Atomic Energy: Origins Of The Fallacy In A Risk-Free Radiation Dose

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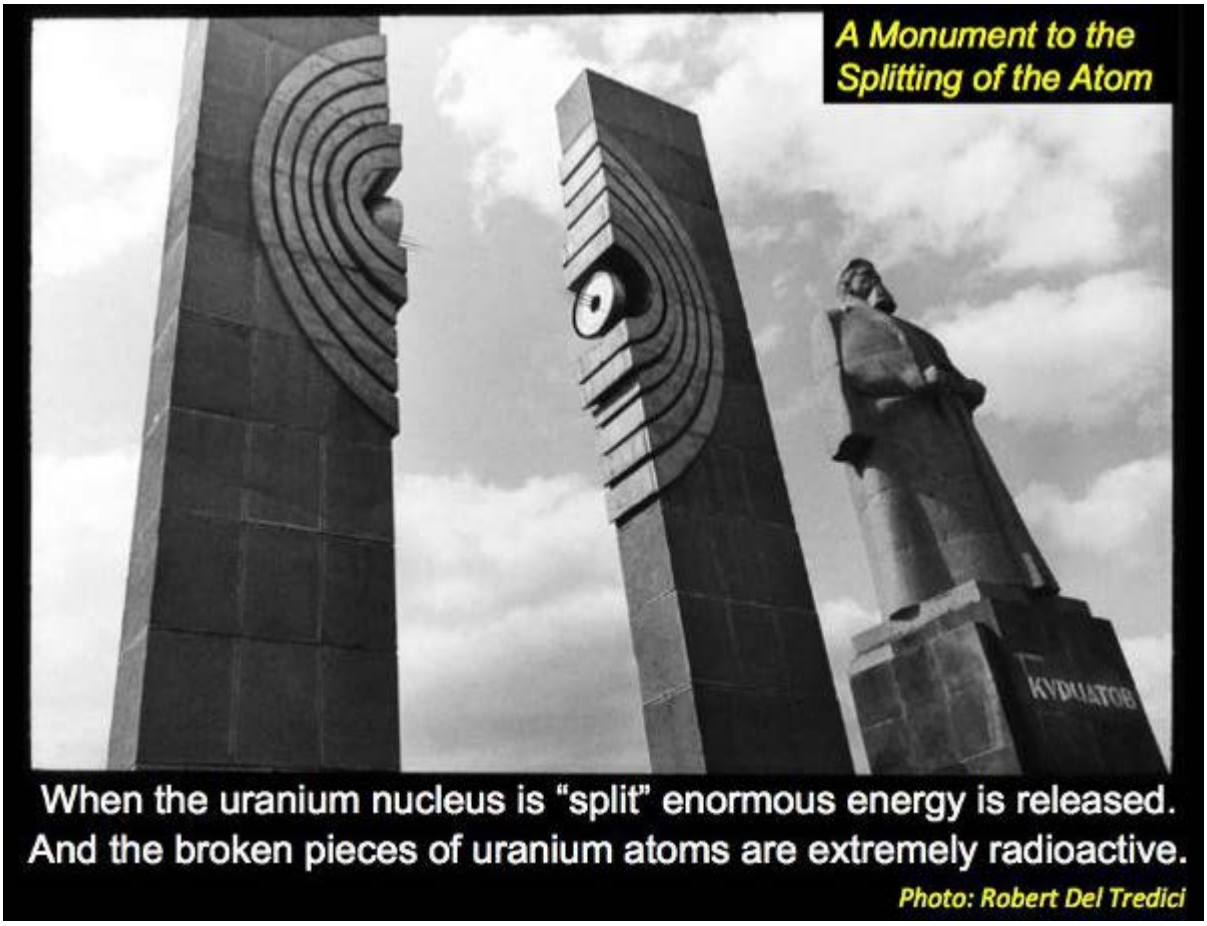

URANIUM: ITS USES AND DANGERS, from a talk by Dr. Gordon Edwards, 25 Sep 2014; Photograph by Robert Del Tredici[1]

The ability to tap energy at the level of the atom is something new to our species. Atomic or nuclear energy is of a profoundly different order than energy that was previously released exclusively through chemical means.

> Let's begin with the word, *nuclear*. What is *nuclear*? Why do we use this word? Basically, a simple answer is, nuclear energy is energy that comes from the nucleus. The nucleus being the core of an atom. Every atom has a tiny core called the nucleus—very massive. And it's surrounded by one or more orbiting electrons. These electrons are negatively charged and the nucleus itself is positively charged.
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> Chemical energy involves only the outer electrons. So every chemical reaction you've ever seen portrayed on television—big explosions—tanks firing things or cooking in the kitchen—all the changes that take place, all the industrial changes that take place in chemical plants—all of it involves only the electrons. It doesn't involve the nucleus. Nuclear energy is energy

> that comes directly from the nucleus and it is typically millions of times more powerful than any chemical energy. And that's why it's rather difficult sometimes to grasp the scale of nuclear energy because things which are extremely tiny can be giving off an incredible amount of energy.
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> There are two types of nuclear energy in particular to discriminate between. The first one is called NUCLEAR FISSION and that's the splitting of uranium atoms, for example. That's what really gives the juice in a CANDU nuclear reactor, that's what really produces the bulk of the heat that's used to produce steam to generate electricity. But, there's another form of nuclear energy, radiation, RADIOACTIVITY, specifically.
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> Now it's very important to understand that these are different things. Nuclear Fission is a process which can be controlled. It can be speeded up, it can be slowed down, it can be stopped, it can be started. Radioactivity cannot be controlled that way. Nobody knows how to speed it up, how to slow it down, how to stop it. You can't shut it off. And that's why we have a nuclear waste problem because this radioactivity—enormous amounts of radioactivity—cannot be shut off.
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> There's the problem in a nutshell. Nobody knows what to do about it. Although some people think they have an answer, we're not sure if that answer is correct or not.
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> — Dr. Gordon Edwards [2]

Beginning in 1940, with the project to create an atomic bomb, a new technology based on the ability to manipulate the chemistry of uranium, was established with profound consequences unforeseen at that time. From that beginning, what came to be known as nuclear power was inextricably linked with nuclear weapons.

> The nuclear power industry grew out of the nuclear bombs that decimated two Japanese cities in August 1945. These two industries are still inextricably entwined and will never be separated. The enrichment technology to make new uranium fuel is identical to that needed to make the uranium bomb that destroyed Hiroshima, while the plutonium stripped from spent nuclear fuel at reprocessing plants like Rokkasho is identical to the plutonium used in the plutonium bomb that destroyed Nagasaki.
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> — Chiho Kaneko [3]

In the past 7 decades, the increasing generation of vast amounts of man-made radioactive matter, inimical to all life on Earth, is unprecedented.

> Long-lived radionuclides, such as cesium-137, are something new to us as a species. They did not exist on Earth, in any appreciable quantities, during the entire evolution of complex life. Although they are invisible to our senses, they are millions of times more poisonous than most of the common poisons we are familiar with. They cause cancer, leukemia, genetic

mutations, birth defects, malformations and abortions at concentrations almost below human recognition and comprehension. They are lethal at the atomic or molecular level.

They emit radiation, invisible forms of matter and energy that we might compare to fire, because radiation burns and destroys human tissue. But unlike the fire of fossil fuels, the nuclear fire that issues forth from radioactive elements cannot be extinguished. It is not a fire that can be scattered or suffocated, because it burns at the atomic level – it comes from the disintegration of single atoms.

— Steven Starr [4]

Disaster Creep: "Safe Radiation Doses" Belief Began Post-1895

The events that developed in the late 1930s to early 1940s, becoming the Manhattan Project during World War II, resulted in the creation of two different designs of atomic bombs detonated over Hiroshima and Nagasaki, Japan on August 6 and 9, 1945. These events were preceded by a half-century of mistaken belief that low dose radiation was not harmful.

In 1895 Wilhelm Röntgen (pronounced rênt′gən) was studying the phenomena accompanying the passage of an electric current through a gas of extremely low pressure. On November 8, 1895, he discovered what he called X-rays as their nature at that time was unknown.[5] In 1898 Marie and Pierre Curie announced their discovery of radium, an element more radioactive than uranium.[6]

Use of xrays and what was termed "therapeutic irradiation for non-malignant conditions" became very popular among physicians even before the turn of the century. Marking the one hundredth anniversary of Röntgen's discovery in 1995, Dr. Ronald G. Evens described some of the enthusiasm of those early days:

By the time of the appearance of the first American clinical diagnostic radiograph [also called roentgenograph and skiagraph], made at Dartmouth College by Dr. Edwin Frost on February 3, 1896, physicians were becoming increasingly aware of the extraordinary potential for the new discovery. By April, "xray mania" had seized the United States. Xray studios had opened for "bone portraits," and countless photographers and electricians had set up shop as "skiagraphers." Thomas Edison became an enthusiast in 1896, and attempted to xray the human brain "at work".... Soon, the appearance of xray machines in general practitioners' offices across the United States would underline the notion that a new technology was available to diagnose any and every ailment. Some physicians even thought it would eliminate the need for laboratory analysis in medicine.[7]

Medical practitioners believed xrays might cure almost every affliction. In 1906 Dr. George MacKee, a dermatologist, wrote about the runaway enthusiasm looking back at the first ten years:

During those years the rays, to a large extent, were empirically used and they were tried out on nearly every chronic disease. The literature was misleading, as it was full of case reports of wonderful cures, the occasional paper from the pen of a good man being ignored or

> overlooked by the average xray operator of the period and in spite of repeated warnings from capable men, the "radiomaniacs" held the reins.[8]

In 1963 Dr. John W. Gofman was asked by the Atomic Energy Commission (AEC) to found and become the first Director of the Biomedical Research Lab at Lawrence Livermore National Laboratory. As a graduate student at UC Berkeley, where he received his PhD in Nuclear/Physical Chemistry in 1943, Gofman worked with Glenn Seaborg (his graduate advisor and co-discoverer of Plutonium) and Robert Oppenheimer on the Manhattan Project, eventually becoming the leader of the plutonium group at UC Berkeley. He received his M.D. from UCSF in 1946.

While working in the plutonium project at UC Berkeley, Gofman met Ernest Lawrence, winner of the Nobel Prize in Physics 1939, "for the invention and development of the cyclotron and for results obtained with it, especially with regard to artificial radioactive elements." In 1952, Lawrence successfully lobbied the AEC to establish the University of California Lawrence Radiation Laboratory in Livermore, California. In 1954 Lawrence invited Gofman into his office to discuss a matter of concern. As Gofman recounts their meeting,

> We were good personal friends. "I'm worried about the guys out at Livermore," he said. "I think they may do some things to harm themselves. You're the only person who knows the chemistry and the medicine and the lab structure. Could you do me a favor and go out there a day or two a week and just roam around and see what the hell they're doing, and see that they do it safely? If you don't like anything they're doing, you can tell them that your word is my word, that either they change, or they can leave the lab."[9]

Lawrence understood and valued the fact that Gofman was especially qualified in both the hard (nuclear physics) and soft (medical) sciences.

In 1995 Gofman was interviewed in a program on Human Radiation Experiments Oral Histories conducted by the Department of Energy.[10] In addition to the interview, he submitted the following supplement, providing context regarding how, in the five decades preceding the Manhattan Project, the dominant biomedical community erroneously believed that exposure to low dose ionizing radiation was of no consequence. Once this bias of missing the boat concerning cancer induction had been adopted over decades, the imperative to continue operating with the "no problem from exposure to low-dose radiation" mindset predominated. This overrode all voices urging caution or that the medical community's prior guidance was wrong.

Supplement to the Oral History of John W. Gofman
March 20, 1995
An Overview in Retrospect of the "1945 + Human Radiation Experiments"

> *It is my opinion based upon some major studies I have accomplished in the past year that it is a grave mistake to consider "human radiation experiments" as a phenomenon peculiar to the advent of large-scale atomic energy.*

In fact, the really significant events were in 1895 (Roentgen's discovery of the X-Ray), and 1898 (the Curie's discovery of radium). The true era of massive human radiation experimentation began very shortly after Roentgen's work, and by the 1940-1945 period, all the features were in place that ASSURED we would have precisely what has been found to have been the case in the post-1945 period. But there really was nothing special about the human experiments beginning after 1945.

Two Major Facts of Life Which Must Be Conceded Here

***1.** Humans in recent decades (last couple of hundred years) operate on the technological imperative. Whatever is discovered must be applied immediately. There has been no thought, until recently, about DISASTER CREEP which can occur as a result of looking only at the short span of time for consequences of exposure to new technologies.*

***2.** A special example of disaster creep is the inordinately long latent period before the full flowering of cancers following exposure to carcinogens such as ionizing radiation. The time is clearly at least 50 years and it may really be 60 or more years.*

***THE RESULT:** The bulk of cancers from x-radiation and radium gamma rays simply were not seen, partly because of the long latency and partly because the idea that long-term follow-up was essential was clearly dismissed in the half-century after the Roentgen discovery.*

***THE FALSE CONCLUSION:** Doses of 200, 400, 600, and even over 1000 Roentgens of exposure to partial body radiation were erroneously exonerated as cancer producers. Millions of cancers were set in motion in the populations receiving ionizing radiation in the half-century before the A-bomb.*

And this set the stage for all the events recently receiving notice. How?

Radiation below 500 to 1000 roentgens of exposure was ridiculed as being of no consequence by failure to look at the follow-up of persons exposed.

When the post-Hiroshima era resulted in the massive Atomic Energy Bureaucracy, with all the biases built-in from 50 years of having missed the boat concerning cancer production, WHO WAS PUT IN CHARGE OF THE PROGRAM ON HEALTH EFFECTS? THE VERY PEOPLE WHO HAD A TOTAL BIAS IN FAVOR OF "No Problem from Low-Dose Radiation." Although there should have been more thoughtfulness over the uranium miners and dial painters, somehow the idea became accepted that beta particles and electromagnetic radiation simply had shown themselves not to be a worry. Alpha particles, grudgingly yes.

Not that these people were correct. THEY WERE NOT. But I am describing the atmosphere in which these individuals came to be the dominant forces in setting up the post-war era of biology and medicine of irradiation. The bias was overwhelming, and with their short-sighted

look at the problem, it seemed as though they really believed there was no harm.

That was the EARLY phase post-war. But once the bureaucracy was set up and the movers and shakers were told, "No problem with health issues," the door was opened wide for all sorts of proposals from nuclear power, massive uses of radionuclides in medicine and elsewhere, and even all the "Plowshare" ideas.

This set up a new phase. Once the biologists had told the high moguls there was no problem with health effects, all kinds of wheels were in motion and from there on out, the biomedical people had to try to have biology conform to their erroneous view of what the real truth was.

And all hell would break loose if the moguls had been embarrassed by the poor biological guidance from an inept biomedical community. And that community, seeing this golden goose of unlimited funds for research and grants, simply was not in any mood to say, "Go Slow," or that our prior guidance was wrong.

We are now slowly coming off that erroneous mountain—but because so much prestige and so much funding have gone into the enterprise, the easiest path is denial that any problem exists at doses of a few rads. After all these same people just a couple of decades earlier were telling the Congress and the public that 500 to 1000 rads were "Safe" exposures. I have recently found even more evidence that this was the prevailing view at the bureaucratic top.

There is a fundamental rule that exposing persons to a potential poison, with an assurance of safety when that cannot be assured, is fraudulent. At the very least, this constitutes human experimentation, with its Nuremberg connotations. Such experimentation is commonplace today, with so-called safe standards being set for "tolerance" doses. The idea of safe doses was much much more in error for the 50 year period before the atomic bomb.

Now we can go into the Oral History, but I think failure to appreciate the 50 years before the a-bomb completely confuses the persons looking into the ethics of so-called "human experimentation." The outcome WAS CRADLED long before the post-bomb period, and was an inevitable expectation.

End of Prologue

I have felt these conclusions needed to be here. They have resulted from an in-depth year-long investigation of the extent to which ionizing radiation, primarily medical x-rays and radium gamma rays, accounts for the current level of breast-cancers. We estimate that 75 % of all breast-cancers were and are induced primarily by medical irradiation. Most of that was in the horrendous use of fluoroscopy and the equally questionable uses of radiation in the therapy of benign diseases—from dermatologists to rheumatologists. There is some REAL human experimentation.

Given the above, the dangers from further increases of low dose radiation exposure by official rulings is of concern to all. Raising the levels of "permissible" radiation exposure limits are occurring in the U.S. and Japan.[11] It becomes an ever more urgent necessity to inform ourselves and others about the true consequences of creating nuclear weapons and power.

A very positive process to be informed by, sign on to, and promote is the Montreal Declaration for a Nuclear-Fission-Free World. As stated in its opening two paragraphs,

> As citizens of this planet inspired by the *Second Thematic World Social Forum for a Nuclear-Fission-Free World*, conducted in Montreal from August 8 to August 12, 2016, we are collectively calling for a mobilization of civil society around the world to bring about the elimination of all nuclear weapons, to put an end to the continued mass-production of all high-level nuclear wastes by phasing out all nuclear reactors, and to bring to a halt all uranium mining worldwide.
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> This call goes out to fellow citizens of all countries worldwide who see the need, whether as an individual or as a member of an organization, for a nuclear-fission-free world. We are committed to building a global network of citizens of the world who will work together, using the internet and social media to overcome isolation, to provide mutual support and to coordinate the launching of joint actions for a world free of nuclear fission technology, whether civilian or military.

References

1. Photograph by Robert Del Tredici, "Monument to the Splitting of the Atom, Chelyabinsk," which commemorates Igor Kurchatov, the father of the Soviet atomic bomb. It shows the splitting of a uranium atom. Large semicircles depict the energy given off at the moment the atom splits. Two hemispheres represent broken pieces of the atom; they are newly formed radioactive materials called `fission products'. Slide Number 4 from "Uranium, Its Uses and Dangers," (PDF), Presentation by Dr. Gordon Edwards, President, Canadian Coalition for Nuclear Responsibility (www.ccnr.org), presented at Wendake, Quebec, on September 25, 2014 for the Assembly of First Nations of Quebec & Labrador.[↩]
   See Also: "Born Again: Denial and Eternally Recurring Surprise in Nuclear Waste Management," a slide presentation by Robert Del Tredici, "in order to capture the human meaning of what we're dealing with." May 12, 2011, Naropa University, Boulder Colorado from Rocky Flats, a Call to Guardianship a lecture series on the sterwardship of nuclear waste sponsored by the Rocky Mountain Peace and Justice Center and the Environmental Studies Department of Naropa University.

2. High Level Nuclear Waste, film presentation by Dr. Gordon Edwards, president of the Canadian Coalition for Nuclear Responsibility, made in Schreiber, Ontario, February 11, 2015. [↩]

3. Chiho Kaneko, member of Fairewinds Board of Directors; "Demystifying Nuclear Power: Nuclear IS Atomic, *Fairewinds Energy Education*, 18 Oct 2015. [↩]

4. Steven Starr, Director, University of Missouri Clinical Laboratory Science Program, Associate, Nuclear Age Peace Foundation, former board member and senior scientist for Physicians for Social Responsibility;
"The Implications of Massive Radiation Contamination of Japan with Radioactive Cesium," Helen Caldicott Foundation Symposium, "The Medical and Ecological Consequences of the Fukushima Nuclear Accident," Co-Sponsored by Physicians for Social Responsibility, March 11 and 12, 2013. [↩]

5. Wilhelm Conrad Röntgen received the Nobel Prize in Physics 1901 "*in recognition of the extraordinary services he has rendered by the discovery of the remarkable rays subsequently named after him*". [↩]

6. See "Dec. 21, 1898: The Curies Discover Radium," by Tony Long, *wired.com*, 12/21/09 [↩]

7. Ronald G. Evens, "Roentgen Retrospective: One Hundred Years of a Revolutionary Technology," *J. American Medical Assn*. Vol.274, No.11: 912-916. September 20, 1995, pp. 914, 915. [↩]

8. George M. MacKee, *XRays and Radium in the Treatment of Diseases of the Skin*, Third Edition. 830 pages. Several chapters have co-authors. (Lea & Febiger, Malvern PA 19355 USA.) 1938, p. 16. [↩]

9. Chapter 4. John W. Gofman, Medical Physicist. from Leslie Freeman, *Nuclear Witnesses: Insiders Speak Out* (New York: W.W. Norton & Co., 1981, 1982), p. 86. [↩]

10. Human Radiation Studies: Remembering The Early Years, Oral History of Dr. John W. Gofman, M.D., Ph.D., conducted December 20, 1994, United States Department of Energy, Office of Human Radiation Experiments, June 1995 [↩]

11. See, for example:[↩]
    - "White House Approves Radical Radiation Cleanup Rollback, Civilian Cancer Deaths Expected to Skyrocket Following Radiological Incidents," Public Employees for Environmental Responsibility (PEER), April 8, 2013.
    - "Japan to raise worker emergency radiation exposure limits," *World Nuclear News*, May 21, 2015. "Japan's nuclear regulator is to increase the radiation exposure limit for workers in emergency situations from the current 100 millisieverts (mSv) to 250 mSv. The limit was temporarily raised following the March 2011 accident at the Fukushima Daiichi plant."
    - "Japan: Government to Raise Maximum Annual Radiation Exposure Ahead of Restart of Nuclear Reactors, *Mainichi Shimbum*, June 30, 2015.
    - Follow the latest developments on how EPA Moves to Relax US Radiation Standards provided at the Nuclear Information and Resource Service.