Depleted uranium weapons or eternal war

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A podcast proposed and produced by Thierry LAMIREAU.

What if the most formidable anti-tank weapon in the modern arsenal had been invented in the first place simply to solve a thorny problem of trash management?

Presented like this, it certainly sounds like a bad joke, but it is nevertheless the strict historical reality of one of the most controversial military technologies of our time.

Yes, because usually, when we think of the destruction of war, we imagine a kind of almost medical readability, a bit like an X-ray for a bone fracture.

Absolutely.

The bone is broken, you can see the white line on the screen, you know where it hurts, you know when it hit. It's violent, but it's circumscribed.
Except that in our in-depth exploration today, the X-ray machine, it doesn't work at all.

That's it. Kinetic damage, i.e. the damage that is visible immediately, gives way to invisible, environmental, cellular alteration.
Something that stretches over time scales, that outright defies human understanding.

And to understand how a simple industrial residue became the absolute nightmare of the battlefield, we dive into a single source and frankly of crazy density.
It is an independent and ultra-documented research thesis written by Thierry LAMIREAU, which dissects from A to Z the use of depleted uranium weapons.

yes, a colossal job!
Our mission today is to understand the physical mechanisms of this weapon, but also all the health, legal and even philosophical implications.
Because we can legitimately ask ourselves how we come to forge munitions with a material that our collective unconscious instantly associates with the heart of nuclear reactors.

To grasp this paradox, we really have to go back to the genesis of the material itself. Depleted uranium, which the military often abbreviates with the letters UA, is not something that is extracted as it is from the mine.

Is it manufactured?

In fact, it is a direct by-product of the process of enriching natural uranium. When we enrich uranium to power civilian power plants or manufacture nuclear warheads, we are trying to isolate a very specific isotope, uranium-235.

The fissile isotope then?

Exactly. Except that this isotope is very rare.
So what is left on the hands of the industrialists, and we are talking about absolutely colossal quantities, is depleted uranium. Something composed of more than 99.8% of another isotope, U-238.

Ok, so to put it super bluntly, it's really the junk of the nuclear industry.

That's it. A waste whose storage costs a fortune, since it is radioactive and toxic.

And that's when it gets crazy. The arms industry saw this logistical burden as an incredible opportunity. They said to themselves, well, we're going to recover this waste, which is extremely abundant and virtually free, to make weapons. The economic argument was unbeatable.

Well yes, you surprise me.

But hey, it's above all the physical argument that seduced the staff. Because uranium has a phenomenal density.
Basically, we are at nearly 19 grams per cubic centimetre.

Oh yes, it's massive. But wait, if the objective of an anti-tank ammunition is just to be as heavy as possible to hit very hard, why don't we stupidly use lead? Lead is heavy, it's not expensive and at least it doesn't come out of a nuclear enrichment centre.

So yes, lead is heavy, but it's way too soft. If you fire a lead shell at the armor of a modern tank, the projectile will just crash like a pancake on impact.

Ah, it'll just do a big task basically.

That's it, it doesn't pierce anything at all. To pierce, you need a metal that combines extreme density and hardness capable of surviving the initial shock, to transmit all the kinetic energy. And uranium, not only is it 1.7 times denser than lead, but once alloyed with other metals, such as titanium, they become incredibly hard.

Okay.

And for a very long time, the reference metal for this kind of work was tungsten.

And precisely, the author of the thesis insists on this technological tipping point between tungsten and uranium.
And while reading, I had an analogy in mind to visualize the difference in front of a huge steel plate. Tungsten is a bit like a knife, very strong. But when it sinks into the opponent's metal, with heat and pressure, the blade flattens and becomes blunt and loses its strength.

That's exactly it.

Whereas depleted uranium, from what I understand, it acts like a kind of magic pencil that self-sharpens in mid-flight as it passes through the target.

Yes, that's the perfect image to describe a very, very complex metallurgical phenomenon called adiabatic shear.

In fact, when the uranium shell hits the armor, the pressure is unimaginable. And instead of crashing into a mushroom shape, as tungsten would, the extreme heat changes the structure of the metal.

Ok, and what's going on physically?

The outer layers of the shell tip fracture, they come off as small scales and this continuous chipping process means that it permanently reveals a fresh, intact and razor-sharp heart.
As a result, he makes his way through the composite steel of the tanks, almost like butter.

It's crazy. It's both fascinating and frankly chilling.
By the way, I was super surprised to discover in the text that the idea of using this doesn't date back at all to the modern wars in the Middle East, the chronology goes back much further.

Oh yes, much further. The first experiments date back to the Second World War.
In 1943, Albert Speer, who was Nazi Germany's Minister of Armaments, ordered the use of natural uranium in some anti-tank munitions.

Because there was a lack of tungsten, right?

Exactly. The Reich was facing a critical shortage.
But hey, large-scale, industrial development was really done under the impetus of the United States during the Cold War. The goal was to pierce the new ultra-thick armor of Soviet tanks.

And that's what gave birth to weapons systems that were just terrifying.
I'm thinking of the famous cannon of ground attack planes, the thing designed specifically to spit uranium bullets at infernal rates.

The gun of the A-10 Warthog, for example.

Yes, there you go. The document mentions shots of more than 4000 rounds per minute. And not to mention the American heavy tanks that use uranium not only as a projectile to attack, but also integrate it as a plate into their own body to defend themselves.

That's clear. Depleted uranium, in fact, it becomes both the sword and the ultimate shield of the conventional battlefield.

Except that, and this is where we get to the heart of the problem, if I understood the mechanics of the thing correctly, it's right at the moment when the weapon accomplishes its tactical mission, you know, at the moment of piercing, that a catastrophic environmental chain reaction is triggered.

Oh well, that's when everything changes, yes.

We hear about surgical strikes all the time in speeches about modern warfare. This idea that a missile or a shell hits its target with the precision of a scalpel.

But the physical reality of this famous adiabatic shear tells a completely different story.

Totally. Because the friction that allows the shell to pierce the armor, it generates an incredible heat. It happily exceeds 500 degrees Celsius. And at that temperature, under that pressure, the depleted uranium projectile doesn't just pass through the metal. In fact, it ignites spontaneously when it comes into contact with oxygen in the air. This is what we call its pyrophoricity.

So the solid metal catches fire on its own.

yes. And it's not just a small fire. An immense part of its mass, sometimes up to 60% of the shell, is literally vaporized. The solid, super-dense metal metamorphoses in a fraction of a second into a gas, then directly into an aerosol, composed of micro and nanoparticles of uranium oxide.

So the projectile no longer even exists in the form of bullets of metal debris. It just becomes a microscopic cloud of dust.

That's exactly it, finer than talcum powder. And obviously, this dust, it escapes all human control. The thesis explains very well that in Iraq, for example, during very hot weather and sandstorms, these particles attached themselves to the grains of sand and travelled considerable distances, carried by the winds.

So the idea of clean war, it completely collapses in the face of the laws of chemistry.

Oh yes, the myth of the clean strike is shattered. These nanoparticles, they fall back. They are deposited on agricultural soils, they are washed away by rainfall, they percolate into the earth until they reach the water table and finally, they enter the local food chain. A super-localized ballistic event turns into widespread pollution.

In fact, there is a passage in the study that perfectly illustrates how volatile and dangerous this material is, even outside of a military war context. This is the story of the crash of a civilian plane, a Boeing 747, in Amsterdam in the early 90s. And when you read that, you wonder, but what the hell is a commercial airliner doing with heavy weaponry?

Yes, it's a detail of the aeronautical industrial history that very few people know. In fact, in 1992, the Elal flight, which tragically crashed into residential buildings in Amsterdam, was carrying 390 kg of depleted uranium by its very construction.

But why? Was it a secret military cargo?

Not even. This uranium simply served as a counterweight in the wings and tail of the aircraft. Given the extreme density of the material, it was ideal for balancing the aircraft's center of gravity in very tight spaces. Boeing was using that at the time.

And so, what happened during the crash?

The massive fire that followed the impact consumed about 150 kg of this depleted uranium. The flames of the kerosene recreated the same thermal conditions as a military impact. It vaporized the uranium oxides just over entire residential quarters. And it proved, under the nose and beard of the reassuring speeches of the time, that the combustion of this metal into a toxic aerosol was an intrinsic danger. Whether it's military or civilian, if there's high temperature, it becomes a toxic cloud.

And the most dizzying thing about this pollution, whether it comes from a tank or an airplane fire, is its permanence.

Suffice to say that on the scale of humanity, it is a contamination that is virtually eternal. Pollution accumulates, it never disappears.

As a result, if these uranium oxides fly in the wind, infiltrate the water for billions of years, the obvious conclusion is that living beings end up inhaling or eating it, which raises just colossal health questions. In concrete terms, what happens in the human body when one of these nanoparticles enters the respiratory system of a soldier or a civilian years after the conflict?

The big problem with depleted uranium inside the body is that it attacks on two fronts at the same time.
Research calls this double toxicity. First of all, you have the purely chemical toxicity that is specific to all heavy metals, a bit like lead or mercury.

Ok, so it poisons?

That's it. When uranium enters the bloodstream, the body tries to get rid of it. The blood passes through the kidneys which act as a filter. But uranium is so heavy, so chemically toxic, that it accumulates in the kidney structures. It causes serious damage, insufficiency and cell death. This nephrotoxicity, for once, is super documented and proven by science.

So that's just the chemical mechanics. But we know that this is not what scares the population and veterans the most. There is the other word that is frightening, the radiological dimension. Because even with the word impoverished stuck next to it, it's still a radioactive metal, we agree.

Well, it's almost harmless. It has a very low penetrating power, it's stopped by the epidermis, the layer of dead skin. Handling a solid depleted uranium block with your bare hands, paradoxically, is very low-risk.

Okay, so the trap really closes the moment that solid projectile is turned into the famous microscopic dust.

That's the whole drama of this weapon. If a soldier or a kid playing in the rubble inhales an insoluble uranium oxide nanoparticle and it lodges deep in his lungs, in a cell, then the situation changes completely.

Yes, because there's no more skin to block.

Exactly. The alpha particle is already inside and it will irradiate directly, continuously, the living cells around it. It's an extremely short distance, yes, but it bombards the lung tissue continuously for years, if not decades.

This is the equivalent of a nuclear bombardment on a microscopic scale, directly on DNA. We quickly understand how it can trigger leukemia, devastating cancers or unspeakable congenital malformations in newborns. We have all heard of veterans who came back bruised with unexplained illnesses, the famous Gulf War syndrome in the early 90s or the Balkan syndrome later.

Yes, absolutely.
Why is it so complicated scientifically and legally to make the official link between the use of these shots and the appearance of diseases?

It's super frustrating, but it can be explained.
Forensic medicine, on the other hand, requires direct, unique and indisputable proof of causality. However, a battlefield is not a clean and sterile laboratory. It's frankly the worst epidemiological environment imaginable.
It's a giant toxic cocktail.

Yes, it's true that there are other factors.

A lot of other factors. Take the Gulf War. The soldiers were exposed to hyper-toxic smoke from hundreds of burning oil wells, massive sprays of pesticides to kill insects in the camps, and myriad vaccines, some of them experimental, that were administered to them in an emergency before deployment.

So, the famous fog of war, it extends straight into the medical records. Isolating the responsibility of a single small, invisible nanoparticle in the midst of all this chemical and medical chaos is almost impossible in front of a judge.

That's it.

And besides, it makes me think, the brief mentions another factor that is even more troubling. It would seem that the uranium used to make its weapons does not always come from its own civilian enrichment stocks, at least if we can use that word.

So that's a critical point raised by the author. Investigations suggest that, for reasons of economic profitability, some of the depleted uranium used actually came from the reprocessing of spent nuclear fuel. Basically, waste that had already spent time inside nuclear reactors in full operation.

Wow. And what does it change concretely?

It changes everything. Because this passage through the reactor irremediably contaminates the uranium with traces of synthetic transuranic elements, ultra-toxic stuff such as uranium-236 or even traces of plutonium.

And plutonium is infinitely more radioactive and carcinogenic. Just the presence of these impurities, even minute ones, in the shells would be enough to explain the rapid onslaught of the serious pathologies that have been observed.

But faced with this legitimate suspicion of veterans and civilian doctors, how do they react to the military and political authorities? Because in the brief, there is an anecdote that stuck to me about a French MP who wanted to conduct the investigation.

Oh yes, this story is crazy. This deputy officially asked the Ministry of Defence to send him the scientific files that assessed the health impact of these weapons. You're expecting to receive a clear summary report, right?

Yes, a document of a hundred pages max, with a conclusion.

In response, he received seven huge binders, totalling more than 10 kilos of raw documents, contradictory studies, unpalatable technical surveys, tables of figures without context.

It's concealment by overload.

The goal is to drown the poor guy in a mountain of totally unusable data, just to make sure that no clear conclusion can ever come out of it.

Exactly. This is a well-known tactic called the instrumentalization of scientific doubt. Military institutions exploit a logical loophole that is formidable. They basically say, as long as your epidemiologists can't prove 100% that depleted uranium is the exclusive cause of diseases, by eliminating all the other stuff from the toxic cocktail, we claim that our weapon is 100% safe.

The absence of absolute proof of a danger cynically becomes the absolute proof of the absence of danger.

It is a total reversal of common sense and the precautionary principle.

And in the face of this wall of inaccessible data, in the face of these never-ending medical controversies, the battle inevitably ends up changing terrain. If science can't cut this famous knot of causality, who do we turn to?

Towards lawyers, international law and philosophy.

The problem, for once, is that international law is often a war behind. At the moment, on this specific subject, there is a huge legal vacuum. No convention, no international treaty mentions or prohibits depleted uranium weapons by name.

It's crazy. Technically, they are not nuclear weapons in the legal sense, since they do not rely on a fission or fusion reaction to explode. Nor are they chemical weapons within the meaning of the Paris Convention. As a result, lawyers and NGOs try to rely on international humanitarian law. And particularly on the famous
"Protocol 1" to the Geneva Conventions, which was added in 1977.

The text of the research explains this well. This Protocol of 77 prohibits the use of methods of warfare designed to cause, and here I quote, widespread, lasting and serious damage to the natural environment.

But these three little words, read together, that's what forms the legal lock, isn't it?

That's the whole problem. These are cumulative criteria in law.
Armies and states defend themselves by saying "ok, our weapons at the AU may cause lasting damage over billions of years, perhaps locally severe at the site of impact, but they are not geographically large enough to constitute a global violation."
Appeals are systematically crushed on this super-strict interpretation of the texts.

Yet, when you think about it, there is another basic principle of the laws of war that is completely shattered here. This is the obligation of distinction.
In law, a distinction must always be made between combatants and the civilian population. And a cloud of radioactive dust, he is not going to ask the person who breathes him for his identity card!

It's clear!

It's going to hit the enemy soldier today, and the kid who is going to play in the rubble in 20 years with the same implacable coldness. And on this very precise point, the depleted uranium weapon behaves nothing more or less than an anti-personnel mine forgotten in a wheat field.

The comparison is very relevant. Since the legal and scientific path is somewhat blocked, the debate is moving to the field of morality and especially of public perception.

Ah, and speaking of public perception, you really have to stop for a second on the linguistic genius, or rather the pure semantic manipulation of the military for this weapon. The simple choice of the word "impoverished". When we hear this word, the brain of the general public instinctively makes a reassuring association.

It's a real semantic shield.

That's exactly it. An impoverished land is a land that no longer yields anything. Impoverished soil is harmless, it's almost sad.

And this little word, it psychologically neutralizes the terrifying charge of the word uranium. We disarm people's anxiety with a stupid adjective.

It's dreadful. And against this kind of anesthesia of opinion, authors and thinkers try to mobilize new philosophical frameworks.
The thesis in particular gives a very interesting place to the thought of the philosopher Hans Jonas and his concept of the ethics of fear.

Oh yes, that's very interesting.

Jonas, basically, he postulates that in the face of the unprecedented capacities for technological destruction that we have developed in the twentieth century, we can no longer afford to wait, to have 100% scientific certainty to act.
The mere prospect of irreversible and apocalyptic damage to future generations should be enough to dictate immediate action. This is the essence of the precautionary principle, but elevated to the rank of an absolute moral imperative.

And it is this reflection that explains the recent emergence of new legal concepts everywhere, such as the notion of ecocide, the idea of criminalizing the deliberate and massive destruction of the conditions that make a territory inhabitable for the living.

Exactly. And associations of sick veterans, I'm thinking of AVIGOLFE for example in France, or other citizen collectives, they use these concepts to wage an asymmetrical war. The goal is more necessarily to win the battle of numbers in a medical trial.

Okay.

The goal is to accumulate so much moral opprobrium, to document so many human tragedies, that the use of weapons ends up becoming an unacceptable political taboo. It is by morally stigmatizing cluster munitions or anti-personnel mines that civil society has succeeded, in the past, in imposing treaties of prohibition, such as the Ottawa Treaty.
This is exactly the strategy that is being tried at the moment for depleted uranium.

Frankly, this whole journey through this documentation leaves us with a rather ferocious irony. For an industrialist, it's a masterstroke, transforming toxic waste that is ultra-expensive to store into a product that you are paid to pull. For an officer, it's the ballistics of a dream, a shell that pierces any tank with disconcerting ease.

On paper, it's the perfect combo.

But this triumph of engineering in the short term hides an environmental and human catastrophe that is played out squarely on a geological scale.

On the one hand, you have the absolute tactical immediacy, the fraction of a second it takes for the shell to demolish the enemy's steel, and on the other, billions of years of toxicity that will slowly settle on the living world.

And you see, this reflection leads me to a final question that shakes up everything we thought we knew about the very history of conflicts.
Historically, for anyone who studies history, we have always had a very binary, very clear definition of peace. It is the precise date that we learn at school, the armistice is signed, the diplomats shake hands for the photo, and above all, the cannons fall silent. And bam, we're moving on to the post-war period.

Peace has returned.

But if modern weaponry transforms land, water and air into active destructive agents for eternity, the very idea of a return to peace, it collapses on a territory covered in depleted uranium oxide, the war never really ends when the generals sign a piece of paper.
It simply changes form, it becomes geological.

I think it's a reflection that definitely changes the way we listen to the next official speeches about the wars that they try to sell us as "clean"...