

Employee Liabilities  
of  
Weapon Manufacturers  
Under  
International Law



# Employee Liabilities of Weapon Manufacturers Under International Law

---

## Contents

---

1. An open letter to  
Daniel J. Murphy, Jr.  
Chairman and Chief Executive Officer  
Alliant Techsystems, Inc.
2. The Nuremberg Principles
3. The Constitution of the United States, Article VI
4. The Geneva Conventions, Article IV
5. The Geneva Conventions, Protocol I
6. Case Studies of Industrialist charged with Crimes Against Humanity:
  - a. United States of America vs. Friedrich Flick, et al.
  - b. United States of America vs. Carl Krauch, et al.
  - c. United States of America vs. Alfred Krupp, et al.
7. Published Media:
  - A Delicate and Dangerous Job*  
Minneapolis StarTribune, July 6, 2004
  - Cluster Bombs Kill in Iraq, Even After Shooting Ends*  
USA TODAY, December 16, 2003
  - Weapons of Self-Destruction*  
Vanity Fair, December, 2004



Vice-Admiral Daniel J. Murphy, Jr., USN (Ret)  
Chairman and Chief Executive Officer  
Alliant Techsystems, Inc.  
5050 Lincoln Drive  
Edina, Minnesota 55439

Dear Vice-Admiral Murphy,

We have sent you letters questioning the legality of certain products currently or formerly produced by ATK, including cluster bombs, landmines and depleted uranium munitions. We have received no response. We have since made repeated phone requests to schedule a meeting to no avail.

The Geneva Conventions make clear the rules of war, including the banning of weapons that cannot distinguish between combatants and civilians, put the civilian population at undue risk or spoil the land.

Over thirty years after the conflict has ended in Southeast Asia, cluster bombs continue to maim and kill civilians every day. These civilians are not combatants, but daughters and sons, mothers and fathers. Representative Betty McCollum of Minnesota has introduced a bill to fund the clean-up of cluster bombs in Laos used there decades ago. Cluster bombs are clearly indiscriminate weapons and illegal under International Laws and Treaties.

On July 6, 2004, the Minneapolis StarTribune ran a front page article about the continued effects of landmines in Afghanistan. It graphically depicted children being blown-up from the legacy of Soviet and *American* landmines planted in their country. Who are these children described as dying in the article - a combatant or a normal 10 year old? Landmines are clearly indiscriminate weapons and illegal under International Laws and Treaties.

Depleted Uranium (DU) Munitions have been used extensively in Gulf War I, the Balkans and now Gulf War II. Four national guardsmen from New York, who returned from Iraq, have been tested and found to be contaminated by uranium. The long term health effects are unknown, but many medical experts warn of the dangers and the English Ministry of Defense has issued warnings to its soldiers entering areas where DU munitions have been deployed. But there are additional consequences which also must be taken into account. The pyrotechnic nature of DU munitions causes them to be aerosolized and dispersed on the ground and blown by the winds upon impact. What are the long term effects on the land and civilian populations? What protection is being provided to civilians and U.S. military personnel in the areas where these munitions were deployed? Can the radioactive, alpha emitting metallic toxic waste, left over from a DU shell, distinguish between a combatant and a civilian? Depleted Uranium Munitions are indiscriminate weapons and illegal under International Laws and Treaties.

As the individuals responsible for the welfare of ATK employees while they are on the job, we ask: What are the health effects on ATK production workers who manufactured the depleted uranium munitions? Did ATK put them at undue risk? Did



ATK employees wear the same protective gear worn by the clean-up crew of building 502, the site of DU munition production at the Twin City Army Ammunition Plant?

Perhaps your position is the United States Government has ordered these products and ATK will provide them, after all, if you don't someone else will. Could your only concern be the shareholder value these contracts represent? But the Nuremberg Principles are quite clear. Principle IV states: *The fact that a person acted pursuant to order of his Government or of a superior does not relieve him from responsibility under international law, provided a moral choice was in fact possible to him.* Have you made that moral choice?

We would like to meet you to engage in a dialog regarding the issues raised in this letter, issues which are of concern to all the people who participate in the weekly vigil outside the doors of ATK. We look forward to your reply.

In Peace,

for AlliantACTION





---

## THE NUREMBERG PRINCIPLES

---

### Principles of International Law Recognized in the Charter of the Nuremberg Tribunal and in the Judgment of the Tribunal

United Nations International Law Commission

#### ***Principle I***

***Any person who commits an act which constitutes a crime under international law is responsible therefor and liable to punishment.***

#### Principle II

The fact that internal law does not impose a penalty for an act which constitutes a crime under international law does not relieve the person who committed the act from responsibility under international law.

#### Principle III

The fact that a person who committed an act which constitutes a crime under international law acted as Head of State or responsible Government official does not relieve him from responsibility under international law.

#### ***Principle IV***

***The fact that a person acted pursuant to order of his Government or of a superior does not relieve him from responsibility under international law, provided a moral choice was in fact possible to him.***

#### Principle V

Any person charged with a crime under international law has the right to a fair trial on the facts and law.

#### ***Principle VI***

***The crimes hereinafter set out are punishable as crimes under international law:***

##### ***(a) Crimes against peace:***

***(i) Planning, preparation, initiation or waging of a war of aggression or a war in violation of international treaties, agreements or assurances;***

(ii) Participation in a common plan or conspiracy for the accomplishment of any of the acts mentioned under (i).

***(b) War crimes:***

Violations of the laws or customs of war which include, but are not limited to, murder, ill-treatment or deportation to slave-labor or for any other purpose of civilian population of or in occupied territory; murder or ill-treatment of prisoners of war, of persons on the Seas, killing of hostages, plunder of public or private property, ***wanton destruction of cities, towns, or villages***, or devastation not justified by military necessity.

***(c) Crimes against humanity:***

Murder, extermination, enslavement, deportation and ***other inhuman acts done against any civilian population***, or persecutions on political, racial or religious grounds, when such acts are done or such persecutions are carried on in execution of or in connection with any crime against peace or any war crime.

Principle VII

***Complicity in the commission of a crime against peace, a war crime, or a crime against humanity as set forth in Principle VI is a crime under international law.***

---

**THE CONSTITUTION of the UNITED STATES of AMERICA**

---

We the People of the United States, in Order to form a more perfect Union, establish Justice, insure domestic Tranquility, provide for the common Defense, promote the general Welfare, and secure the Blessings of Liberty to ourselves and our Posterity, do ordain and establish this Constitution for the United States of America.

***Article. VI***

Clause 2: This Constitution, and the Laws of the United States which shall be made in Pursuance thereof; and ***all Treaties made, or which shall be made, under the Authority of the United States, shall be the Supreme Law of the Land***; and the ***Judges in every State shall be bound thereby***, any thing in the Constitution or ***Laws of any State to the Contrary notwithstanding***.

---

## THE GENEVA CONVENTIONS

---

### **Convention (IV) respecting the Laws and Customs of War on Land and its annex: Regulations concerning the Laws and Customs of War on Land**

The Hague, 18 October 1907.

(relevant excerpt)

Seeing that while seeking means to preserve peace and prevent armed conflicts between nations, it is likewise necessary to bear in mind the case where the appeal to arms has been brought about by events which their care was unable to avert;

Animated by the desire to serve, even in this extreme case, the interests of humanity and the ever progressive needs of civilization;

Thinking it important, with this object, to revise the general laws and customs of war, either with a view to defining them with greater precision or to confining them within such limits as would mitigate their severity as far as possible;

Have deemed it necessary to complete and explain in certain particulars the work of the First Peace Conference, which, following on the Brussels Conference of 1874, and inspired by the ideas dictated by a wise and generous forethought, adopted provisions intended to define and govern the usages of war on land.

According to the views of the High Contracting Parties, these provisions, the wording of which has been inspired by the desire to diminish the evils of war, as far as military requirements permit, are intended to serve as a general rule of conduct for the belligerents in their mutual relations and in their relations with the inhabitants.

It has not, however, been found possible at present to concert regulations covering all the circumstances which arise in practice;

On the other hand, the High Contracting Parties clearly do not intend that unforeseen cases should, in the absence of a written undertaking, be left to the arbitrary judgment of military commanders.

Until a more complete code of the laws of war has been issued, the High Contracting Parties deem it expedient to declare that, in cases not included in the Regulations adopted by them, the inhabitants and the belligerents remain under the protection and the rule of the principles of the law of nations, as they result from the usages established among civilized peoples, from the laws of humanity, and the dictates of the public conscience.

## SECTION II: HOSTILITIES

### CHAPTER I

Means of injuring the enemy, sieges, and bombardments

***Art. 22. The right of belligerents to adopt means of injuring the enemy is not unlimited.***

***Art. 23. In addition to the prohibitions provided by special Conventions, it is especially forbidden:***

(a) To employ poison or poisoned weapons;

***(b) To kill or wound treacherously individuals belonging to the hostile nation or army;***

(c) To kill or wound an enemy who, having laid down his arms, or having no longer means of defense, has surrendered at discretion;

(d) To declare that no quarter will be given;

***(e) To employ arms, projectiles, or material calculated to cause unnecessary suffering;***

(f) To make improper use of a flag of truce, of the national flag or of the military insignia and uniform of the enemy, as well as the distinctive badges of the Geneva Convention;

***(g) To destroy or seize the enemy's property,*** unless such destruction or seizure be imperatively demanded by the necessities of war;

(h) To declare abolished, suspended, or inadmissible in a court of law the rights and actions of the nationals of the hostile party. A belligerent is likewise forbidden to compel the nationals of the hostile party to take part in the operations of war directed against their own country, even if they were in the belligerent's service before the commencement of the war.

---

## THE GENEVA CONVENTIONS

---

### **Protocol I: Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts**

8 June 1977.

(relevant excerpt)

Preamble

The High Contracting Parties,

Proclaiming their earnest wish to see peace prevail among peoples,

Recalling that every State has the duty, in conformity with the Charter of the United Nations, to refrain in its international relations from the threat or use of force against the sovereignty, territorial integrity or political independence of any State, or in any other manner inconsistent with the purposes of the United Nations,

Believing it necessary nevertheless to reaffirm and develop the provisions protecting the victims of armed conflicts and to supplement measures intended to reinforce their application,

Expressing their conviction that nothing in this Protocol or in the Geneva Conventions of 12 August 1949 can be construed as legitimizing or authorizing any act of aggression or any other use of force inconsistent with the Charter of the United Nations,

Reaffirming further that the provisions of the Geneva Conventions of 12 August 1949 and of this Protocol must be fully applied in all circumstances to all persons who are protected by those instruments, without any adverse distinction based on the nature or origin of the armed conflict or on the causes espoused by or attributed to the Parties to the conflict,

Have agreed on the following:

#### ***Part III. Methods and Means of Warfare***

Section I. Methods and Means of Warfare

##### ***Art. 35. Basic rules***

***1. In any armed conflict, the right of the Parties to the conflict to choose methods or means of warfare is not unlimited.***

***2. It is prohibited to employ weapons, projectiles and material and methods of warfare of a nature to cause superfluous injury or unnecessary suffering.***

**3. It is prohibited to employ methods or means of warfare which are intended, or may be expected, to cause widespread, long-term and severe damage to the natural environment.**

Art. 36. New weapons

In the study, development, acquisition or adoption of a new weapon, means or method of warfare, a High Contracting Party is under an obligation to determine whether its employment would, in some or all circumstances, be prohibited by this Protocol or by any other rule of international law applicable to the High Contracting Party.

#### **Part IV. Civilian Population**

Section I. General Protection Against Effects of Hostilities

Chapter I. Basic rule and field of application

##### **Art. 48. Basic rule**

***In order to ensure respect for and protection of the civilian population and civilian objects, the Parties to the conflict shall at all times distinguish between the civilian population and combatants and between civilian objects and military objectives and accordingly shall direct their operations only against military objectives.***

Art. 49. Definition of attacks and scope of application

1. "Attacks" means acts of violence against the adversary, whether in offense or in defense.

2. The provisions of this Protocol with respect to attacks apply to all attacks in whatever territory conducted, including the national territory belonging to a Party to the conflict but under the control of an adverse Party.

***3. The provisions of this section apply to any land, air or sea warfare which may affect the civilian population, individual civilians or civilian objects on land.*** They further apply to all attacks from the sea or from the air against objectives on land but do not otherwise affect the rules of international law applicable in armed conflict at sea or in the air.

4. The provisions of this section are additional to the rules concerning humanitarian protection contained in the Fourth Convention, particularly in part II thereof, and in other international agreements binding upon the High Contracting Parties, as well as to other rules of international law relating to the protection of civilians and civilian objects on land, at sea or in the air against the effects of hostilities.

## **Chapter II. Civilians and civilian population**

### Art. 50. Definition of civilians and civilian population

1. A civilian is any person who does not belong to one of the categories of persons referred to in Article 4 (A) (1), (2), (3) and (6) of the Third Convention and in Article 43 of this Protocol. In case of doubt whether a person is a civilian, that person shall be considered to be a civilian.
2. The civilian population comprises all persons who are civilians.
3. The presence within the civilian population of individuals who do not come within the definition of civilians does not deprive the population of its civilian character.

### **Art. 51. - Protection of the civilian population**

**1. The civilian population and individual civilians shall enjoy general protection against dangers arising from military operations.** To give effect to this protection, the following rules, which are additional to other applicable rules of international law, shall be observed in all circumstances.

2. The civilian population as such, as well as individual civilians, shall not be the object of attack. Acts or threats of violence the primary purpose of which is to spread terror among the civilian population are prohibited.

3. Civilians shall enjoy the protection afforded by this section, unless and for such time as they take a direct part in hostilities.

**4. Indiscriminate attacks are prohibited.** Indiscriminate attacks are: (a) those which are not directed at a specific military objective; **(b) those which employ a method or means of combat which cannot be directed at a specific military objective;** or (c) those which employ a method or means of combat the effects of which cannot be limited as required by this Protocol; and consequently, in each such case, **are of a nature to strike military objectives and civilians or civilian objects without distinction.**

5. Among others, the following types of attacks are to be considered as indiscriminate:

(a) an attack by bombardment by any methods or means which treats as a single military objective a number of clearly separated and distinct military objectives located in a city, town, village or other area containing a similar concentration of civilians or civilian objects;

and

**(b) an attack which may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof,** which would be excessive in relation to the concrete and direct military advantage anticipated.

6. Attacks against the civilian population or civilians by way of reprisals are prohibited.

7. The presence or movements of the civilian population or individual civilians shall not be used to



render certain points or areas immune from military operations, in particular in attempts to shield military objectives from attacks or to shield, favor or impede military operations. The Parties to the conflict shall not direct the movement of the civilian population or individual civilians in order to attempt to shield military objectives from attacks or to shield military operations.

8. Any violation of these prohibitions shall not release the Parties to the conflict from their legal obligations with respect to the civilian population and civilians, including the obligation to take the precautionary measures provided for in Article 57.

---

## CASE STUDIES

---

In April 1949, judgment was rendered in the last of the series of 12 Nuremberg war crimes trials which had begun in October 1946 and were held pursuant to Allied Control Council Law No. 10. **Far from being of concern solely to lawyers, these trials are of especial interest to soldiers, historians, students of international affairs, and others.**

The **defendants in these proceedings, charged with war crimes and other offenses** against international penal law, were prominent figures in Hitler's Germany and included such outstanding diplomats and politicians as the State Secretary of the Foreign Office, von Weizsaecker, and cabinet ministers von Krosigk and Lammers; military leaders such as Field Marshals von Leeb, List, and von Kuechler; SS leaders such as Ohlendorf, Pohl, and Hildebrandt; **industrialists such as Flick, Alfried Krupp, and the directors of I. G. Farben**; and leading professional men such as the famous physician Gerhard Rose, and the jurist and Acting Minister of Justice, Schlegelberger.

1. United States of America vs. Friedrich Flick, et al.  
Six officials of the Flick Industrial Concern
2. United States of America vs. Carl Krauch, et al.  
23 officials of the I.G. Farben Industrial Concern
3. United States of America vs. Alfried Felix Alwyn Krupp von Bohlen und Halbach, et al.  
Twelve officials of the Krupp Industrial Concern

## United States of America vs. Friedrich Flick, et al.

The trial of Friedrich Flick and five other officials of the Flick Concern was commonly referred to as the "Flick Case" and is officially designated *United States of America vs. Friedrich Flick, et al.* (Case 5) and was the **first of the industrialist cases** tried in Nuremberg.

The six defendants were **leading officials in the Flick Concern** or its subsidiary companies and were **charged with the commission of war crimes and crimes against humanity**, principally because of conduct undertaken as officials of the Flick Concern. The specific counts **charged them with** conduct relating to slave labor, **the spoliation of property** in occupied France and the Soviet Union, the "Aryanization" of Jewish industrial and mining properties, beginning in the year 1936 (charged only as crimes against humanity), and membership in and support of the SS and the Circle of Friends of Himmler.

In its judgment the Tribunal **found the defendant Flick guilty under the charges of** slave labor, **spoliation**, and support of criminal activities of the SS by his financial contributions to the Circle of Friends of Himmler; the defendant Steinbrinck guilty of membership in the SS and support of the criminal activities of the SS by his participation in the Circle of Friends of Himmler; and the defendant Weiss guilty under the slave-labor charges. The Tribunal acquitted the three other defendants Burkart, Kaletsch, and Terberger on all the counts under which they were indicted.

## United States of America vs. Carl Krauch, et al.

The trial of **23 officials of the I.G. Farben** concern was commonly referred to as the Farben case and is officially designated as *United States of America vs. Carl Krauch, et al.* (Case 6). The Farben case was the third largest of all the Nuremberg trials and was the **second of the industrialist cases**.

Each of the 23\* defendants in the Farben trial was an official of the I.G. Farben concern for varying periods of time: the first-named defendant, Krauch, was a member of Farben's managing board (Vorstand) from 1934 until 1940 and thereafter, until 1945, the chairman of Farben's supervisory board (Aufsichtsrat) 19 of the other defendants were members of the managing board; and three of the defendants held other important positions in the concern.

**Each of the defendants was charged** under four of the five counts of the indictment: count one, the **planning, preparation, initiation, and waging of wars of aggression** and the invasions of other countries; count two, plunder and **spoliation**; count three, slave labor; and count five, common plan or conspiracy to commit crimes against peace. Only three of the defendants, Schneider, Bueteffisch, and von der Heyde, were charged under count four with membership in the SS, an organization of the Nazi Party declared criminal by the judgment of the International Military Tribunal. None of the defendants was found guilty under counts one and five (crimes against peace). **Nine of the defendants were found guilty under count two, plunder and spoliation:** Buergin, Haefliger, Ilgner, Jaehne, Kugler, ter Meer, Oster, Schmitz, and von Schnitzler. Five of the defendants were found guilty under count three (slave labor) : Ambros, Bueteffisch, Duerrfeld, Krauch, and ter Meer. None of the three defendants charged was found guilty under count four (membership in the SS).

---

\* The Farben indictment named 24 defendants. The case as to defendant Brueggemann was severed early in the trial by reason of Brueggemann's ill health and inability to stand trial.

## United States of America vs. Alfried Felix Alwyn Krupp von Bohlen und Halbach, et al.

The trial of **twelve officials of the Krupp** concern was commonly referred to as the “Krupp Case” and is officially designated as *United States of America vs. Alfried Felix Alwyn Krupp von Bohlen und Halbach, et al* (Case 10). The Krupp Case was the **third and last of the industrialist cases** tried in Nuremberg.

Alfried Krupp and eight of his codefendants were members or deputy members of the Vorstand (Managing Board) of the concern for varying periods of time, and the other three defendants held other important official positions in the firm. After December 1943, Alfried Krupp was the sole owner and the directing head of the Krupp concern.

All of the **defendants were charged with crimes against peace and with participation in a common plan or conspiracy to commit crimes against peace** (counts one and four). These charges were dismissed by the Tribunal shortly after the prosecution's case-in-chief was completed, upon a defense motion that the prosecution's evidence had failed to sustain these charges. **All of the defendants**, except Kupke and Lehmann, **were charged under count two with plunder and spoliation** activities during belligerent occupations by Germany of neighboring countries. Six of the ten defendants charged **were found guilty under this count**. **All of the defendants were charged with war crimes and crimes against humanity** in connection with the slave labor program of the Third Reich (count three) and all defendants, except Pfirsch, **were found guilty under this count**. The defendant Pfirsch alone was acquitted on all counts.

---

Gustav Krupp von Bohlen und Halbach, the father of the first named defendant and the leading figure in the Krupp concern until 1943, was not indicted because of his continuing incapacity to stand trial for physical and mental reasons. Gustav Krupp had been indicted under all four counts of the indictment, being **charged with crimes against the peace, war crimes, and crimes against humanity**.



Select Published Media





## A delicate and dangerous job

Sharon Schmickle

Published July 6, 2004

BAGRAM AIR BASE, AFGHANISTAN -- Inviting the danger that Afghans dread every day, Sgt. Gary Feldewerd manipulated a control panel inside his armored cab and started slapping the ground with chains in search of land mines and other unexploded weapons.

As the resulting dust plume drifted, Feldewerd, from New Munich, Minn., saw that the flail had uncovered a mortar shell and a battered explosives box.

The work that Feldewerd and other Army reservists in Minnesota's 367th Engineer Battalion are doing to help clear Afghanistan's minefields came too late to save Parwana Meer's right leg and Gulmarjan's life.

Gulmarjan, 13, was herding goats near his village, Lalander, in May. One goat strayed off the path. The boy ran to fetch it. And suddenly, his lower body exploded in a cloud of red vapor, his cousin said. A pile of stones marks where his family buried what was left of his remains.

Meer, also 13, was cooking rice in her family's mud and stone house near Bagram when an explosion shattered one of her legs below the knee and severely burned the other.

Sitting by her bed at a U.S. Army field hospital in June, her brother told a story that is all too familiar in this war-ravaged land where weapons continue to kill and maim long after the clashing armies have left.

Meer and her family returned this year to the village they had fled when it became a battleground between the Taliban and rival northern tribes, Naseer Meer said. What the villagers didn't know is that the retreating Taliban forces had booby trapped their houses -- in the Meers' case, planting a mine under the kitchen's dirt floor.

Such tragedies are everyday occurrences in Afghanistan, one of the world's most heavily mined nations. Blasts from land mines and other ordnance kill or maim dozens of people every month.

No one knows how much unexploded military junk remains strewn around Afghanistan. By any estimate, there are more than 10 million explosive devices in a space the size of Texas, said Maj. Paul Mason of the Australian Army. He coordinates the Minnesota battalion's mine-clearing projects under the United Nations' larger effort in Afghanistan involving work by military and civilian groups from many nations.

### Children vulnerable

In Afghanistan, where women have been secluded, three out of four victims are male. The blasts have been most deadly for children, however, because their vital organs are closer to the explosions. And children are more likely than adults to pick up strange objects. Especially tempting were toy-like "butterfly mines" the Soviets dropped from aircraft.

Most of the mines uncovered in Afghanistan were laid by Soviet forces and their supporters from 1979 to 1992, according to Human Rights Watch. But the United States provided mines to anti-Soviet mujahedeen fighters in the 1980s.

The United States is not known to have used anti-personnel land mines since the Gulf War in 1991. Still, it is sharply criticized by groups working to rid the world of land mines because it hasn't signed a mine-ban treaty, ratified by 142 other nations, including Afghanistan. Beyond mines, cluster bombs are a major concern because they scatter explosives that often lie in

wait rather than going off on impact. Many remnants of the bombs the U.S.-led forces dropped during 2001 and 2002 were designed to deactivate after a set period, Human Rights Watch said, but critics aren't satisfied that the feature works.

The United States has paid for a good share of the land mine removal in Afghanistan, along with European nations, Japan and Canada.

Despite the global cooperation, no one expects Afghanistan to be mine-free anytime soon.

To understand why, join the Minnesota teams as they clear a patch of land near Bagram Air Base. The area is to be used for military operations now and eventually turned over to the Afghan people.

### **The Hydrema**

Climbing into the Hydrema, the mine-clearing vehicle, is like getting into the cab of a construction crane, except instead of a long arm, this beast has a turntable holding a steel blast shield and a 72-chain flail. The cab's windshield is pocked and battered by blasts. The last battalion to use these machines set off an anti-tank mine. It blew out an engine and rear axle, but the soldier inside the armored cab survived.

There will be no stepping out of the cab, Feldewerd orders. Sometimes, he'll scramble over the top of the Hydrema to handle a problem. Feldewerd is operating one of three Hydremas working together to clear a lane just over 3 yards wide.

### **Bounce. Jolt. Slap. Slap. Slap.**

Each of the 30-inch chains is spun into the ground with a force of 2,000 pounds per square inch. The dust is so blinding that Feldewerd has no idea what's being unearthed. The other two Hydrema operators spot for him. As the dust clears, they see an artillery casing from a tank round and a lot of other debris that may or may not blow up.

Whenever possible, the soldiers try to spot explosives without detonating them. When Feldewerd saw the mortar shell, he fixed its location with a global positioning device and reported it to explosives teams for disposal.

Since beginning work in late April, the Minnesota battalion and a private contractor working with the troops at Bagram and another airfield near Kandahar have uncovered hundreds of bombs, a dozen anti-tank mines and more than 200 anti-personnel mines. They also have unearthed a well-fortified Soviet fighting position with a steel roof that was covered by dirt.

Scary stuff? Maybe. But Feldewerd is a study in cool control.

"I like the minefields," he said. "Mostly because there isn't anybody out here bothering you."

### **Indeed.**

Once the heavy equipment operators have flailed a safe lane through a minefield, they hand off to a team that works the ground much like archeologists on a dig, probing and sifting dirt cupful by cupful. Except, of course, relics here are more volatile than dinosaur bones. This is slow, dusty work, much of it done while crawling or lying belly down.

Sgt. Steven Tyler from Sleepy Eye, Minn., is training others to use a device that resembles a beachcomber's metal detector. Only this gadget also has ground-penetrating radar capable of sizing up objects as deep as 8 inches.

Because this ground is littered with metal shrapnel and trash as banal as old sardine tins from Soviet mess kits, a metal detector alone would give so many false positives that the job would never get done, Tyler said. Further, some mines are mostly plastic and give only a weak hum on the metal detector.

"Ground-penetrating radar is a lifesaver out here," said Tyler, who learned to clear mines in Korea in 1988 and took extra training at Fort Leonard Wood in Missouri before deploying to Afghanistan. More than 100 troops are getting their first hands-on intensive training here in the minefields.

Donning body armor, protective boots and face shields, they work in pairs to clear branches off the safe lane. First the soldiers check a patch of soil for visible debris, then scan it with the metal detector/radar gizmo, marking suspicious spots. Finally, they get down on the ground and gingerly dig around the marked spots with a probe and garden trowel.

The hard-packed dirt is not helpful. A little heft behind the probe is needed to break the soil. Push too hard, though, and there's a danger of setting off a blast. The point is not to blow anything up but to mark the hot stuff for explosives teams.

Inching forward hour by hour, the manual detection teams clear criss-crossing lanes through the field, leaving large patches in between.

### **Next step: canines**

Now come the dogs, pacing each uncleared patch, nose to the ground. They belong to RONCO Consulting Corp., a Virginia-based contractor working with the Minnesota battalion. The military also owns dogs the troops will use after the teams are trained.

The dogs are trained to smell explosives, plastics and metals, said Joel Murray, RONCO's program manager, and to signal a find by sitting in a certain way and looking at a handler. Trust between dog and handler must be unshakable, Murray said, and it takes months of training to develop.

"You have to trust the dog because you have to walk through the areas the dog has proofed," Murray said.

Even so, the soldiers use a two-dog test before they trust a patch of land. And they're careful to work under conditions that are ideal for the dogs -- never when the wind is behind the dogs or when the dogs are tired.

When a dog makes a hit, the manual detection team follows through to size up and carefully uncover the find.

Mine-clearing has become one of Afghanistan's largest industries since the United Nations began coordinating the effort in 1990. The work has been paced by fits and starts because Afghanistan has been so politically volatile.

During the 1990s, the Taliban and other warring factions raided de-mining project offices, seizing equipment and assaulting staff members. Operations were sharply curtailed in 2001 as it became clear the United States would attack Taliban and Al-Qaida forces in response to the Sept. 11, 2001, attacks.

Since then, insurgents have plagued mine-removal teams. Last year, the United Nations suspended operations in eight provinces because of threats against workers. Assailants who ambushed their vehicle shot and killed four U.N. de-miners in Farar Province in February, the Associated Press reported.

### **Many casualties**

Despite the attacks, there is little doubt that most Afghans are deeply thankful for the effort. Almost every family has suffered the casualties seen at an orthopedic clinic in Kabul run by the International Committee for the Red Cross. Nine in 10 of the workers and most of the patients are mine victims, said the director, Najmuddin, who like many Afghans goes by a single name.

He lost both of his legs 22 years ago while hauling sand from a riverbed near Kabul. His truck hit a land mine, knocking him unconscious for five days. When he woke, his life seemed to be over at

age 18. After five empty years at home, he found the Red Cross clinic and a new life.

"I got prosthetics and they pushed me to walk," he said.

Deeply grateful, Najmuddin volunteered to work for the clinic for free. Instead, the clinic hired him and educated him as a physical therapist. In the 16 years since then, Najmuddin has seen a heartbreaking parade of mine victims: "I have seen many who lost one leg to a mine, then hit another and lost the second leg. I have seen one man who survived a third encounter. His wheelchair hit a mine, and he lost a hand and an eye."

For land mine victims, this clinic offers physical rehabilitation -- new feet, legs and hands, along with lessons in using them. It also provides social rehabilitation, from processing the emotional horror of the blast to learning work skills.

Like Najmuddin, everyone has a story. Parnaz Spandyar, a 12-year-old wisp of a girl with haunting eyes, believed the pasture where she was herding goats had been cleared of mines. It wasn't. She lost her left leg below the knee in April.

Abjalal Hormat was a soldier when he lost a leg 12 years ago.

Fahim, 15, was walking near an abandoned Soviet checkpoint last year when a blast took one leg and severely burned the other, damaging his nerves. He dropped out of school after fifth grade.

Nasir, also 15, took one step off a well-worn walking path in his village in Parwan Province and lost one leg above the knee.

These are the lucky ones, Najmuddin said. They survived.

Any rewards the Minnesota troops gain from mine-clearing come from a sense of duty and humanitarianism. They get hazard pay for being in Afghanistan, a war zone, but nothing extra for hunting mines. Many of them will leave Afghanistan with skills they don't expect to use in the mine-free Midwest.

Specialist Douglas McLellan from Carlton, Minn., joked that the proof of his expertise will be going home in one piece: "Ten fingers and 10 toes, that's my résumé." Seriously, McLellan said, the mines are "all the proof I need that the work we're doing here is important."

Sharon Schmickle is at [sschmickle@startribune.com](mailto:sschmickle@startribune.com).  
© Copyright 2004 Star Tribune. All rights reserved.

<http://www.startribune.com/stories/126/4861806.html>

USA TODAY

## Cluster bombs kill in Iraq, even after shooting ends

By Paul Wiseman, USA TODAY

Published December 16, 2003

BAGHDAD — The little canisters dropped onto the city, white ribbons trailing behind. They clattered into streets, landed in lemon trees, rattled around on roofs, settled onto lawns.

When Jassim al-Qaisi saw the canisters the size of D batteries falling on his neighborhood just before 7 a.m. April 7, he laughed and asked himself: "Now what are the Americans throwing on our heads?"

The strange objects were fired by U.S. artillery outside Baghdad as U.S. forces approached the Iraqi capital. In the span of a few minutes, they would kill four civilians in the al-Dora neighborhood of southern Baghdad and send al-Qaisi's teenage son to the hospital with metal fragments in his foot.

The deadly objects were cluster bomblets, small explosives packed by the dozens or hundreds into bombs, rockets or artillery shells known as cluster weapons. When these weapons were fired on Baghdad on April 7, many of the bomblets failed to explode on impact. They were picked up or stumbled on by their victims.

The four who died in the al-Dora neighborhood that day lived a few blocks from al-Qaisi's house. Rashid Majid, 58, who was nearsighted, stepped on an unexploded bomblet around the corner from his home. The explosion ripped his legs off. As he lay bleeding in the street, another bomblet exploded a few yards away, instantly killing three young men, including two of Majid's sons — Arkan, 33, and Ghasan, 28. "My sons! My sons!" Majid called out. He died a few hours later.

The deaths occurred because the world's most modern military, one determined to minimize civilian casualties, went to war with stockpiles of weapons known to endanger civilians and its own soldiers. The weapons claimed victims in the initial explosions and continued to kill afterward, as Iraqi and U.S. forces accidentally detonated bomblets lying around like small land mines.

A four-month examination by USA TODAY of how cluster bombs were used in the Iraq war found dozens of deaths that were unintended but predictable. Although U.S. forces sought to limit what they call "collateral damage" in the Iraq campaign, they defied international criticism and used nearly 10,800 cluster weapons; their British allies used almost 2,200.

The bomblets packed inside these weapons wiped out Iraqi troop formations and silenced Iraqi artillery. They also killed civilians. These unintentional deaths added to the hostility that has complicated the U.S. occupation. One anti-war group calculates that cluster weapons killed as many as 372 Iraqi civilians. The numbers are impossible to verify: Iraqi hospital records are incomplete, and many Iraqi families buried their dead without reporting their deaths.

In the most comprehensive report on the use of cluster weapons in Iraq, USA TODAY visited Iraqi neighborhoods and interviewed dozens of Iraqi families, U.S. troops, teams clearing unexploded ordnance in Iraq, military analysts and humanitarian groups. The findings:

- The Pentagon presented a misleading picture during the war of the extent to which cluster weapons were being used and of the civilian casualties they were causing. Gen. Richard Myers, chairman of the Joint Chiefs of Staff, told reporters on April 25, six days before President Bush declared major combat operations over, that the United States had used 1,500 cluster weapons and caused one civilian casualty. It turns out he was referring only to cluster weapons dropped from the air, not those fired by U.S. ground forces.

In fact, the United States used 10,782 cluster weapons, according to the declassified executive summary of a report compiled by U.S. Central Command, which oversaw military operations in Iraq. Centcom sent the figures to the Joint Chiefs in response to queries from USA TODAY and others, but details of the report remain secret.

U.S. forces fired hundreds of cluster weapons into urban areas. These strikes, from late March to early April, killed dozens and possibly hundreds of Iraqi civilians. Forty civilians were killed in one neighborhood in Hillah, 60 miles south of Baghdad, say residents and Saad Khazal al-Faluji, a surgeon at Hillah General Hospital who tracked casualties.

The attacks also left behind thousands of unexploded bomblets, known as duds, that continued to kill and injure Iraqi civilians weeks after the fighting stopped. U.S. officials say they sought to limit civilian casualties by trying to avoid using cluster munitions. But often alternative weapons were not available or would not have been as effective during the invasion.

- Unexploded U.S. cluster bomblets remain a threat to U.S. forces in Iraq. They have killed or injured at least eight U.S. troops.
- The U.S. Air Force, criticized for using cluster bombs that killed civilians during the wars in Vietnam, Kosovo and Afghanistan, has improved its cluster bombs. But U.S. ground forces relied on cluster munitions known to cause a high number of civilian casualties.

The Air Force, responding to the criticism, began working on safer cluster bombs in the mid-1990s and started using them in Afghanistan. But the Army started a program to install self-destruct fuses in existing cluster bomblets only after former Defense Secretary William Cohen called in January 2001 for dud rates of no more than 1% after 2005. The safer bomblets won't be available for at least two years. During the war in Iraq, U.S. ground forces dipped into stockpiles of more than 740 million cluster bomblets, all with a history of high dud rates.

Senior Army officials in Washington would not answer questions about the Army's use of cluster weapons in Iraq. Maj. Gary Tallman, an Army spokesman at the Pentagon, said such weapons are effective "against enemy troop formations and light-skinned vehicles" and are used only after "a deliberate decision-making process."

### **Why cluster bombs are deadly**

Cluster bombs have been controversial since they killed thousands of Vietnamese, Cambodian and Laotian civilians during and after the Vietnam War. They have since been used by armies around the world, including Russian forces in Chechnya and Sudanese government troops fighting rebels in a long-running civil war. But their use in urban areas of Iraq has given new momentum to a movement to restrict the use of cluster bombs.

Last month, dozens of activist groups hoping to duplicate the success of the campaign to ban land mines formed a coalition aimed at getting a worldwide moratorium on cluster weapons. After seeing the toll the weapons took on Iraqi civilians and their own forces, even some U.S. soldiers have misgivings about using cluster weapons, at least in urban areas.

As the war in Iraq approached, humanitarian groups warned the Pentagon against using cluster weapons, especially in urban areas. New York-based Human Rights Watch predicted on March 18, a day before the war began with an airstrike in Baghdad: "The use of cluster munitions in Iraq will result in grave dangers to civilians and friendly combatants." Cluster weapons are especially dangerous to civilians because they spray wide areas with hundreds of bomblets. Most are unguided "dumb" weapons, so they can miss their target, and many of the bomblets don't explode immediately.

The U.S. military was aware of the threat cluster munitions posed and was determined to minimize them. Col. Lyle Cayce, an Army judge advocate general (JAG), led a team of 14 lawyers providing advice on the battlefield to the 3rd Infantry Division on the use of cluster munitions, as well as other weapons, during its 21-day, 450-mile drive north from Kuwait to Baghdad. The goal was to ensure that U.S. forces complied with international humanitarian law, enshrined in the Geneva

Conventions. "No other army in the world does that," Cayce says. "We value the rule of law."

The Geneva Conventions hold that when choosing which targets to hit and which weapons to use, armies must make sure they do not "cause superfluous injury or unnecessary suffering" and ensure that the harm to civilians does not outweigh the military advantages.

U.S. forces relied on sophisticated radar to pinpoint the sources of Iraqi fire, then cross-checked them against a computerized list of about 10,000 sensitive sites, such as mosques and schools. Cayce and the other lawyers looked at potential targets and advised U.S. commanders whether the military benefits of using specific weapons against those targets justified the risks to civilians.

Cayce gave advice 512 times during the war, usually in cases involving cluster munitions. Most involved sites outside populated areas. Cayce estimates he dealt with only 25 to 30 "controversial missions." For example: He approved a strike against an Iraqi artillery battery in a soccer field next to a mosque because it was firing on the 3rd Infantry Division's artillery headquarters. The choices could be agonizing. He says he asked himself, "How many Americans do I have to let get killed before I take out that (Iraqi) weapons system?" Ten to 15 times, Cayce advised commanders against firing on a target; they never overruled him. Five times, in fact, they decided against using cluster munitions even after he gave them the go-ahead because they believed the risk to civilians was too great. "We didn't just shoot there willy-nilly," he says. "It was the enemy who was putting his civilians at risk. ... They put their artillery right in town. Now who's at fault there?"

Rather than call upon their artillery to hit a target with cluster munitions, U.S. ground forces preferred either to use other weapons, such as M-16 rifles or tank rounds, or to summon the Air Force to hit Iraqi targets from the sky with precision bombs. "Cluster munitions were the last choice, not the first," Cayce says.

But aircraft frequently were unavailable. Sometimes the weather was bad or sandstorms were swirling. Sometimes Air Force pilots insisted on seeing targets instead of relying on radar readouts. The cluster munitions, especially M26 rockets fired by a multiple-launch rocket system (MLRS), had greater range than other weapons and were more reliable in bad weather.

Commanders also thought an MLRS was better at returning fire and killing the enemy. "MLRS is ideal for counterfire," says Col. Ted Janosko, artillery commander for the Army's V Corps. In fighting on March 31 around Karbala, 50 miles south of Baghdad, U.S. forces came under heavy artillery fire from the Iraqis. "We used (MLRS) rockets to fire back," Janosko says. "As soon as we started using rockets, guess what? We never heard from that unit again. I'm not going to say we killed them all ... but believe me, they did not fire again from that position."

The 3rd Infantry Division also used MLRS frequently. The rockets can go more than 20 miles, and they spray a wider area than other weapons. The 3rd Infantry fired 794 MLRS rockets during the Iraq war, according to an assessment by two high-ranking division artillery officers in the U.S. Army journal *Field Artillery*, published at Fort Sill, Okla.

As they raced north from Kuwait toward Baghdad in late March and early April, U.S. forces fired rockets and artillery shells loaded with bomblets into Iraqi troop and artillery positions in Hillah, in Baghdad and in other cities. U.S. aircraft sometimes dropped cluster bombs as well.

Just before U.S. forces' "thunder run" into Baghdad on April 7, the 3rd Infantry Division fired 24 MLRS cluster rockets into Iraqi positions at an important intersection in the capital. The damage assessment, recounted in the *Field Artillery* article: "There's nothing left but burning trucks and body parts."

### **Iraqis — and U.S. troops — stumble across bomblets**

No civilians in Iraq endured as much "steel rain" from U.S. cluster munitions as the impoverished squatters who live in the Nader neighborhood of Hillah, a city of 650,000 near the ruins of ancient Babylon. In Nader, stone houses are packed close together, roads are unpaved, raw sewage runs stinking in ditches and livestock wander aimlessly amid trash.

## **Town hit hard by 'steel rain'**

Residents, many of whom opposed Saddam Hussein and welcomed the U.S. decision to topple him, say there was no resistance in Nader, just Iraqi troops fleeing north through the area toward Baghdad. But U.S. radar reports showed Iraqi guns firing from Hillah, and anti-aircraft guns were located in a Nader-area schoolyard.

The cluster attack began mid-morning on March 31.

"I wish they'd shelled with regular artillery, not with those bloody cluster bombs," says retired civil servant Ali Selman al-Isawi, whose son, Wisam, 30, was killed that day. "Regular shells would hit only one spot, not every place just like a rain of death." Al-Isawi, 58, took six bodies to the morgue in his car.

When the bombing started, Abdul Jewad al-Timimi, 44, a disabled veteran of the 1980-88 Iran-Iraq War, decided to gather his wife and six children and clear out of Nader. He hoped to catch a taxi on a main road and get to his parents' house, 3 miles away.

It was the wrong decision. Exposed on open ground, al-Timimi and his family were caught in a storm of falling bomblets. "We had no place for shelter," he says. "We were an easy target for the cluster bombs. It was just like land mines exploding everywhere."

They stopped near a refuse-filled canal. "I heard only the explosion," al-Timimi says. "I caught two of the kids with my hand. But they were thrown backward, and I was thrown into the canal. My wife was thrown into a wall nearby. The baby was in her arms. The six children immediately were dead." Al-Timimi and his wife were injured.

The scenes from Nader that day, including footage of a baby torn in half, were so gruesome that Western television networks refused to air them. The dead child, 2 months old, was Jacob al-Timimi.

"My son," al-Timimi says. "I could not talk at that time. But I wished that the person who started this war, whether Iraqi or American, could be brought before me so I could kill him six times or kill six of those close to him. I still feel that way."

Iraq Body Count, an anti-war group that has been compiling a database of civilian casualties from media reports, attributes 200 to 372 Iraqi civilian deaths to cluster bombs and munitions. That doesn't include 78 to 201 civilians who died in fighting in and around Hillah; many of them were killed by cluster munitions, Iraq Body Count says, but it doesn't know how many.

## **Bitterness in Baghdad**

In Baghdad neighborhoods such as al-Dora, al-Furat and al-Hurriyah, the evidence of cluster-munition attacks is obvious. Holes the size of golf balls still riddle dust-colored stone walls around homes. Metal gates are pinged and punctured. Windows are shattered. Shrapnel from cluster bomblets has ripped into rooftop water tanks and torn through walls. Many Iraqis are bitter that their neighborhoods were chosen for attacks by U.S. cluster munitions. That anger has hurt efforts to convince Iraqis that U.S. troops came as liberators, not occupiers.

Baghdad was hit particularly hard in late March and early April. Cluster munitions landed in north Baghdad's al-Hurriyah neighborhood on April 8, apparently aimed at anti-aircraft batteries in a nearby park. "The whole street went black," recalls Mohammed Mustafa al-Bayati, 42, a sergeant in the Iraqi army. Al-Bayati's brother Maher, 33, was mentally disabled. He became disoriented by the explosions and smoke. Maher staggered into an intersection, where a bomblet got him. He died after 12 days in a hospital. Mohammed says he found 85 metal fragments in his brother's body. "I counted them one by one," he says. Their father died a week later. Mohammed believes he died of grief.

A few blocks away in al-Hurriyah, a submunition exploded in the courtyard of the home of Bashir



Abdul al-Zaidi, 32 the same day. Shrapnel pierced his neck and abdomen. He crawled into the kitchen. Family members found him by following the trail of blood. He died on the way to a hospital.

Before the attack, al-Zaidi's older brother had a dream in which their dead father returned to remove a date palm tree from the garden. Asked why he was taking it, the father just said: "I need it." Now, the family understands the dream. "We realized it meant that someone was going to join their father in eternal life," says their mother, Telba Gutheb, 60. "It was Bashir."

The cluster-bomb attack left hundreds of duds in al-Furat, a poor, densely packed Baghdad neighborhood of narrow streets and low, sparsely furnished houses with modest gardens.

"This neighborhood became a no-man's land," says Sheik Abul Amir Hussein al-Amir, 40, a local political leader. "You couldn't take a car out unless someone walked ahead to lead you."

Ten days after the attack, Tareq al-Lami, 35, discovered several unexploded cluster bomblets inside his family's house in al-Furat. He carried them with a pile of trash to a vacant lot down the street. His relatives don't know exactly what happened. They heard an explosion and found him dead.

Children were particularly vulnerable. About a week after the cluster attack on Hillah, Mahmoud Medhi al-Jabouri, 15, was wandering the Nader neighborhood's trash-filled streets with his brother Salem, 13. Mahmoud either picked up a dud cluster bomblet or stumbled across one concealed by refuse. There was an explosion, and Mahmoud was killed. "The bomb tore away his face," says his father, Mehdi Tali al-Jabouri, 53. Salem spent three days in a hospital with leg injuries; he has recovered.

Duds continued to turn up in gardens, trees and fields months after the military campaign ended. Al-Furat resident Adel Khalil al-Taie, 35, found one on his roof when he went up to install a satellite dish in July. It was an irony he relished: The U.S. campaign to topple Saddam Hussein gave him the freedom to put up a previously forbidden satellite dish but left a deadly explosive on his roof.

Sa'ad al-Shawk, 51, lost his wheat harvest to cluster munitions. His family's field in Yusifiyah, which is south of Baghdad, is filled with unexploded cluster bomblets. A mine-clearance team that works for the U.S. State Department took a look at the field of waist-high stalks and decided it was too dangerous to clear.

### **Dangers for U.S. troops**

The abundance of unexploded submunitions also left a dangerous mess for U.S. soldiers advancing into Baghdad.

Troops from the 101st Airborne found themselves in Baghdad's al-Jihad neighborhood in mid-April, contending with hundreds of unexploded M42 cluster bomblets. "There were M42s all around the houses," says Maj. Mike Getchell, 37, of Bridgewater, Mass., executive officer of the 101st Airborne's 3rd Brigade. During the three weeks the 101st troops patrolled al-Jihad, they destroyed an average of 100 M42s every day.

On April 19, Sgt. Troy Jenkins, 25, a 6-foot-7 paratrooper from Repton, Ala., was bringing up the rear of a patrol through the streets of al-Jihad. The streets were packed with people celebrating a festival. Suddenly, a little girl emerged from the crowd, carrying what turned out to be an M42 cluster bomblet. She tried to hand it to Jenkins. No one in the patrol knows exactly what happened next. But the bomblet went off, and the little girl, Jenkins and three other soldiers went down.

The little girl died after her family took her to a hospital. Jenkins was evacuated for medical treatment, first to Kuwait and then to Germany, where he died after losing his left leg. He left behind a wife and two sons, ages 4 and 2. The three other soldiers recovered.

Cluster munitions also may have claimed the life of Lance Cpl. Jesus Suarez del Solar, 20. The Marine scout from Escondido, Calif., died March 27 after stepping on some type of unexploded ordnance while on reconnaissance patrol outside Baghdad. A Marine investigation concluded that

the "origin of the ordnance is unknown and really impossible to determine," says First Lt. Eric Knapp, spokesman for the 1st Marine Division in Camp Pendleton, Calif.

But the dead Marine's father, Fernando Suarez del Solar, 47, has a different account. He says he was contacted by one of his son's friends, who said the Army dropped cluster weapons on March 26 and not all of the submunitions exploded.

"The next day, on the 27th, my son's company received the order for advance and my son was a scout, so he advanced ahead of the others without information that there were unexploded bombs. ... The scout is looking for the enemy, so his eyes are on the horizon, so he was not looking down toward the ground. And he stepped on a bomb."

Fernando Suarez, a former print shop worker who is now a full-time anti-war activist, is seeking an official explanation for his son's death. He has angry words for President Bush and Defense Secretary Donald Rumsfeld: "They say that America has the best weapons and the best technology and the best army. Well, this is not the best technology when they drop bombs that don't explode, and then they don't tell their own military where the bombs are. The best army would make that information available."

Sgt. 1st Class Rick Johanningsmeier, 34, of Martinsville, Ind., was in the same Army unit as Sgt. Jenkins. He saw four more U.S. troops injured when a dud bomblet exploded near the Baghdad airport. "These things are wicked. They're evil," Johanningsmeier says.

In their Field Artillery article, Army Col. Thomas Torrance, who commanded the 3rd Infantry Division's artillery in Iraq, and Lt. Col. Noel Nicolle praise the MLRS cluster munitions, calling them "the munition of choice for killing tanks and personnel in the open." They also note the weapon's major drawback: the dud rate.

"The duds ... littered the battlefield and created a hazard to the local populace," they write. "We need to develop a bomblet for cannons and MLRS that self-destructs or re-engineer the round to significantly reduce the dud rate."

To reduce casualties from dud bomblets, the military tried to keep track of where it fired cluster munitions. U.S. military and State Department teams are working to clear unexploded bomblets in Iraq. The U.S. military also has tried to warn Iraqis about the dangers of unexploded submunitions. U.S. forces have addressed schools and town councils and put up educational posters.

Cayce, the Army lawyer, believes U.S. forces acted responsibly. Even so, he says: "Ethically and morally, we need to find alternatives to cluster weapons in cities."

Contributing: Valerie Alvord in Escondido, Calif.; Steven Komarow in Baghdad, Dave Moniz in Washington, D.C., and Mark Memmott

[http://www.usatoday.com/news/world/iraq/2003-12-10-cluster-bomb-cover\\_x.htm](http://www.usatoday.com/news/world/iraq/2003-12-10-cluster-bomb-cover_x.htm)

## Weapons of Self-Destruction

Heroic soldiers returning from Iraq seem to be prey to the same debilitating, potentially fatal illness that first became known as Gulf War syndrome and then afflicted veterans of Bosnia and Kosovo. Critics point to the U.S.'s own ammunition made of toxic, radioactive depleted uranium—an explanation the Pentagon is resisting.

by David Rose

Published December 2004

When he started to get sick, Staff Sergeant Raymond Ramos's first instinct was to fight. "I had joint pains, muscle aches, chronic fatigue, but I tried to exercise it out," he says. "I was going for runs, working out. But I never got any better. The headaches were getting more frequent and sometimes lasted all day. I was losing a lot of weight. My overall physical demeanor was bad."

A 20-year veteran of the New York National Guard, Ramos had been mobilized for active duty in Iraq in the spring of 2003. His unit, the 442nd Military Police company, arrived there on Easter, 10 days before President Bush's MISSION ACCOMPLISHED appearance on the U.S.S. Abraham Lincoln. A tall, soft-spoken 40-year-old with four children, the youngest still an infant, Ramos was proud of his physique. In civilian life, he was a New York City cop. "I worked on a street narcotics team. It was very busy, with lots of overtime—very demanding." Now, rising unsteadily from his armchair in his thickly carpeted living room in Queens, New York, Ramos grimaces. "The shape I came back in, I cannot perform at that level. I've lost 40 pounds. I'm frail."

At first, as his unit patrolled the cities of Najaf and al-Diwaniyya, Ramos stayed healthy. But in June 2003, as temperatures climbed above 110 degrees, his unit was moved to a makeshift base in an abandoned railroad depot in Samawah, where some fierce tank battles had taken place. "When we first got there, I was a heat casualty, feeling very weak," Ramos says. He expected to recover quickly. Instead, he went rapidly downhill.

By the middle of August, when the 442nd was transferred to Babylon, Ramos says, the right side of his face and both of his hands were numb, and he had lost most of the strength in his grip. His fatigue was worse and his headaches had become migraines, frequently so severe "that I just couldn't function." His urine often contained blood, and even when it didn't he would feel a painful burning sensation, which "wouldn't subside when I finished." His upper body was covered by a rash that would open and weep when he scratched it. As he tells me this, he lifts his shirt to reveal a mass of pale, circular scars. He was also having respiratory difficulties. Later, he would develop sleep apnea, a dangerous condition in which he would stop breathing during sleep.

Eventually, Ramos was medevaced to a military hospital in Landstuhl, Germany. Doctors there were baffled and sent him on to the Walter Reed Army Medical Center, on the outskirts of Washington, D.C. There, Ramos says, one neurologist suggested that his condition could have been caused by some long-forgotten head injury or might just be "signs of aging." At the end of September 2003, the staff at Walter Reed ordered him to report to Fort Dix, New Jersey, where, he says, a captain went through his record and told him "I was clear to go back to Iraq. I got the impression they thought I was faking it." He was ordered to participate in a longdistance run. Halfway through, he collapsed. Finally, on July 31, 2004, after months of further examinations, Ramos was discharged with a medical disability and sent home.

Symptoms such as Ramos's had been seen before. In veterans of Operation Desert Storm, they came to be called Gulf War syndrome; among those posted to Bosnia and Kosovo in the 1990s, Balkans syndrome. He was not the only member of the 442nd to suffer them. Others had similar urinary problems, joint pains, fatigue, headaches, rashes, and sleep apnea. Today, some scientists believe that all these problems, together with others found in war-zone civilians, can be traced to the widespread use of a uniquely deadly form of ammunition.

In the ongoing Iraq conflict, just as in the Gulf War of 1991 and in the Balkans, American and

British forces have fired tens of thousands of shells and cannon rounds made of a toxic and radioactive material called depleted uranium, or D.U. Because D.U. is dense—approximately 1.7 times as dense as lead—and ignites upon impact, at a temperature of about 5,400 degrees, it can penetrate armor more effectively than any other material.

It's also remarkably cheap. The arms industry gets its D.U. for free from nuclear-fuel processors, which generate large quantities of it as a by-product of enriching uranium for reactor fuel. Such processors would otherwise have to dispose of it in protected, regulated sites. D.U. is "depleted" only in the sense that most of its fissile U-235 isotope has been removed. What's left—mainly U-238—is still radioactive.

Three of the main weapons systems still being used in Iraq—the M-1 Abrams tank, the Bradley Fighting Vehicle, and the A-10 Warthog attack jet—use D.U. ammunition. A 120-mm. tank round contains about nine pounds of solid D.U. When a D.U. "penetrator" strikes its target, up to 70 percent of the shell's mass is flung into the air in a shower of uranium-oxide fragments and dust, some in the form of aerosolized particles less than a millionth of a meter in diameter. When inhaled, such particles lodge in the lungs and bathe the surrounding tissue with alpha radiation, known to be highly dangerous internally, and smaller amounts of beta and gamma radiation.

"I WORKED ON A STREET NARCOTICS TEAM," SAYS RAMOS. "THE SHAPE I CAME BACK IN, I CANNOT PERFORM AT THAT LEVEL. I'M FRAIL."

Even before Desert Storm, the Pentagon knew that D.U. was potentially hazardous. Before last year's Iraq invasion, it issued strict regulations designed to protect civilians, troops, and the environment after the use of D.U. But the Pentagon insists that there is little chance that these veterans' illnesses are caused by D.U.

The U.S. suffered only 167 fatal combat casualties in the first Gulf War. Since then, veterans have claimed pensions and health-care benefits at record rate. The Veterans Administration reported this year that it was paying service related disability pensions to 181,996 Gulf War veterans—almost a third of the total still living. Of these, 3,248 were being compensated for "undiagnosed illnesses." The Pentagon's spokesman, Dr. Michael Kilpatrick, deputy director of its Deployment Health section, says that Gulf War veterans are no less healthy than soldiers who were stationed elsewhere.

Those returning from Operation Iraqi Freedom are also beginning to report illnesses in significant numbers. In July 2004, the V.A. disclosed that 27,571 of them—16.4 percent of the total—had sought health care. Of that group, 8,134 suffered muscular and skeletal ailments; 3,505 had respiratory problems; and 5,674 had "symptoms, signs and ill-defined conditions." An additional 153 had developed cancers. The V.A. claims that such figures are "typical of young, active, healthcare-seeking populations," but does not offer figures for comparison.

There is also evidence of a large rise in birth defects and unprecedented cancer rates among civilians following the first Gulf War in the Basra region of southern Iraq, where the heaviest fighting took place. Dr. Kilpatrick says, "I think it's very important to try to understand what are the causes of that high rate of cancer and birth defects. There has to be a good look at that, but if you go to the M. D. Anderson hospital, in Houston, Texas, you're going to find a very high rate of cancer. That's because people from all over the country with cancer go there, because it's one of the premier care centers. Basra was the only major hospital in southern Iraq. Are the people there with these different problems people who lived their entire lives in Basra, or are they people who've come to Basra for care?" It is possible, he says, that some other environmental factor is responsible for the illnesses, such as Saddam's chemical weapons or poor nutrition. "I don't think anything should be taken off the table."

In October 2004, an early draft of a study by the Research Advisory Committee on Gulf War Veterans' Illnesses, a scientific panel run by the V.A., was leaked to The New York Times. According to the Times, the panel had concluded that there was a "probable link" between veterans' illnesses and exposure to neurotoxins, including a drug given to troops in 1991 to protect them from nerve gas, and nerve gas itself, which was released when U.S.-led forces destroyed an Iraqi arms depot. Asked why there was no mention of D.U. in the report, Dr. Lea Steele, the panel's scientific director,

says that her group plans to address it in a later report. "We've only just begun work on this topic. We are certainly not ruling it out."

#### WHEN INHALED D.U. PARTICLES LODGE IN THE LUNGS AND BATHE THE SURROUNDING TISSUE WITH ALPHA RADIATION.

D.U.'s critics, meanwhile, say it's entirely possible that both neurotoxins and D.U. are responsible for the widespread sickness among veterans.

Members of the 442nd have vivid memories of being exposed to D.U. Sergeant Hector Vega, a youthful looking 48-year-old who in civilian life works in a building opposite Manhattan's Guggenheim Museum, says he now struggles with chest pains, heart palpitations, headaches, urinary problems, body tremors, and breathlessness~none of which he'd ever experienced before going to Iraq. He recalls the unit's base there: "There were burnt-out Iraqi tanks on flatbed trucks 100 yards from where we slept. It looked like our barracks had also been hit, with black soot on the walls. It was open to the elements, and dust was coming in all the time. When the wind blew, we were eating it, breathing it. It was everywhere." (The Department of Defense, or D.O.D., says that a team of specialists is conducting an occupational and environmental health survey in the area.)

Dr Asaf Durakovic, 64, is a retired U.S. Army colonel and the former head of nuclear medicine at a veterans' hospital in Wilmington, Delaware. Dr. Durakovic reports finding D.U. in the urine of 18 out of 30 Desert Storm veterans, sometimes up to a decade after they were exposed, and in his view D.U. fragments are both a significant cause of Gulf War syndrome and a hazard to civilians for an indefinite period of time. He says that when he began to voice these fears inside the military he was first warned, then fired: he now operates from Toronto, Canada, at the independent Uranium Medical Research Centre.

In December 2003, Dr. Durakovic analyzed the urine of nine members of the 442nd. With funds supplied by the New York Daily News, which first published the results, Durakovic sent the samples to a laboratory in Germany that has some of the world's most advanced mass-spectrometry equipment. He concluded that Raffios, Vega, Sergeant Agustin Matos, and Corporal Anthony Yonnone were "internally contaminated by depleted uranium (D.U.) as a result of exposure through [the] respiratory pathway."

The Pentagon contests these findings. Dr. Kilpatrick says that, when the D.O.D. conducted its own tests, "our results [did] not mirror the results of Dr. Durakovic." "Background" sources, such as water, soil, and therefore food, frequently contain some uranium. The Pentagon insists that the 442nd soldiers' urinary uranium is "within normal dietary ranges," and that "it was not possible to distinguish D.U. from the background levels of natural uranium." The Pentagon says it has tested about 1,000 vets from the current conflict and found D.U. contamination in only five. Its critics insist this is because its equipment is too insensitive and its testing methods are hopelessly flawed.

At a briefing before the Iraq invasion in March 2003, Dr. Kilpatrick tried to reassure reporters about D.U. by citing the cases of about 20 Desert Storm vets who had D.U. shrapnel in their bodies. "We have not seen any untoward medical consequences in these individuals" he said. "There has been no cancer of bone or lungs, where you would expect them." It appears that he misspoke on that occasion: one of these veterans had already had an arm amputated for an osteosarcoma, or bone tumor, at the site where the shrapnel entered. Dr. Kilpatrick confirms that the veteran was treated by the V.A. in Baltimore, but says his condition may not have been linked with the shrapnel. "Osteosarcomas are fairly common." Studies have shown that D.U. can begin to move through the body and concentrate in the lymph nodes, and another of the vets with shrapnel has a form of lymphatic cancer. But this, Dr. Kilpatrick says, has "no known cause." He concedes that research has not proved the negative, that D.U. doesn't cause cancer. But, he says, "science doesn't in 2004 show that D.U. causes any cancer."

It does, however, show that it may. Pentagon-sponsored studies at the Armed Forces Radiobiology Research Institute, in Bethesda, Maryland, have found that, when D.U. was embedded in animals, several genes associated with human tumors underwent "aberrant activation" and oncoproteins of the type found in cancer patients turned up in their blood. The animals' urine was "mutagenic" meaning that it could cause cells to mutate. Another institute project found that D.U. could damage

the immune system by hastening the death of white blood cells and impairing their ability to attack bacteria.

In June 2004 the U.S. General Accounting Office (G.A.O.) issued a report to Congress that was highly critical of government research into Gulf War syndrome and veterans' cancer rates. The report said that the studies on which federal agencies were basing their claim that Gulf War veterans were no sicker than the veterans of other wars "may not be reliable" and had "inherent limitations" with big data gaps and methodological flaws. Because cancers can take years to develop, the G.A.O. stated, "it may be too early" to draw any conclusions. Dr. Kilpatrick dismisses this report, saying it was "just the opinion of a group of individuals."

Yet another Pentagon-funded study suggested that D.U. might have effects on unborn children. After finding that pregnant rats transmitted D.U. to their offspring through the placenta, the study concluded: "Fetal exposure to uranium during critical prenatal development may adversely impact the future behavioral and neurological development of offspring." In September 2004, the New York Daily News reported that Gerard Darren Matthew, who had served in Iraq with the 719th Transportation Company, which is based in Harlem, had tested positive for D.U. after suffering migraines, fatigue, and a burning sensation when urinating. Following his return, his wife became pregnant, and their daughter, Victoria Claudette, was born missing three fingers.

Ultimately, critics say, the Pentagon underestimates the dangers of D.U. because it measures them in the wrong way: by calculating the average amount of D.U. radiation produced throughout the body. When we meet, Dr. Kilpatrick gives me a report the Department of Defense issued in 2000. It concludes that even vets with the highest exposures from embedded shrapnel could expect over 50 years to receive a dose of just five rem, "which is the annual limit for [nuclear industry] workers." The dose for those who inhaled dust from burned-out tanks would be "far below the annual guideline (0.1 rem) for members of the public."

But to measure the effect of D.U. as a whole-body radiation dose is meaningless, Asaf Durakovic says, because the dose from D.U. is intensely concentrated in the cells around a mote of dust. The alpha particles D.U. emits-high-energy clumps of protons and neutrons-are harmless outside the body, because they cannot pass through skin. Inside tissue, however, they wreak a havoc analogous to that of a penetrating shell against an enemy tank, bombarding cell nuclei, breaking chains of DNA, damaging fragile genes. Marcelo Valdes, a physicist and computer scientist who is president of Dr. Durakovic's research institute, says the cells around a D.U. particle 2.5 microns in diameter will receive a maximum annual radiation dose of 16 rads. If every pocket of tissue in the body were to absorb that amount of radiation, the total level would reach 7 trillion rads-millions of times the lethal dosage.

In the potentially thousands of hot spots inside the lungs of a person exposed to D.U. dust, the same cells will be irradiated again and again, until their ability to repair themselves is lost. In 1991, Durakovic found D.U. in the urine of 14 veterans who had returned from the Gulf with headaches, muscle and skeletal pain, fatigue, trembling, and kidney problems. "Immediately I understood from their symptoms and their histories that they could have been exposed to radiation," he says. Within three years, two were dead from lung cancer: "One was 33, the other 42. Both were nonsmokers, in previously excellent health."

D.U., he says, steadily migrates to the bones. There it irradiates the marrow, where stem cells, the progenitors of all the other cells the body manufactures in order to renew itself, are produced. "Stem cells are very vulnerable," Durakovic says. "Bombarded with alpha particles, their DNA will fall apart, potentially affecting every organ. If malfunctioning stem cells become new liver cells, then the liver will malfunction. If stem cells are damaged, they may form defective tissue."

"DUST WAS COMING IN ALL THE TIME" SAYS SERGEANT VEGA. "WE WERE EATING IT, BREATHING IT. IT WAS EVERYWHERE"

If D.U. is as dangerous as its critics allege, it can kill even without causing cancer. At her home in Yarnlouth, Nova Scotia, Susan Riordon recalls the return of her husband, Terry, from the Gulf in 1991. Terry, a security captain, served in intelligence during the war: his service record refers to his setting up a "safe haven" in the Iraqi "theatre." Possibly, Susan speculates, this led him behind

enemy lines and exposed him to D.U. during the long aerial bombing campaign that preceded the 1991 invasion. In any event, "when he came home, he didn't really come home," she says.

At first, Terry merely had the usual headaches, body pain, oozing rash, and other symptoms. But later he began to suffer from another symptom which afflicts some of those exposed to D.U.: burning semen. "If he leaked a little lubrication from his penis, it would feel like sunburn on your skin. If you got to the point where you did have intercourse, you were up and out of that bed so fast-it actually causes vaginal blisters that burst and bleed." Terry's medical records support her description. In England, Malcolm Hooper, professor emeritus of medicinal chemistry at the University of Sunderland, is aware of 4,000 such cases. He hypothesizes that the presence of D. U. may be associated with the transformation of semen into a caustic alkali.

"It hurt [Terry] too. He said it was like forcing it through barbed wire," Riordon says. "It seemed to burn through condoms; if he got any on his thighs or his testicles, he was in hell." In a last, desperate attempt to save their sex life, says Riordon, "I used to fill condoms with frozen peas and insert them [after sex] with a lubricant." That, she says, made her pain just about bearable. Perhaps inevitably, he became impotent. "And that was like our last little intimacy gone."

"By late 1995, Terry was seriously deteriorating. Susan shows me her journal-she titled it "The Twilight Zone"-and his medical record. It makes harrowing reading. He lost his fine motor control to the point where he could not button his shirt or zip his fly. While walking, he would fall without warning. At night, he shook so violently that the bed would move across the floor. He became unpredictably violent: one terrible day in 1997 he attacked their 16-year old son and started choking him. By the time armed police arrived to pull him off, the boy's bottom lip had turned blue. After such rages, he would fall into a deep sleep for as long as 24 hours, and awake with no memory of what had happened. That year, Terry and Susan stopped sleeping in the same bedroom. Then "he began to barricade himself in his room for days, surviving on granola bars and cartons of juice."

"IT WAS A VERY STRANGE DEATH. HE WAS VERY PEACEFUL. . . . KNOWING HE WAS D.U.- POSITIVE MEANT HE WASN'T CRAZY."

As he went downhill, Terry was assessed as completely disabled, but there was no diagnosis as to why. His records contain references to "somatization disorder," post-traumatic stress, and depression. In 1995 the army doctors even suggested that he had become ill only after reading of Gulf War syndrome. Through 1998 and 1999, he began to lose all cognitive functions and was sometimes lucid for just a few hours each week.

Even after he died, on April 29, 1999, Terry's Canadian doctors remained unable to explain his illness. "This patient has a history [of] 'Gulf War Syndrome' with multiple motor, sensory and emotional problems," the autopsy report by pathologist Dr. B. Jollymore, of Yarmouth, begins. "During extensive investigation, no definitive diagnosis has been determined. . . . Essentially it appears that this gentleman remains an enigma in death as he was in life."

Not long before Terry's death, Susan Riordon had learned of Asaf Durakovic, and of the possibility that her husband absorbed D.U. His urine-test results-showing a high D.U. concentration eight years after he was presumably exposed came through on Monday, April 26. "Tuesday he was reasonably cognitive, and was able to tell me that he wanted his body and organs to go to Dr. Durakovic," she remembers. "He knew it was too late to help him, but he made me promise that his body could help the international community. On the Wednesday, I completed the purchase of this house. On Thursday, he was dead.

"It was a very strange death. He was very peaceful. I've always felt that Asaf allowed Terry to go: knowing he was D.U.-positive meant he wasn't crazy anymore. Those last days he was calm. He wasn't putting the phone in the microwave; he had no more mood swings."

After Riordons death, Dr. Durakovic and his colleagues found accumulations of D.U. in his bones and lungs.

Dr. Durakovic suspects the military of minimizing the health and environmental consequences of

D.U. weapons, and suggests two reasons it may have for doing so: "to keep them off the list of war criminals, and to avoid paying compensation which could run into billions of dollars." To this might be added a third: depleted uranium, because of its unique armor-penetrating capabilities, has become a defining feature of American warfare, one whose loss would be intolerable to military planners.

In 1991, the U.S. used D.U. weapons to kill thousands of Iraqis in tanks and armored vehicles on the "highway of death" from Kuwait to Basra. The onesided victory ushered in a new era of "lethality overmatch"-the ability to strike an enemy with virtual impunity. A Pentagon pamphlet from 2003 states that a central objective of the American military is to "generate dominant lethality overmatch across the full spectrum of operations" and no weapon is better suited to achieving that goal than D.U.

The value of depleted uranium was spelled out more simply in a Pentagon briefing by Colonel James Naughton of the army's Materiel Command in March 2003, just before the Iraq invasion: "What we want to be able to do is strike the target from farther away than we can be hit back. . . . We don't want to fight even. Nobody goes into a war and wants to be even with the enemy. We want to be ahead, and D.U. gives us that advantage."

If the Pentagon is right about the risks of D.U., such statements should not be controversial. If it is wrong, says retired army colonel Dr. Andras Korényi-Both, who headed one of the main field hospitals during Desert Storm and later conducted some of the first research into Gulf War syndrome, the position is less clear-cut. "You'd have to deal with the question of whether it's better not to use D.U. and have more of your soldiers die in battle or to use D.U. and lose very few in the field-but have them get sick and die when they get home."

"I WENT INTO THIS WANTING TO WORK OUT HOW TO USE D.U. SAFELY" ROKKE SAYS.  
"SLOWLY IT DAWNED ON ME THAT WE WERE SCREWED."

One desert morning in the early spring of 1991, while sitting in his office at the Eskan Village military compound near Riyadh, Saudi Arabia, Lieutenant Doug Rokke was shown a memorandum. Rokke, a health physicist and training specialist, was a reservist and had recently been ordered to join the Third U.S. Army's depleted-uranium-assessment team, assigned to clean up and move American vehicles hit by friendly fire during Operation Desert Storm. The memo, dated March 1, came from a senior military officer at the Los Alamos National Laboratory, in New Mexico.

During the Gulf War, it said, "D.U. penetrators were very effective against Iraqi armor." However, "there has been and continues to be a concern regarding the impact of D.U. on the environment. Therefore, if no one makes a case for the effectiveness of D. U. on the battlefield, D.U. rounds may become politically unacceptable and thus, be deleted from the arsenal. . . . I believe we should keep this sensitive issue at mind when after-action reports are written."

Rokke says: "I interpreted the memo to mean: we want this stuff-don't write anything that might make it difficult for us to use it again."

Rokke's assignment was dangerous and unpleasant. The vehicles were coated with uranium-oxide soot, and dust lay in the sand outside. He wore a mask, but it didn't help. "We could taste it and smell it," he says of the D.U. "It tasted very strong and unmistakable." Years later, he says, he was found to be excreting uranium at 5,000 times the normal level. Now 55, he pants during ordinary conversation and says he still gets a rash like the one Raymond Ramos of the 442nd suffers from. In addition, Rokke has joint pains, muscle aches, and cataracts.

In 1994, Rokke became director of a Pentagon project designed to learn more about D.U. contamination and to develop training that would minimize its risks. "I'm a warrior, and warriors want to fulfill their mission," Rokke says. "I went into this wanting to make it work, to work out how to use D.U. safely, and to show other soldiers how to do so and how to clean it up. This was not science out of a book, but science done by blowing the shit out of tanks and seeing what happens. And as we did this work, slowly it dawned on me that we were screwed. You can't do this safely in combat conditions. You can't decontaminate the environment or your own troops."



Rokke and his colleagues conducted a series of experiments at the U.S. Department of Energy's Nevada nuclear test site. They set fire to a Bradley loaded with D.U. rounds and fired D.U. shells at old Soviet tanks. At his remote, ramshackle farmhouse amid the rural flatlands of central Illinois, Rokke shows me videos of his tests. Most spectacular are those shot at night, which depict the fiery streak of the D.U. round, already burning before impact, followed by the red cascade of the debris cloud. "Everything we hit we destroyed," he says. "I tell you, these things are just. . . fantastic."

The papers Rokke wrote describing his findings are more sobering. He recorded levels of contamination that were 15 times the army's permissible levels in tanks hit by D.U., and up to 4.5 times such levels in clothing exposed to D.U.

The good news was that it was possible, using a special Department of Energy vacuum cleaner designed for sucking up radioactive waste, to reduce contamination from vehicles and equipment to near official limits, and to "mask" the intense radiation around holes left by D.U. projectiles by sealing them with layers of foam caulking, paint, or cardboard. (Such work, Rokke wrote, would naturally have to be carried out by teams in full radiological-protection suits and respirators.) When it came to clothes, however, D.U. particles "became imbedded in the clothing and could not be removed with brushing or other abrasive methods." Rokke found that even after he tried to decontaminate them the clothes were still registering between two and three times the limit. "This may pose a significant logistics impact," Rokke wrote, with some understatement.

The elaborate procedures required to decontaminate equipment, meanwhile, would be almost impossible to implement in combat. "On a real battlefield, it's not like there's any control," Rokke says. "It's chaos. Maybe it's night. Who's going to come along and isolate contaminated enemy tanks? You've got a pile of rubble and mess and you're still coming under fire. The idea that you're going to come out in radiological suits and vacuum up a building or a smashed T-72 [tank]-it's ridiculous."

Large amounts of black D.U.-oxide dust were readily visible within 50 meters of a tank hit by penetrators and within 100 meters of the D.U.-packed Bradley that was set on fire. But less obvious amounts were easily detected at much greater distances. Worse, such dust could be "re-suspended" in the atmosphere "upon contact, if wind blew, or during movement." For American troops, that meant that "respiratory and skin protection is warranted during all phases of recovery." For civilians, even ones at considerable distances, it meant they might be exposed to windblown D.U. far into the future.

After Rokke completed the project, he was appointed head of the lab at Fort McClellan where it had been based. He resigned the staff physicist post he'd held for 19 years at the University of Illinois at Urbana-Champaign and moved south with his family. Early in 1996, after he began to voice the conclusions he was drawing about the future viability of D.U. weapons, he was fired. "Then I remembered the Los Alamos memo," he says. "They'd wanted 'proponency' for D.U. weapons, and I was giving them the opposite."

I ask Dr. Kilpatrick, the D.O.D. spokesman on D.U., about Rokke's test firings. His reply: "One, he never did that. He was in Nevada as an observer. He was not part of that program at all. At that time he was working in education at an army school, and his assignment was to develop educational materials for troops." Rokke, he says, may have spent a few days observing the tests but did not organize them.

Documents from Rokke's service record tell a different story. His appraisal from December 1, 1995, written by Dr. Ed Battle, then chief of the radiation laboratories at Fort McClellan, describes Rokke's mission as follows: to "plan, coordinate, supervise and implement the U.S. Army . . . depleted uranium training development project." He continued: "Captain Rokke has repeatedly demonstrated the ability to function well above his current rank and is as effective as any I have known." He had directly participated in "extremely crucial tests at the Nevada Atomic Test Site" and his achievements had been "absolutely phenomenal."

Rokke was awarded two medals for his work. The citation for one commended him for "meritorious service while assigned as the depleted uranium project leader. Your outstanding

achievements have prepared our soldiers for hazards and will have a vast payoff in the health, safety, and protection of all soldiers."

Rokke's work in Nevada helped persuade the military that D.U. weapons had to be dealt with carefully. On September 16, 2002, General Eric Shinseki, the U.S. Army chief of staff, signed Army Regulation 700-48, which sets forth strict rules for handling items, including destroyed or disabled enemy targets, that have been hit and contaminated by D.U. "During peacetime or as soon as operational risk permits," it states, local commanders must "identify, segregate, isolate, secure, and label all RCE [radiologically contaminated equipment]. Procedures to minimize the spread of radioactivity will be implemented as soon as possible." Under pre-existing regulations, damaged vehicles should be moved to a collection point or maintenance facility, and "covered and wrapped with canvas or plastic tarp to prevent spread of contaminants," with loose items placed in double plastic bags. Soldiers who carry out such tasks should wear protective equipment.

The burned-out tanks behind the 442nd's barracks in Samawah may not have been the only D.U. contaminated pieces of equipment to be left where they lay. In the fall of 2003, Tedd Weyman, a colleague of Dr. Durakovic's, spent 16 days in Iraq, taking samples and observing the response of coalition forces to General Shinseki's directive. "When tanks shot up by D.U. munitions were removed, I saw no precautions being taken at all" he says. "Ordinary soldiers with no protection just came along and used chains to load them onto flatbeds, towing them away just as they might your car if it broke down on the highway. They took them to bases with British and American troops and left them in the open." Time after time, Weyman recorded high levels of contamination so high that on his return to Canada he was found to have 4.5 times the normal level of uranium in his own urine.

A Pentagon memo, signed on May 30, 2003, by Dr. William Winkenwerder, an assistant defense secretary, says that any American personnel "who were in, on, or near combat vehicles at the time they were struck by D.U. rounds," or who entered such vehicles or fought fires involving D.U. munitions, should be assessed for possible exposure and receive appropriate health care. This category could be said to include any soldier who fought in, or cleaned up after, battles with Iraqi armor.

Still, the Pentagon insists that the risks remain acceptably small. "There isn't any recognized disease from exposure to natural or depleted uranium," Dr. Kilpatrick says. He tells me that America will mount a thorough cleanup in Iraq, disposing of any D.U. fragments and burying damaged vehicles in unpopulated locations, but that, for the time being, such an operation is impossible. "We really can't begin any environmental assessment or cleanup while there's ongoing combat." Nevertheless, he says, there's no cause for concern. "I think we can be very confident that what is in the environment does not create a hazard for those living in the environment and working in it."

As this article was going to press, the Pentagon published the findings of a new study that, according to Dr. Kilpatrick, shows D.U. to be a "lethal but safe weapons system."

**"WE DON'T WANT TO FIGHT EVEN" SAID COLONEL JAMES NAUGHTON. "WE WANT TO BE AHEAD, AND D.U. GIVES US THAT ADVANTAGE."**

In his Pentagon briefing in March 2003, Dr. Kilpatrick said that even if D.U. weapons did generate toxic dust, it would not spread. "It falls to the ground very quickly-usually within about a 50-meter range," he said. "It's heavy. It's 1.7 times as heavy as lead. So even if it's a small dust particle. . . it stays on the ground." Evidence that this is not the case comes from somewhere much closer than Iraq-an abandoned D.U.-weapons factory in Colonie, New York, a few miles from Albany, the state capital.

In 1958, a corporation called National Lead began making depleted-uranium products at a plant on Central Avenue, surrounded by houses and an Amtrak line. In 1979, just as the plant was increasing its production of D.U. ammunition to meet a new Pentagon contract, a whistleblower from inside the plant told the county health department that N.L. was releasing large amounts of D.U. oxide into the environment.

Over the next two years, he and other workers testified before both the New York State Assembly and a local residents' campaign group. They painted a picture of reckless neglect. D.U. chips and shavings were simply incinerated, and the resulting oxide dust passed into the atmosphere through the chimneys. "I used to do a lot of burning," William Luther told the governor's task force in 1982. "They told me to do it at night so the black smoke wouldn't be seen." Later, many of the workers were found to have inhaled huge doses into their lungs, and some developed cancers and other illnesses at relatively young ages.

In January 1980 the state forced N.L. to agree to limit its radioactive emissions to 500 microcuries per year. The following month, the state shut the plant down. In January alone, the D.U.-chip burner had released 2,000 microcuries. An official environmental survey produced horrifying results. Soil in the gardens of homes near the plant was emitting radiation at up to 300 times the normal background level for upstate New York. Inside the 11-acre factory site, readings were up to five times higher.

The federal government has been spending tax dollars to clean up the Colonie site for the past 19 years, under a program called FUSRAP-the Formerly Utilized Sites Remedial Action Program. Today, all that is left of the Colonie plant are enormous piles of earth, constantly moistened with hoses and secured by giant tarpaulins to prevent dispersal, and a few deep pits. In its autumn 2004 bulletin to residents, the FUSRAP team disclosed that it had so far removed 125,242 tons of contaminated soil from the area, all of which have been buried at radioactive-waste sites in Utah and Idaho. In some places, the excavations are more than 10 feet deep. FUSRAP had also discovered contamination in the neighboring Patroon Creek, where children used to play, and in the reservoir it feeds, and had treated 23.5 million gallons of contaminated water. The cost so far has been about \$155 million, and the earliest forecast for the work's completion is 2008.

Years before FUSRAP began to dig, there were data to suggest that D.U. particles and those emitted at Colonie are approximately the same size as those produced by weapons-can travel much farther than 50 meters. In 1979, nuclear physicist Len Dietz was working at a lab operated by General Electric in Schenectady, 10 miles west of Colonie. "We had air filters all around our perimeter fence," he recalls. "One day our radiological manager told me we had a problem: one of the filters was showing abnormally high alpha radiation. Much to our surprise, we found D.U. in it. There could only be one source: the N.L.plant." Dietz had other filters checked both in Schenectady and at other G.E. sites. The three that were farthest away were in West Milton, 26 miles northwest, and upwind, of Colonie. All the filters contained pure Colonie D.U. "Effectively," says Dietz, "the particles' range is unlimited."

In August 2003, the federal Agency for Toxic Substances and Disease Registry published a short report on Colonie. On the one hand, it declared that the pollution produced when the plant was operating could have increased the risks of kidney disease and lung cancer. Because the source of the danger had shut down, however, there was now "no apparent public health hazard." Thus there was no need to conduct a full epidemiological study of those who had lived near and worked at the factory-the one way to produce hard scientific data on what the health consequences of measurable D.U. contamination actually are.

The people of Colonie have been trying to collect health data of their own. Sharon Herr, 45, lived near the plant for nine years. She used to work 60 hours a week at two jobs-as a clerk in the state government and as a real-estate agent. Now she too is sick, and suffers symptoms which sound like a textbook case of Gulf War syndrome: "Fourteen years ago, I lost my grip to the point where I can't turn keys. I'm stiff, with bad joint and muscle pain, which has got progressively worse. I can't go upstairs without getting out of breath. I get fatigue so intense there are days I just can't do much. And I fall down-I'll be out walking and suddenly I fall." Together with her friend Anne Rabe, 49, a campaigner against N.L. since the 1980s, she has sent questionnaires to as many of the people who lived on the streets close to the plant as possible. So far, they have almost 400 replies.

Among those who responded were people with rare cancers or cancers that appeared at an unusually young age, and families whose children had birth defects. There were 17 cases of kidney problems, 15 of lung cancer, and 11 of leukemia. There were also five thyroid cancers and 16 examples of other thyroid problems-all conditions associated with radiation. Other people described symptoms similar to Herr's. Altogether, 174 of those in the sample had been diagnosed

with one kind of cancer or another. American women have about a 33 percent chance of getting cancer in their lifetimes, mostly after the age of 60. (For men, it's nearly 50 percent) Some of the Colonie cancer victims are two decades younger. "We have what look like possible suspicious clusters," says Rabe. "A health study here is a perfect opportunity to see how harmful this stuff really is."

"WHEN TANKS SHOT UP BY D.U. MUNITIONS WERE REMOVED," WEYMAN SAYS, "I SAW NO PRECAUTIONS BEING TAKEN AT ALL."

On June 14, 2004, the army's Physical Evaluation Board, the body that decides whether a soldier should get sickness pay, convened to evaluate the case of Raymond Raillos of the 442nd Military Police company. It followed the Pentagon's approach, not Dr. Durakovic's. The board examined his Walter Reed medical file summary, which describes his symptoms in detail, suggests that they may have been caused by serving in Iraq, and accepts that "achieving a cure is not a realistic treatment objective." But the summary mentions no physical reason for them at all, let alone depleted uranium.

Like many veterans of the first Gulf War, Ramos was told by the board that his disability had been caused primarily by posttraumatic stress. It did not derive "from injury or disease received in the line of duty as a direct result of armed conflict." Instead, his record says, he got "scared in the midst of a riot" and was "emotionally upset by reports of battle casualties." Although he was too sick to go back to work as a narcotics cop, he would get a disability benefit fixed at \$1,197 a month, just 30 percent of his basic military pay.

On the day we meet, in September 2004, his symptoms are hardly alleviated. "I'm in lots of pain in my joints. I'm constantly fatigued~ I can fall asleep at the drop of a dime. My wife tells me things and I just forget. It's not fair to my family."

For the time being, the case against D.U. appears to remain unproved. But if Asaf Durakovic, Doug Rokke, and their many allies around the world are right, and the Pentagon wrong, the costs-human, legal, and financial-will be incalculable. They may also be widespread. In October, the regional health authority of Sardinia, Italy, began hearings to investigate illnesses suffered by people who live near a U.S. firing range there that tests D.U. weapons.

In 2002 the United Nations SubCommission on the Promotion and Protection of Human Rights declared that depleted uranium was a weapon of mass destruction, and its use a breach of international law. But the difference between D.U. and the W.M.D. that formed the rationale for the Iraqi invasion is that depleted uranium may have a boomerang effect, afflicting the soldiers of the army that fires it as well as the enemy victims of "lethality overmatch."

The four members of the 442nd who tested positive all say they have met soldiers from other units during their medical treatment who complain of similar ailments, and fear that they too may have been exposed. "It's bad enough being sent out there knowing you could be killed in combat," Raymond Raillos says. "But people are at risk of bringing something back that might kill them slowly. That's not right."

© December 2004 Vanity Fair.

