

February 21, 2003

The Honorable Jim McDermott, Congressman
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RE: Declassified 1943 memo to General L.R. Groves – a blueprint for depleted uranium

Dear Congressman McDermott,

Mr. Joe Pemberton, a lawyer in Bellingham, Washington, has asked me to provide you with scientific information on the critical and overlooked issues of particle size, penetration of gas masks, and mobility of depleted uranium formed under battleground conditions. It is also powerful scientific information to counter false statements recently made by the White House¹ and the DOD².

I am writing this letter out of concern for the military personnel who may now be serving on or near the Gulf War battlefields in Iraq and may be quartered in areas already contaminated by depleted uranium munitions. But they are not my only concern. The Gulf War Veterans who are now suffering severe health consequences have also been exposed to depleted uranium, chemicals and biological materials including vaccines while serving in Iraq and Kuwait.

The children and people of Iraq have been the greatest victims from exposure to depleted uranium¹⁵ used in the Gulf War and will continue to be. Over time, they cannot escape the chronic, low level exposure to internal radiation from depleted uranium and its decay products (see Attach. 7) as it cycles and recycles through their environment³ in water, air and food products.

Depleted uranium dust will continue to be an extreme hazard to soldiers, civilians, populations in countries downwind^{6,8}, and the environment as a radiological contaminant to all living systems for ten half-lives or 45 BILLION years.

I am a former Lawrence Berkeley Lab and Lawrence Livermore Lab scientist, and now work with a group of independent scientists called the **Radiation and Public Health Project**⁴. Together this group has written ten books on the health effects of low level radiation. Presently I am writing a science report on depleted uranium for the United Nations Human Rights Sub-commission, now investigating the illegality and use of depleted uranium munitions. I have written the *Foreword* (Attach.1) to ***Discounted Casualties: The Human Cost of Depleted Uranium*** by Akira Tashiro⁵.

Attached (Attach. 2) is a declassified memo to General L. R. Groves, director of the Manhattan Project, dated October 30, 1943. Major Doug Rokke provided me with this memo. It summarizes a report written by Manhattan Project physicists Drs. James B. Conant, A. H. Compton and H.C. Urey on the dissemination of very fine radioactive material as a method of warfare. It is a “blueprint” for depleted uranium as it has been used in Iraq, Kuwait, Kosovo, Bosnia and Afghanistan during the past decade. The memo details the use of very fine and superfine particles of radioactive materials as a military weapon. Depleted uranium, produces very fine and superfine particles in large amounts as it burns. The 1943 memo outlines what was known in 1943 and below are my comments:

- A gas warfare instrument: the memo indirectly referred to fission products from Fermi’s nuclear pile or radioactive waste like depleted uranium. The pyrophoric effect of depleted uranium, which spontaneously burns when heated to 170 C (once it is fired) and on impact, effectively forms very large numbers of extremely fine (0.1 micron) and submicroscopic particles as small as 0.001 micron or 10 _ngstroms (see Attach. 3 - Chart “Characteristics of Particles and Particle Dispersoids”) as described in the memo. Particles in this size range behave like a gas when inhaled, disperse in the lungs to the blood lung barrier where the white blood cells

(greater than 7microns in diameter) engulf the tiny particles of depleted uranium and carry them throughout the body. Once these particles have been engulfed by blood cells or lodged in tissues, they may not be detectable in the urine. Contaminated personnel will take the depleted uranium home, deposited in tissues throughout their bodies.

There is no known treatment for exposure.

- **It will permeate a gas mask filter:** particles in the 0.1 micron range will penetrate even a HEPA filter (High Efficiency Particulate Airfilter – see Attach. 4 - HEPA chart) in large numbers. The filters in gas masks issued to military personnel are much less efficient than HEPA filters. There are 1 billion particles of 0.1 micron diameter in a cubic meter of normal air. It is clear that a man (without a gas mask) breathing at a normal rate (about 28 cubic meters per day⁶) and retaining 75% of the very fine particulate matter in the respiratory system⁶ will inhale very large numbers of very fine particles in a short time period.

In a day an average man would normally inhale 33 million particles in the 0.1 micron range through a gas mask with HEPA filters. It would take one billion fine particles to fill the period at the end of this sentence. On the battlefield during live fire, the high concentrations of fine and very fine depleted uranium particles could increase the numbers inhaled in the small particle range by magnitudes.

The gas masks issued to military personnel now deployed to the Gulf Region are defective and do not provide even a minimum of protection to personnel. Recently I went on a speaking tour in 3 northeastern states with Major Doug Rokke, January 25-February 1, 2003. In nearly every talk we gave, a National Guardsman or other military person would tell us that their masks fell off when they tilted their heads.

Air filters in gas masks also fail as they are wetted by moisture from breathing or are used in the rain.

There is no possible protection from exposure to very fine particles of depleted uranium through filtering of air.

- **As a terrain contaminant:** the dispersal of very fine particles of depleted uranium will contaminate the terrain and deny access to either side except at the risk of exposure. That includes civilians and animals who may live there after the battle. The half-life of depleted uranium – 4.5 billion years – leaves the contaminated terrain radioactive forever.

Small particles less than 1 micron in diameter do not settle from the air (see Attach. 3 – Chart “Characteristics of Particles and Particle Dispersoids”) but become incorporated into atmospheric dust (see Attach. 5 - Chart “Natural Aerosols”) and are transported around the earth until they are removed (“rainout”) by rain, pollution or snow³. Seasonal climate change, agricultural activities, fires and other natural and man-made disturbances will continue to remobilize particles in the upper dust level contaminating terrains off the battlefield.

Weathering of larger particles of depleted uranium deposited on the battlefield⁷ will contribute to concentrations of depleted uranium fine and superfine particles in the air and upper dust level.

Air monitors in Hungary⁸ and Greece during bombing in Kosovo and Bosnia measured Uranium 238 carried by the wind from the battlefields. Seasonal fluctuations of depleted uranium particles in the air have been reported in Kuwait⁶.

- **Water and food contamination:** the depleted uranium dust will cycle through the environment both on and off the battlefield contaminating water supplies and food. Food grown in contaminated areas will be transported to markets and contaminate populations and areas far from the battlefields. Wind, water, birds⁹ and animals who transport the depleted uranium in their droppings, slowly contaminate wider and wider areas.
- **Internal contamination:** inhalation of very fine depleted uranium dust particles is extremely damaging to the respiratory tract and will get into the blood stream where it is carried by blood cells and contaminates tissues throughout the body. These “hot particles”¹⁰ will continue to emit alpha and gamma radiation (see Attach. 6 - photo “Hot particle in lung tissue”) as they travel throughout the body or where they rest in tissue. After the

Uranium 238 nucleus decays, the radioactive daughter product which forms (see Attach. 7) will continue to decay to other isotopes as many as four times. This will increase the level of radioactive exposure by magnitudes. Depleted uranium particles lodged in tissue will decay and continue emitting higher levels of radioactivity from daughter isotopes into the surrounding tissues.

SYNERGISTIC EFFECTS: The health effects from exposure to a combination of radiation, chemicals, and biological agents was not addressed in this WW II memo. This is a critical issue on the battlefield and should be considered in studies of Gulf War Illness. The combination of radiation with heavy metals, chemicals and biological toxins accelerate and increase the adverse health effects of exposure. The effects are unknown since very little research exists in this field¹¹.

THIS IS AN ISSUE WHICH SHOULD BE CONSIDERED IN FUTURE CONFLICTS SUCH AS THE PLANNED BOMBING OF IRAQ.

MEASUREMENTS OF DU IN TISSUES FROM 71 DEAD RESIDENTS OF BASRA:

Dr. Hari Sharma, a radiochemist living in Canada and member of the Radiation and Public Health Project, has measured depleted uranium levels in the tissues of 71 residents of Basra who died after the Gulf War from cancers¹². They were in the age range of 35-50 years. He found high concentrations of depleted uranium in tissue samples from these individuals. The levels were about the same throughout the tissues, suggesting that very fine particles were transported in the blood and deposited or lodged throughout the body.

WORLD TRADE CENTER AIR STUDIES:

Dr. Thomas Cahill, Emeritus Professor of Physics and Atmospheric Sciences at the University of California at Davis, conducted an independent study of the air around Ground Zero at the World Trade Center after the 9/11 disaster¹³. Using very sophisticated monitoring instruments¹⁴ which detect very fine and ultra fine particles, Cahill and his group monitored the smoldering pile at the WTC for 5 months following the disaster from one mile north of the center. They measured concentrations of particles in six size ranges from 2.5 microns to 0.09 microns¹³. They reported the highest concentrations of very fine particles of metals ever reported in the US¹³, and unprecedented numbers of very fine and super fine particles¹³. This air monitoring study of the WTC provided new information about very fine and superfine particles which have rarely been studied. Burning metals and other materials at high temperatures generate very large amounts of very small particles. For this reason depleted uranium which has burned is particularly hazardous.

The EPA has verified that depleted uranium was in the plane that crashed into the Pentagon on 9/11^{18,19} and that the crash site was contaminated. Residents of New York City detected radiation on hand held geiger counters at the WTC site. The EPA not only failed to protect emergency response personnel at both sites, but did not report or measure¹³ concentrations of very fine particles at any of the 9/11 plane crash locations. These are the most hazardous to health, and many personnel who worked at the crash sites are now very ill.

Dr. Cahill also studied the Kuwaiti oil field fires following the Gulf War.

ECRR: RELEASED JANUARY 30, 2003

A new report from the European Parliament has been released "2003 Recommendations of the European Committee on Radiation Risk: Health Effects of Ionising Radiation Exposure at Low Doses for Radiation Protection Purposes" Regulators' Edition: Brussels, 2003¹⁰. The report was written by 46 international scientists and has over 550 references to epidemiological studies which include nuclear site leukemias, Chernobyl infants, minisatellite mutations, weapons fallout cancers, DU Gulf Veterans, and Iraqi children.

The report concludes that the International Committee on Radiation Protection (ICRP) determined international standards for risk and dose effects from studies on A-bomb survivors which were based on high dose, external, acute exposures. The ICRP model only considered cancer as a health risk associated with radiation exposure. The ICRP model, using "bathtub" chemistry, "steam engine" physics, and deceptive reporting, produced faulty and fraudulent estimates of risk and dose effects. Additionally, because the ICRP model is based on acute, high dose, external exposure it cannot accurately determine risks or dose response for internal, chronic, isotopic exposures. For this reason, the ICRP and ECRR models are mutually exclusive.

This new ECRR report based on epidemiological studies, concludes that the health effects of low level radiation exposure have been underestimated by the ICRP model by 100-1000 times. It also includes other health effects due to radiation exposure from global weapons fallout. In addition to cancer it estimates the number of foetal deaths, infant mortality, and predicts “a 10% loss of life quality integrated over all diseases and conditions in those who were exposed over the period of global weapons fallout”.

The committee concluded that underestimates of risk and dose effects for depleted uranium exposure could be very great since the effect at the cell level may be very different than other types of radiation exposures. For this reason the health effects of depleted uranium exposure in Gulf Veterans will be investigated in depth by this committee and will be presented in a new report.

Internal exposure to depleted uranium is a “novel” exposure to an altered form of natural isotopes. The size, shape, surface texture, density, chemical composition and other physical and chemical factors of the particles greatly affect the health impact and damage to the cells of any biological system from depleted uranium exposure. Particle size may be the most overlooked and one of the most important characteristics of depleted uranium dust formed on the battlefield. After burning, depleted uranium is altered both physically and chemically and estimates of risk to health and dose effects cannot be based on previous studies of naturally occurring uranium. In the *Research Report Summaries*⁷ of depleted uranium studies done for the military between 1974 and 1999, they clearly provide information and concerns in these studies about the hazards of depleted uranium both to health, exposure on the battlefield and damage to the environment. This summary is well worth reading as it provides a timeline of the military politicizing decisions on the use of depleted uranium over 25 years. For example, in a 1980 Army report¹⁷:

This report provides an excellent history of the logic behind the Army’s decision to use DU as a kinetic energy, armored-piercing munition. DU’s final selection over tungsten was based on several reasons, including the lower initial cost of the penetrator itself and its better overall performance. DU and tungsten were rated even for “producibility”. Tungsten had the advantage for safety, environmental concerns, and deployment.

RADIATION RESPECTS NO BORDERS

Depleted uranium is being used as an effective munition on the battlefield and as a radiological weapon to destroy the genetic future of the Iraqi people¹⁵. Before the Gulf War, Iraq was the most developed and advanced country in the Middle East¹⁶. Writing, religion, poetry, music and science began in the region which includes Iraq, the Cradle of Civilization. The ability of the Iraqi people has been recognized for millenia. The Iraqi people are more feared than Saddam Hussein by the US. Their talent for creativity, ability to be self-determined, and their natural resources have made them the target of the US Government, US oil companies and the Department of Defense.

In November of 1991, Richard Berta, the Western Regional Inspector for the Department of Energy who was based at the Lawrence Livermore Lab where I worked, told me: “The Pentagon exists for the oil companies...”

The use of depleted uranium by the Department of Defense has created a slow Chernobyl in the Middle East.

With my best wishes and hopes that this radiation nightmare will finally come to an end, and with thanks for your efforts to move the issue into the light,

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ATTACHMENTS:

- Attachment 1: “Forward” by Leuren Moret to **Discounted Casualties: The Human Cost of Depleted Uranium** by Akira Tashiro, *Chugoku Shimbun* (2001).
- Attachment 2: Declassified memo to General L.R. Groves, Director of the Manhattan Project, October 30, 1943.
Source – US Army Major Doug Rokke
- Attachment 3: TABLE: “Characteristics of Particles and Particle Dispersoids” from the **HANDBOOK OF CHEMISTRY AND PHYSICS** 53rd Edition
This chart provides the particle range which is very wide for metallurgical dusts and fumes, a range from 100 microns to 0.001 microns (10 Angstroms). Particles smaller than 0.1 microns will coagulate and form larger particles, but the greatest number or population of particles will be in the 0.1 micron range (see Chart “Natural Aerosols”). This particle range is smaller than blood cells, bacteria, pollens, spores and other typical air contaminants. Very fine particles are extremely hazardous to health because they are carried by

the blood throughout the body. The rate of radiation exposure from one very small particle can be more than is allowed for a whole body exposure in one year (see photo “Hot particle in lung tissue”).

Attachment 4: CHART: “Penetration of a HEPA filter as a function of particle size” from 18TH DOE NUCLEAR AIRBORNE WASTE MANAGEMENT AND AIR CLEANING CONFERENCE, Baltimore 1984.

Experimental penetration of particles through a HEPA filter – determination that approximately 0.1% in the 0.1 micron particle range will pass through the filter. If there are 100,000 particles 0.1 micron in diameter per cubic centimeter of air, then 120 per cubic centimeter of air will pass through a HEPA filter. **In one day an average man will inhale 33 million particles in the 0.1 micron range through a HEPA filter.**

Attachment 5: CHART: “Natural Aerosols” from **ENCYCLOPEDIA OF SCIENCE & TECHNOLOGY** 7th Edition (1992), McGraw Hill.

This chart provides the average size distribution for natural aerosols in atmospheric dusts. The largest population or number of particles in an aerosol dust is in the 0.1-0.01 micron range. Depleted uranium particles in this size range will be incorporated in atmospheric dusts and will travel indefinitely, transported by winds.

Attachment 6: PHOTO: “Hot” or radioactive particle in lung tissue” photo by Del Tredici, **Burdens of Proof** by Tim Connor, Energy Research Foundation (1997).

This is a photo of a “hot particle”, in this case a 1 micron particle of plutonium, and shows the alpha tracks emitted from that particle in one year.

Attachment 7: **Van Nostrand’s Scientific Encyclopedia** 5th Edition (1976)

Decay paths for natural uranium – Table 1 The Uranium Series, and Table 3 The Actinium Series.

The decay paths for uranium are very complex but decay through a number of steps before they become stable and are no longer radioactive. Each of these steps produces a radioactive daughter product which will be more radioactive than the original uranium atom.