "ground war."

We now know that many of the soldiers that were present during each of these events are ill -- others were given medals for their actions. Many of the veterans of the Gulf War and their families are now suffering permanently debilitating illnesses -- some have died. Currently it is estimated that there are 29,000 servicemen and women on the Department of Veterans Affairs Persian Gulf Registry and 7,000 on the Department of Defense Registry. The Department of Defense Registry is growing at a rate of about 500 individuals per week.

Just over one year ago, on September 9, 1993, when the first staff report was prepared for the Chairman, we were forced to estimate the numbers of sick veterans. Since that time we have learned that 5,400 Persian Gulf War veterans had registered with the Department of Veterans Affairs up to that point. The Department of Defense Registry numbered only a few hundred. In just over a years time the number of veterans who have registered in these registries has grown by nearly 700% We have also learned that many of the signs and symptoms of illnesses initially experienced by the veterans of the Persian Gulf War are now being experienced by their spouses and families. This data confirms that these illnesses are becoming a major threat to the health and well-being of a significant and rapidly growing number of individuals and warrants a serious and immediate effort by the government to determine the precise causes of the illnesses.

APPENDIX A-1

MAY - 4 1994

Honorable Donald W. Riegle, Jr.
Chairman
Committee on Banking, Housing,
and Urban Affairs
United States Senate
Washington, DC 20510

Dear Mr. Chairman:

Thank you for your letters of February 9, regarding health concerns of our Persian Gulf veterans and their families. We are jointly responding in our capacities as co-chairs of the Persian Gulf Veterans Coordinating Board. We share your interest and concern for the men and women who served in the Persian Gulf. We want to emphasize that we are investigating all possible cause(s) of the unexplained illnesses that veterans are experiencing. We are not excluding any possibilities from our research efforts. Our research efforts focus on parasitic infections, the effects of drugs or inoculations, oil fire smoke, industrial pollutants and chemicals, chemical or biological agents, some combination of these, or something as yet not identified.

We understand your concern regarding exports made in prior years. As you know, all exports to Iraq were compliant with regulations in effect at the time. These regulations were revised and strengthened in February, 1989. We would like to specifically address the suggestions in your letters that pertain to the activities of our Departments.

You asked that we immediately establish disability rating systems for stricken Persian Gulf veterans that are dependent on the degree of individual disability rather than using some arbitrary point system. The Department of Defense (DoD) and the Department of Veterans Affairs (VA) work closely on disability and compensation issues, and DoD uses the guidelines established by the VA. When a veteran receives a service-connected evaluation, it is based upon the individual disability demonstrated by the veteran and the average impairment in earning capacity resulting from the disability.

You also recommended that we not delay establishing this disability rating because of an inability to arrive at a specific diagnosis. Many Persian Gulf veterans have been granted service connection status for disabilities shown to be related to their military service. Other veterans have complained of non-specific symptoms, but medical evaluations have found no abnormalities. At this time, VA has seen only a few instances in which final action has been delayed because of an inability to arrive at a medical diagnosis. Please be assured that we will continue to work diligently with the scientific and medical communities to resolve unanswered medical questions, and once consensus has been reached, we will act without hesitation. We are also taking steps to contact and identify individuals affected and ensure that they receive medical evaluations and care in military or VA facilities, as appropriate.

You suggested that we expand our research to include the possibility that the unexplained illnesses are being transmitted to spouses and children of veterans and to assess what, if any, public health hazard may exist. Although we believe the possibility is small that we are dealing with an infectious communicable disease, we have not excluded such diseases from our research efforts. We are also working closely with the Centers for Disease Control and Prevention (CDC) on various research efforts. For instance, the Veterans Affairs Medical Center in Jackson, Mississippi, in conjunction with CDC, the Mississippi State Department of Health, and the University of Mississippi Medical Center Pediatrics Department, is examining the medical records of children born to Persian Gulf veterans for evidence of possible health effects related to their parent's service in the Gulf. Expansion of our research efforts to include possible examination of Persian Gulf veterans' children is currently under consideration.

We fully agree that we must ensure that all who served in the Persian Gulf, on active duty, in the reserves, and those who have left the military, receive proper medical attention and are awarded appropriate compensation for their service connected disabilities.

You recommend that the Secretaries of Defense and Veterans Affairs publicly announce that personnel who believe they were exposed to chemical or biological warfare agents during the Persian Gulf War or who detected the presence of any chemical or biological warfare agents during the Gulf War are released from any oath of secrecy relative to these exposures or detections. There is no classified information that would indicate any exposures to or detections of chemical or biological weapons agents. We will ensure that all of those who served understand that we do not wish for them to hold back any information on exposures or detections of chemical or biological agents during the War.

We are committed to a full and accurate resolution of the issues surrounding the health problems experienced by the men and women who served in the Persian Gulf War.

We appreciate your interest and concern with this matter.

Sincerely,

William Perry
Secretary of Defense

Jesse Brown
Secretary of Veterans Affairs

Donna Shalala
Secretary of Health
and Human Services

cc:
Honorable Alfonse D'Amato
Ranking Republican

APPENDIX A-2

STATEMENT OF HONORABLE EDWIN DORN

UNDER SECRETARY OF DEFENSE (PERSONNEL AND READINESS)

HEARINGS BEFORE THE SENATE COMMITTEE ON

BANKING, HOUSING, AND URBAN AFFAIRS

MAY 25, 1994

Not for Publication Until

Released by the Committee

Mr. Chairman and Members of the Committee,

I am pleased to provide information to support the Committee's review of how materials contributing to Iraq's chemical and biological warfare program were exported to Iraq from the United States. These are significant issues as you consider measures to strengthen the Export Administration Act.

Secretary Perry has asked me to be the focal point within DoD for issues related to service in the Persian Gulf during Operation Desert Shield and Desert Storm. I am here today in that capacity.

Senator, I know that you and your colleagues are very concerned about Persian Gulf Veterans who have developed health problems. So are we in the Department of Defense. In recent weeks we have testified before the Armed Services committees and the Veterans Affairs committees in both Houses, and I will be pleased to share with you the same information we have shared with them. Indeed, before we move on to discuss matters related to the Export Administration Act, I would like to offer a few points about our efforts on behalf of Persian Gulf veterans.

We take the position that the veterans who say they are sick should receive the best care we can provide. Three years ago, we trusted these men and women to make life-and-death decisions in the heat of battle. Today, we should believe them if they're sick. We are committed to treating the symptoms, to fashioning appropriate compensation for those who are disabled, and to identifying the causes of their illnesses. An interagency coordinating board ensures that the Defense Department's treatment and research programs complement related efforts by the Department of Veterans Affairs and

the Department of Health and Human Services. I should note here that Congress aided our ability to respond by authorizing VA to provide priority care to Persian Gulf veterans for conditions that might possibly be related to their Gulf service.

We are especially concerned about those Desert Shield/Desert Storm veterans who, since the war, have developed symptoms whose causes we cannot identify. These veterans represent a small proportion of the nearly 700,000 U.S. military personnel who served in the Persian Gulf region during the conflict, and indeed they represent a small proportion of those who have been treated for illnesses or injuries suffered during the war. DoD and VA doctors have treated thousands of Persian Gulf veterans for readily identifiable illnesses and injuries; but we know of about 2,000 people for whom a clear diagnosis continues to elude physicians.

We are working very hard on this. There are lots of theories about causes. We have heard from people who are convinced that we will find the answer if we focus solely on parasitic diseases, or Kuwaiti oil fire smoke, or industrial pollutants, or the effects of inoculations, or stress, or multiple chemical sensitivity. We are trying to maintain a program that explores all the possibilities. In the course of our work, some possibilities have begun to appear less plausible than others.

One theory involves Iraq's chemical and biological warfare capability. That theory provides a connection between the health problems of Gulf War veterans and the Senate Banking Committee's review of the Export Administration Act.

At the time of its invasion of Kuwait in August of 1990, Iraq clearly represented a case in which past efforts to prevent the proliferation of weapons of mass destruction had not been effective. Many American policy makers and military commanders were greatly concerned, going into the war, that Iraq would use chemical and/or biological weapons. We knew they had used chemical weapons in the past and we had evidence that they had acquired a biological warfare capability as well.

Our concerns led us to take measures to protect our personnel against such weapons, through immunizations, special training, equipment, and detection. The tension surrounding the possible use of chemical or biological weapons was evident to every American who watched on television as journalists scrambled to put on protective masks in response to the SCUD-attack warning sirens in downtown Riyadh and other areas. There were many alarms, witnessed by U.S. and other coalition military personnel and by the civilian populations of Saudi Arabia, Kuwait, and Israel.

Following the war, we confirmed through the inspections conducted by the United Nations Special Commission that Iraq did have significant stocks of chemical agents and the weapons systems to deliver them, as well as equipment and materials suited for chemical agent production. All of these chemical agents and related equipment were found stored at locations a great distance from the Kuwait Theater of Operations. These materials have been undergoing destruction at a centralized location in Iraq under the supervision of the United Nations Special Commission since late 1992. U.S. military personnel have been present, on site in Iraq, and involved in each of the teams overseeing these destruction operations.

We have concluded that Iraq did not use chemical or biological weapons during the war. This conclusion is based on analysis of large amounts of detailed data gathered in the theater and reviewed after the war. First, throughout the operation, there was only one instance of a soldier who was treated for chemical burns that were initially attributed to mustard agent; but subsequent tests on the soldier and his clothing did not definitively support the initial finding. We know of no other reports of any U.S. military, coalition military or civilians in the region having symptoms caused by exposure to chemical or biological warfare agents. The effects of chemical and biological weapons are acute and readily identifiable, and our personnel had been trained to look for the symptoms.

Second, our detectors were strategically located, and although many detectors alarmed, there were no confirmed detections of any chemical or biological agents at any time during the entire conflict. Third, no chemical or biological weapons were found in the Kuwait Theater of Operations -- those portions of Southern Iraq and Kuwait that constituted the battlefield -- among the tons of live and spent munitions recovered following the war. The international community agrees with these conclusions.

This is a complicated and contentious issue, however. To ensure that we have not overlooked or misinterpreted important information, we have asked an independent panel of experts, chaired by Nobel Laureate Joshua Lederberg, to review all the available evidence. We expect to receive the panel's report in June. We also remain eager to hear from Gulf war veterans who feel that they can shed light on the sources of the undiagnosed illnesses.

I understand the fear and the frustration many Persian Gulf veterans are experiencing: they are sick, and their doctors can't offer definitive answers. To them, let me say: this Administration is committed to treating you fairly. You stood up for the nation; the nation will now stand up for you.

Now, let me turn to the Defense Department's role in the export licensing process. First, it should be noted that DoD is not a licensing agency. That responsibility falls on the Department of Commerce for dual-use items. The Department of Defense reviews and provides recommendations on export license applications when they are referred to Defense or to interagency groups in which Defense participates. Records on the ultimate disposition of dual-use, biological, chemical, nuclear, or missile technology-related licenses reside in the Commerce Department.

DoD is a member of the interagency Subgroup on Nuclear Export Controls which was in operation throughout the 1980s. This group reviews export requests for nuclear-related dual-use technology. In the missile area, Defense played a significant role in the

establishment of the Missile Technology Control Regime in 1987, and subsequently helped set up an interagency license review group in 1990. In the chemical and biological area, Defense also plays an important role, as part of an interagency team, in reviewing export license requests for items controlled by the Australia Group.

The Department has taken and will continue to take its responsibility here very seriously. For example, DoD made an important contribution in halting export of the Argentine Condor Program that was aiding Iraq's Weapons of Mass Destruction program and we spearheaded the effort to prevent Iraq from acquiring a more capable missile than the SCUD. Defense also played a leading role in developing the President's Enhanced Proliferation Control Initiative and most recently the comprehensive DoD Counterproliferation Initiative. The Department of Defense continues to consider proliferation as a significant military threat.

The growing ability to produce and use chemical weapons is a great concern to DoD. We fully support any measures that will prevent or control this proliferation, which include strengthening the Export Administration Act. It is important to remember that all exports made to Iraq in the 1980s were completely consistent with the laws in effect at the time, and Iraq was not considered a hostile country. Defense's role in reviewing exports was greatly expanded in 1991 -- and would be further expanded through measures you are considering in this committee

I would now like to introduce the other members of the panel. Dr. Theodore Prociv is the Deputy Assistant to the Secretary of Defense for Chemical and Biological Matters. In that role, he oversees the Department's Chemical and Biological Defense Program; the Army program to destroy the U.S. stockpile of chemical weapons; and the implementation of bilateral and multilateral chemical weapons treaties, including the Chemical Weapons Convention which is being considered currently by the Senate for ratification. Additionally, his office has assisted the Defense Science Board Task Force

examining the issue of Gulf War health, and has assisted my staff with technical support in the area of chemical and biological warfare defense. Dr. John T. Kriese is the Chief of the Office for Ground Forces at the Defense Intelligence Agency. He is responsible for the production of intelligence on foreign ground forces and associated weapons systems worldwide; and all aspects of foreign nuclear and chemical programs. Dr. Prociv and Dr. Kriese are with me here this morning. Dr. Mitchel Wallerstein, who will testify this afternoon, is an expert in Counterproliferation and Export Control for the Under Secretary of Defense for Policy in International Security Policy. He is the Deputy Assistant Secretary of Defense for Counterproliferation Policy.

Mr. Chairman, that concludes my opening statement. Before we turn to questions, I ask the Committee's indulgence while Dr. Prociv and Dr. Kriese describe their areas of expertise.

head by the Defense Department that says, no, you can't tell what you know.

Mr. Dorn. The Secretary, the Chairman says that people should be free to talk about their experiences but let me clarify it further addressing specifically that clause which says that this information is not classified, okay?

The Chairman. See, I think all this information related to this topic should now be declassified. I think everybody in the public domain ought to have a right to see it, including the medical researchers and others. But very specifically, I don't want any of us who have proper Congressional roles to play here to be denied access to any of this information.

And that is absolutely unacceptable and I want to get that cleared up today.

Mr. Dorn. Let me clarify further.

The Chairman. Now, earlier, you made a statement or a statement was made by one of the three of you that all of the chemical agents and related equipment that was discovered was found stored far from the Kuwait field of operations.

At An Nasiriyah, and we've got a map over here where bombings occurred and many chemical weapons were found, that area is only 125 miles from the Kuwait/Saudi border and it's well within scud missile range of most coalition

deployments.

Weren't U.S. forces located around this area?

Dr. Prociv. Yes, they were.

I'll say frankly the word, far, got in the last draft of Dr. Dorn's testimony this morning. I thought we had that fixed to be stricken from the draft testimony that he was given.

It is not correct to say that all munitions were found far from the KTL, sir.

The Chairman. Well, that's an important clarification. So there were instances then where some of these munitions were found close to where we had troop deployments?

Dr. Prociv. That's correct.

The Chairman. This would be one.

Can you cite others?

Dr. Prociv. Not off the top of my head.

Just a second.

(Pause.)

Dr. Prociv. I think the answer, sir, is that we attacked Talile but U.N. inspections show nothing in that after the War.

That's it.

The Chairman. But in terms of An Nasiriyah here, we did find them there.

Do I assume that we continued to use our forces to

secure that area as the War went along?

We would not have just been in that area and then left, would we?

Dr. Prociv. I don't know those details of how long we were in that area.

My understanding is that munitions were found not at the site we bombed, but some 15 nautical miles away from where we attacked.

The Chairman. How close would U.S. forces have been stationed to that?

Dr. Prociv. I think they were across the river. Not stationed but during the ground force phase of the campaign, that's as close as we got.

The Chairman. And the river would be how wide, roughly? I mean, you know, what are we talking about?

Dr. Prociv. It's a desert area so I expect it's not very wide there.

The Chairman. So it's a pretty narrow river?

Dr. Prociv. Right.

The Chairman. So our troops were right across this narrow river from where we found these things. Is that right?

Dr. Prociv. They got that close but I don't know how long they were there.

The Chairman. We've got a lot of questions here. We've

THE SECRETARY OF DEFENSE

WASHINGTON, THE DISTRICT OF COLUMBIA

APPENDIX A-4

25 MAY 1994

MEMORANDUM FOR PERSIAN GULF WAR VETERANS

SUBJECT: Persian Gulf War Health Issues

As you may know, there have been reports that some Persian Gulf War veterans are experiencing health problems that may be related to their service in the Gulf. We want to assure each of you that your health and well-being are top priorities for the Department of Defense.

There are many hazards of war, ranging from intense combat to environmental exposures. Anyone who has health problems resulting from those hazards is entitled to health care. If you are experiencing problems, please come in for a medical evaluation. Active duty personnel and their eligible family members should report to any military hospital and ask to be included in the Department's Persian Gulf War Veterans Health Surveillance System. You will receive a full medical evaluation and any medical care that you need. Reserve personnel may contact either a military hospital or their nearest Veterans Affairs Medical Center and ask to be included in the DoD Surveillance System or the VA's Persian Gulf War Health Registry. You will receive a full medical examination. Depending on the results of the evaluation and eligibility status, reserve personnel will receive medical care either from military facilities or from VA facilities.

There have been reports in the press of the possibility that some of you were exposed to chemical or biological weapons agents. There is no information, classified or unclassified, that indicates that chemical or biological weapons were used in the Persian Gulf. There have also been reports that some veterans believe there are restrictions on what they can say about potentia exposures. Please be assured that you should not feel constrained in any way from discussing these issues.

We are indebted to each one of you for your service to your country during the Persian Gulf War and throughout your military careers. We also want to be sure that you receive any medical care you need.

Thank you for your service.

John M. Shalikashvili
Chairman
of the Joint Chiefs of Staff

William J. Perry
Secretary of Defense

APPENDIX B-1

RECOMMENDATION FOR AWARD (For Other Than Valor) OF ARMY ACHIEVEMENT MEDAL (AA
ARMY COMMENDATION MEDAL (ARCOM), AND MERITORIOUS SERVICE MEDAL (MSM)---
For use of this form, see AR 672-5-1; the proponent agency is DCCSPER

CDR, CS/11th ACR, APO AE 09146	CDR, 54th Chem Trp, CS/11th ACR	

PART A - SOLDIER DATA

a. BRANCH OF SERVICE	XX ARMY	☐ USN ☐ USMC ☐ USAF ☐ USCG	
b. RECOMMENDED AWARD	☐ MSM XX ARCOM ☐ AAM ☐ OLC ☐ ORDER	c. REASON	☐ ACH ☐ SVC XX FOR ☐ ORG ☐ RET
d. PERIOD OF AWARD: FROM 2 NOV 90	TO 15 SEP 93	e. FOREIGN? ☐ Yes ☐ No	f. PROPOSED PRESENTATION DATE
g. NAME (Last, First, Middle) TUCKER, JAMES WARREN		h. RANK SERGEANT	i. SSN 420-90-8620
j. DUTY POSITION/TITLE DECONTAMINATION NCO		k. ORGANIZATION 54TH CHEMICAL TROOP, C.S. 11TH ACR	
l. PREVIOUS AWARDS ARMY ACHIEVEMENT MEDAL (2)			
m. RECOMMENDER			
a. NAME LUCAS, GEORGE KEENE	b. POSITION DECONTAMINATION PLATOON SQUAD LEADER	c. ADDRESS 54th Chem. Trp. C.S. 11th ACR unit: 20811 APO AE 09146	
d. SIGNATURE	e. RANK STAFF SERGEANT		

PART B - JUSTIFICATION AND CITATION DATA (Also Specific Duties/Examples of Meritorious Acts or Services)

n. ACHIEVEMENT #1 DURING THE REGIMENT'S DEPLOYMENT TO SOUTHWEST ASIA, SERGEANT TUCKER'S TECHN AND TACTICAL EXPERTISE CONTRIBUTED GREATLY TO THE OVERALL SUCCESS OF ALL THE TROOP'S MISSIONS.

o. ACHIEVEMENT #2 WHILE DEPLOYED TO SOUTHWEST ASIA, SERGEANT TUCKER PARTICIPATED IN THE MISSI THAT LOCATED STORES OF CHEMICAL AGENTS. SERGEANT TUCKER'S PERFORMANCE DURING THAT MISSIO CONTRIBUTED GREATLY TO THE MISSION'S SAFE ACCOMPLISHMENT.

p. ACHIEVEMENT #3 SERGEANT TUCKER SUCCESSFULLY DEPLOYED TO GIN II, GRAFENWOEHR, AND COMBAT MANEUVER TRAINING CENTER, HOHENFELS. SERGEANT TUCKER'S SKILL AND KNOWLEDGE CONTRIBUTED GREATLY TO THE OVERALL SUCCESS OF THE TROOP'S ROTATION.

q. ACHIEVEMENT #4 SERGEANT TUCKER WAS A KEY PERSON IN THE PLATOON DURING THE TROOP EXTERNAL EVALUATION, DRAGON JOUST. SERGEANT TUCKER MOTIVATED THE SOLDIERS RESULTING IN SUCCESSFUL ACCOMPLISHMENT OF ALL THE PLATOON'S MISSIONS.

r. PROPOSED CITATION FOR MERITORIOUS SERVICE WHILE SERVING AS A RECON SECTION LEADER AND AS A DECONTAMINATION SERGEANT. SERGEANT TUCKER'S TECHNICAL AND TACTICAL EXPERTISE, DEVOTION TO DUTY, AND SOUND JUDGEMENT CONTRIBUTED GREATLY TO THE SUCCESS OF ALL UNIT MISSIONS AND REFLECTS GREAT CREDIT UPON HIMSELF, HIS UNIT AND THE UNITED STATES ARMY.

DA FORM 638-1, NOV 90

PART C - RECOMMENDATION/APPROVAL/DISAPPROVAL

a. TO: CDR, 54th Chem Bn, CS/11th ACR	b. FROM: STAFF SERGEANT GEORGE K. LUCAS	c. DATE

d. Recommend: APPROVAL UPGRADE TO DOWNGRADE TO DISAPPROVAL

e. NAME: GEORGE B. SHUPLINKOV	f. TITLE/POSITION: CPT, CM, Commanding	g. SIGNATURE: George B. Shuplinkov h. RANK: CAPTAIN

i. COMMENTS:

21. Certification of Eligibility and Date

I certify that the individual is eligible for an award in accordance with AR 600-8-2; and that the information contained in Part A is correct.

a. SIGNATURE: Wendell Carlson b. DATE: 15 JUL 10

22. AAM APPROVAL AUTHORITY

a. TO: CDR, 11TH ACR	b. FROM: CDR, CS/11TH ACR	c. DATE

d. Recommend: APPROVAL UPGRADE TO DOWNGRADE TO AAM DISAPPROVAL

e. NAME: WAYNE D. TAYLOR	f. TITLE/POSITION: SQUADRON COMMANDER	g. SIGNATURE: W D Taylor h. RANK: LTC

i. COMMENTS:

23. ARCOM APPROVAL AUTHORITY

a. TO	b. FROM	c. DATE

d. Recommend: APPROVAL UPGRADE TO DOWNGRADE TO DISAPPROVAL

e. NAME	f. TITLE/POSITION	g. SIGNATURE h. RANK

i. COMMENTS:

24. MSM APPROVAL AUTHORITY

a. TO	b. FROM	c. DATE

d. APPROVED DOWNGRADE TO RECOMMEND UPGRADE TO DISAPPROVED

e. NAME	f. TITLE/POSITION	g. SIGNATURE h. RANK

i. COMMENTS:

PART D - ORDERS DATA

25. ORDERS ISSUING HQ: CS/11thACR	25a. PERMANENT ORDER NUMBER: 78-30 25b. DATE: 3 Sept 98	26. APPROVED AWARD: AAM 2OLC
27a. NAME OF ORDERS APPROVAL AUTHORITY: Richard Herzstein	27b. TITLE/POSITION: Adjutant	28. DISTRIBUTION
27c. SIGNATURE	27d. RANK	

THE UNITED STATES OF AMERICA

TO ALL WHO SHALL SEE THESE PRESENTS, GREETING: THIS IS TO CERTIFY THAT THE PRESIDENT OF THE UNITED STATES OF AMERICA AUTHORIZED BY EXECUTIVE ORDER, 16 JANUARY 1969 HAS AWARDED

THE MERITORIOUS SERVICE MEDAL

TO

CAPTAIN MICHAEL F. JOHNSON, CHEMICAL CORPS
HEADQUARTERS AND HEADQUARTERS TROOP, 11TH ARMORED CAVALRY REGIMENT

FOR

OUTSTANDING MERITORIOUS SERVICE AS TROOP COMMANDER. HE DEPLOYED HIS TROOP TO KUWAIT WHERE HE SUPERVISED THE POSITIVE IDENTIFICATION OF A SUSPECTED CHEMICAL AGENT. HIS DEDICATION TO DUTY, EXEMPLARY LEADERSHIP AND COMMITMENT TO EXCELLENCE REFLECT DISTINCT CREDIT UPON HIM, V CORPS, AND THE UNITED STATES ARMY.

FROM: 19 OCTOBER 1990 TO 28 JANUARY 1993

GIVEN UNDER MY HAND IN THE CITY OF WASHINGTON
THIS 8TH DAY OF FEBRUARY 19 93

JERRY R. RUTHERFORD
Lieutenant General, USA
Commanding

Commander, V Corps
Frankfurt, Germany

PERMANENT ORDERS 15-15 8 FEBRUARY 1993

RECOMMENDATION FOR AWARD (For Other Than Valor) OF ARMY ACHIEVEMENT MEDAL (AAM), ARMY COMMENDATION MEDAL (ARCOM), AND MERITORIOUS SERVICE MEDAL (MSM)

For use of this form, see AR 672-5-1; the proponent agency is CCOSPER

1. TO	2. FROM	3. DATE
CDR, 11TH ACR APO AE 09146	CDR, HHT, 11TH ACR APO AE 09146	25 NOV 92

PART A - SOLDIER DATA

4. BRANCH OF SERVICE: ☒ ARMY ☐ USN ☐ USAF ☐ USMC ☐ USCG

5. RECOMMENDED AWARD: XX MSM ☐ ARCOM ☐ AAM ☐ OLC ☐ OVSEAS

6. REASON: ☐ ACH ☐ SVC ☐ FOR ☐ STY ☐ SUS

7. PERIOD OF AWARD	8. POSTHUMOUS	9. PROPOSED PRESENTATION DATE
FROM: 19 OCT 90 TO: 28 JAN 93	☐ Yes ☒ No	24JAN93

10a. NAME (Last, First, Middle)	10b. RANK	10c. SSN
JOHNSON, MICHAEL P.	CPT	507-92-9293

11. DUTY POSITION/TITLE	12. ORGANIZATION
TROOP COMMANDER	HHT REGIMENT 11TH ACR APO AE 09146

13. PREVIOUS AWARDS
ARCOM (2), NDSM, SWASM (SS), CIB

14. RECOMMENDER

a. NAME	b. TELEPHONE	c. ADDRESS
ROBERT W. COBB	353	HHT, 11TH ACR APO AE 09146
d. SIGNATURE: Robert W. Cobb	e. RANK: MAJOR	

PART B - JUSTIFICATION AND CITATION DATA (Add Specific Unit Examples of Meritorious Audit or Service)

15. ACHIEVEMENT #1
RECEIVED THE COVEDO STAFF AWARD WHICH RECOGNIZED HIS UNIT FOR BEST OVERALL PERFORMANCE (CALENDAR YEAR '92) OF ANY NON-ARMOR UNIT IN THE REGIMENT.

16. ACHIEVEMENT #2
FIELDED THE REGIMENT'S FOCES CHEMICAL RECON VEHICLES AND ENSURED SOLDIERS WERE TRAINED RESULTING IN COMMENDATION FROM THE GERMAN NBC SCHOOL AND REGIMENTAL CHEMICAL OFFICER.

17. ACHIEVEMENT #3
DEPLOYED HIS TROOP TO KUWAIT WHERE HE SUPERVISED THE POSITIVE IDENTIFICATION OF A SUSPECTED CHEMICAL AGENT — THE FIRST US ARMY UNIT TO PERFORM THIS MISSION. DURING BLACKHORSE SHOCK INSPECTIONS, RECEIVED OUTSTANDING RATINGS IN MAINTENANCE AND SUPPLY.

18. ACHIEVEMENT #4
PERFORMED SUPERBLY AS REGIMENTAL CHEMICAL OFFICER. HE REPLACED A MAJOR AND TWO CAPTAINS AND MADE SIGNIFICANT IMPROVEMENTS TO THE OPERATION OF NBC AND CBR REPORTING.

19. PROPOSED CITATION
FOR OUTSTANDING SERVICE WHILE ASSIGNED AS CHEMICAL TROOP COMMANDER, COMBAT SUPPORT SQUADRON, 11TH ACR, AND REGIMENTAL CHEMICAL OFFICER, 11TH ACR. YOUR DEDICATION TO DUTY, EXEMPLARY LEADERSHIP AND COMMITMENT TO EXCELLENCE REFLECT GREAT CREDIT UPON YOU, THE 11TH ACR, AND THE UNITED STATES ARMY.

PART C - RECOMMENDATION/APPROVAL/DISAPPROVAL

a. TO: 93D, 11TH ACR	b. FROM: 863, 11TH ACR	c. DATE: 25 NOV 92
d. RECOMMEND APPROVAL / UPGRADE TO / DOWNGRADE TO / DISAPPROVAL		
e. NAME: ROBERT W. COBB	f. TELEPHONE: 863	g. SIGNATURE: [signature] h. RANK: MAJOR
i. COMMENTS		

21. Certification of Eligibility and Data

I certify that this individual is eligible for an award in accordance with AR 600-8-22; and that the information contained in Part A is correct. — b. SIGNATURE: [signature] — c. DATE: 11 DEC 92

22. AAM APPROVAL AUTHORITY

a. TO	b. FROM	c. DATE
d. RECOMMEND APPROVAL / UPGRADE TO / DOWNGRADE TO / DISAPPROVAL		
e. NAME	f. TELEPHONE	g. SIGNATURE h. RANK
i. COMMENTS		

23. ARCOM APPROVAL AUTHORITY

a. TO: COR, V CORPS	b. FROM: COR, 11TH ACR APO AE 09146	c. DATE
d. RECOMMEND APPROVAL / UPGRADE TO / DOWNGRADE TO / DISAPPROVAL		
e. NAME: WILLIAM S. WALLACE	f. TELEPHONE: REGIMENTAL COMMANDER	g. SIGNATURE: [signature] h. RANK: COL
i. COMMENTS		

24. AGCM APPROVAL AUTHORITY

a. TO: ORDERS ISSUING AUTHORITY	b. FROM: COMMANDER, V CORPS	c. DATE
d. RECOMMEND APPROVAL / DOWNGRADE TO / RECOMMEND UPGRADE TO / DISAPPROVED		
e. NAME: JERRY R. RUTHERFORD	f. TELEPHONE: COMMANDER	g. SIGNATURE: [signature] h. RANK: LTG
i. COMMENTS		

PART D - ORDERS DATA

25. ORDERS ISSUING HQ: COMMANDER, V CORPS FRANKFURT, GE APO AE 09079	26a. PERMANENT ORDER NUMBER: 15-15 26b. DATE: 8 FEBRUARY 1993	28. AWARDED AWARD: MSM
27a. NAME OF ORDERS APPROVAL AUTHORITY: C. C. HABERER 27b. SIGNATURE: [signature]	27c. TELEPHONE: ASST ADJ GEN 27d. RANK: CW4	29. DISTRIBUTION: 1-ORDERS SET 1-HQRJ 1-UNIT 1-INDIVIDUAL

REVERSE. DA FORM 638-1. NOV 80

APPENDIX B-3

4 January 1994

MEMORANDUM FOR DIRECTOR, CATD

SUBJECT: IRAQI CHEMICAL AGENTS--INFORMATION PAPER

1. Purpose. To present first hand knowledge of Iraqi chemical agents identified in Kuwait.

2. Discussion.

a. Nearly three years have passed since Operation Desert Shield/Storm. Recent headlines have aroused considerable interest in the possible exposure of coalition forces to Iraqi chemical agents. Much of this interest is the result of health problems by Gulf War Veterans that indicated exposure to chemical agents. Although no government officials have confirmed use, there is a high likelihood that some coalition forces experienced exposure to chemical agents.

b. On 7 August 1991, the 54th Chemical Troop of the 11th ACR received the tasking (TAB A) to support the 21st EOD Squadron, British Royal Engineers. The mission was to confirm the presence of a suspect liquid chemical agent. The Royal Engineers anticipated that the agent was an H-agent (Mustard-a highly volatile blister agent) discovered on 5 August 1991 while clearing unexploded ordnance at the Sabahiyah High School for Girls (Grid TN18832039). TAB B is a detailed report by the 21st EOD Squadron. I was the Commander of the 54th Chemical Troop and would lead the mission.

c. To accomplish the tasking, the 54th Chemical Troop employed two FOX NBC Reconnaissance Vehicles. The FOX accurately detects 60 known chemical agents simultaneously using a highly sophisticated, laboratory quality mass spectrometer. Through the use of a collective protection system, the FOX also provides a high degree of crew protection in a field environment. The mission required two FOX vehicles to validate results.

d. 54th Chemical Troop Leadership went to the US Embassy in Kuwait to receive a complete mission brief by the Military Attaché. The Troop Leadership gave a back brief to the Military Attaché on the capabilities of the FOX and how the Troop would conduct the mission.

e. Since this was the first joint and combined live chemical detection mission involving US and British forces, it was essential that the operation be carefully planned to insure any differences in doctrine, TTPs, or other possible concerns were resolved. A leader's reconnaissance and detailed rehearsals occurred to ensure everyone knew their assigned duties and responsibilities.

f. At TAB C are photographs of the site during the 8 August 1991 mission. One FOX team moved to the suspected contamination area and began to conduct point surveys using the detection probe to a depth of approximately four centimeters. The mass spectrometer results

showed the presence of micro levels of H-Agent in the soil. Simultaneously, a dismounted collection team, in full chemical over garments, moved to the container (estimated to be 800-1000 liter capacity) with Chemical agent Monitors(CAM) and other assorted chemical detection equipment. The collection team took off the storage container's seals and there was an emission of a vapor into the air under pressure that sounded similar to the opening of a soda container. We saw a light copper to amber color vapor exiting from the seal hole. The dismounted collection team employed chemical detection paper and the CAM: The detection paper changed color to reflect the color of H-Agent detection; the CAM registered eight bars, confirming H-Agent.

g. We inserted a medical syringe with catheter tube into the container to extract the liquid for detection paper, CAM, and FOX testing. We placed the sample into a Kidney shaped, metal medical dish. Immediately, the liquid began to evaporate into the atmosphere. By the time the ground team member moved to the rear of the FOX probe, there was not enough liquid available to get a credible reading. The first test was unsuccessful because of the volatility of the liquid. We performed a second test with success. The ground detection team extracted a larger sample of the liquid and placed it into the metal dish. They moved to the FOX probe and the system drew in the liquid for analysis. Within six (6) seconds, the mass spectrometer detected and identified the liquid as highly concentrated (6.4 bars) H-Agent. Further analysis indicated some traces of Phosgene (CG), a non-persistent choking agent and Phosgene Oxime (CX), a non-persistent blister agent. The FOX team took another sample test to validate previous identification. The test results confirmed the presence of H-Agent and traces of Phosgene (CG) and Phosgene Oxime (CX). We initiated a third test utilizing the second FOX team to rule out any possibility of false readings from the first FOX. The second FOX began its test executing the same procedures as the first FOX. The second FOX team reported the same findings with the exception of identifying much higher levels of CX in the liquid. The ground collection team extracted more liquid and prepared it for transport out of the area for further testing and evaluation.

h. A British team member, while withdrawing the liquid from the container, had some of the liquid drops make contact with his left wrist. The soldier had an immediate reaction to the liquid contact. The soldier was in extreme pain and was going into shock. Immediately he went to the decontamination site. The decontamination team covered the soldier with Fillers of Earth (decontamination powder) and cut him out of his individual protective equipment. The decontamination team doused him with a mixture of Fillers Of Earth and Industrial Bleach. Within one minute, we observed that the soldier had a small blister forming on his left wrist the size of a stick-pin head. Five minutes later, the blister reached the size of a (US) half-dollar coin. The medics screened the casualty for residual liquid contamination and sent the casualty to the hospital for further treatment. Further decontamination of personnel and equipment continued until all were free of contamination.

I. In a controlled area, the FOX team leaders removed the tapes from the mass spectrometer by order of LTC Kilgore, Task Force Victory Chemical Officer. The tapes are the paper records of the exact chemical breakdown of the liquid by the Mass Spectrometer. The tapes listed the percentage of the Mustard and Phosgene agent concentrations and any other chemical compounds present in the liquid. These tapes would eventually go with the collected

samples as supporting documentation to assist in further testing of the liquid. The tapes and samples were turned over to personnel wearing desert camouflage uniforms with no rank or distinguishing patches. It is unknown what happened to the tapes and samples. Although the Troop had an on order mission to assist in the removal of the container, the disposition of the container is unknown as the troop was never directed to execute that mission.

3. Conclusion.

a. Iraqi Blister and Phosgene agents where present in Kuwait. It is, however, confusing why the Iraqi Army would leave such a large container sitting in the open and exposed next to a school. It is possible that the fleeing Iraqi Army left it there and never had the time to retrieve it or forgot it because of the rapid advancement of Coalition ground forces' into Kuwait.

b. Coalition soldiers did experience exposure to Iraqi chemical agents. I can confirm that at least one Coalition soldier (British) did experience exposure to a liquid chemical agent.

c. I am concerned that the information regarding the history of this action has not been documented.

MICHAEL F. JOHNSON
CPT, CM
NBC Branch

MANAGEMENT IN CONFIDENCE

APPENDIX B-4

21 EOD SQN GP
OP PINSEEKER
BFPO 635

21:1542/20

Mentor Ext 0004

See Distribution

07 Aug 91

INITIAL REPORT
SUSPECTED CHEMICAL CONTAINER

BACKGROUND

1. Whilst attending the International EOD meeting at Kuwait MOD on 5 Aug 91 I was tasked to investigate a container which was thought to be leaking Mustard Gas. The task was detailed by Lt Col Saleh Al Ostath (Kuwait Army) and agreed by Mr Lucas of Royal Ordnance.

INITIAL FINDINGS

2. After some confusion in locating the suspect container I was shown to a metal storage tank with a capacity of approximately 2000 litres, which had been penetrated by a bullet of approximately 7.62 calibre creating an entry hole and exit hole. A brown gas/vapour was emerging from both holes. The storage tank was outside the perimeter walls of the Sabahiyah High School for Girls, at Grid TN 18832039 (Magellan). The school was not in use but an American civilian contractor was in the process of clearing Explosive Ordnance (EO) and rubbish.

ACTIONS TAKEN

3. All personnel were moved up wind to a distance of 100 metres. Further evacuation was not considered necessary as the school was situated in an open area and the vapour leakage was small.

4. Wearing full Individual Protection Equipment (IPE) I approached the container and tested the brown coloured vapour emerging from the bullet holes with Chemical Agent Monitor (CAM). It gave a reading of 8 Bars on H and no bars on G. I then tested the vapour with one colour detector paper which showed no effect. I then tested the vapour with 3 colour detector paper which showed a pink colour, indicating an H agent.

5. On a second visit to the container I fed a piece of D10 wire through the bullet hole and on extracting the wire wiped an oily substance on both types of detector paper (both of which may have exceeded there shelf life). The one colour detector paper turned brown and the 3 colour detector paper turned pink, the latter again a positive indication of an H agent. .I effected a temporary seal of both holes with black masking tape.

86-558 95 – 17

6. On a third visit the holes were uncovered and the vapour was tested using the M18A2 chemical detector kit. The test was repeated 6 times. On four of the tests the colour indication turned blue indicating H agent. For the remaining 2 tests the colour indicator went yellow but some hours later turned blue. On a subsequent control test in an uncontaminated environment 3 phials showed no colour change. A further wire dip test was conducted using the three colour detector paper from the M18A2 kit. The paper turned pink/orange again indicating and H agent. Some of the chemicals within the M18A2 showed signs of being beyond their shelf life. The bullet holes were resealed with black masking tape.

7. On the fourth and final visit the black masking tape was removed and the holes were both sealed using an industrial silicone filler and plaster of paris bandages. The container was checked with CAM for leaks and none were found.

8. The container was guarded overnight by the civil police and a school security officer. The following morning (6 Aug 91) orange poles and white marker tape were positioned at 50 metres radius outside the school wall around the container. The container was rechecked for leaks with CAM, none were found. The school security officer was told that nobody should go near the container but otherwise clearance activity in the school could continue.

ADDITIONAL INFORMATION

9. The school security officer was employed at the school prior to the conflict and was certain that the container was not there prior to the invasion. He first noticed the container on 20 Mar 91 when he had returned to the school. He thought that the container was leaking on that date. It is understood that samples of the vapour were taken for laboratory analysis by the Kuwait Oil Company (KOC).

10. The positioning of the container suggested that it had been placed in a hasty manner using some heavy lifting equipment.

11. There were Iraqi defensive positions in the surrounding area but no obvious indications as to why such a container should be located where it was. The area was also contaminated with items of EO.

12. The only markings on the container were the arabic numbers "< V" (translated 27) marked with green paint on one end.

13. The vapour leak from the container dispersed from visual recognition over a distance of 20 - 25 cm. It equated to a heavily smoking cigar.

14. It is estimated that the container is approximately 30% - 50% full of liquid suspected to be H agent (800 - 1000 litres).

DETAILED INFORMATION

15. A 1:50,000 map showing the location of the container is a Annex A. The school is not marked on the map.

16. Various photographs of the container are at Annex B.

17. A drawing showing dimensions of the container is at Annex C.

18. The following timings were noted:

a. 05[illegible] 1435 hrs - Police escort to the school.

b. 1440 hrs - Viewed container. Set up ICP.

c. 1450 - 1505 hrs - First approach in IPE. CAM and paper test.

d. 1530 - 1555 hrs - Second approach in IPE. Wire dip and liquid on paper test. Temporary seal using black masking tape.

e. 1705 - 1730 hrs - Third approach with BD Engr in IPE. Test with M18A2 6 times. Wire dip and liquid test on M18A2 3 colour paper. Resealed with black masking tape.

f. 1830 - 1900 hrs - Fourth approach with BD Engr in IPE. Sealed holes with silicone sealant and plaster of paris. Tested for leaks. Polaroid photographs taken.

g. 060891.
1030 - 1130 hrs - Checked for leaks visually and using CAM. Measured dimensions. Took polaroid photographs.

CONCLUSION

19. There is no obvious explanation for this container being in its current location adjacent to a school and an Iraqi defensive position. It probably contains an H agent and may have been placed by the Iraqi Army during their occupation of Kuwait. The leak caused by a bullet hole was minor and only vapour has escaped, however the leak has probably been occuring for 3 - 5 months with no apparent casualties or ill effects.

20. The container is now sealed and represents no hazard provided no tampering occurs.

RECOMMENDATIONS

21. Kuwait MOD are advised to promulgate a description and drawing of the container with a view to locating any other similar containers.

22. A low key discrete guard of the school area is recommended to prevent tampering or theft of the container.

23. The samples of vapour reported to have been taken for laboratory analysis by KOC should be tested thoroughly to confirm the chemical substance.

24. In due course the container and its contents should be moved with care and close supervision to a suitable location where the contents can be safely destroyed. This is a specialist task and one which is within the capabilities of 21 EOD Sqn Group.

J P WATKINSON
Major
Officer Commanding

Annexes:

A. Location Map
B. Photographs
C. Drawing showing dimensions

Distribution:

External:

Action:

Kuwait MOD
Comd British Forces Kuwait

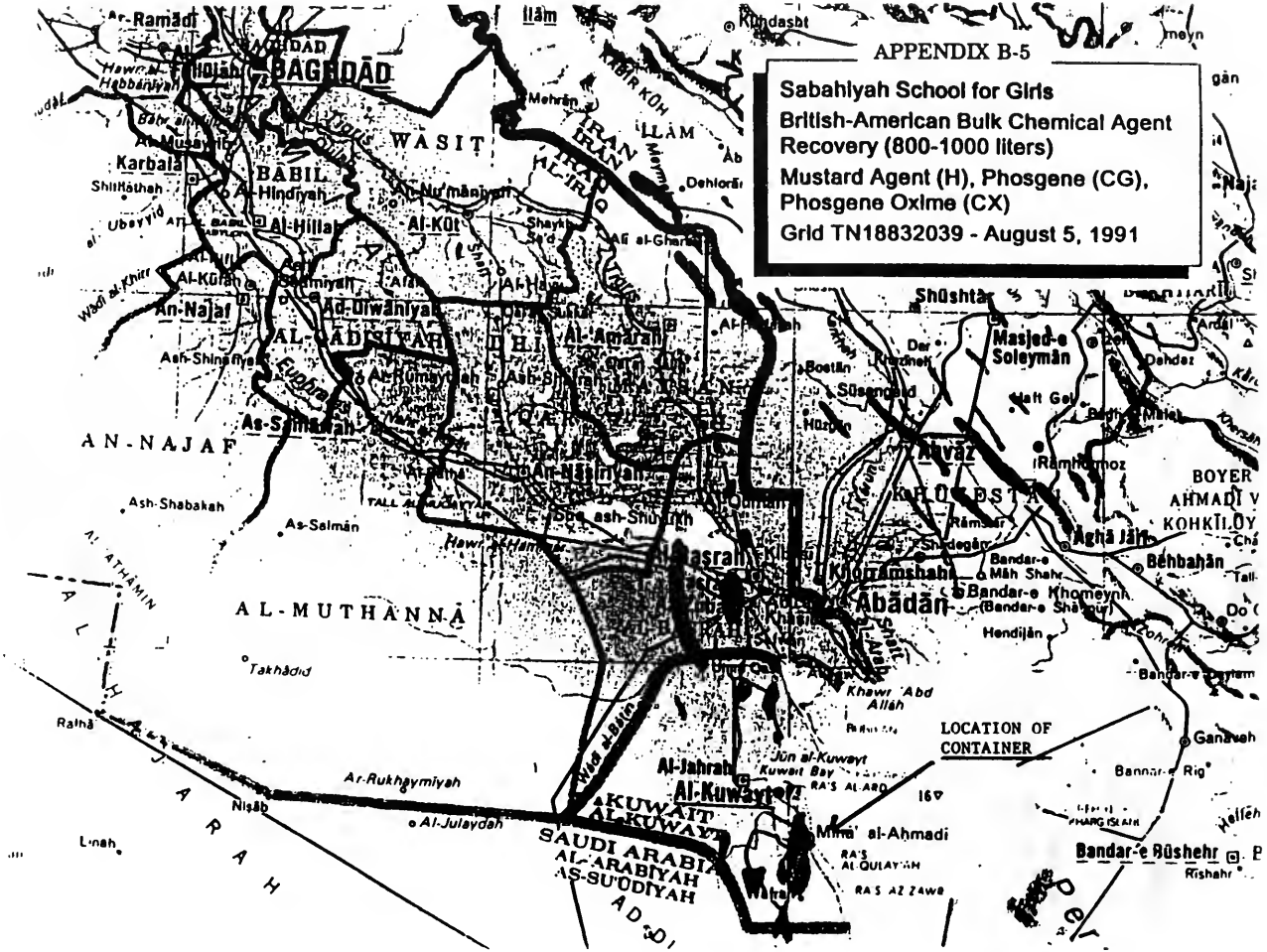
Information:

British Embassy - Attn DA/1st Secretary
American Embassy
MO1 MOD UK Army - for Maj Parsons
JHQ High Wycombe - for Engrs
Tech Int Army MOD DI60 - for Maj C King
HQ UKLF - for Engrs
US Forces Kuwait - DRAO
DNBCC
CDE Porton Down - for Mr P Hearn
33 Engr Regt (EOD) - for CO and Int Sgt
EODTIC

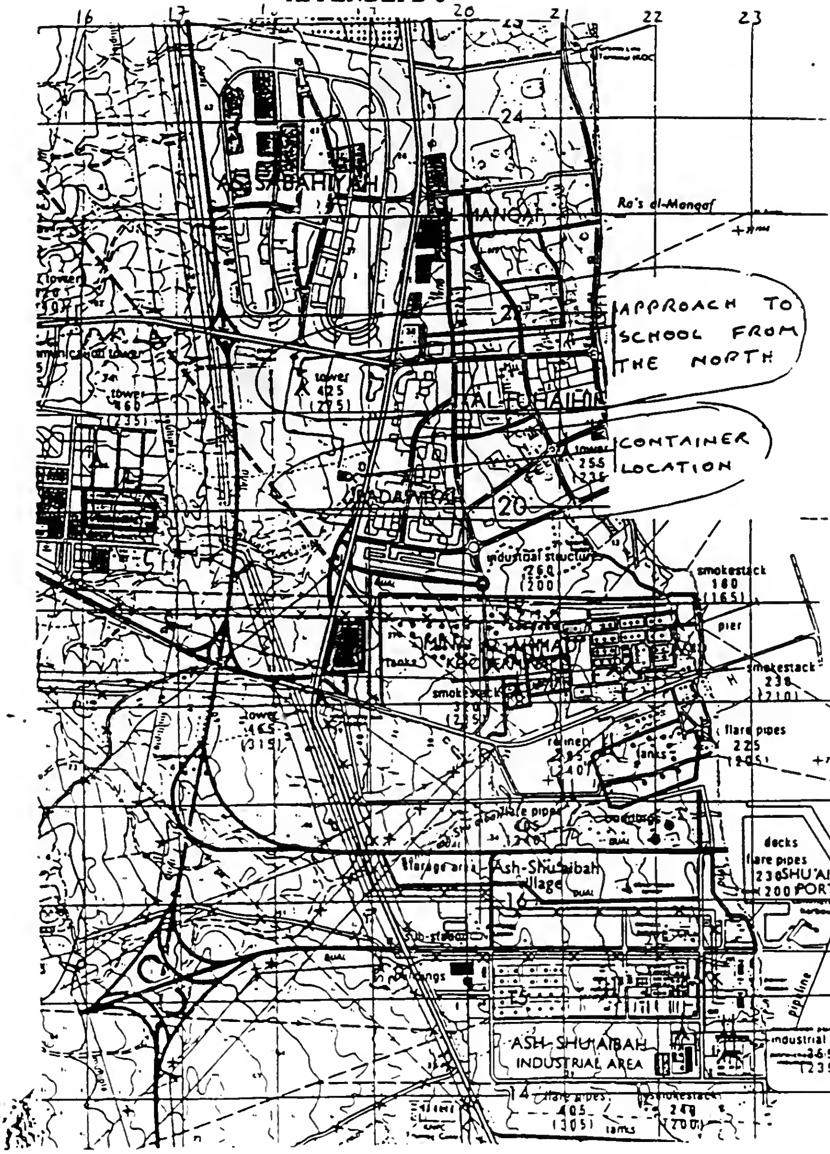
Internal:

Information:

OC
Int Cpl
File


APPENDIX B-5
Sabahlyah School for Girls
British-American Bulk Chemical Agent Recovery (800-1000 liters)
Mustard Agent (H), Phosgene (CG), Phosgene Oxime (CX)
Grid TN18832039 - August 5, 1991
LOCATION OF CONTAINER
BAGHDĀD
AL-MUTHANNA
AN-NAJAF
AL-QĀDISIYAH
BĀBIL
WĀSIT
KUWAIT
SAUDI ARABIA
IRAN
IRAQ
Abādān
Khorramshahr
Ahvāz
Basrah
Al-Jahrah
Al-Kuwayt
Mīnā' al-Ahmadi
Bandar-e Būshehr
Masjed-e Soleymān
Aghā Jārī
Behbahān
Karbalā
An-Najaf
Al-Hillah
Al-Kūt
Al-'Amārah
As-Samāwah
Ash-Shabakah
As-Salmān
Takhādid
Ar-Rukhaymiyah
Al-Julaydah
Nishāb
Khawr 'Abd Allāh
Jūn al-Kuwayt
Kuwait Bay
Shūshtar
Dehdez
Ramhormoz
Hendijān
Bandar-e Khomeynī
Bandar-e Rig
Ganāveh

APPENDIX B-6


APPROACH TO SCHOOL FROM THE NORTH
CONTAINER LOCATION
AS SABAHIYAH
MANGAF
Ra's al-Mangaf
tower 425 (275)
tower 255 (235)
industrial structure 260 (200)
smokestack 180 (165)
pier
smokestack 230 (210)
smokestack 370 (235)
tower 465 (315)
flare pipes 225 (205)
refinery
tanks
flare pipe
Ash-Shu'aibah village
docks
flare pipes 230 200
SHU'AIB PORT
storage area
DUAL
pipeline
ASH-SHU'AIBAH INDUSTRIAL AREA
industrial s 365 235
flare pipes 405 (305)
smokestack 250 (200)
tanks

APPENDIX B-7

6225. Mustard Gas. ***1,1'-Thiobis[2-chloroethane]; bis-(2-chloroethyl)sulfide; β,β'-dichloroethyl sulfide; 2,2'-dichlorodiethyl sulfide; bis(β-chloroethyl)sulfide; 1-chloro-2-(β-chloroethylthio)ethane; sulfur mustard; yellow cross liquid; Kampfstoff "Lost"; Yperite.*** $C_4H_8Cl_2S$; mol wt 159.08. C 30.20%, H 5.07%, Cl 44.58%, S 20.16%. $(ClCH_2CH_2)_2S$. **War gas prepd by treating ethylene with sulfur chloride (Levinstein process): Mann, Pope, *J. Chem. Soc.* 121, 594 (1922); by treating β,β'-dihydroxyethyl sulfide with HCl gas (German process): Meyer, *Ber.* 19, 3260 (1886); *Ann.* 240,** 310 (1887); Gomberg, *J. Am. Chem. Soc.* 41, 1427 (1919). Reactions and derivatives: Helfrich, Reid, *ibid.* 42, 1208 (1920). Toxicity: Anslow *et al., J. Pharmacol. Exp. Ther.* 93, 1 (1948). Review of carcinogenicity studies: *IARC Monographs* 9, 181-192 (1975).

Oily liquid. *Deadly vesicant.* Weak, sweet, agreeable odor. On cooling it forms prisms, mp 13-14°. d^{13} 1.338 (solid); d_4^{20} 1.2741 (liq). bp_{760} 215-217°; bp_{10} 98°. Volatile with steam. n_D^{20} 1.53125. Very sparingly sol in water; sol in fat solvents, other common organic solvents. High lipid soly. Vapor pressure at 0° = 0.025 mm; at 30° = 0.090 mm. Hydrolyzed by alkalies. Recommended neutralizing agent and inactivator: Bleaching powder, sodium hypochlorite. LD_{50} in rats, mice (mg/kg): 3.3, 8.6 i.v. (Anslow).

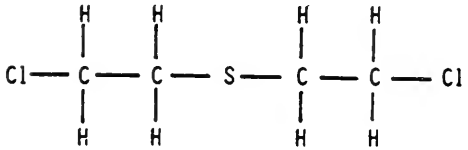
Human Toxicity: Conjunctivitis, blindness. Produces delayed effects. In 1-12 hrs cough, edema of eyelids, erythema of skin, severe pruritus. May cause edema, ulceration, necrosis of respiratory tract and exposed skin. Ingestion of contaminated material may cause nausea and vomiting. Permanent eye damage, severe respiratory impairment may result. This substance has been listed as a known carcinogen: *Fourth Annual Report on Carcinogens* (NTP 85-002, 1985) p 136.

USE: In chemical warfare.

bis (2-chloroethyl) sulfide

APPENDIX B-9

Distilled Mustard



HD

Standard NATO agreement (STANAG) code: HD

Chemical name: bis (2-chloroethyl) sulfide
Common name: distilled mustard*
Formula: $Cl(CH_2)_2S(CH_2)_2Cl$

Family: casualty agent
Type: blister agent (mustard)

An amber brown liquid with an odor similar to that of burning garlic, the odor becoming more pronounced with impurities in the solution. Creates a low-laying colorless vapor around the splashed liquid.

* during WWI HD was variously known as HS (Britain), das Lost (Germany), and Yprite (France). International codes became standardized by convention after 1919-1920.

History

Distilled mustard (HD) was known as early as the late 1880s as a by-product of the dye industry whose toxic effects might be of use in both treating minor tumors and in killing warehouse pests.

Origionally investigated by the British and rejected as not being lethal enough, it was first used against them. At 10 PM on the evening of July 12th, 1917 the British 15th and 55th infantry divisions came under an artillery barrage in their positions near Ypres, France. Mixed in with high explosives was a significant quantity of distilled mustard. Other than a stench "like garlic" of "like mustard" (which is how the compound gets its name) there was little nuisance beyond eye irritation like diluted phosgene. Many troops did not bother to put their gas masks on. By the following afternoon the British field hospitals were clogged and on the next evening the first deaths began.

Distilled mustard, the first of the major blister agents, became the chemical compound by which all others have been judged since. According to a British army study, the Foulkes Papers, 16½% of all encountered casualties in the last eighteen months of that war were due to chemicals, mainly distilled mustard. In 1920 about 19,000 British veterans drew permanent disability, mainly from mustard. A 1927 Porton Down study of HD victims found pre-cardiac conditions common, and typical conjunctivitis, laryngitis, bronchitis, and reoccuring skin burns. A Porton Down study of 1929 of 29 severe cases showed fibrosis, respiratory and spinal TB, persistent laryngitis, anaemia, conjunctivitis, aphonia, and pulmonary fibrosis. By 1930, 80% of known survivors suffered chronic bronchitis.

After the first world war limited production continued in Great Britain and France. Production began in Italy and the

Soviet Union by 1925, and in Japan in 1928.

HD was allegedly used against the Afgans by the British in 1919 It was known to be used against Moroccans by the French and Spanish in 1925, against Ethopians by the Italians after 1935, and by the Japanese against China after 1934 and ending by 1944.

The late 1920s through the 1930s were a time a chemical warfare experimentation as the older agents were adapted to fit new methods and tactics of war. New munitions, especially those for aerial sprays and bombs, were developed. It was assumed that chemicals would be used in the the "next war" to the same extent they had been used in 1915-1918. As German rearmament beginning in 1934 started a general trend, chemical munitions plants were upgraded.

Great Britain built new facilities such as those at Sutton Oak-St Helens, Lancashire. France opened a HD and CG plant at Clancy. The USSR built new HD-L-CG plants at Brandyuzhsky, Kuibyshev, and Karaganda. Germany built plants at Munster, Wunsdorf, and List. The US reluctantly reopened Pine Bluff Arsenal (in production by 1942) and built new facilities such as Rocky Mountain Arsenal (near Denver) and opened the Dugway, Utah, Proving Grounds for the express purpose of testing chemical agents.

Casualty agent use in the second world war, outside of China through 1943-1944, was virtually non-existent. The only known incident in the west occured in Bari harbor on the Italian Adriatic.

An American merchantman, the S.S. John Harvey, carried the bulk of US chemical munitions for the Mediterranean area, in the form of 2000 M47A1 aerial bombs, containing a total of about 100 tons of HD. The S.S. John Harvey's cargo was known only to SHAFE in London and a few junior Army Ordinance officers on board. On 7:30 PM, July 2nd, 1943, the John Harvey was sunk in a German air raid. Her cargo of HD had all

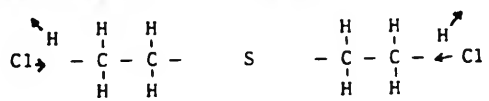
been made by the quick-but-dirty Levinstein process. Thus it had hydrogen and ethane gas impurites in the HD mix. The John Harvey blew up and flooded the harbor. By the following morning it was Ypres all over again, except nobody knew why the massive blistering was happening, especially among sailors soaked in oil and some smelly stuff from the harbor waters. About 630 serious military cases occured and over a thousand Italian civilians died within a few days.

Allegations of the use of distilled mustard surface from time to time. Yemen and Afganistan are often mentioned in this regard, as are Laos and Cambodia. Allegations they remain. New chemical and biological technologies have produced whole new variations and nobody's bragging about what they may or may not be doing.

A known area of occasional distilled mustard use is in the Iran-Iraq war which began in 1979. When Iraq was pushed back to its starting point by the early 1980s, it is alleged to have begun the use of chemical agents as an effective weapon against Iranian human wave attacks consisting of untrained volunteer levies begging for death and recieving it in spades.

Structure

Distilled mustard has a simple structure, consisting of two ethyl ($C_2H_5^-$) groups bound together around an atom of sulphur. The outer two hydrogen bonds along the central axis have been replaced by chlorine bonds.



The old Levinstein process consisted of treating ethylene with sulphur chloride.

Pathology

Both distilled mustard and its vapors create an extreme hazard. The greater the absorbed dose of either the greater the damage.

Vapors of this agent will cause temporary blindness and inflammation of the entire respiratory tract. Further heavy vapor exposure will make the blindness permanent and will strip the bronchial tubes of their mucus membrane lining. Any concentration will cause a severe choking effect.

Distilled mustard liquid is corrosive to human tissue both locally and systematic. Local effects include immediate inflammation of the tissues around the eyes and pronounced reddening of exposed skin. If not decontaminated, reddened skin will ulcerate into waterish boils within four to six hours. These blisters, if crudely broken, will reblister. Systemic effects from prolonged exposure may include internal inflammation and blistering (ulceration) of the throat and lungs, resulting in what is termed "dry land drowning," in which the windpipe clogs from bottom to top. Ingestion will cause nausea and vomiting within the same time frame. Absorption into the blood results in white blood cell destruction. Long term exposures may promote bone marrow destruction and subsequent damage to the immune system. Currently listed by NIOSH/RTECS as being mutagenic in all mammals in solution concentrations above 750 m/liter.

Field behavior

Distilled mustard is among the most commonly listed military casualty agents. It is used to deny terrain and to contaminate equipment and stores.

The delayed effects of distilled mustard necesitate constant chemical survey and monitoring. The human body slowly detoxifies this agent, so prolonged toxic exposures may slowly build up without initial warning symptoms. The vapors are heavier than air and may persist as long as one month in winter weather. They will seek lower elevations in open terrain and substructures, tunnels, and conduits in man-made terrain.

With a flash point of 105°C (221°F) distilled mustard, and particularly its vapors, may explode if exposed to fire or munitions detonations.

Decontamination must be immediate and thorough when this agent is discovered. Exposed personnel should recieve immediate personal decontamination and medical examination.

Slightly soluble in cold water, although volatile in steam. Soluble in most organic solvents.

Specific data

median lethal dosage (LCt_{50})

(Inhalation) 1500 mg-min/m^3 or 23 ppm/10 molar.
(Skin absorption) 10,000 mg-min/m^3 or 34 mg/kg.

median incapacitating dosage (ICt_{50})

(Eye injury) 200 mg-min/m^3.
(Skin absorption) 2000 mg-min/m^3.

eye toxicity

Very susceptible to low concentrations (see above). Damage is accumulative to tissue and blood vessels, causing blindness or permanent impairment if untreated.

skin toxicity

Less susceptible to concentrations, but accumulative and irritating. Severe blistering is possible and permanent damage to skin tissues may result even from delayed treatment. HD dissolved in sweat is of great danger to areas of skin like the face, underarms, knees, elbows, and crotch!

rate of action

Delayed. Major pathological symptoms commonly do not appear until at least four hours after exposure. However, do to the accumulative effect of this compound, symptoms may manifest perhaps a week or more after a series of incremental exposures. Effects from ingestion and eye exposure may be more immediate.

protection required

Protective mask/respirator, with full protective overclothing under all conditions.

rate of detoxification

Very low natural detoxification in the body makes the dosages (and effects) accumulative.

decontaminants

Strong bleach solutions and caustic soda (sodium hypochlorite) for personnel and terrain. For the decontamination of buildings and substructures live steam may also be used. Under combat conditions fire may be used as a field expedient decontaminant, mindful of an explosive hazard.

vapor density

5.4 times heavier than air.

vapor pressure

0.072 mm Hg at 20°C (68°F).

liquid density

1.27 g/cc.

persistency

Heavily splashed liquid may last several days in temperate climates. May last up to a month under winter conditions.

volatility

(Solid) 75 mg/m^3 at 0°C (32°F), (liquid) 610 mg/m^3 at 20°C (68°F), 2680 mg/m^3 at 40°C (104°F).

latent heat of vaporization

94 calories per gram

melting point

14.45°C (58.1°F).

boiling point

217°C (422.6°F) with decomposition.

decomposition point

Begins at 149°C (300°F).

flash point

105°C (221°F).

rate of hydrolysis

Hydrolyses within 17 minutes in distilled water at 25°C (77°F) and two hours in salt water at the same temperature.

hydrolysis products

Hydrochloric acid and thiodiglycol.

stability in storage

Stable in steel or aluminum canisters.

actions on metals or other materials

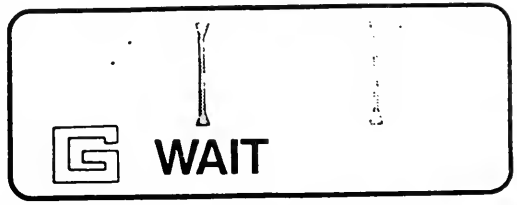
Little corrosive property when pure. Electrostatic properties in electrical equipment.

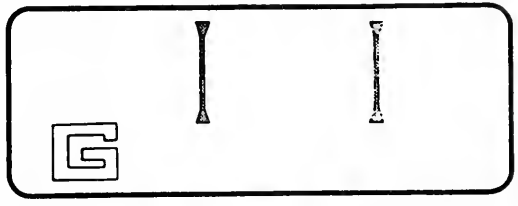
molecular weight

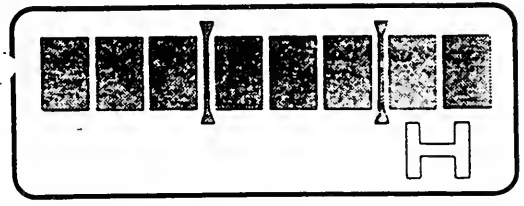
159.08

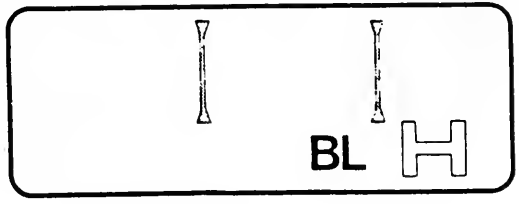
Warning

The above specific data refer to distilled mustard in its traditional form of a pure chemical. Microencapsulation techniques could make this into a highly persistent poison presenting a profoundly greater hazard.









Chemical Agent Monitor (CAM) in use

DEPARTMENT OF THE ARMY
Headquarters, Task Force VICTORY (Fwd)
Camp Doha, Kuwait
APO 09889-0003

APPENDIX B-11

AETSBGC-V 7 August 1991

MEMORANDUM FOR Commander, 11th ACR, ATTN: RS3

Subject: Tasking Number 91-047

1. You are tasked to provide the following support: Two FOX NBC Reconnasiance Vehicles in support of Kuwaiti MOD and British EOD.

2. Personnel: Personnel to operate 2 FOX NBC Reconnaissance Vehicles.

3. Equipment required: 2 FOX Reconnasiance Vehicles.

4. Specific instructions:

a. Initially FOX Vehicles will be used to provide NBC reconnasiance/detection.

b. On order be prepared to provide two FOX NBC Reconnasiance Vehicles for escort/monitoring of EOD operations.

c. Standard NBC SOPs will be followed to ensure safety of FOX vehicle crews.

d. Direct coordination with Major Jon Watkinson, British Royal Engineers, Commander 21st EOD Group, Beteal Camp Messlack, grid 181376, 539-4505 (Comm) is authorized.

e. Report status to TF Victory POC LTC Killgore, 5056 (AT&T).

5. The attached report from the British Army is provided for your information.

Encl-as

JOSEPH W. MILLER
LTC, GS
ACofS, G-3

CF:
Chief of Staff, TF Victory (Fwd)

ASSISTANT TO THE SECRETARY OF DEFENSE
3050 DEFENSE PENTAGON
WASHINGTON, DC 20301-3050

ATOMIC ENERGY

APPENDIX B-12

The Honorable Donald W. Riegle, Jr.
Chairman
Committee on Banking, Housing, and Urban Affairs
United States Senate
Washington, D.C. 20510-6075

Dear Senator Riegle:

Secretary Perry has designated me the point of contact for all Operation Desert Storm chemical and biological weapons matters. It is in this capacity I am providing an interim response to your July 5, 1994 letter to Major General Jerry Harrison concerning the alleged discovery of suspected Iraqi chemical agents in 1991.

CPT Michael F. Johnson's statement is at Enclosure 1. Included in CPT Johnson's statement are the initial British report and photocopies of photographs. CPT Johnson was not aware that samples had been collected from the site for analysis at Porton Down, or that a special United Nations chemical weapons evlauation team had responded to the site.

This incident was discussed with COL Macel, Central Army Command J4/7, in April 1994 (Enclosure 2). COL Macel was the Chief of Security Assistance and senior U.S. Defense representative in Kuwait following the cease fire. COL Macel was present at the site during efforts to identify the liquid. He knew that a United Nations chemical warfare specialist team was flown in from Bahrain to assess the liquid, and that samples of the liquid were flown to Great Britain for further analysis.

A statement from Dr. Graham S. Pearson, Director General, Chemical & Biological Defence Establishment, United Kingdom Ministry of Defence is expected to be released by the British Government early this week. Dr. Pearson telephonically related that a memorandum from Porton Down to the Ministry of Defence dated August 23, 1991 stated that the brown fumes emitting from the tank, destruction of the protective suit material, and the skin blister suggested that the liquid was most likely fuming nitric acid, a highly corrosive oxidizing acid used as a rocket propellant, and not a chemical warfare agent. Iraq used red fuming nitric acid as a rocket propellant during the war.

Samples of the suspected agent and overgarment material were delivered to Porton Downs for analysis cn 13 September 1991. Analytical results showed that there was a high concentration of nitrate in the sample and a PH that was extremely acidic. The scientific analysis determined that the contents of the tank were nitric acid and there was no evidence of any CW agent being present.

The Fox reconnaissance vehicle tapes were analyzed by the Program Manager NBC Defense Systems.,(PM NBC) Fox Reconnaissance Vehicle Division. Analysis of the molecular ions showed that the ions matched in three of four categories for H agent, and were not in the correct proportions for H or phosgene oxime. When the PM NBC scientists heard of the British identifying nitric acid they compared the Fox tapes to the spectrometry of nitric acid. The spectrum matched nitric acid ions in all four categories, and were in the correct proportions.

All personnel at the scene of the suspected chemical agent performed their duties in an exemplary manner. Proper planning and coordination was made between U.S. , British and U.N. forces; all field equipment was used properly; all technical resources were employed; and following proper NATO procedures, samples were taken and transported for laboratory analysis.

Indicators were present that could have caused soldiers on the scene to identify the liquid as an industrial chemical were simply overlooked , because of the positive readings received on the chemical detection test equipment. The blister injury suffered by the British soldier was an indicator that the liquid was not H mustard or phosgene oxime. The soldier was in extreme pain and a blister formed within one minute of agent contact. H mustard agents are insidious, pain and symptoms are delayed for a minimum of one hour and usually 4-12 hours. Phosgene oxime blanches the skin within 30 seconds but does not cause blisters. See Enclosure 3 for more explanation. Red fuming nitric acid causes extreme pain and blisters upon contact with the skin.

In a telephonic conversation with CPT Johnson on July 15, 1994 he stated that the chemical protective gloves worn by soldiers began disintegrating upon contact with the liquid. U.S. chemical protective gloves are designed to withstand contact with liquid agent and would be uneffected . Nitric acid would cause immediate disintegration.

Fuming nitric acid is identifiable by its tell-tale brown fuming smoke.

We anticipate receiving additional information next week that will completely answer your inquiry. PM NBC Defense is searching its files for the memorandum it prepared on the analysis of the tapes. As a cross-check, CPT Johnson will provide the vehicle identification numbers so historical tapes from the Fox vehicles can be compared against the tapes analyzed by PM NBC Defense. The British Chemical and Biological Defense Establishment recommended that the nitric acid be disposed of by selling it to a local chemical industry or pay to have it neutralized under controlled conditions. Attempts will be made to verify its method of disposal.

Research and correct interpretation of incidents of this nature is a sometimes difficult and tedious task. Our Chemical Section is always available to analyze and explain the technical and operational aspects of reported chemical warfare related incidents. We appreciate the opportunity to provide you with this information.

T. M. Proctv

THEODORE M. PROCTV
Deputy for Chemical/Biological
Matters

Enclosures

Sorry about the quality of the pictures ... we only have copies, no originals. YP

United States Senate
COMMITTEE ON BANKING, HOUSING, AND URBAN AFFAIRS
WASHINGTON, DC 20510-6075

August 1, 1994

APPENDIX B-13

Mr. Stephen Stein
National Institutes of Standards and Technology
Spectrometry Standards
NIST A260/222
Gaithersburg, Maryland 20899

Dear Mr. Stein:

Recently, the Department of Defense responded to a congressional request for explanation of a U.S. report prepared after the Persian Gulf War that details the identification of bis (2-chloroethyl) sulfide [$Cl(CH_2)_2S(CH_2)_2Cl$], carbonyl chloride [$COCl_2$], and dichloroform oxime [CCl_2NOH]. The official Department of Defense explanation was that the substance was actually fuming red nitric acid. The identifications for bis (2-chloroethyl) sulfide, sulfur mustard, were made by an array of military chemical identification equipment as disclosed in the attached reports. The final eight identifications (4-four peak identifications and 4 full spectra identifications) were made by two different Bruker Instruments MM1 mass spectrometers. According to the manufacturer, the following four principal peaks were programmed into the computer's identification algorithm for recognition of these substances:

For identification of bis (2-cholroethyl) sulfide [$Cl(CH_2)_2S(CH_2)_2Cl$]; common name: sulfur mustard (HD) Molecular Weight: 159.08

158.0 (rel. intensity 20.1%), 109.0 (rel. intensity 100%),
111.0 (rel. intensity 41.6%), and 160.0 (rel. intensity 12.9%).

For identification of carbonyl chloride [$COCl_2$]; common name: phosgene (CG) Molecular Weight: 98.92

65.0 (rel. intensity 38.8%), 63.0 (rel. intensity 100%),
98.0 (rel. intensity 11.2%), and 109.0 (rel. intensity 0.0%).

For identification of dichloroform oxime [CCl_2NOH]; common name: phosgene oxime (CX) Molecular Weight: 113.92

113.0 (rel. intensity 55.9%), 78.0 (rel. intensity 100%),
115.0 (rel. intensity 38.8%), and 77.0 (rel. intensity 55.9%).

The mass of fuming red nitric acid, HNO_3, is 63.01 and its most likely breakdown components appear to be nitrogen oxides and hydrogen of even lesser molecular weights. The sample of the questioned liquid was drawn directly from the container using a standard plastic medical syringe with a standard plastic medical i.v. tubing, deposited into a metallic dish, and transported directly to the ground probe of the MM1. This ground probe has a chrome nickel cap, and there was no damage to either the metal dish or the chrome nickel cap on the ground probe.

The MM1 identified sulfur mustard (HD) with a 6.4 confirmation reading. This, according to the manufacturer, indicates highly concentrated HD agent.

Given the foregoing:

Q.1. What are the principal mass peaks for fuming red nitric acid (HNO_3)?

Q.2. Is it possible that a mass spectrometer could match 3 of 4 peaks or 4 of 4 peaks for HD all of which appear above the total mass of nitric acid and still match 4 of 4 for fuming red nitric acid?

Q.3. Is the reverse possible, that is, could the mass peaks for HNO_3 be confused with those for HD? Under what circumstances might this be possible? Is it likely?

Q.4. The commander of the unit said that tests were run using both the 4 principle mass peaks and full spectrum analysis on the questioned substances. The tests were run twice each by two FOX vehicles using the MM1. These MM1s were checked for calibration both before and after the tests were run and with no problems noted. Further each time the testing was conducted identical substances were repeatedly identified, chemical mustard agent, phosgene, and phosgene oxime. How likely is it that under these

circumstances the computer algorithm identified these chemicals instead of fuming red nitric acid?

Q.5. Bruker Instruments has contacted Thyssen Henschel regarding conducting a field trial with fuming red nitric acid on an operational FOX vehicle and said they responded with some concern that it might result in damage to the GC/MS. Could fuming red nitric acid (conc. >90%) damage a mass spectrometer? Be specific.

Q.6. Does NIST maintain a spectrum standard for nitric acid. If not, why?

Q.7. If a metallic container were used to store nitric acid, what kind of metal container would be required? If two open bullet holes were in the container for over 5 months, that is, if there were a continuous source of oxygen to the fuming red nitric acid, would it evaporate?

Q.8. If a metal tray were used to transport red fuming nitric acid from this container to a mass spectrometer, would it react with the metal? What metals would it not react with?

Any assistance either you or any other qualified scientists at the National Institutes of Standards and Technology might provide in answering these questions would be appreciated. Please feel free to contact me directly at (202)-224-1563, if you have any questions regarding this request.

Sincerely,

James J. Tuite
Professional Staff

Attachments

NIST
UNITED STATES DEPARTMENT OF COMMERCE
National Institute of Standards and Technology
Gaithersburg, Maryland 20899-0001

SEP - 6 1994 Bldg. 222/Rm. A260

APPENDIX B-14

Mr. James J. Tuite
Committee on Banking, Housing and Urban Affairs
United States Senate
Washington, DC 20510-6075

Dear Mr. Tuite:

In this letter I will answer, as fully as I can, the questions posed in your letter of August 1, 1994 concerning the possible detection of chemical agents by Bruker Instruments MM1 mass spectrometers after the Persian Gulf War. In preparing this response, I have reviewed the documents that you provided, consulted with several NIST colleagues and conducted a literature search. Responses to each of your eight questions are presented below, followed by a discussion of the difficulties expected in the detection of nitric acid by mass spectrometry.

Q.1. What are the principal mass peaks for fuming red nitric acid (HNO_3)?

A.1. Fuming red nitric acid is a mixture of two compounds, nitric acid (HNO_3) and nitrogen dioxide (NO_2). For nitrogen dioxide, the largest peak (100%) appears at 30 u, the next largest is the molecular ion at 46 u (37%). Smaller peaks are present at 16 u (22%) and 14 u (10%). I was unable to locate a reference spectrum for nitric acid. However, because of the instability of its molecular ion, I do not expect a significant molecular ion peak at 63 u. Instead, I would expect the same peaks as nitrogen dioxide in approximately the same magnitudes, possibly accompanied by additional small peaks at 62 u (NO_3^+) and 17 u (OH^+).

Q.2. Is it possible that a mass spectrometer could match 3 of 4 peaks or 4 of 4 peaks for HD all of which appear above the total mass of nitric acid and still match 4 of 4 for fuming red nitric acid?

A.2. HD has no major peaks in common with those expected to arise directly from fuming nitric acid. It is highly unlikely that a properly functioning mass spectrometer would produce any of the major peaks characteristic of HNO_3 or NO_2 from HD.

Q.3. Is the reverse possible, that is, could the mass peaks for HNO_3 be confused with those for HD? Under what circumstances might this be possible? Is it likely?

A.3. If fuming red nitric acid did not decompose prior to detection (ionization), there would be no possibility of mistaking it for HD. Under proper operating conditions, it could not generate significant peaks above the molecular ion. If, however, the nitric acid underwent chemical reaction prior to detection, its decomposition products might fortuitously give rise to peaks in the mass spectrum of HD. It is highly unlikely, however, that these decomposition products would generate a spectrum that resembles that of HD.

Q.4. The commander of the unit said that tests were run using both the 4 principle mass peaks and full spectrum analysis on the questioned substances. The tests were run twice each by two FOX vehicles using MM1. These MM1s were checked for calibration both before and after the tests were run and with no problems noted. Further each time the testing was conducted identical substances were repeatedly identified, chemical mustard agent, phosgene, and phosgene oxime. How likely is it that under these circumstances the computer algorithm identified these chemicals instead of fuming red nitric acid?

A.4. If fuming red nitric acid did not react prior to detection, there is no likelihood that either the 4 peak analyses or full spectrum analyses would lead to the false identification of HD. However, if nitric acid did react, the reaction products might generate a large number of peaks. Some of these might, fortuitously, be those characteristic of HD or other chemical agents and therefore might produce a false positive 4-peak identification of HD. A robust, full-spectrum matching algorithm, however, would not be expected to falsely identify HD. However, being unfamiliar with the algorithms used by the MM1 mass spectrometer, I cannot further evaluate this possibility.

Q.5. Bruker Instruments has contacted Thyssen Hanschel regarding conducting a field trial with fuming red nitric acid on an operational FOX vehicle and said they responded with some concern that it might result in damage to the GC/MS. Could fuming red nitric acid (conc. >90%) damage a mass spectrometer? Be specific.

A.5. Red fuming nitric acid could damage a GC/MS, especially one not designed to handle highly reactive materials. Damage could occur in any of the three regions of the GC, the inlet, capillary column or outlet, depending on the materials used for construction or deposited during use. Organic substances, certain metal surfaces or other materials may vigorously react with nitric acid or even nitrogen dioxide. In the mass spectrometer section, reaction at the silicone membrane or even in the high vacuum chamber is also possible.

Q.6. Does NIST maintain a spectrum standard for nitric acid? If not, why?

A.6. We have no reference spectrum for nitric acid in our collection, nor have we been able to find one in other collections or in a cursory literature survey. This absence is not as surprising as one might first imagine for such a common compound. Owing to the high reactivity of nitric acid, the reliable determination of its mass spectrum would probably require special-instrumentation and substantial effort. Since mass spectrometry is not a practical method for the identification of nitric acid, there has been little motivation for making this determination.

Q.7. If a metallic container were used to store nitric acid, what kind of metal container would be required? If two open bullet holes were in the container for over 5 months, that is, if there were a continuous source of oxygen to the fuming red nitric acid, would it evaporate?

A.7. Large quantities of red fuming nitric acid are normally shipped and stored in aluminum or stainless steel containers. The volatility of this substance depends on the relative amounts of nitric acid and nitrogen dioxide present, with the normal boiling point varying from 25 C for a 45/55 wt%/wt% NO_2/HNO_3 mixture to 86 C for pure nitric acid. Once a sufficient amount of nitrogen dioxide has evaporated to raise the boiling point above ambient, further evaporation through holes in a large container would be slow.

Q.8. If a metal tray were used to transport red fuming nitric acid from this container to a mass spectrometer, would it react with the metal? What metals would it not react with?

A.8. As mentioned above, fuming red nitric acid is not reactive towards passivated aluminum or stainless steel (or other chromium-steel alloys). Passivation of these untreated surfaces occurs through a mild chemical reaction.

One issue, that of the detection of nitric acid by mass spectrometry, deserves further comment. Unless a mass spectrometer is specifically designed to detect highly reactive gases, it is not clear that a good quality spectrum nitric acid would be obtained. It is even less likely that nitric acid would pass intact through a GC and then through the silicone membrane inlet of the Bruker instrument to the mass spectrometer. Therefore, the introduction of nitric acid into a GC/MS may produce unpredictable results. Without examining the observed spectra and spectral comparison algorithms, I cannot evaluate the plausibility of the claimed false positive identifications.

Upon request, I can provide further details concerning any the above responses. I will also be glad to provide further technical assistance on these matters.

Sincerely,

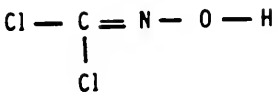
Stephen E Stein

Stephen E. Stein, Ph.D.
Director, NIST Mass Spectrometry Data Center
Chemical Science and Technology Laboratory

APPENDIX B-15

Phosgene Oxime

APPENDIX B-16



CX

Standard NATO agreement (STANAG) code: CX

Chemical name: dichloroform oxime
Common name: phosgene oxime
Formula: CCl_2NOH

Family: casualty agent
Type: blister agent (oxime)

In pure form a white solid. When melted, burned, or dissolved it emits a clear musty, pepperish vapor causing violent irritation to the eyes and nasal membranes.

History

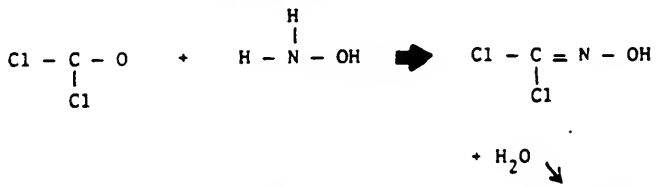
Nothing of this compound exists in any of the standard chemical or pharmaceutical texts. Passing references are made to it in chemical warfare literature in terms of its effects, and to the fact that samples were taken in central and northern Laos in the 1980s.

Commonly confused with phosgene in some popular sources, although that compound ($COCl_2$) is probably the aldehyde from which this compound is formed (see below).

Phosgene oxime has developed a reputation for being a very nasty systemic poison whose effects are prone to reoccur up to a year after exposure. It produces ulcerating sores which feel like elongated bee stings. One wag has put it that the "bees" that dropped "yellow rain" in Laos also left some of this, their venom.

Structure

Oximes are compounds containing an NOH^{+2} radical, formed as a condensation product of hydroxylamine (N_3OH) with aldehydes or keytones. Phosgene (carbonyl chloride, $COCl_2$) fits the catagory of a keytone by virtue of its (C:O) bond, so the following would seem feasible:



The result would be an anhydrous solid, phosgene oxime.

Pathology

Phosgene oxime represents an entirely new concept in blister agents. The previous agents in this chapter all attack the human system to produce toxic effects *under* the skin with the result that oxidation-reduction reactions in living tissue produce water blisters containing concentrations of unutilized chemical agent form on the surface. In this manner the body attempts to detoxify a systemic poison which has entered through the skin.

Phosgene oxime acts a bit different. It simply attacks whatever tissue it comes in contact with, skin, muscle and nerve alike. Its neuro-destructiveness can cause intense, unremitting pain. The human body detoxifies this agent very slowly. The mechanism of expulsion appears to be through the skin, hence the reappearence of initial symptoms. Being anhydrous in nature, this compound even prevents water-blisters common to the other blister agents. Instead, CX forms hard tissue masses like beesting wheals in which expelled CX may collect under scab materials, and may re-enter the body via adjacent tissue.

Initially, CX comes into contact with the skin and leaves a blanched area within 30 seconds where it is absorbed into the skin. A red, rash-like, ring immediately forms surrounding a forming wheal. Within a day the blanced area and rash will turn dark as broken down skin pigment pools near the surface. A scab will form over the whole in about a week, which may fall off after another three weeks. Depending on the total dosage recieved, total healing may take a week to about a year (severe cases).

Immediate death from systemic shock or trauma is possible. Effects from inhalation are little known in the west. This agent is readily water soluble (even though it precipitates), which might be an ameliorating factor.

This agent will dissolve in human sweat. A particularly insidious effect must be avoided through use of protective overclothing: if mixed in sweat, phosgene oxime would flow into the more tender parts of the body, to include the armpits, the hollows behind the elbows and knees, and to the area of the buttocks and crotch.

Phogene oxime's effects are INSTANTANEOUS. Even immediate decontamination would do little to ease pain. Treatment may involve neuro blocking drugs.

Field behavior

Phosgene oxime in pure form is a colorless, crystalline solid which would probably be micropulverized into a fine powder or dust. It may also be encountered as a water based aerosol.

CX melts at about 40°C(104°F). Thus, below that temperature its pure compound would create no vapor pressure of its own. Contamination would be either by aerial or ground contamination.

CX would probably exist in the environment until fully diminished through rain, fog, or snow. In desert areas it would be expected to evaporate *where exposed to direct sunlight* when temperatures rise above 104°F.

Specific data

median lethal dosage (LCt_{50})

Unknown.

median incapacitating dosage (ICt_{50})

Minimal exposure causes accute discomfort.

skin toxicity

See Pathology.

eye toxicity

Highly toxic. Severe injury possible.

rate of action

Immediate. See Pathology.

protection required

Protective mask/respirator and full protective overclothing.

rate of detoxification

Not fully studied. Many cases last from between two months and a year for full recovery. Reoccurances can be as painful as initial contact.

decontaminants

Warm water effectively dissolves CX. Bleaches and strong oxidizers will break down the compound. Strong alkalai solutions (such as sodium hydroxide, NaOH) with live steam should be used on large ground and structural areas of contamination.

vapor density

None below 40°C(104°F). CX is normally a solid.

vapor pressure

None below 40°C(104°F). Temperature/pressure curve not fully studied.

solid density

Probably between 1.40 and 1.50 g/cc at 20°C(68°F).

persistency

See Field Behavior.

volatility

None below 40°C(104°F). See Vapor Pressure, above.

latent heat of vaporization

Indeterminate.

melting point

About 40°C(104°F)

boiling point

About 54°C(129.2°F), with decomposition.

decomposition point

At boiling point.

flash point

None.

rate of hydrolysis

Data not available.

hydrolysis products

Data not available.

stability in storage

Stable in steel containers when dry.

action on metals and other materials

Slightly acidic and corrosive when mixed with water.

molecular weight

113.92

DEPARTMENT OF THE ARMY
OFFICE OF THE INSPECTOR GENERAL
[illegible] ARMY PENTAGON
WASHINGTON DC 20310-1700

APPENDIX B-17

SAIG-ID 29 July 1994

MEMORANDUM FOR The Office of the Assistant Secretary of Defense for Chemical Biological Matters (OASD(CBM))

SUBJECT: Suspect Chemical Container Found in Kuwait City, Kuwait in August 1991.

1. REFERENCES.

a. OASD Letter, undated, no subject, from Mr. Theodore M. Prociv, Deputy ASD for Chemical/Biological Matters to Senator Donald W. Riegel Jr., (designating himself as POC for all Operation DESERT STORM chemical/biological weapons matters and discussing information concerning the suspect chemical container found in Kuwait city, Kuwait in August 1991).

b. British Ministry of Defense Letter, Chemical and Biological Defense Establishment, 14 July 1994, Subject: Suspect Chemical Container: Kuwait city; August 1991 (Draft).

c. Memorandum For Director, CATD, 4 January 1994, Subject: Iraqi Chemical agents -- Information Paper

d. Task Force Victory Memorandum, AETSBGC-V, 7 August 1991, Subject: Tasking Number 91-047.

e. British EOD Squadron GP Document, 7 August 1991, Subject: Initial Report Suspected Chemical container.

1. PURPOSE. At the request of the OASD(CBM), to present information concerning the suspect chemical container found in Kuwait City, Kuwait in August 1991.

2. BACKGROUND.

a I served as Division Chemical Officer (DCMLO) for the Third Infantry Division (3ID) Weurtzburg, Germany from April 1989 until December 1991.

SAIG-ID

SUBJECT: Suspect Chemical Container Found In Kuwait City, Kuwait in August 1991

b. As the DCMLO I had Command and Control of the Division Chemical Company (the 92d). For example, I rated the Company Commander. The 92d's Reconnaissance (Recon) Platoon was one of two chemical platoons in U.S. Army Europe (USAREUR) assigned to deploy to Operation DESERT SHIELD/STORM (OpDS/S), receive training on the FOX NBC Recon Vehicle (at the Germany NBC School in Sonthofen, Germany), and receive the FOX NBC Recon Vehicles. The 92d Chemical Company Recon Platoon was the first USAREUR unit to deploy in support of OpDS/S.

c. The 3ID was also assigned the mission to coordinate FOX NBC Recon Vehicle training at the Germany NBC School. Our Division Chemical Section received that mission. As a result of the Recon Platoon deployment and our coordination of training at Sonthofen, I was thoroughly familiar with the FOX's employment, capabilities, and peculiarities.

d. In about early 1990, at the request of the 3ID Commander (MG Wilson A. Shoffner), I began serving as the acting Division Chief of Staff (CofS) when the CofS was not available for duty.

e. Once OpDS/S began and Seventh U.S. Corp, First Armored Division, and Third Armored Division were deployed in support, 3ID was assigned the mission of rear support (3ID was attached to Fifth U.S. Corp) for USAREUR Army units in Germany.

f. Along with the mission of rear support, came many "new" mission requirements. The 3ID Commander assigned me the title of Deputy CofS for Rear Operations and the mission to coordinated numerous aspects of that mission.

g. In spring 1991, a decision was made to relieve First Brigade, Third Armored Division in Kuwait City with the Eleventh Armored Cavalry Regiment (11ACR), Fulda, Germany. The deployment of the 11ACR included a General Officer (GO) Headquarters (HQ) to act as a command level between the 11ACR and Army Central Headquarters (ARCENT) Forward and provide coordination with the Kuwaiti Military, Gulf Coalition forces, Kuwaiti Ministers, and the U.S. Embassy (de facto).

h. 3ID was given the mission to provide that GO HQ. The GO HQ plus the 11ACR, an Evacuation Hospital, and 18 tenant activities became Task Force Victory (TFV). The 3ID Commander assigned BG Robert A. Goodbarry as TFV Commander. I was assigned as TFV CofS.

SAIG-ID

SUBJECT: Suspect Chemical Container Found In Kuwait City, Kuwait in August 1991

i. I (and other 3ID staff officers) was sent TDY to Dhahran, Saudi Arabia in mid May 1991 to coordinate the deployment of TFV. I returned to 3ID for a few days, briefed the Division Commander, proposed a staff, and returned to Kuwait as part of the forward deployment on 2 June 1991. The rest of the TFV staff followed in about two weeks. I remained in Kuwait City (as TFV CofS) until our 3ID GO HQ was relieved. I redeployed to 3ID on 9 September 1991. I returned on Permanent Change of Station (PCS) to the Department of the Army Inspector General (DAIG) around 16 December 1991.

j. Although I was the senior chemical branch officer in Kuwait during this time frame, I was the TFV CofS, not chemical officer. The TFV chemical officer was the 11ACR chemical officer.

3. SITUATION.

a. Pre 8 August 1991.

(1) On about 6 August 1991 (evening), I received a telephone call from Col Macel, the U.S. Army Liaison Officer, Kuwait (USALOK). Col Macel informed me that a British Explosive Ordnance Disposal (EOD) team had found what they thought might be a container of chemical agent near a Kuwaiti school south of Kuwait City. Col Macel stated that there was going to be a meeting at the Kuwaiti Ministry of Defense (MOD) the next morning and would I attend. I said yes.

(2) The meeting was attended by Kuwaiti personnel, British personnel, Col Macel, and myself. These were the major players. Others may have been represented but I can not state for fact they were.

(3) The British EOD personnel stated what they had found an approximately one ton container immediately behind the rear fence (wall) of the Sabbaniyah High School for girls. This High School is south of Kuwait City, outside Seventh Ring Road. They further stated:

(a) That the container had been found by their EOD personnel but that a caretaker at the school had stated that the container had been there since he returned after the war.

(b) That the container had been struck by a 7.62 mm round (approximately) which had penetrated the container.

SAIG-ID

SUBJECT: Suspect Chemical Container Found In Kuwait City, Kuwait in August 1991

(c) That they had gotten positive readings for mustard agent (H) with their chemical agent monitors (CAM), positive color changes with their detector paper (although not always exactly as they expected), and positive readings from their detector kits (however, there was a shelf life concern with some components).

(d) That the container was "leaking" a noticeably brown colored vapor.

(e) That during the sampling process one soldier had received some apparent burns on his wrist and that the injury appeared to be more of a burn than the result of vesication.

(f) That their protective gloves appeared to have been "softened" by the material from the container.

(g) That they had sealed the container with silicon and a plaster of paris patch and that the container was not presently leaking.

(4) The British further proposed that the container be removed from the city (out in the desert) and destroyed (blown up). Either Col Macel or I stated that this may be premature since a United Nations (UN) Chemical Weapons Evaluation Team was currently in Iraq attempting to determine the Iraqi chemical posture. Destroying a container that might contain Iraqi chemical agent might not be wise. I suggested that we use the FOX NBC Recon Vehicles (assigned to the 11ACR) to see if the FOX could confirm or deny the presence of agent in the container. If we could confirm that there was no agent, then the situation became much "easier".

(5) All agreed that this was the best course of action and agreed to resample the container and analyze the materiel with the FOX vehicles. I stated that we would employ two FOXs in order to confirm their readings. The British stated that they would handle the area set up, hot line, decon support, medical, and all sampling.

(6) Col Macel stated that he would inform the Ambassador and attempt to contact the UN Chemical Weapons Evaluation Team.

SAIC-ID

SUBJECT: Suspect Chemical Container Found In Kuwait City, Kuwait in August 1991

(7) I returned to TFV HQ, briefed BG Goodbarry, and suggested that we support the operation and be prepared to provide security for the site if we confirmed the presence of chemical agent. BG Goodbarry agreed. I told our G3 to task the 11ACR to provide two Fox vehicles to support the analysis operation and be prepared for follow on missions should we confirm the presence of chemical agent. I contacted our Provost Marshall and told him to be prepared to provided site security should it be required. I called the 11ACR and briefed the Executive Officer and Chemical Officer of the situation and their mission requirements.

(8) Later that evening Col Macel called and stated that the mission was "a go" for tomorrow and that we would meet at the British EOD compound south of Kuwait City. I informed BG Goodbarry, the 11ACR, and our staff.

b. 8 August 1991.

(1) All parties met at the British EOD compound. Participants included Col Macel, British EOD personnel, 11ACR personnel (two FOX vehicle crews and their company commander), a TFV security representative, and myself.

(2) We proceeded to Sabbaniyah High School and established the operation (i.e. the command post, hot line, decon operations, medical support, FOX vehicle operations, sampling operations, and contingencies), and executed "practice runs".

(3) Medical support was a major concern. By the time we were prepared to commence operations, it was approaching 1100 hours. The weather conditions were approximately 140 degrees Fahrenheit, 30 knot winds, and fine blowing sand. Since we would have soldiers in full protective gear, heat stress was a high priority. The FOX crews were not a particular concern since the vehicles were air conditioned.

(4) The operation proceeded as the FOX vehicles were positioned; British EOD personnel proceeded beyond the hot line, unsealed the container, obtained samples, presented the samples to the FOX vehicles, obtained backup samples in glass containers, resealed the suspected agent container, and returned to the hot line. The FOX vehicles returned to the hot line, were checked for contamination, deconed if required, and cleared through the hot line. All British personnel were checked for contamination, deconed if required, and cleared through the hot line.

SAIG-ID

SUBJECT: Suspect Chemical Container Found In Kuwait City, Kuwait in August 1991

(5) The FOX vehicles both indicated the presence of H agent and Phosgene (CX). During the sampling operation the first sample presented to the first Fox vehicle evaporated prior to introduction to the FOX. Additional samples (of more volume) were successfully analyzed by both FOXs. The harsh weather conditions did bring into question the accuracy of the FOX vehicle's Gas Chromatography/Mass Spectrometry (GCMS) analysis because the rate of evaporation could realistically effect the indicated volumes of components in the sample (i.e. not all components in the sample would evaporate at the same rate, the "lighter" components could evaporate first).

(6) It was my original intention to maintain custody of at least one set of samples (I had access to a walk-in freezer at TFV); however, after the indication of possible CX, I felt it was unwise to transport the samples back to TFV in my vehicle. The British EOD personnel maintained the samples. I instructed the FOX crews to give me the GCMS tapes from their analyses. They did.

(7) The operation had occurred without incident. The only incident was one British EOD soldier who was processed through the hot line early because of heat stress. The soldier was "cooled off" and was not a casualty. There were no other casualties.

(8) We established our TFV security forces to secure the area. Col Macel stated he would contact the Kuwaiti MOD in order to get them to assume the security mission. This occurred in a "couple of days". The operation ended and I returned to TFV.

(9) I briefed BG Goodbarry and suggested that I contact the Chemical Research, Development, and Engineering Center (CRDEC) Aberdeen, MD and relay the situation to them. He agreed. I contacted CRDEC by telephone (I do not remember the point of contact), briefed the situation, and suggested I fax them the FOX GCMS tapes for analysis. They agreed. I prepared a brief paper describing the operation and faxed the paper with copies of the FOX tapes to them. I do not have copies of the paper or the tapes.

(10) Later that evening Col Macel called to state that he had contacted the UN Chemical Weapons Evaluation Team (they were in Bahrain for rest), that they would be at the British EOD compound tomorrow morning, and would I attend the meeting. I agreed.

SAIG-ID

SUBJECT: Suspect Chemical Container Found In Kuwait City, Kuwait in August 1991

c. Post 8 August 1991.

(1) All parties met at the British EOD compound. Participants included Col Macel, five (or six) members of the UN Chemical Weapons Evaluation Team, British EOD personnel, and myself. The UN team was composed of officers and civilians with the civilians being from the British Chemical and Biological Defense Establishment, Proton Down, UK.

(2) The situation was briefed to the UN team. The UN team stated that the UN would take custody of the container, container materiel samples, and provide any further analysis required. I think the UN team and British EOD personnel returned to the container and resampled in order to maintain custody of the samples; however I do not know that for a fact. I told the UN team that I had contacted CRDEC and provided them copies of the FOX GCMS tapes. I think I provided the UN team the original FOX GCMS tapes; however, I can not remember for sure. If not the original tapes, they did receive copies. I do not currently know the status or location of the original tapes. The meeting ended.

(3) After the meeting, Col Macel stated that the container was now in custody of the UN and that we did not have to "worry" about it any more. I returned to TFV, briefed GB Goodbarry, and called CRDEC and told them that the UN team had custody of the container and samples. I told CRDEC that the samples were going to Proton Down and suggested that CRDEC contact Proton Down for further consultation. CRDEC agreed.

(4) I continued my mission as TFV CofS, redeployed to 3ID, PCSed to DAIG, and did not hear any more about the suspect chemical materiel until I was contacted by the OASD(CBM) in July 1994.

4. ADDITIONAL FACTS.

a. U.S. Army soldiers did not sample the materiel in the container at Sabbaniyah High School. No U.S. Army soldiers were downwind of the hot line other than the FOX vehicle crews who remained inside their vehicles.

b. The FOX GCMS tapes (of the materiel in question) were not clean tapes (i.g. there was not a pure materiel in the container). I was not sure what the materiel was; however, I did know that it was a complex materiel and that it was "nasty".

SAIG-ID

SUBJECT: Suspect Chemical Container Found In Kuwait City, Kuwait in August 1991

c. I did not see the injury to the British soldier. Although his injury was related as more of a burn than a vesication injury, the weather conditions in Kuwait City in August are harsh and could effect the action of any materiel.

d. I did not see the "softened" rubber gloves; however, their deterioration from agent (or agent degradation products) could not be absolutely disregarded.

e. The brown vapors from the container were not characteristic of pure H agent; however, I knew that whatever the materiel was, it was not pure. If it where some agent, I felt it might be a mixture of materiel (H and CX) and degradation products.

f I thought it odd that the Iraqi would "mix" H and CX agent and that this one container was found where it was; however, many things the Iraqi did were odd.

g. The configuration of the container was interesting. The container had one large blind flange on top with three small blind flanges exiting the large flange. The container did not resemble any bulk chemical agent container I had ever heard about. The use of the three flanges could only be guessed at.

h. I can confirm (from personal photographs) that one FOX vehicle (involved in the operation) was 11ACR vehicle CML 23.

5. OPINION.

a. One of the high priority Essential Elements of Information (EEI) in the U.S. Army is the first use of chemical agent. Where it is first used, how it is employed, against whom it is employed, and at what level it is employed by our adversary is extremely important to the defensive posture of our troops. There is a U.S. Army system (the NBC Warning System) specifically designed to provide this information as fast as possible. Troops are trained to initiate this system automatically if a chemical attack occurs on their position or is observed in their area. NATO conducts exercises in Europe to specifically assess how fast the notification of a chemical attack can be relayed to Army level and higher. If an Iraqi chemical attack had occurred, the information would have been relayed to all command levels as soon as possible. Every Commander, Chemical Officer, and staff would have known about the attack quickly. That never happened in OpDS/S.

SAIG-ID

SUBJECT: Suspect Chemical Container Found In Kuwait City, Kuwait in August 1991

b. An attempt by the military to "cover up" a chemical attack would have been adverse to our training, tactically illogical, a disaster for our troops, and virtually impossible to do.

c. There appears to have been no political reason why an Iraqi chemical attack would need to be "covered up". The use of chemicals by Iraq would have further justified our mission and strengthened the coalition.

d. Prior to my deployment to Kuwait City I was privileged to receive Top Secret - Special Compartmented Information (TS-SCI) intelligence briefings as the 3ID Deputy CofS. I know of no use of chemicals by Iraq based on the above.

e. After my deployment to TFV, I was privileged to the same level of U.S. military information as well as information from the American Embassy (and their assets), Kuwaiti military, Gulf Coalition of Forces, and the significant EOD and oil well fire fighting efforts. I know of no use of chemicals by Iraq based on the above. To my knowledge, the container found at Sabbaniyah High School, was the only incident related to chemical agent or munitions that occurred in Kuwait from June until early September 1991.

f. During the Iran/Iraq War, Iraq held chemical agent release authority at a high level (normally the Corp). There is no reason to assume that release authority would have been at a lower level for OpDS/S.

g. In my opinion, Iraq never made the decision to deploy chemical munitions forward of depot level storage prior to the initiation of the air war. After the air war, deployment of these munitions became impossible.

h. In my opinion, Iraq did not employ chemical agents during OpDS/S.

6. DISCLAIMER. The information in this paper is as I remember the situation in August 1991 and is supported by the references at paragraph one.

SAIG-ID

SUBJECT: Suspect Chemical Container Found In Kuwait City, Kuwait in August 1991

7. **CONCLUSION.** A container of chemical materiel (approximately one ton in size) was found at Sabbaniyah High School, Kuwait City, Kuwait in summer 1991. In August 1991, chemical materiel from that container was subjected to field tests for chemical agent. Although some test results may have been questionable, the materiel did produce positive field tests for H and CX chemical agent. There was no confirmation of the materiel as chemical agent in Kuwait in August 1991. Custody of the container and contents were transferred to United Nation's control around 9 August 1991.

Don W. Killgore

DON W. KILLGORE
LTC, IG
Technical Inspections Branch

CF: HQDA, DAMO-FDB

From: Dr Graham S Pearson CB, Director General

Ministry of Defence
CHEMICAL & BIOLOGICAL DEFENCE ESTABLISHMENT
Porton Down, Salisbury, Wilts. SP4 0JQ
Telephone: (0980) 61 3100
Facsimile: (0980) 611963

APPENDIX B-18

Ptn/TG 1090/18/1894/94

Lt Col Vicki Merriman
Office of the Deputy Assistant to the Secretary of Defence
(Chemical and Biological Matters)
The Pentagon
WASHINGTON DC 20301-3050
United States of America

14 July 1994

Dear Col. Merriman,

SUSPECT CHEMICAL CONTAINER: KUWAIT CITY: AUGUST 1991

1. In August 1991, a member of CBDE Porton Down staff led a team into Kuwait to obtain samples from the suspect chemical container located by a British EOD team outside the walls of the Sabbaniyah High School for Girls and advise on short-term control of the problem.

2. The team consisted of three CBDE scientists. The team visited Kuwait City and then the 21 EOD Headquarters. The report of the team leader dated 11 August 1991 shows that following discussions with other CBDE personnel the possibility was identified that the material may be fuming nitric acid as this was consistent with the use of these containers in Iraq and this chemical may account for some of the indications of mustard obtained by various chemical detection equipments.

3. A subsequent note from CBDE Porton Down to the Ministry of Defence dated 23 August 1991 stated that the brown fumes associated with the material, the destruction of the NBC suit material and the burns produced on skin suggests that the material may be fuming nitric acid, a highly corrosive oxidising acid which may be used as a rocket propellant. The damage to the NBC suit material and the brown fumes showed that the material was not liquid mustard.

4. Samples on resin were received at CBDE Porton Down on 13 September 1991. The samples had a definite yellow/brown colour compared to the original white of the resin and were labelled Sample 1 dated 10 August 1991 and Sample 3 dated 10 August 1991. Analytical results showed that there was a high concentration of nitrate in the sample and a pH that was extremely acidic. Extraction of the resin with dichloromethane and analysis by gas chromatography/mass spectrometry showed the presence of no material of CW interest. The samples were entirely consistent with the contents of the tank being nitric acid and there was no evidence of any CW agent being present. CBDE gave advice that the tank may contain up to two tonnes of nitric acid and the best option identified for its disposal was to give or sell the

material to the local chemistry industry to utilise in any chemical process or to pay them to neutralise the nitric acid under controlled conditions.

5. The UK view is that the tank discovered by the EOD unit in Kuwait City in August 1991 contained fuming nitric acid. It did not contain any CW agent although various detectors responded giving indications of mustard. These indications were not, however, confirmed in the subsequent laboratory analyses.

Yours sincerely

RANDALL L. VALLEE
8001-E N. MESA
EL PASO TEXAS 79932
(505) 589-4522

APPENDIX B-19

DURING THE MONTH OF MAY I WAS CONTACTED BY LT. COL. VICKY MARRYMAN AT MY HOME IN SANTA TERESA N.M. BY PHONE.

LT. COL. MARRYMAN STATED SHE WAS CALLING ON BEHALF OF THE UNDER SECRETAY OF DEFENCE, AND WAS WITH HTE O.D.S. TASKFORCE, REVELWING AND CONDUCTING THIER OWN INVESTIGATION REGUARDING THE CLAIMS OF CHEMICAL AND DIOLOGICAL WARFARE IN TU EPERSIAN GULF.

LT. COL. MARRYMAN STARTED ASKING QUESTIONS, IN WHAT SEEMED TO BE CONCERNED MOTIVES. SHE STARTED BY ASKING ME MY M.O.S., MY FAMILY AND WHAT I DID IN THE GULF WAR. AFTER A SHORT TIME OF SMALL TALK LT. COL. MARRYMAN BEGAN TO GET TO THE TRUE NATURE OF THE CONVERSATION.

LT. COL. MARRYMAN STATED SHE WOULD LIKE TO ASK ME SOME QUESTIONS REGUARDING THE MAY 25 1994 SENATE REPORT PUT OUT BY SENATOR RIEGLE AND MY STATEMENT THEREIN.

LT. COL. MARRYMAN ASKED ME TO TELL HER WHAT HAPPENED AGAIN EVEN THOUGH SHE HAD A COPY OF THE REPORT IN FRONT OF HER.

TO THE BEST OF MY ABILITY I RECOUNTED THE STATEMENT.

AFTER COMPLYING WITH THE LT. COL., MARRYMANS ATTITUDE CHANGED FROM BEING CONCERNED TO A FORM OF INTERROGATION.

LT. COL., MARRYMAN STARTED USEING TACTICS OF DOUBT REGUARDING MY STATEMENT, ALTHOUGH SHE DIDI SUSSTANTIATE THE SCUD ATTACKS THAT I HAD MENTIONED IN THE REPORT, IN REGUARDS TO MY STATEMENT OF THE POSSIBLE USE OF CHEMICALS, SHE FLATLY DENIED THEIR USE IN ANY FORM DURING THE PERSIAN GULF WAR.

I STATED TO LT. COL. MARRYMAN THAT I DID NOT BELIEVE THAT TO BE THE CASE, NOT ONLY BECAUSE OF MY FAILING HEALTH BUT THE DETERIORATING HEALTH OF FRIENDS WHO HELPED DESTROY THE MUSTARD GAS FOUND IN IRAQUI BUNKERS.

LT. COL. MARRYMAN STATED THAT "IF" CHEMICALS OR BIOLOGICAL WARFARE HAD BEEN USED, THEN WHY WERENT ANY OF THE ALLIED FORCES AFFECTED IN ANY WAY. THAT THERE ARE NO COMPLAINTS OF ANY ILLNESS FROM ANYONE NOT U.S. SOLDIERS, WHINING ABOUT BEING SICK AND ONLY A FEW OF THEM AT THE MOST.

I ASKED LT. COL. MARRYMAN ABOUT THE CZECHS WERE KNOWN TO USE AND CONDUCT CHEMICALS ON THEMSELVES, AND THIS WAS THE REASON FOR THIER DETECTION. AND AS TO THE SO CALLED FROG MISSLES... WE HAVE FOUND THROUGH INTERVIEWS LIKE THIS THAT MOST OF THE STATEMENTS ARE BEING CHANGED BECAUSE PERSONS BEING INTERVIEWED HAVE NO PROOF OF WHAT THEY SAW OR PHYSICAL PROOF TO SUSTANTIATE THE EXSISTANCE OF FROG MISSLES BEING USED AT THAT TIME.

I STATED TO MARRYMAN THAT I WOULD NOT CHANGE MY STATEMENT ON WHAT I SAW OR KNEW TO BE TRUE.

MARRYMAN BECAME FORCEFULL IN HER APPROACH TO CONVINCE THAT NO CHAMICAL AGENTS, OR BIOLOGICAL WEAPONS HAD BEEN USED.

BECAUSE THE CONVERSATION WAS GOING NO PLACE AND I WAS BECOMING VERY UPSET I STATED TO MARRYMAN WE HAD NOTHING FURTHER TO DISCUSS.

THIS IS THE CONVERSATION TO THE BEST OF MY RECOLLECTANCE. EVERY THING I HAVE STATED WAS FACT.

Randall L. Vallee

SGT. RANDALL L. VALLEE U.S. ARMY
HONORABLLY DISCHARGED.

SGRD-UV-ZA
5 March 91

ANNEX I

APPENDIX C-1

INFORMATION PAPER
CHEMICAL AGENT EXPOSURE
OPERATION DESERT STORM

1. PFC David Allen Fisher, 263-78-6470, is assigned to Scout Platoon, HHT, 4/8 Cavalry, 2nd Bde, 3d Armored Division, as a cavalry scout, MOS 19D. His exposure to mustard liquid occurred on 1 March 91 on the objective of 4/8 Cav in northwestern Kuwait (grid reference reported separate by LTC Adams, 3AD Chemical Officer). PFC Fisher's mission on 1 March included exploring enemy bunker complexes for intelligence material and personnel, and demolition of enemy fighting vehicles. On that date he wore Nomex tanker coveralls and a ballistic protective vest. While exploring numerous bunkers he remembers coming into contact with many surfaces in tight passages, resulting in the soiling of his clothing and equipment. He participated in demolition of ZSU-23 antiaircraft systems, BRDM vehicles, and T-55 tanks only. He specifically states that he was not in contact with tube or rocket field artillery systems.

2. PFC Fisher completed his mission at about 1700 on 1 March, returned to his platoon area, and experienced no symptoms for 8 hours until he started radio watch at 0100 on 2 March. At that time he felt stinging pain on the skin of his left upper arm, saw that the skin had a red sunburned appearance without blisters, and thought that it felt like a spider bite. He slept from 0300 to 0400, woke for stand-to, and felt more stinging pain on his arm. At this time there were blisters on the upper arm and more reddened skin on the lower arm. At 0800 his company medic checked him, thought he might

have a heater burn, and had him return at 1600, when more blisters had formed on the lower arm. At that time he was seen by CW3 Ahmed and CW3 Wildheim at the 4/8 Cav aid station. They suspected he might be a blister agent casualty, decontaminated him with 0.5% chlorine solution, applied a local dressing and evacuated him to C Co., 45th Support Battalion. During evaluation, they were assisted by chemical personnel who monitored PFC Fisher's clothing and equipment with the spectrometer of a Fox NBC recon vehicle. Initial readings of soiled areas of clothing gave weak positive spectra suggesting possible lewisite or phosgene oxide contamination. A later reading of a soiled area of the left upper shoulder pad of the ballistic vest gave a strongly positive reading for HQ, a mustard compound. A subsequent Fox survey of the bunker complex was positive for mustard, HD.

3. At C Co. 45th Support Bn, PFC Fisher was treated by MAJ DuClaw, who confirmed the clinical diagnosis of blister agent exposure, photographed the blisters, applied a topical antibiotic and gauze dressing, and returned him to duty with follow-up at his unit. PFC Fisher remains in full duty status. I examined him and interviewed CW3 Ahmed and CW3 Weidheim on 3 March at 1100. PFC Fisher had two blisters, about 2 cm diameter each on the left upper arm, and another 2 blisters, 1 to 2 cm diameter, on the lateral left forearm, each surrounded by a narrow margin of erythema. The roof of one upper arm blister had broken and the other three remained fluid-filled. PFC Fisher felt fine except for mild local pain that did not interfere with his duty performance. The skin area was photographed and a urine sample was saved in preservative for later analysis for .

thiodiglycol, a mustard breakdown product. Fox spectra printouts and samples of the coverall sleeve and ballistic vest were retained by 3AD chemical personnel for transport and analysis via technical intelligence channels.

4. I conclude that PFC Fisher's skin injury was caused by exposure to liquid mustard chemical warfare agent. The complete sequence of events is consistent with this conclusion. In particular, the latent period of 8 hours between exposure and first symptoms is characteristic of mustard [gas] exposure. No other corrosive or skin-toxic chemical compound that could reasonably be expected to have been present on the battlefield shows this latent period. The confirmatory Fox spectra findings are also consistent. It seems more likely that PFC Fisher's exposure occurred during bunker exploration rather than during vehicle demolition because of the positive Fox result in the bunker complex and the lack of established chemical capability of the vehicle types he encountered. MAJ DuClaw, CW3 Wildheim, and CW3 Ahmed are all recent graduates of the Medical Management of Chemical Casualties Course. Their accurate diagnosis and appropriate decontamination and treatment procedures reflect well on their professional capability.

Prepared and authenticated by COL Michael A. Dunn

Q+A SHEET USED BY USCENTCOM PAO (JOINT INFORMATION BU
IN MARCH 1991.

APPENDIX C-2

RESPONSE TO QUERIES: MUSTARD AGENT EXPOSURE

Q1: Can you confirm that a soldier (PFC Davis A. Fisher) was exposed to a chemical agent during OPERATION DESERT STORM?

A1: Clinical evidence strongly indicated a mild mustard agent exposure.

Q2: What was this chemical agent?

A2: Mustard is classified as a blister agent.

Q3: When did the event occur?

A3: As best as can be determined he was exposed to the agent sometime prior to 1700 on 1 March 1991. He experienced the first symptoms, those being discomfort and erythema of the skin, at 0100 on 2 March 1991.

Q4: Can you tell us the circumstances leading to his exposure?

A4: While on a mission to explore enemy bunker complexes in SE Iraq, he came into contact with many surfaces in tight passages, resulting in the soiling of his clothing and equipment.

— He experienced no symptoms until March 2, when he said he felt a stinging pain on the skin of his upper left arm. There were small blisters and reddened skin on the lower portion of his arm.

— He was treated at the unit aid station where they suspected he may have come in contact with a chemical agent. PFC Fisher was then evaluated at a Medical Clearing Company by a Chemical Casualty Specialist that supported the clinical diagnosis of mustard exposure.

Q5: What did this further diagnosis show?

A5: This further medical evaluation showed fluid filled blisters surrounded by a red margin typical of mustard agent blistering.

Q6: How serious was the exposure to PFC Fisher?

A6: The exposure was characterized as "mild" and the patient lost no duty time as a result of the incident. He was returned to duty after treatment.

Q7: Are there any other cases?

A7: There are no other reported cases.

Q8: Can we assume that the bunker complex was used by the Iraqis as a chemical storage site?

A8: We can't confirm this. We can only state that the bunker contained evidence of a mustard agent (as indicated by a mass spectrometer on the "Fox" NBC Reconnaissance Vehicle. It's important to keep in mind that mustard is a very persistent chemical. There is evidence from other conflicts (i.e., WWI) that mustard can persist for decades. If this bunker had been used as a storage site, it may have been for its previous conflict with Iran.

Medical Chemical Defense in Operations Desert Shield and Desert Storm

APPENDIX C-3

Lt Col John V. Wade, MC*
Maj Robert M. Gum, MC*
Col Michael A. Dunn, MC**

The authors give a brief overview of how the Chemical Institute prepared for Desert Shield/Storm. Numerous refresher courses dealing with chemical warfare were held, and 800 deploying health professionals graduated from these courses. The center assisted medical facilities in assessing their clinical efficacy and safety of medical countermeasures and provided consultation to the USCENTCOM Surgeon in medical-casualty care and other related issues.

Introduction

The Army Medical Department (AMEDD) has historically played a crucial role in any successful combat operation. The advent of highly sophisticated and automated weapons systems has in no way lessened the significance of our most critical asset —the soldier. Operation Desert Storm's execution required US forces to operate in a potential chemical threat environment for the first time since World War II, not having actually experienced chemical warfare (CW) agent use since World War I. Chemical warfare poses problems for the soldier which are uniquely medical in nature. Whereas most weapons systems are hardware oriented, and thus somewhat foreign to many AMEDD personnel, CW agent effects are based on fundamental principles of physiology and pharmacology. To some degree we should all be CW subject matter experts.

As soldiers, it is imperative that we also remain focused on the ultimate goal of the AMEDD, which is to "conserve the fighting strength." Our research and clinical efforts must therefore provide the soldier in the field with knowledge or products which improve his combat effectiveness and enhance his ability to fight and win. Our responsiveness to all aspects of this mission was tested during Operations Desert Shield and Desert Storm, as we faced an adversary who possessed a modern, offensive CW capability. We weren't as ready as we could have been, but we rose to the challenge admirably.

*US Army Medical Research Institute of Chemical Defense, Aberdeen Proving Ground, MD 21010-5425
**Formerly, Commander US Army Medical Research Institute of Chemical Defense, Aberdeen Proving Ground, MD 21010-5425; now, US Army MEDDAC, Ft. Meade, MD 20755

Before the Crisis

All AMEDD personnel receive individual skill training in the detection, decontamination, signs, symptoms and treatment of CW agent exposure. We have all practiced donning our masks and chemical protective overgarments. Many have experienced life at MOPP 4 (chemical gear) for extended periods of time. Yet, all too often, we have failed to fully appreciate the difficulties inherent in accomplishing our mission in a chemical environment. This is borne out in numerous after action reviews from the National Training Center, which clearly demonstrate a lack of training with realistically integrated CW agent employment for medical and non-medical units alike. This issue, which has been the subject of two Department of the Army IG readiness assessments and periodic General Officer Medical Chemical Defense Reviews, was briefed to the Army Surgeon General in July 1990. This timing was fortuitous in that it set the stage for a series of events which culminated in the highest degree of medical-chemical readiness the Army has ever seen.

The US Army Medical Research Institute of Chemical Defense (USAMRICD), Aberdeen Proving Ground, Maryland, is the lead laboratory conducting research on medical defense measures against CW agents. Its mission includes elucidating the mechanism of action of threat CW agents, identifying promising candidate pretreatment, therapeutic and decontamination compounds, testing their efficacy, and supporting those organizations tasked with their development, testing and evaluation. It also has responsibility for the postgraduate education of medical personnel in the management of chemical casualties, through the Medical Management of Chemical Casualties Course (M2C3), a professional short-course under the co-sponsorship of the Office of the Army Surgeon General and the US Army Academy of Health Sciences.

Training and Readiness in Desert Shield

With the Iraqi invasion of Kuwait on Aug 2, 1990, it became clear that our research efforts over the past several decades might be put to the test under fire. It was also apparent that the greatest contribution that USAMRICD could make to Operation Desert Shield was to rapidly share our experience in medical-chemical defense with the largest number of people possible. Teams gave pre-deployment familiarization lectures to health professionals of all services at US locations in August and September. In September, at the request of US Central Command (USCENTCOM), an initial cell of three officers from USAMRICD arrived in Saudi Arabia to provide staff support and training in chemical casualty care during Operation Desert Shield. The mission of the USAMRICD Forward Detachment and the USCENTCOM Chemical Casualty Officer was threefold:

(1) To conduct refresher and supplementary training of US and coalition forces medical personnel in chem-

ical casualty care initially as formal M2C3, and subsequently on an as-needed-as-available basis.

(2) To assess the clinical efficacy and safety of medical countermeasures and treatments directed against chemical agent exposure, formulate needed treatment modifications and disseminate new information in the theater as rapidly as possible to ensure optimal chemical casualty care.

(3) To provide consultation to the USCENTCOM Surgeon on medical-chemical defense, chemical casualty care and other related issues.

From September through December 1990, this team conducted 16 three-day M2C3s in theater, training over 1,450 medical personnel from all four services and seven allied nations in CW agent detection, in the recognition of signs and symptoms, the decontamination and treatment. These sessions included an intensive field training exercise with triage, decontamination and treatment of mock chemical and mixed chemical/conventional casualties. Other USAMRICD teams conducted M2C3 courses in Europe and the United States that graduated another 800 deploying health professionals. In spite of the challenging "classroom" conditions, attentiveness to course material and performance on the final examinations were exceptional. Many M2C3 graduates provided further instruction to their entire unit, assisted by a series of USAMRICD Technical Memoranda. These publications, which were developed to provide up-to-date information on selected medical issues relevant to CW agents, were provided during or soon after the M2C3. All in all, medical personnel took optimal advantage of the five months before the start of the war by enhancing their knowledge of CW agent effects and preparing for possible CW agent use.

Operation Desert Storm: Continued Training and Clinical Assessment

The CW threat and chemical casualty treatment were assessed as greatest for Army (ARCENT) and Marine Corps (MARCENT) units within the range of tube artillery and short-range multiple launch rocket systems. The possible use of SCUD missiles carrying chemical warheads, while extensively covered in the press and of great concern to the civilian population, was determined to be a much lower risk. Although medical personnel had been well-trained in the medical management of chemical casualties, the relevant doctrine and its clinical concepts were largely based on historical data, laboratory research and medical intelligence derived from the chemical casualty care experience of non-allied forces. While our doctrine and concepts were soundly based, they could likely have been improved upon with first-hand experience in chemical casualty management. The nature of the anticipated ground combat and the challenge posed by timely dissemination of information in theater required an agile and expert capability to capture, evaluate and disseminate clinical lessons learned. Thus, upon the initiation of hostilities, with the threat of actual US and allied chemical casualties, USCINCCENT requested deployment of a detachment of clinical experts in chemical casualty care and the continued support of a dedicated Chemical Casualty Officer. USAMRICD's total in-theater end-strength of eight soldiers was deployed from January to March 1991. It included four physicians, three clinical scientists (AN, VC, MS), and one noncommissioned officer (91T).

Additional mini-courses and refresher updates were provided to over 40 field hospitals and medical units during the initial phases of Operation Desert Storm, the target audience being approximately 3,000 physicians, physician assistants (PAs), nurses and medics. By the onset of ground operations, over 90% of the physicians and PAs assigned to divisional units were M2C3 graduates. For corps-level units and echelons above corps the figure was about 50%.

The process of designating selected M2C3 graduates as "Medical Chemical Casualty Officers" began in December, and was completed prior to the initiation of ground operations. For the first time since World War I, Army units designated medical-chemical casualty officers for each hospital. The other services participated on an informal basis. This network was used extensively in January to communicate the perceived medical-chemical threat, to disseminate the US Food and Drug Administration's recommended soldier information on Nerve Agent Pyridostigmine Pretreatment (NAPP), to collect data on the use and acceptance of NAPP in the field and to clarify the doctrinal use of the Convulsant Antidote Nerve Agent (CANA) upon introduction to the theater.

A specific message format, the Medical Chemical Update (MCU), was initiated to allow rapid dissemination of relevant information to Medical Chemical Casualty Officers. MCUs were used to recommend initiation and cessation of NAPP to the component services. A subsequent review of how these messages were received in the field suggests that this was a worthwhile endeavor, and would have been extremely beneficial in the face of actual chemical agent use.

Medical-chemical related staff actions and policies were proposed and managed at USCENTCOM and subordinate unit levels. These included, for example, restriction of insecticide use that would potentially impair cholinesterase reserve; consideration of chemical casualty recovery times and the impact on theater evacuation plans and policy; implementation of plans to load all medical evacuation vehicles with decontamination solution to permit far-forward decontamination of patients whenever possible; distribution and accountability for CANA, the diazepam autoinjector; and guidance on chemical decontamination of human remains. Requirements for public information presentations to the American and allied civilian communities and to the press were recurring actions.

Clinical Assessment During Desert Storm

Soon after initiation of hostilities in January 1991, three chemical assessment cells, each composed of two experts in chemical casualty management, were placed under operational control of the Corps Surgeons of the VII Corps and XVIII Airborne Corps of ARCENT, and of the MARCENT Surgeon. The Army Corps and MARCENT Surgeons' sections were tasked and staffed to perform medical threat estimates, battle tracking and information gathering on the occurrence of conventional and chemical casualties. USCENTCOM also had a strong NBC threat assessment capability. Upon anticipation of CW use, or identification of actual chemical casualties, the chemical assessment cells were to deploy forward to the most appropriate medical element, depending on the predominant threat agent. For example, nerve agent vapor exposures would be best evaluated at a forward support or clearing company, while mustard casualties would be best evaluated at a Corps-level evacuation hospital. This was put to the test on the second day of the ground war when a cavalry scout of the 3d Armored Division was treated for blister lesions on his arm which were presumptively identified as clinically similar to those produced by sulfur mustard (HD). This individual was seen at his battalion aid station by one of the assessment teams, the lesions were examined and photographed, and the soldier was treated symptomatically after which he returned to duty. Definitive identification of vesicant agent exposure was not confirmed. Relevant data was to be captured on a standardized form with subsequent entry into an automated database on a portable computer. In addition, targeted data needs or opportunities which arose from special circumstances (eg, the use of pyridostigmine by a large unit before the onset of major ground combat) were exploited.

The USCENTCOM Surgeon's Chemical Casualty Officer was to serve as the hub for data evaluation. He was best positioned to communicate as needed with the scientific experts in all three cells and with resources at USAMRICD and other laboratories. Also, depending on the nature of the clinical lessons learned, he could rapidly disseminate this information to all component services and allied forces as appropriate. As a hypothetical example, an evaluation of our initial experience with severe nerve agent casualties treated with CANA might have indicated that some hallmark findings could guide further therapy; ie, convulsions breaking through the first CANA may be a reliable sign that atropine requirement over the first day would likely exceed 50mg. The officer at USCENTCOM was well positioned to sound out this inference quickly with the neuroscience community and immediately formulate new management guidelines. The Commander, USAMRICD, has DoD teaching authority to promulgate such guidelines as part of his chemical casualty professional education mission. The Medical Chemical Casualty Officer network was to be used for rapid dissemination of evaluated information and new management concepts and guidelines. The cells at each Corps level assisted, as time permitted, with reinforcement and explanation of information regarding the management of chemical casualties.

Specific Medical-Chemical Countermeasures

Over 41,000 soldiers from the XVIII Airborne Corps took NAPP for one to seven days in January 1991 under a nerve agent threat. Clinical information of the physiologic changes attributable to NAPP that resulted in need for medical attention, discontinuation, hospitalization and/or evacuation from theater were captured (Kaeiser et al: *JAMA*, vol 266, Aug 1991). In summary, the NAPP regimen as practiced by soldiers under wartime conditions caused more frequently noticed physiologic responses than reported in earlier peacetime evaluations, however, these non-incapacitating symptoms did not impair military mission performance. The known effects of pyridostigmine on postsynaptic acetylcholine receptors and cholinergic transmission suggest that special attention to muscle relaxant management may be important during anesthesia. This information was reviewed with the anesthesia staffs of theater medical units, and the appropriate data capture management approaches were widely disseminated.

CONCLUSION

The Army Medical Department made a strong response to the chemical threat in the Persian Gulf. Guided by the Surgeon General's staff, it provided doctrine and training packages from the Academy of Health Sciences that supported new products such as NAPP and CANA. The US Army Medical Materiel Development Activity and Medical Materiel Agency both worked closely with the US Food and Drug Administration to ensure delivery and appropriate safety and efficacy monitoring of medical chemical countermeasures. Scientists at USAMRICD and other laboratories supported the effort with critical confirming and monitoring studies. Collectively, US forces achieved an unprecedented level of readiness to cope with the potential for enemy CW agent use. Timely M2C3 training, prior to deployment or in theater, allowed medical personnel to focus their attention on the mission at hand—treatment and conservation of the fighting strength—with less concern about the uncertainties of CW agent use. The competence and confidence that medical personnel acquired as a result of these efforts cannot be overestimated. The immediate presence of medical-chemical experts in the theater allowed for rapid dissemination of information, prompt answers to the questions of field commanders and continued reassurance that we were the best equipped and prepared medical force in the world. ●

APPENDIX C-4

Veteran's story counters official one on gas war

By THOMAS D. WILLIAMS
Courant Staff Writer

A U.S. Army Persian Gulf War veteran who was injured by a form of mustard gas said Tuesday that the Iraqi bunker he searched contained crates marked with skulls and crossbones.

But although former Sgt. David Allen Fisher, now 25, said he told U.S. Defense Department investigators about the crates, no mention of them appeared in a 1991 report, prepared by Army Col. M.A. Dunn, on gulf war exposure to chemical agents, Fisher said Tuesday.

Dunn, former commander of the U.S. Army Medical Research Institute for Chemical Defense, who treated Fisher for what Dunn said were chemical wounds, did not say in his report how Fisher received those wounds.

The Defense Department continues to claim more than 3½ years after the war that no chemical weapons were used by the Iraqis, none were found and no soldiers were seriously injured by them.

Fisher, who now lives in Albuquerque, N.M., said he was searching the Iraqi bunker for weapons on March 1, 1991, when he brushed up against some wooden crates inscribed with skull and crossbones warnings.

Within a couple of hours, Fisher said, his arms were covered with painful blisters. Subsequent tests with battlefield detection equipment determined that Fisher's protective clothing and the bunker itself contained mustard compound, a warfare chemical, Dunn's report shows.

But, when Fisher's tanker overalls and protective gear were sent for testing at the U.S. Army testing facility in Edgewood, Md., they were found to contain no signs of the compound, published test results say.

Last month, Lt. Col. Douglas Hart, a Pentagon spokesman, cited the 1991 Edgewood test to play down the initial report of Fisher's chemical exposure in March 1991 in Iraq.

But Hart said Tuesday that he was not aware that any chemical crates were discovered by Fisher in the bunker. And despite Fisher's statement, Hart said, it still is the Defense Department's belief that no chemical or biological weapons were used during the Persian Gulf War.

Fisher said he was sent to Germany with his injury five days after he entered the bunker, and was given 30 days of free leave. Subsequently, Fisher said, he was awarded the Purple Heart for injuries from the chemicals, which have scarred his arms slightly.

Hart and Dunn said last month they believe whatever chemical exposure Fisher experienced in the bunker must have come from chemicals left over from fighting in the earlier war between Iraq and Iran.

Fisher said he was told the chemicals in the bunker were checked out by an Army chemical unit, a fact confirmed in Dunn's report. No report from that chemical defense unit has surfaced.

Paul Sullivan, president of the Gulf War Veterans of Georgia, called for an investigation of Fisher's statements. He said all reports on the episode should be released immediately, and investigators should visit Iraqi bunkers as soon as possible to check for signs of chemical warfare.

To be fair and objective, Sullivan said, the inquiry should be conducted simultaneously by the Defense Department, independent scientists and a veterans' service organization.

Sullivan said that Defense Department denials of chemical-weapons use have hindered attempts by sick gulf war veterans to find out what is wrong with them.

U.S. Sen. Donald W. Riegle Jr., a Michigan Democrat whose inquiry into mysterious gulf war illnesses has spearheaded efforts to get help to veterans, said Tuesday he was distressed by Fisher's statements.

"I think it is further proof that gulf war troops were exposed to chemical, and possibly biological, agents, and they are a likely factor in what's causing Gulf War syndrome.

"Sgt. Fisher's experience is not an isolated incident. We will continue our fight to dig out the truth," Riegle said.

About 20 percent of all troops who fought in the Persian Gulf War have complained of one kind of sickness or another. At least 2,200 have died since the war, the U.S. Department of Veterans Affairs says. Doctors have been unable to diagnose the sicknesses of many veterans, and they have dubbed those illnesses Gulf War syndrome.

About 127,000 retired servicemen and women have sought care at U.S. Department of Veterans Affairs hospitals. Twenty-one thousand of those have complained of more serious illnesses. Meanwhile, 4,896 active-duty servicemen and women have registered health complaints with the Defense Department.

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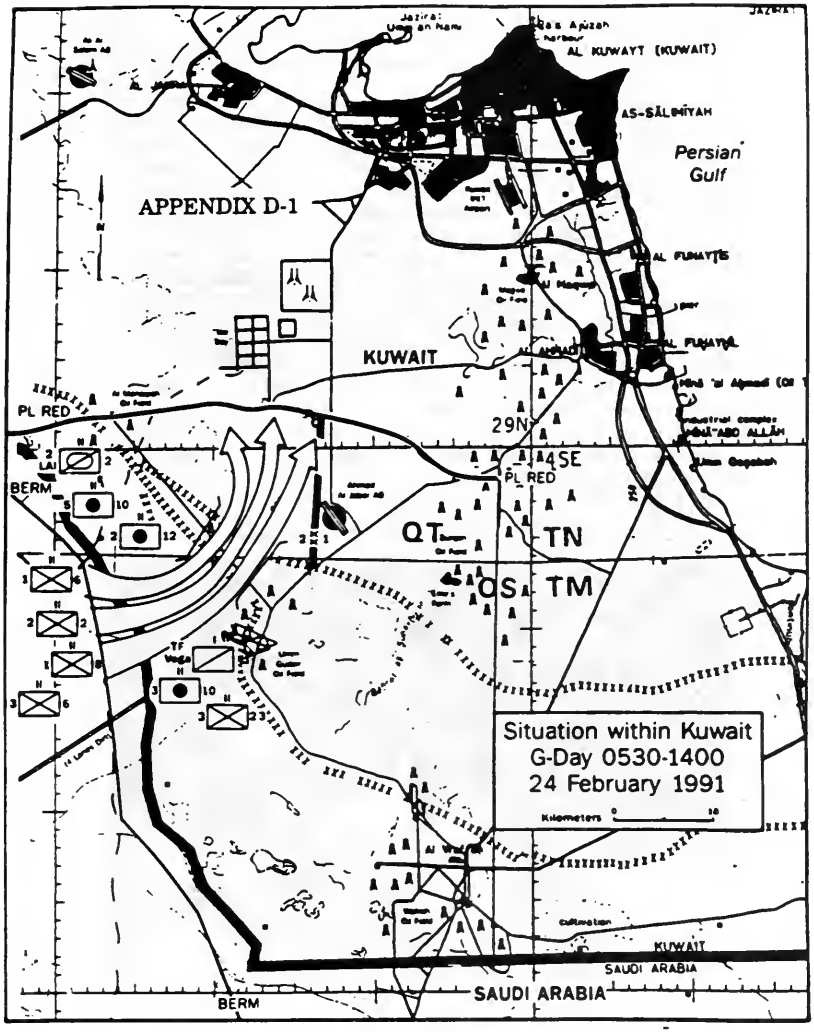
APPENDIX D-1
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APPENDIX D-2

shape prevented easy removal, so the best way to dispose of them was to blow them in place.[148]

Gunnery Sergeant Mart J. Culp, the noncommissioned officer in charge of a demolitions team, was therefore especially busy this morning. His expertise was required at several of the lanes where unexploded mines or line charges which had failed to detonate were preventing the clearance of the lanes and the movement of the assault battalions. Time and again he entered the minefields, supervising the setting of demolitions charges and personally activating the fuzes. In spite of occasional Iraqi artillery and mortar fire, Gunnery Sergeant Culp and his team helped to clear three lanes and allow the assault to continue.[149]

The use of chemical munitions by the Iraqis had been expected, but happily had not yet occurred. At approximately 0656, the "Fox" chemical reconnaissance vehicle at lane Red 1 detected a "trace" of mustard gas, originally thought to be from a chemical mine.[150] The alarm was quickly spread throughout the division. Since everyone had been required to don his protective outer garments and boots the previous evening, it was only necessary to hurriedly pull on a gas-mask and protective gloves to attain MOPP level 4. A second "Fox" vehicle was sent to the area, and confirmed the presence of an agent which had probably been there a long time. Unknown in origin, it was still sufficiently strong to cause blistering on the exposed arms of two AAV crewmen.[151] Work continued on the clearance of the lanes, and the MOPP level was reduced to 2 after about a half-hour.

The first lanes to be opened were Red 1 and 2 through which the 1st Battalion, 6th Marines pushed. At 0724, the battalion reported it had passed

Photograph by author

Marines don full chemical protective equipment (MOPP level 4) during general chemical alert on 24 February 1991.

United States Senate
COMMITTEE ON BANKING, HOUSING, AND URBAN AFFAIRS
WASHINGTON, DC 20510-6075

April 15, 1994

APPENDIX E-1

Lawrence Livermore National Labs
7000 East Avenue
Building 345, Room 1122
L-371
Attn: Brian Andresen
Forensic Science Center
Livermore, California 94550

Dear Dr. Andresen:

Reference is made to the telephone conversations between James J. Tuite of Committee staff and Brian Andresen of the Lawrence Livermore National Laboratory. The Banking Committee has Senate oversight responsibility for the Export Administration Act which is schedule for legislative action later this session. As you know, many of the materials used in the Iraqi chemical and biological warfare program, as well as in their nuclear weapons program, were exported directly from the U.S. The Committee is currently conducting an inquiry to determine whether any of these, or any other hazardous materials from the Gulf War theater of operations, may be contributing to the illnesses being experienced by Gulf War veterans.

The following examinations are requested, in part, to determine what some of these exposures may have been.

Exhibits:

Questioned Specimen #1

Iraqi gas mask delivered to the Committee on April 15, 1994. This mask was in the possession of a U.S. Army veteran of the Gulf War. Reportedly, the mask has a yellow-color growth and when the mask was uncased on April 13, 1994, it caused several individuals to experience nasal burning, watery eyes, and facial numbness. These individuals also reported noting the odor of ammonia.

Request

Conduct appropriate analysis to determine what, if any, chemical or biological warfare-related materials, or other hazardous materials or substances might have contaminated this mask.

Questioned Specimen #2

Iraqi gas mask delivered to the Committee on Janaury 20, 1994. This mask was in the possession of a U.S. Army veteran of the Gulf War. Reportedly, the mask has a yellow-color growth.

Request

Conduct appropriate analysis to determine what, if any, chemical or biological warfare-related materials, or other hazardous materials or substances might have contaminated this mask.

Questioned Specimen #3

U.S. gas mask filters delivered to the Committee on December 3, 1993. This mask was in the possession of a U.S. Army veteran of the Gulf War. Reportedly, the filters are sticky and have a foul odor.

Request

Conduct appropriate analysis to determine what, if any, chemical or biological warfare-related materials, or other hazardous materials or substances might have contaminated this mask.

Questioned Specimen #4

Military dosimeter worn by a U.S. Navy employee during Operation Desert Shield/Storm.

Request

If possible conduct reading or refer for reading. If the Lawrence Livermore National Laboratories cannot perform the reading, then the dosimeter should be returned to the Committee.

· Findings regarding examinations performed should be reported only to James J. Tuite or to myself if he is unavailable. Questions regarding the requested examinations or the questioned specimens should be referred to James Tuite at 202-224-3162 or 202-224-7391.

Sincerely,

Donald W. Riegle Jr.
Chairman

APPENDIX E-2

Preliminary Results of Gas Masks and Exposure-Monitoring Equipment Associated with Desert Storm: Chemical and Biological Analyses of First Sample Set

Brian D. Andresen, Ph.D.,
Jackie Stilwell, M.S., Patrick Grant, Ph.D., Jeff Haas, M.S., Richard Whipple, B.A., and Armando Arcaraz, M.S.

Forensic Science Center
J-Division/NAI Directorate
Lawrence Livermore National Laboratory
Livermore, California 94550

June 1994

Preliminary Results of Gas Masks and Exposure-Monitoring Equipment Associated with Desert Storm: Chemical and Biological Analyses of First Sample Set

Tentative Results Obtained During the Period of May-June 1994 at the
Forensic Science Center
Lawrence Livermore National Laboratory

Introduction

On April 21, 1994 a sample box arrived by Federal Express at Lawrence Livermore National Laboratory, Forensic Science Center. The box contained three paint-can sample-containers and one small cardboard box. One set of metal containers held a complete Iraqi gas mask with filters, carrying bag, and respirator filters. Another paint-can held a set of U.S. gas mask filters. The cardboard box contained a black plastic dosimeter pendant. All samples were handled under strict isolation conditions and were screened for radiation, chemical agents and biological organisms of unknown origin.

Analytical Tests

The Forensic Science Center at the Lawrence Livermore National Laboratory has an extensive suite of nuclear, chemical, and biological analysis capabilities. A comprehensive analytical protocol was applied to selected samples obtained from the mask and materials submitted to the laboratory. First we applied sensitive gamma counting techniques to all samples to screen for radioactivity. Organic extraction steps were applied to the surface of the samples. The extracts were then concentrated and analyzed by gas chromatography-mass spectrometry (GC-MS) instrumentation to

screen for chemical weapons and other unusual compounds. Concurrent with these analyses, samples were cultured and wipe samples were processed and analyzed for DNA fragments indicative of a suite of known pathogenic agents.

All organic and biological analyses are still ongoing. The results presented below are preliminary and highlight the work performed over the last two months. Additional research will be applied to these samples and follow-up experiments will be conducted.

Overview of Nuclear, Organic, and Biological Preliminary Data

A. Nuclear

Sensitive nuclear interrogation of the submitted samples did not reveal any unusual radioactive species. Scintillation counting with a low background sodium iodide detector system did not reveal any radioactive species above background for any of the gas masks, filters, or pendant.

B. Organic Analysis

1. Sample Isolation and Chemical Preparation

The submitted samples were either swiped with a solvent-saturated swab or treated with the appropriate solvents to completely remove any surface residues. The collected organics were then concentrated by evaporation to a few microliters and injected into a computer controlled GC-MS instrument. In addition, sample aliquots were taken to dryness and

then derivatized chemically in order to form volatile compounds, making polar analytes more amenable to GC-MS analysis.

2. Tentative Results

A large number of representative samples were prepared and analyzed in a manner which would have isolated chemical weapons, their precursors, or hydrolysis products. However, from all the GC-MS data generated, no chemical warfare agents were detected. In particular none of the nerve agent hydrolysis products or methylphosphonic acid, a key nerve agent marker compound, were detected. No thiodiglycol, a hydrolysis product of mustard, was detected in any of the samples. Phosphoric acid was detected on all exposed materials. A large number of industrial compounds were also detected, as well as rubber and antioxidant compounds. Triphenylphosphate, an industrial antioxidant, was identified on many samples. Phenol was detected on the U.S. gas mask filters. Interestingly, pentachlorophenol was detected on the Iraqi mask in a complex mixture of over 100 other organic compounds. Pentachlorophenol is a strong acid, insecticide, and antifungal agent used for a variety of wood preservative applications.

C. Biological Analyses

1. Sample Preparation

Specimen samples were taken from a variety of locations within a biological safety hood. Sterile tubes, water, and swabs were used to obtain organisms and fugitive DNA fragments. Nutrient agar plates were exposed to

swabbed samples and incubated at 37°C and examined at 24 and 48 hours for growth. Growth was noted for some samples and pictures were taken of the cultures. These cultures have been archived in a secure refrigerator for further analysis if needed.

A second swab sampling of each specimen was utilized for polymerase chain reaction (PCR) analyses and screening. These swabs were extracted with chloroform/buffer to isolate cells and any water soluble compounds. Cells were lysed with enzymes to liberate DNA, which was then isolated and purified. The purified DNA was subjected to PCR analysis with designated DNA primer pairs. The PCR products were then analyzed and compared to standards utilizing electrophoretic gels.

Our laboratory has developed many DNA primer pairs which can clearly identify a suite of pathogenic organisms through DNA isolation and amplification. A single representative set of each primer pair was selected to initially screen for any potential threat organisms which may have been on the surface of the mask or filters. If any of these initial analyses registered positive, four more primer pairs were then selected to verify the suspect organism.

2. Biological Results

Based on our preliminary testing we do not believe that pathogens were present on the samples. From the initial screening a tentative indication of unique DNA sequences was detected using a single DNA primer pair. *Coxiella burnetti* and *Brucella species* were first indicated from the inside of

the Iraqi carrying bag, the top of one its gas mask filters, and under the rubber seal of the Iraqi filter. However, when additional primer pairs were used for testing the findings were negative. Because of the experimental nature of PCR testing, false-positive results can occur with only a single PCR primer pair analysis. It is essential to utilize additional and unique DNA sequences for confirmation tesing.

Future Study and Research Needs

Biological studies need further attention. Cultures should be investigated more closely. Experiments to amplify the whole genome and allow for the manipulation of increased concentrations of DNA by PCR would likely be more precise in identifying threat organisms in the future. In addition, false-negative DNA results can be obtained with certain DNA primer pairs when environmental contaminants and inhibitors impede the PCR reaction. Therefore, some initial chemical pretreatment of the samples might prove effective. Research to remove PCR inhibitors, as well as sample concentration studies, may allow the whole genome to be amplified for unambiguous characterization of unknown organisms in the future.

Finally, many organic compounds were present and identified in the samples. Additional analyses of more samples may isolate and characterize either CW or pathogens on the surface of collected items. Continued study is warranted. PCR primer pairs could also be developed to detect certain DNA or plasmids associated with genetic engineering.

APPENDIX E-3 Q FEVER

An acute disease characterized by sudden onset of fever, headache, malaise, and inter stitial pneumonitis, caused by Coxiella burnetii (Rickettsia burnetii). Unlike other ricket sial diseases, Q fever is not associated with a cutaneous exanthem or agglutinins fo *Proteus* strains (Weil-Felix reaction).

Etiology and Epidemiology

Worldwide in its distribution, Q fever is maintained as an inapparent infection in domes tic animals; sheep, cattle, and goats are the principal reservoirs for human infections. C *burnetii* persists in feces, urine, milk, and tissues (especially the placenta), so that fomite and infective aerosols form easily. Cases occur among workers whose occupations brin them in close contact with domestic animals or their products. Transmission is usually b inhalation of infected aerosols, but the disease can also be contracted by ingesting infectiv raw milk.

C. burnetii is also maintained in nature through an animal-tick cycle. In the USA, C fever was first recognized in persons bitten by *Dermacentor andersoni*. Various arthro pods, rodents, other mammals, and birds are naturally infected and may play a role ir human infection.

Symptoms and Signs

The incubation period varies from 9 to 28 days (average, 18 to 21 days). Onset is abrupt, with fever, severe headache, chilliness, severe malaise, myalgia, and often, chest pains. Fever may rise to 40° C (104° F) and persist for 1 to > 3 wk. Rash is absent. A nonproductive cough and x-ray evidence of pneumonitis often develop during the 2nd wk of illness. Mortality is < 1% in untreated patients and even lower with antibiotic therapy.

In fatal Q fever, lobar consolidation usually occurs, and the gross appearance of the lungs may resemble that of bacterial pneumonia. However, histologic changes in Q fever pneumonia resemble those of psittacosis and some viral pneumonias. An intense interstitial infiltrate about the bronchioles and blood vessels extends into the adjacent alveolar walls. Plasma cells are numerous. The bronchiolar lumina may contain polymorphonuclear leukocytes. The alveolar lining cells are swollen, and the alveoli contain desquamated lining cells and large mononuclear cells.

Hepatitis is present in about ⅓ of patients with the protracted type of Q fever and may be acute. This hepatitis is characterized by fever, malaise, hepatomegaly with right upper abdominal pain, and possibly jaundice. Headache or respiratory signs are frequently absent. Liver biopsy specimens show diffuse granulomatous changes, and *C. burnetii* may be identified by immunofluorescence. Lobar pneumonia may be particularly severe in aged or debilitated patients. There are also several forms of chronic Q fever (eg, chronic hepatitis, endocarditis). Chronic Q fever hepatitis must be differentiated from other liver granulomas (eg, TB, sarcoidosis, histoplasmosis, brucellosis, tularemia, and syphilis). Endocarditis caused by *C. burnetii* is serious but uncommon. Clinically, it simulates SBE, with aortic valve involvement more common. Routine blood cultures are persistently negative.

Diagnosis

Diagnosis is made by clinical suspicion and by demonstration of phase 1 antibodies in the patient's serum. Clinically during early stages, Q fever simulates many infections (eg, influenza, other viral infections, salmonellosis, malaria, hepatitis, brucellosis) and later on, many forms of bacterial, viral, and mycoplasmal pneumonias. Contact with animals, animal products, or ticks is an important clue.

C. burnetii may be isolated from the blood. The Weil-Felix reaction is negative. Specific CF and agglutinating antibodies appear during convalescence. Agglutination tests are more sensitive than CF tests; fluorescent antibody tests are helpful. *C. burnetii* exists in 2 phases; antibodies against phase 1 organisms are rarely produced in infected human serum but when present, they indicate chronic Q fever.

Prophylaxis

Animal-to-man transmission must be prevented: milk should be pasteurized; dust control in pertinent industries is essential; and animal placentas, feces, and urine should be incinerated. Sputum and urine from a Q fever patient should be autoclaved and the patient isolated. Vaccines made from phase I rickettsiae are effective and should be used to protect slaughterhouse and dairy workers, rendering-plant workers, herders, woolsorters, farmers, and others at risk. These vaccines are not available commercially but may be obtained from special laboratories—eg, the US Army Medical Research Institute of Infectious Diseases in Frederick, Maryland.

Treatment (See also TREATMENT OF RICKETTSIAL DISEASES, below)

Tetracycline and chloramphenicol are effective. In acute disease, treatment should be continued until the patient has been afebrile for about 5 days. The course of illness may be shortened by giving tetracycline 250 mg orally q 4 or 6 h. Chloramphenicol may be used in young children.

In endocarditis, treatment needs to be prolonged and tetracycline is preferred. When antibiotic treatment is only partially effective, damaged valves must be replaced surgically. Some cures without surgical intervention have been reported. Clear-cut regimens for chronic hepatitis have not been determined.

BRUCELLOSIS

(Undulant, Malta, Mediterranean, or Gibraltar Fever)

An infectious disease characterized by an acute febrile stage with few or no localizing signs and by a chronic stage with relapses of fever, weakness, sweats, and vague aches and pains.

APPENDIX E-4

Etiology and Epidemiology

The causative microorganisms of human brucellosis are *Brucella abortus* (cattle), *B. suis* (hogs), *B. melitensis* (sheep and goats), and *B. rangiferi* (*B. suis* biotype 4—Alaskan and Siberian caribou); *B. canis* (dogs) has caused sporadic infections. *Brucella* infections of deer, horses, moose, hares, chickens, and desert rats have also been reported. Brucellosis is acquired by direct contact with secretions and excretions of infected animals and by ingesting the milk of cows, sheep, or goats or the products of their milk (eg, butter and cheese) containing viable *Brucella* organisms. It is rarely transmitted from person to person. Most prevalent in rural areas, brucellosis is an occupational disease of meat-packers, veterinarians, farmers, and livestock producers; children are less susceptible. Distribution is worldwide.

Clinical Course

The incubation period varies from 5 days to several months (average, 2 wk). Symptoms vary, especially in the early stages. Onset may be sudden and acute, with chills and fever, severe headache, pains, malaise, and occasionally diarrhea; or it may be insidious, with mild prodromal malaise, muscular pain, headache, and pain in the back of the neck, followed by a rise in evening temperature. The total WBC count usually is normal or reduced, with a relative or absolute lymphocytosis. As the disease progresses, the temperature increases to 40 or 41° C (104 or 105° F), then subsides gradually to normal or near-normal in the morning, when profuse sweating occurs.

Typically, the intermittent fever persists for 1 to 5 wk, followed by a 2- to 14-day remission with symptoms greatly diminished or absent; the febrile phase then recurs. Sometimes this pattern occurs only once; occasionally, however, subacute or chronic brucellosis ensues, with repeated febrile waves (undulations) and remissions recurring over months or years. In some patients, fever may be only transient.

After the initial phase, constipation usually is pronounced; anorexia, weight loss, abdominal pain, joint pain, headache, backache, weakness, irritability, insomnia, mental depression, and emotional instability occur. Splenomegaly appears, and lymph nodes may be slightly or moderately enlarged; hepatomegaly may be present in up to 50% of patients.

Patients with acute, uncomplicated brucellosis usually recover in 2 to 3 wk. Complications are rare but include SBE, meningitis, encephalitis, neuritis, orchitis, cholecystitis, hepatic suppuration, and bone lesions. Chronic disease usually results in prolonged ill health, but the disease is rarely fatal.

Diagnosis

A definitive diagnosis is based on recovery of the organism, usually from the blood or less often from CSF, urine, or tissues. However, serologic results are of major importance also, and agglutination tests are particularly valuable when a titer is 1:160 or higher. *Brucella* agglutination tests should include the simple procedure of identifying the titers of IgG and IgM antibodies. IgG antibodies indicate active disease. Therefore, when the agglutination test is positive with no bacteriologic evidence, diagnosis is based on a history of exposure to infected animals or animal products (eg, ingestion of unpasteurized milk), epidemiologic data, and the characteristic clinical findings and course. Intradermal tests with *Brucella* antigens are of little value in diagnosing active brucellosis.

Prophylaxis

Pasteurizing milk and eating only aged cheese will help prevent human *Brucella* infections. Persons handling animals or carcasses likely to be infected should wear goggles (or glasses) and rubber gloves and should protect skin breaks from bacterial invasion. Every effort should be made to detect the infection in animals and eliminate infected animals and to vaccinate young seronegative cattle and swine.

Treatment

Since treatment with single agents has been associated with a high incidence of relapses, combination therapy is used whenever possible. Doxycycline 100 mg orally bid (or tetracycline 500 mg orally qid) for 3 to 6 wk plus streptomycin 1 gm IM q 12 to 24 h for 14 days lowers the rate of relapses. In children < 8 yr, trimethoprim/sulfamethoxazole and either IM streptomycin or oral rifampin for 3 to 5 wk have been used. Prednisone 20 mg orally tid for 5 to 7 days can be given concurrently with the antibiotics if toxemia is present. Severe musculoskeletal pains, especially over the spine, may require codeine 15 to 60 mg orally or s.c. q 4 to 6 h.

Activity should be restricted in acute cases, with bed rest recommended during febrile periods.

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