Nuclear Technology:
The Inappropriate Exercise of Human Intelligence
-- and Given This, What *Is* Appropriate?

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> It is not a normal situation when the people who are in charge of the fate of a whole civilization lie quite openly to the whole world.
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> --Dr. Vladimir Chernousenko,
> Physicist and Scientific Director of the Chernobyl "clean-up", 1986-91,
> testifying at the World Uranium Hearings in Salzburg, September, 1992.

PART I: Shattering Treacherous and Lethal Assumptions

We need now, as we have for more than fifty years, to articulate and then dispel and shatter the false and exceedingly lethal assumptions underlying the "promises" of nuclear technology. The hierarchies of centralized authority, which have the greatest vested interest in perpetuating the employment of this technology, have lied about its true costs from the very beginning. These hierarchies include the Fortune 500 [**1**] / Global 500 [**2**] corpses [**3**], G7 governments, the World Bank [**4**] [**5**] [**6**] and International Monetary Fund, known by "grassroots" as players in The World Game. These players have a deep, abiding financial interest in and obsession with the promotion of nuclear weapons and energy. Collectively they have said and will continue to say and do *anything* to maintain the continuation of this technology with the falsehoods, uttered for decades regarding the "energy angle", about its being "safe", "clean", and "cheap". Such assumptions as, "There can be a peaceful promotion of atomic energy," and, "It has not been proven that exposure to low-level ionizing radiation causes cancer," are lethal to the extreme. Since the early 1940s such deceitful suppositions have sustained the nuclear nightmare that has seized upon and threatens *all* life, and *all* of its future, here on Earth.

This essay articulates *some* of the fundamentally treacherous assumptions underlying claims used by nuclear industrial interests, to justify further development and the ongoing employment of this technology in our society and on our ineffably precious and irreplaceable planetary home. It concludes with a partial listing of what our response abilities provide us with in the exercise of our true intelligence. Let us begin with the most essential and obfuscated fact to understand about nuclear weapons -- which *was known* by the original bomb creators back at the very beginning of this new epoch.

The Utterly Inappropriate Exercise of Human Intelligence

What has carefully been obscured since the "dawn of the atomic age", when men in the Manhattan Project such as Enrico Fermi, Robert Oppenheimer, and Edward Teller were attempting to build an atomic bomb, is acknowledgement of the fact that the nuclear bomb is primarily a *biological* weapon. This is chronicled by Richard Rhodes in his book, *The Making of the Atomic Bomb* when he relates how, in April of 1943, Enrico Fermi

> proposed ...to Robert Oppenheimer ...that radioactive fission products bred in a chain-reacting pile might be used to poison the German food supply....
>
> Oppenheimer ... discussed Fermi's idea with Edward Teller. The isotope the men identified that "appears to offer the highest promise" was strontium, probably strontium 90, which the human body takes up in place of calcium and deposits dangerously and irretrievably in bone. Teller thought that separating the strontium from other pile products "is not a very major problem."[**7**]

In fact, it was earlier than this, in 1940, that

> Otto Frisch and Rudolf Pierls described in a three-page paper how uranium-235 could be assembled into a critical mass producing an atomic explosion. And they noted:
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> In addition to the destructive effects of the explosion itself, the whole material of the bomb would be transformed into a highly radioactive state. The energy radiated by these active substances will amount to about 20 percent of the energy liberated in the explosion, and the radiations would be fatal to living beings even a long time after the explosion.[**8**]

This fact -- that from the beginning it was understood that nuclear technology provided a new form of biological weapon "fatal to living beings" disbursed via the radioactive matter generated in the reaction -- coupled with the fact that the nuclear fuel "cycle" continues to generate more and more lethal hi-level and low-level radioactive fission products, has created an absolutely untenable situation for the ongoing survival of life on Earth. The interlocking dynamic between these two facts -- the essential nature of nuclear technology providing a new class of biological weapon combined with the consequences to the biosphere of mining and processing uranium, both of which are producing such orders of magnitude more poisonously destructive material than anything heretofore generated by man -- is the utterly inappropriate exercise of human intelligence. By continuing these joint activities we betray not only our own instinctual and intuitive intelligence for survival, but our unique responsibility for the future of all life exploring itself here on Earth.

Websters defines *intelligence* as, "1. *a*) the ability to learn or understand from experience; ability to acquire and retain knowledge; mental ability; the ability to respond quickly and successfully to a new situation; use of the faculty of reason in solving problems, directing conduct, etc. effectively". In spite of the knowledge promoters of the nuclear juggernaut *have had for over five decades* regarding the inimical-to-life nature of digging up uranium and tinkering with it on so vast a scale, they continue to engage in this inherently inappropriate exercise of human "intelligence". Asking "Why?" only points to the profit motive and pursuit of self-aggrandizement which is not at all sufficient to respond decisively to and deal effectively with this crisis. What *is* critical to understand is that the results of such behavior *are already evident* to those not trapped in their own self-deception and demand a *truly intelligent and well-reasoned* response if we are to succeed in reversing the toxifying magnitude of what has taken place in fifty-plus short years.

It is essential to recognize that what is euphemistically labeled "the nuclear fuel *cycle*"[**9**] is not a "cycle" at all, but rather the route uranium travels starting from the hundreds of millions of tons of uranium tailings left at mine sites around the world[**10**], past intermediate stops such as enrichment, the reactor fuel process, and reprocessing, to "final storage" which doesn't exist. Calling this process a cycle promotes the deception that it is a circular, closed loop implying the possibility of *recycling*. All the radioactive fission products (the radioactive elements that are generated when uranium atoms are split) created in this route uranium travels, constitutes the most pernicious and poisonous physical matter being generated by man on the planet.[**11**] The unrivaled incoherence of this human activity is laid bare in the fact that *no one* in the above-cited hierarchies of authority has acknowledged that they do not have *any idea* how to ensure 100% containment and isolation of this material from the biosphere over its lifetime of upwards of millions of years.[**9**] [**12**]

Chernobyl: Some of the Actual Costs of Nuclear Power

It has now been only 10 very short years since the worst industrial catastrophe ever created by man occurred on Earth near the town its people know as Chornobyl. The results of this staggering assault on the integrity and viability of the biosphere will remain present and ongoing for thousands of generations of human existence. This is one of the actual costs of nuclear energy: a legacy of poisonous contamination of immense areas of the earth that will continue to negatively impact the health of all life for millenia.

A very partial list of *some* of these costs includes:

- Death rates are 30 percent higher for those in contaminated regions in the Ukraine compared to the rest of the country.
- Birth rates in Belarus have fallen 50 percent.
- Thyroid cancer, particularly among children, is up 285 percent in Belarus.
- About 7,000 in Russia alone who helped put out the fire and seal the reactor are believed to have died and 38 percent are recovering from some kind of disease.
- Belarus, the most heavily affected country, spends 20 percent of its budget on dealing with Chernobyl's aftermath; Ukraine devotes four percent and Russia, one percent.[**13**]
- Contamination of Lake Kojanovskoe -- downriver from Chernobyl and used by more than 30 million people -- with "radiation levels 60 times above European Union safety norms".[**14**]
- Repair estimates for the disintegrating sarcophagus range from $1.28 to $2.3 billion.[**15**]
- 125,000 people alone have died "from diseases related to the accident" according to Ukraine's Health Ministry.[**16**]
- Ivan Kenik, Belarus's Chernobyl minister, estimates the cost within the borders of Belarus for "total damages from the Chernobyl catastrophe from 1986 to 2015" to be $235 billion.[**17**]

Physiologically and psychologically for those directly afflicted, psychologically for their families and friends, biologically for the food, earth, and water, economically for the civil systems of authority -- all of these areas constitute *some* of the *true costs* we pay by employing nuclear energy. Is there *anything* that can possibly justify paying such a terrible price? "The consequences, likewise, have spread far beyond the nuclear energy industry and raise fundamental questions for a technological civilization" says Yuri Shcherbak writing in *Scientific American*. [**18**] Mr. Shcherbak is ambassador of the Ukraine to the U.S., an epidemiologist, and founder of the Ukrainian Green Movement (now Green Party). In 1989 he was voted into a seat on the USSR's Supreme Soviet where he initiated the first parliamentary investigation of the Chernobyl disaster.

Some Fundamental Questions

Let us pause a moment to consider *some* "fundamental questions," specific to the employment of nuclear technology in our civilization, which *must* be honestly and openly addressed if we are to have a chance of ensuring a healthy future for the seventh generation yet unborn. (What other questions can *you* think of that belong on this list?)

1. Why do we continue to play with and produce more and more of this poisonous nuclear fire when we do not have any way to contain its lethal properties for the requisite lifetime -- millions of years -- of its longest-lived radioactive isotopes?

2. Why do we accept the claim, by nuclear industry promoters, that making steam by heating water in a nuclear reactor to spin a wheel is a "cheaper", "cleaner", and "safer" means of producing consumable energy than pursuing the development and deployment of such alternatives as wind, solar, and biomass?

3. Are centralizing energy-producing technologies such as nuclear power more sustainable, and thus preferable, to such de-centralizing ones as solar, biomass, wind, and energy-efficiency?[**19**]

4. How can a sane person honestly believe, much less claim, that nuclear weapons are an intelligent, rational means of providing "security" from violence, and that their use in the biosphere can be "limited" to only affect "military targets"?[**20**]

5. How can sane human beings continue to condone *any* technology created in the absence of true public debate where all partake of and take part in the decision as to its appropriateness for the civilization and planet as a whole?

6. For what perceived benefit can society sacrifice the health of future generations?

7. What is the true meaning and value of a technology which, by its fundamentally toxic nature, requires the abdication of each person's freedom and liberty in order to ensure it is not acquired and employed by "terrorists".

8. Who *are* the *real* "terrorists", in a world where governments possess nuclear weapons and are the primary promoters of nuclear energy?

9. How can the actual health, environmental, psychological, and economic costs of nuclear technology be honestly and accurately assessed by governments -- the largest single sources of funding for such studies -- who are at the same time the single largest promoters of this technology for purportedly "peaceful" purposes?

10. If government authorities truly believe what they pronounce about the "clean bill of health" they give to the nuclear industry, then why do they only allow certain scientists to examine and study their voluminous records from places like Hanford, Washington, Muroroa, and Savannah River, Georgia?

11. If nuclear power is "safe," why did the US government pass the Price-Anderson Act to circumvent the fact that since the 1950s the insurance industry has refused to insure homeowners against nuclear accidents via the Nuclear Exclusion clauses included in all homeowner's policies?[21]

If such questions continue to be side-stepped, ignored and unaddressed, we will continue to experience the vitality of our world and our collective future inexorably and irrevocably damaged and diminished by further insults to the biosphere and to the very genetic fabric of life within this "life sphere" from future "Chernobyls" as well as from the ongoing mining and transmutation of uranium. As Dr. Gordon Edwards points out,

> Basically, what we are doing on the planet by mining uranium is two things: All uranium ends up as either nuclear weapons or highly radioactive waste from nuclear reactors. That's the destiny of all uranium that's mined. And in the process of mining the uranium we liberate these naturally occurring radioactive substances, which are among the most harmful substances known to science.
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> So, I think that we as a human community have to come to grips with this problem and say to ourselves -- and bearing in mind one other thing, and that is, that nuclear technology never was a solution to a human problem. We have here a situation where it is a technology in search of an application. We don't need nuclear technology for electricity. All you need for electricity is to spin a wheel, and there's many ways of doing it: water power, wind power, etc., etc. Nuclear power needs an application. It's up to us as humans in a community to say: Enough is enough! We do not want to permanently increase our radiation levels on the planet. We have enough problems.[22]

In our culture there is a fundamental thought associated with the above. Since 1945 there has been the belief that there was *one* time when nuclear technology *was* a "solution" to a human problem. Popular mythology states that dropping the atomic bomb on the cities of Hiroshima and Nagasaki was justified and the result of rational deliberations. Stewart Udall, in his book, *THE MYTHS OF AUGUST, A Personal Exploration of our Tragic Cold War Affair with the Atom*, chronicles his own penetrating inquiry into and scrutiny of the following:

> The men and women of my generation had, for a half-century, nurtured the belief that
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> - the U.S. had won a race with Hitler's scientists;
> - the bomb was an American breakthrough in physics;
> - the bombing of Hiroshima and Nagasaki ended the war; and
> - these two bombs saved the lives of hundreds of thousands of American soldiers and Japanese civilians.
>
> But where these beliefs rooted in realities, or were they the manifestations of myths? This book describes an effort to ascertain the truth about these issues.[23]

Udall was a three-term congressman from Arizona, Secretary of the Interior for eight years in the Kennedy and Johnson administrations, and has represented citizens in his region who were suing the federal government for radiation injuries inflicted on them by the nation's nuclear weapons industries.[24] In his book, Udall demonstrates with substantial sourcing the fallacies and misrepresentations of the four beliefs listed above. Military commander of the Manhattan Project General Leslie Groves and Secretary of War Henry Stimson were *the* directors of the birth and only military use ever of atomic weapons. There will be those who scoff at Udall's exposition of historical facts meticulously described and documented. But this is more a result of the power of propaganda elevated to the realm of myth, which serves only to rationalize and justify falsehoods, rather than a non-pre-judging, open-ended curiosity to ascertain the facts surrounding the actual series of events that initiated "the dawn of the atomic age", and inexorably set in motion the subsequently toxic age of secrecy dubbed the Cold War and beyond.

People who take the time to read the first 125 pages -- section I. THE DAWN TIME OF THE ATOMIC AGE -- of *THE MYTHS OF AUGUST* will find themselves having to re-examine and re-assess the exceedingly powerful myths that completion of the building of the atomic bomb was required to win a "race" with Hitler's scientists, and that its use in the bombing of two Japanese cities *was* necessary to end the war at the earliest possible moment.[**25**] This first-and-only use of atomic weapons against civilian metropolises is always cited and defended as having been "necessary" and "warranted". From the very beginning such justification for the "benefits" of the atomic bomb has served to legitimate the employment of nuclear technology throughout our civilization. However such beliefs have not only been toxic to the extreme for the biosphere and all life within it, but also devastatingly toxic to the very fabric of human consciousness which has fallaciously rationalized the wide-spread employment of this fundamentally death-dealing technology.

Low-Dose Exposure to Radiation: No Safe Threshold

This much is clear -- the laws of nature ensure no other outcome is possible: if we continue to contaminate our world, we will suffocate in the toxicity we create. There are no "appeals" we can "file" to the laws of nature. Pretending this fact does not exist is at the heart of the attempts to falsify and lie about the known toxicological and carcinogenic effects of radioactive isotopes and fission products on living cells and their DNA. This is especially true with respect to low-level ionizing (also called "low-dose") radiation.

Proponents of nuclear technology falsely claim that no harm has ever been proven to be caused from exposure to very low-doses of radiation.

> It is factually wrong to believe or to claim that no harm has ever been proven from very low-dose radiation. On the contrary. Existing human evidence shows cancer-induction by radiation at and near the lowest *possible* dose and dose-rate with respect to cell-nuclei. By any reasonable standard of scientific proof, such evidence demonstrates that there is no safe dose or dose-rate below which dangers disappear. No threshold-dose. Serious, lethal effects from *minimal* radiation doses are not "hypothetical," "just theoretical," or "imaginary." They are real.[**26**]

The above is taken from "An ''Open Letter'' to Editors of Major Journals and Newspapers, to Science Reporters and Physicians," by Dr. John Gofman, showing, "in abbreviated fashion, the factual basis for rejecting the claim that no harm has yet been proven from low-dose radiation ... Assertions in this communication are supported in detail, and with very specific sourcing, in Gofman 1990 [**27**] (Chapters 18, 19, 20, 21, 32, 33).... ***We have found no refutation of our proof*** . On the contrary, our method is extensively confirmed in the 1993 report of the United Nations (UNSCEAR 1993, esp. pp.627-636, p.681, p.696 Table 17)." [emphasis added] Gofman's background and credentials (described in detail below) provides substantial weight to the fact that there has been no refutation to the proof given.

It is important to recognize that the essential quality of any poison which can be diluted to a weaker and weaker concentration does not apply to ionizing radiation:

> [I]onizing radiation is not like a poison out of a bottle where you can dilute it and dilute it. The lowest dose of ionizing radiation is one nuclear track through one cell. You can't have a fraction of a dose of that sort. Either a track goes through the nucleus and affects it, or it doesn't. So I said "What evidence do we have concerning one, or two or three or four or six or 10 tracks?" And I came up with nine studies of cancer being produced where we're dealing with up to maybe eight or 10 tracks per cell. Four involved breast cancer. With those studies, as far as I'm concerned, it's not a question of "We don't know." The DOE has never refuted this evidence. They just ignore it, because it's inconvenient. We can now say, there cannot be a safe dose of radiation. There is no safe threshold. If this truth is known, then any permitted radiation is a permit to commit murder.
>
> What other things does the DOE use as crutches? "Well, maybe if you give the radiation slowly it won't hurt as much as if you give it all at once." Now if you have one track through a cell producing cancer, what is the meaning of 'slowly?' You have the track or you don't. It comes in on Tuesday or it comes in on Saturday. To talk about slow delivery of one track through the nucleus is ludicrous. But they do it anyway.[**28**]

In stating "There is no safe dose of radiation", the word "safe" means free from risk of injury. But as long as a sufficient number of people believe such a statement is merely "hypothetical", those people with a vested interest in the further promulgation of nuclear technology will continue to benefit at the expense of all else. This dynamic is known as the law of Concentrated Benefit over Diffuse Injury and can be stated as follows:

> A small, determined group, working energetically for its own narrow interests, can almost always impose an injustice upon a vastly larger group, provided that the larger group believes that the injury is "hypothetical," or distant-in-the-future, or real-but-small relative to the real-and-large cost of preventing it.[**29**]

The significance of this law is that for there to be a successful reversal to the toxification of our Earth from accumulated man-made nuclear pollution, such changes will far more likely come from the grassroots than prominent members of the culture who are so dependent, directly and indirectly, on approval from one special interest or another.

In their essay analysing the significance of the law of Concentrated Benefit over Diffuse Injury with respect to nuclear pollution, authors Gofman and O'Connor point out the central issue to grasp: if the *sum* of all injuries from radioactive poisons released into the biosphere matters biologically, then each contribution to that sum matters:

> The axiom of Concentrated Benefit over Diffuse Injury accounts for the current promotion of a "de minimis" policy toward nuclear (and other) pollution. A de minimis policy asserts that society should not concern itself with trivia. (Latin: De minimis non curat lex. The law does not concern itself with trifles.) A de minimis policy toward *pollution* asserts that poisonous discharges and human exposures below a certain level should be treated as non-existent -- because their consequences are allegedly trivial.
>
> Trivial. That is the essence of the axiom. Triumph for each injustice is virtually assured if the advocates succeed in presenting it as trivial....
>
> **With respect to nuclear pollution and every other type of persistent pollutant which lacks a safe dose, the following point deserves emphasis again and again:**
>
> ***What counts biologically is the*** **sum** ***of all the injuries over time from ALL the combined sources and events which release persistent poisons (radioactive or other) into the biosphere. If the*** **sum** ***matters biologically, then each contribution to the sum matters. Whoever consents to the small releases is consenting automatically to their worldwide*** **sum*****, whatever it turns out to be.***[**30**]

Whenever a release of radioactivity is acknowledged as having occured, from a nuclear power plant or other source, statements by nuclear officials invariably parrot the assertion "there is no danger" to the environment or to people. Such official sources of pronouncements do not alter the fact that these statements are utterly false. The appalling fact is, for those with a vested interest in promulgating this technology, such deception *must* be maintained -- as it has been since the 1940s. Otherwise the light would shine on this monumentally grandiose lie and the house of cards built upon the treacherous claims that nuclear technology is "safe" and poses no danger to people or other living systems would collapse in a single day. In spite of the confusion sown by official claims that things are "o.k.", the most tragic aspect of all of this is passive acceptance by the majority of people of the continued toll the injuring and killing of life on a global scale is exacting from the employment of this technology. Whatever else may be said however, in terms of "cosmic accounting", the people responsible for the radioactive contamination of our biosphere *are liable* for the continued damage and degradation of our collective future.

Whenever the release of radioactivity is extraordinarily large, extraordinary measures are taken by public officials to "close ranks" and parrot the line even more forcefully that everything is all right and there is no cause for alarm. This was terribly, horrifyingly true with respect to the release of the reactor core at Chernobyl.

Chernobyl: The Biological Consequences Of Playing With The Poison Fire

Chernobyl was a watershed event in the history of human kind. The destructive energies unleashed during the loss of control of so technologically complex a mechanism demanded *so much more* from us all, in the form of a well-considered penetrating response comprising our own innate instinctual wisdom, than anything expressed by those responsible for this technology. Initially, the message and response was numbingly deadly: ‘Do not worry.’ ‘There is no cause for alarm.’ ‘Everything is alright.’ ‘There is no immediate danger.’ Denial and deceit pervaded every story about the actual amount of the reactor core that was released, the raging radioactive fire, and the attempts at containment.

The trust we placed in those in positions of authority was so absolutely violated in this situation, it is no longer appropriate, in any manner whatsoever, to acquiesce and "leave it to those who know best" since such "authorities" only know how to lie and deceive in order to maintain their positions of power and their own affluence. We must plan and follow our own course into the future now and not grant any further legitimacy or credence to those who indicated by their deceitful pronouncements just how illegitimate their "authority" truly is. Where possible, it is critical to clarify what actually occurred.

In March of 1993, an abbreviated version of an essay written by Dr. Jay Gould titled "Chernobyl and the Collapse of Soviet Society"[**31**], was published by *The Nation* magazine. Dr. Gould presented the evidence concerning the devastating health effects suffered by the majority of the Russian people from their exposure to the radioactivity released at Chernobyl as being *the* single most important factor hastening the collapse of the Soviet Empire. He draws upon three books (especially the first two) to substantiate his premise: *Chernobyl: Insight from the Inside* , by Dr. Vladimir M. Chernousenko (Scientific Director of the attempted clean-up), *Memoirs* , by Andrei Sakharov (developer of the Soviet hydrogen bomb), and *The Petkau Effect: Nuclear Radiation, People and Trees*, by Ralph Graeub.

Gould points out that after his 1955 H-Bomb explosion succeeded, Sakharov wrote that he "worried more and more about the biological effects of nuclear tests ...", and that for all the laudatory reviews of this book none mention that Sakharov too came to the conclusion that the nuclear bomb was primarily a biological weapon. Sakharov wrote of his understanding that "[t]he long-term biological consequences (particularly atmospheric testing, in which radioactive fallout is dispersed throughout the hemisphere) can be predicted and the total number of casualties calculated with some accuracy."

This acknowledgement of "the biological consequences" of exposure to radioactive particles, made forty years ago by another such noteworthy nuclear scientist as the father of the Soviet hydrogen bomb, once more puts the lie to those who pretend nuclear technology is "safe" and poses "no danger" to us or our biosphere. Following from Sakharov's words above, Gould writes,

> Considering only such fission products as radioactive carbon, strontium and cesium, he calculated that genetic damage, plus the immediate and delayed damage to immune systems would accelerate the deaths of between 500,000 to one million persons for every 50 megatons of nuclear explosive power. An important consideration was what he termed "nonthreshold effects", by which every radioactive particle released had a statistical probability of doing damage to either the DNA of a cell or to the immune system, by low-level internal radiation from ingesting such particles. He also predicted that radiation would accelerate the mutation of microorganisms, leading to the inference that persons with damaged immune systems would in time succumb more easily to these new strains.
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> He states (page 201):
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> > " I posited that cancer and damage to the body's immune system (resulting in premature death) may also be due to nonthreshold effects ... I also suggested that a global increase in mutations of bacteria and viruses (irrespective of the cause of the mutations) might have been an important factor in the spread of such diseases as diphtheria in the 19th century, or the influenza epidemic, and that low-level radiation might further increase the rate of mutations."

More than 3 years later, Mr. Shcherbak's article, in something no less reputable than *Scientific American*, corroborates the essential points articulated by Dr. Gould. Although measurable adverse health impacts *have* been statistically on the rise starting with the 17 year period of bomb "testing" engaged in by the U.S. and U.S.S.R. from 1945 to 1962[**32**] -- the NRDC has estimated that during this period the superpowers subjected the world to the fallout yield equivalent of 40,000 Hiroshima bombs[**33**] -- and we *have* seen an epidemic rise of diseases based upon damaged immune systems, from the swelling numbers of people experiencing environmental and food-based allergies to AIDS, the undeniable proof of the toxicity of exposure to low-level radiation is tragically and incontestably apparent in the initial aftermath of Chernobyl.

Citing an example given by Mr. Shcherbak,

> The numbers speak for themselves. Data gathered by the Kiev researcher Mykola D. Tronko and his colleagues indicate that between 1981 and 1985 -- before the accident -- the number of thyroid cancer cases in Ukraine was about five a year. Within five years of the disaster the number had grown to 22 cases a year, and from 1992 to 1995 it reached an average of 43 cases a year. From 1986 to the end of 1995, 589 cases of thyroid cancer were recorded in children and adolescents. (In Belarus the number is even higher.) Ukraine's overall rate of thyroid cancer among children has increased about 10-fold from preaccident levels and is now more than four cases per million.[**34**]

Dr. Vladimir M. Chernousenko's book, *Chernobyl, Insight From the Inside* [35], published by Springer-Verlag in 1991, contains a wealth of information about the true scope of this calamity. The book's Forward, written *From the Publisher*, describes Chernousenko (born in 1941) as having,

> started his scientific career at the Ukrainian Academy of Sciences Institute of Physics in Kiev. Since 1971, he has worked at the Institute for Theoretical Physics of the Ukrainian Academy of Sciences in Kiev, where he earned his Ph.D. in theoretical physics in 1973. Since then, up to 1991, he has been the head of the Laboratory for Nonlinear Physics and Ecology. His scientific acumen is exceptionally diverse, as can be seen from his numerous publications (120 scientific papers and four monographs).

When the Chernobyl Reactor went critical and exploded on April 26, 1986, Dr. Chernousenko was invited by the Academy to act as "Scientific Director of the Task Force for the Rectification of the Consequences of the Chernobyl Accident" (i.e. to help direct the cleanup of this catastrophe). In this capacity, he served for five years as one of three key participants in the attempts to "clean up" the disaster. In the Preface, "The Myths of Chernobyl, and why I Wrote This Book," Chernousenko articulates an "(incomplete) catalogue of [21] myths" about this tragedy.

To this writer, one of the most disturbing, mind-boggling facts cited in Chernousenko's work, is contained in a February, 1988, unpublished report by A. A. Yadrikhinskii, Nuclear Safety Inspection Engineer of the USSR State Atomic Energy Survey Commission. Mr. Yadrikhinskii states that, "Radiation emission was no less that 80% of the core (with a total of 192 tons), which amounted to 6.4 x 10^9 Ci.[16] If we divide the figure by the population of the whole earth (4.6 x 10^9 people) then we get 1 Ci per person.[17]"[36] Ci is the symbol used for "Curie", named after "Madame Marie Curie, a Polish-born French chemist (1867-1934) ...who discovered the radioactivity of thorium, polonium and radium by isolating radium from pitchblend. She and her daughter Irene were among the earliest known radiation victims, both dying of aplastic anaemia."[37] In science, "curie" is a measure of radioactivity. One curie equals 3.7 x 10^10 nuclear transformations per second. It is the exposure of living cells to bombardment by such nuclear transformations or explosions, that can damage the ability of the cell's DNA to continue to correctly perform whichever of the exquisitely precise functions it has been programmed to carry out.

As Chernousenko states in his footnote number 17, "Naturally, the implications are not that everybody received such a dose, but such crude numbers certainly help to illustrate the scale of the accident." Indeed. There was an astronomically massive increase in the exposure to radiation for life *planet-wide* from the expulsion of at least 80% of the *192 tons* of radioactive fission products [11] from the reactor core at the time of the explosion and afterwards.

The Siamese Twins: Civilian-Military Atomic Industries

In 1986, the myth was born that only *3 percent* of Chernobyl's reactor core escaped into the biosphere. Today we hear much from public officials about how such myths of Chernobyl were the singular result of a closed-society's propensity for and obsession with secrecy. But this is itself yet another new domain of myth heaped upon the mountain of myths promulgated by witting and unwitting sources alike.

It is difficult to assess which source many political "authorities" belong to. Politicians utter a peculiar brand of "cheap talk" in that they either haven't the faintest idea what they are speaking about, or, usually and regrettably more often the case, know *exactly what **not** to talk about*. Witness U.S. Secretary of State Warren Christopher's statement [**38**] on March 19 about the cause of Chernobyl being "the product of a closed, authoritarian government" -- that its occurrence "was one of the most cruel legacies of communism, a system that managed to produce virtually all the evils of industrialization with very few of the benefits". It is precisely this sort of mantric "it can't happen here" bombast that leaves one believing that here in "the west", our consumeristic, exploitative-of-the-earth-to-extreme society doesn't suffer from such "evils of industrialization"; that people here haven't suffered from the pernicious tyranny of nuclear technology as they have by such "closed, authoritarian governments" like the U.S.S.R.

What not to talk about, by Mr. Christopher and a legion of others, are facts such as the following "twins":

1. United Nations Organizations such as the International Atomic Energy Agency/Organization (it is known/referred to by both IAEA and IAEO titles) exist as a contradiction in terms.

   This organization was founded in 1957 to both "encourage and assist research on, and development and practical application of, atomic energy for peaceful uses throughout the world" [Article III, Section 1], and at the same time, to "establish or adopt ...standards of safety for protection of health and minimization of danger to life and property" [Article III, Section 6].[**39**]

   As described in the Workshop Report by Peter Weish from the 1992 World Uranium Hearings in Salzburg[**40**], it is unbearable that, going on 40 years later, promotion of the atomic industry from the IAEA's original charter is *still* a fact of our world. Peter sums up this contradiction by stating,

   > Since we know, and have known for a very long time now, that the civilian and military atomic industries cannot be separated from each other -- Hannes Euphen, a Swedish Nobel Prize winner has described them as Siamese twins -- it is naturally absurd to try to promote one of the twins while trying to hold the other under control.[**41**]

   Yet this paradox -- of empowering the world organization responsible for setting the health standards for "safe" exposure to such lethal, toxic materials to *also* be responsible for promoting the promulgation of the very same technology which produces such vast long-lived pernicious substances -- is never, ever discussed. It is imperative that we all commence doing so. Such inquiry is *long* overdue -- as well as concrete actions to take as a result of such examinations.

2. 10 years after telling Chernousenko and others "Just be quiet, everything is all right, everything is under control, there is no cause to worry", Hans Blix is *still* the Director General of the IAEA!

How can one possibly believe the integrity of, much less grant *any* credence to, such industrial world luminaries as Hans Blix, who today *still* occupies the position of Director General of the IAEA as he did in April of 1986? Blix was present and accounted for to give the Welcoming and opening address at the ONE DECADE AFTER CHERNOBYL: SUMMING UP THE CONSEQUENCES OF THE ACCIDENT [**42**] Conference held in Vienna on April 8-12, 1996.

Yet this is the very same person who, acting in the capacity as Director General of the IAEA, visited Chernobyl days after the explosion and, in the helicopter with Chernousenko et al, said, "Just be quiet, everything is all right, everything is under control, there is no cause to worry" as they circled the blown out reactor core, and Blix himself saw that the 192 ton core "was absolutely empty". That, "according to our estimates that was not 50 million Curies, but approximately 6.3 billion Curies of activity." As Chernousenko went on to describe, "what astonished us after that -- the IAEO was only too keen to believe every word [of Soviet government statements that Chernobyl was a "completely unpredictable situation"] and began to convince the whole world: ‘‘Yes, do not worry, the rest of the 15 blocks will not explode. No problems.’’ It is not a normal situation when the people who are in charge of the fate of a whole civilization lie quite openly to the whole world."[**43**]

This paradox, that Mr. Blix is *still* Director General of the same agency he headed up ten years ago -- which at that time colluded with the nuclear industrial interests in the Soviet Union to cover-up and lie about the known facts, scope, and magnitude of Chernobyl’s melt-down assault on all life on Earth --, is never, ever discussed. Certainly not by the likes of Mr. Christopher who prefers instead to exist in the realm of fantasy which employs the "us against them" fairy tale to obfuscate and dissemble the facts about who is truly responsible for the "evils of industrialization".

The above "twins" are fundamentally interrelated. Number **2** highlights the fact of the IAEA’s utter lack of credibility and integrity -- especially given what they have been forced to minimally acknowledge in the past 10 years concerning the effects of the contamination -- *and is a direct consequence* of the glaring magnitude of conflict-of-interest in number **1**. This situation is reminiscent of the how the U.S. Atomic Energy Commission (AEC) came to be abolished in the 1970s when the bankruptcy of its own integrity and credibility was irrefutably demonstrated by the published works of Gofman and Tamplin[**44**], and Ford and Kendall.[**45**]

At that time, two organizations *were* created to replace the AEC: the Energy Research and Development Agency (ERDA), which was supposed to promote the development of atomic energy, and the Nuclear Regulatory Commission (NRC), which was supposed to concern itself only with public safety. However anyone who has studied its history with respect to promotion of such NRC-proposed policies as "Below Regulatory Concern", or BRC, knows its mandate to concern itself only with the public safety is also not credible.[**46**]

Besides the intentional obfuscation of the crucial fact that from the very beginning of the development of nuclear technology in the 1940s the nuclear bomb was understood to provide a new class of *biological* weapon for military strategists, another critically important fact most people do not understand is that the commercial nuclear energy industry was created by the US government not to produce electricity purported to be "too cheap to meter", as was declared by the AEC and all its descendant incarnations, but to provide a publicly visible "legitimate" *civilian* arena in which to further develop nuclear weapons technology.

Before 1940 there was practically no plutonium in or on our Earth. Plutonium is needed to make the triggers in nuclear weapons. As a young chemist in 1942, John Gofman was head of a group working in Berkeley, California under Robert Oppenheimer in the Manhattan Project. He describes this scarcity of plutonium:

> At the time there was so little plutonium that our research team had never even *seen* the element. But we were *assuming* that the proposed atomic reactors would indeed work ... in which case there'd be a good bit of plutonium created, and there would be a need for methods to *isolate* enough to fuel a bomb.
>
> . . . [T]he other chemists in my group [had] been down [in] Los Alamos a couple of months when Oppenheimer came back up and asked me to produce a half-milligram of plutonium.
>
> . . . [A]t that time a half-milligram was *10 to 20 times* the amount of the element in existence! Oppenheimer said that he needed the radioactive material right away for some crucial physics measurements that were vital to the bomb project.
>
> So some other chemists and I surrounded the Berkeley cyclotron with a *ton* of uranium nitrate and, in order to bombard the uranium with neutrons, ran the machine night and day for about seven weeks. Then we began processing--in ten-pound batches!--the entire ton of uranium nitrate. After three weeks of such work, we had isolated 1.2 milligrams of plutonium in around a quarter of a teaspoon of liquid. We sent most of that off to Los Alamos.[**47**]

As described in the primitive method employed above, the activity of *processing* uranium to generate plutonium is what the first nuclear reactors (originally called "plutonium production piles"[**48**]) at Hanford and elsewhere were constructed for. However 10 years would pass after the construction of the nuclear reactors employed for weapons production in facilities like Hanford, Washington and Oak Ridge, Tennessee before President Eisenhower made his "Atoms For Peace" address to the United Nations on December 8, 1953. With Ike's assertion that "this greatest of destructive forces can be developed into a great boon, for the benefit of all mankind", the government campaign began in earnest to make nuclear technology, with all its support industries, acceptable to society in general by attempting to present civilian "peaceful" uses of nuclear energy as if they were "separable", distinct, and mutually exclusive from the clearly destructive and lethal military applications. The US government employed a host of subsidies, incentives as well as bringing great pressure to bear to induce America's private utility companies to get involved in the production of commercial nuclear power plants. As Sam Day, former editor of the *Bulletin of the Atomic Scientists* has said, "The private electric companies did not jump into nuclear power. They were kicked in."[**49**]

> Atoms for Peace and its daughter idea, the "peaceful atom," proved to be remarkably long-lived images of policy. As metaphors, they survived long after their substantive fallacy had become obvious. Their basic assumption that the military and civilian applications of nuclear power could be separable, and that certain uses of nuclear power could be developed for peaceful purposes, held sway for almost a quarter of a century. In making these hopeful beliefs the foundations of American nuclear policy, Eisenhower reversed what had been until then the AEC's operating assumption, articulated by its first chairman, David Lilienthal, in 1947: "This must always be remembered: atomic-energy research and development -- whether for the uses of war and destruction or for beneficent and creative purposes -- is virtually an identical process: two sides of the same coin." But Atoms for Peace formally enunciated the dogma that military and civilian applications were separable. Like other dogmas, it continued to be cherished by its believers as an article of faith long after it had ceased to be tenable as a matter of common sense or observation.[**50**]

Few people understand this "siamese twins" nature of the seamless interlock between the military and civilian "arms" of the nuclear industry. Dr. Rosalie Bertell explains the essential fact -- that "[n]uclear reactors, whether or not they are used for the generation of electricity, are a necessary part of the nuclear weapon industry" -- clearly and concisely in the section entitled "A Full-blown Commercial Nuclear Technology" from her important book, *No Immediate Danger, Prognosis For A Radioactive Earth*:

> Summing up, a uniform irradiation of the whole human species, sufficient to reduce the actual rate of reproduction, might now be regarded, if it were practicable, as not by any means disadvantageous....**1**
>
> What did not seem 'practicable' in the 1950s became a reality in the 1960s: the basic research, mining, milling, enrichment, transportation and decommissioning involved in the nuclear process could serve two nuclear industries. As we saw in the chart [below] outlining the connections between parts of the US nuclear commercial and nuclear weapons industries, enriched and natural uranium is normally diverted (before reaching weapons grade) into fuel for nuclear power generators. Nuclear reactors, whether or not they are used for the generation of electricity, are a necessary part of the nuclear weapon industry. After six to eight months of use in a reactor, the 'spent' rods can be reprocessed for removal of fissionable uranium and plutonium, needed for weapons. Further, governments can freely subsidize the shared portion of the nuclear industry in the name of energy. In this way the public pays for its energy in taxes rather than electricity bills, making it appear 'cheap'. Citizen co-operation and public financing overtly seem to be helping to ease the 'energy crisis'; weapon industry needs are provided for indirectly, and everyone is enabled to work in good conscience to promote 'peaceful' uses of nuclear technology.[**51**]
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> **1.** C. D. Darlington, 'The Cell and Heredity Under Ionization', Conference on Biological Hazards of Atomic Energy convened by the Institute of Biology and the Atomic Scientists Association, October, 1950, Clarendon Press, Oxford, 1952.
>
> The US government, which had provided all the money for the basic research needed to launch the American nuclear reactor industry, also operated the uranium enrichment installations and provided the Price-Anderson Act to assume public liability in case of a nuclear reactor accident....
>
> With the concept of the peaceful atom accepted by the public and financial liability for the industry somewhat guaranteed, the commercial nuclear industry began to expand in the late 1960s. However, government involvement was not generally understood, and most people assumed they were financially protected. Many nuclear physicists and engineers were trained in and oriented towards commercial nuclear technology only and they mentally dissociated themselves from the nuclear bomb, never having co-operated with that aspect of the nuclear industry. Dissociation from the weapon industry was possible for those involved in research, radiation protection activities, mining and milling, transportation, enrichment, fabrication, reprocessing, waste disposal, training nuclear engineers or physicists and producing educational or public relations material. Individuals were able to shut out of their consciousness the atomic weapon world and wholeheartedly promote the 'peaceful atom'. The work of their minds and hands, however, could and would be used for both purposes either directly or indirectly. For example, much of the extravagant 'need' for electricity in the USA is for the production of aluminium for bombers and submarines or for other weapon-related industries. Much of the theoretical work in the nuclear commercial industry is directly transferable to nuclear-powered ships and submarines. Theoretical physics research serves both weapon and commercial technology. Uranium mining, milling, transportation, enrichment and other shared aspects of nuclear technology support both civilian and military programmes. Many other examples could be given, but the overall curtain of respectability appears to be the main advantage of the 'peaceful atom' programme when viewed from a military perspective.[**52**]

[53]

This "curtain of respectability" has proved essential to the ongoing development of nuclear weapons technology with the unwitting connivance of people working in the commercial nuclear technology arena. The belief that the civilian nuclear power industry is not integrally and fundamentally related to the design, development, and production of nuclear weapons is one of the most lethal of the false assumptions about nuclear technology promoters of the industry have utilized in their public relations campaigns since the 1950s.

The era of "the experts" is over. The intoxicating power of belief in their own infallibility was no where more evident than the doublethink and talk employed by Edward Teller to achieve his dream of creating the hydrogen bomb regardless of the dangers posed by the unleashing of such a super-weapon:

> Teller went out of his way to tell *Bulletin of the Atomic Scientists* readers at the time: "The scientist is not responsible for the laws of nature. It is his job to find out how these laws operate. It is the scientist's job to find the ways in which these laws can serve the human will. However, it is *not* the scientist's job to determine whether a hydrogen bomb should be constructed, whether it should be used, or how it should be used. This responsibility rests with the American people and with their chosen representatives." But in the real world--as Teller well knew--secrecy restrictions prevented the American people from participating in the deliberative process until the basic

> decisions had already been made at governmental top levels, by men very much like himself.[**54**]

By reducing the family of humankind to an abject infantile status, where decisions that affected all people and all life were made in secret without *any* public debate, such "experts" have brought us all to the brink of utter extinction.

It is difficult to conceive of a more inappropriate exercise of human intelligence when one understands the actual manifestations of nuclear technology’s essential attributes. First and foremost, it provides an order-of-magnitude more lethal biological weapon than anything heretofore created. Creation of such death-worshiping mechanisms is dependent upon the activity of mining and processing uranium which, in itself, also generates the *most* inimical-to-life physical matter ever created by man. Without the "curtain of respectability" contrived by the government-directed creation and commercialization of "the peaceful atom", ongoing nuclear weapons development would, in all likelihood, be an impossible "bill of goods" to successfully sell to taxpayers. Seeing through the totality of this Grand Deception is what we must be about for the sake of our children and the future of all life on Earth we have now, because of the poisonous legacy created in the short span of 50 years, taken irrevocable responsibility for.

PART II: Our Remarkable Powers of Response Ability

There is a great deal about all that has been cited here that oppresses one’s sense of viable responses to properly deal with this incoherent state of affairs. What is called for is recognition of our own innate "response abilities" given any challenge as demanding of all our wits and skills as this one clearly is. We are naturally endowed with an extraordinary resourcefulness, inner strength, and clarity in dealing with emergency situations. There is much about our post-industrial culture that dissipates our innermost self-reliance and sense of confidence. Much of this paralysis of inner strength feeds on the thought that we are not "response able" -- that we are somehow not capable of being able to respond decisively to situations that have been on-going and, by degree, more and more adversely affecting our world and our lives. This is understandable of course, given the barrage of lies and untruths we see, read, and hear every day.

We conclude by articulating three of the more obvious life-affirming responses to this conundrum we find ourselves facing -- these are by no means the only approaches open to us. (What other health-promoting responses can *you* articulate?)

1. The justifications for "needing" nuclear power are as hollow as they are lethal. De-centralizing, sustainable technologies for alternative energy sources have come a *long* way in the past 20 years. Their adoption is an essential step towards asserting our own response ability for our life, the life of our community, and by extension, all life on Earth.

2. The need to take care of and protect ourselves and our planetary home from the poison fire of uranium and all radioactive matter transmuted from it is the challenge we must now answer and address for millenia to come. Adopting the practice and ethics of Nuclear Guardianship appears to be the most appropriate exercise of our true intelligence as a health-promoting response to the legacy we have created and saddled ourselves and future generations with.

3. The need for a factual, complete assessment of our current collective health status cannot be overemphasized. It is time for independent analysis and articulation of exactly what the true health is of our children and hence, of our genetic future. Only with such understanding can we appropriately and effectively respond in reversing the effects of what we have suffered ourselves and how we have damaged the biosphere.

We consider these areas in reverse order.

Independent Assessment of Our Current State of Health

In responding unconditionally to this specific mass of continuing deceptions daily doled out to us, the appropriate exercise of human intelligence would appear to include such recommendations as that presented by Dr. Anna Ledkova, a child-ophthalmologist of the Nentsy Nation from Novaya Zemlya:

> We need an independent expertise on an international level. The scientists from the native population have to be among them. We have to know how long we still have to live, and the most important thing is, we have to know the truth -- even the bitter truth -- about the health of our children. At this international meeting I learned the whole truth, even the most bitter truth, all the sufferings of the people of the terrestrial globe. If it is possible, I will ask my government with the words from a song: "Do the Russians want war?", from another song which we sang in our youth: "I really do not know any other land where the humans live so badly."[**55**]

The call for independent expertise has been echoed by others and is a veritable necessity. Not only are world organizations like the IAEA undeserving and unworthy of any further credulous acceptance, but we must address the catch-22 of governments like the U.S., Britain, Japan, the Soviet non-Union, and France being both the biggest promoters of the adoption of nuclear energy by nations around the globe, and *the* financial backers of such previous world studies as The Biological Effects of Ionizing Radiation (BEIR) Reports, or those studies produced by the likes of the Radiation Effects Research Foundation (RERF), the International Commission on Radiological Protection (ICRP), and the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR). The compromising nature of such a situation *demands* the coming together of independent scientists from around the globe who are *not* in the employ of such governments or corporate organizations or their front groups whose overriding purpose is dedicated to the continued employment of this technology.

Dr. John Gofman writes in great detail about the growing retroactive alteration of the original data collected by the Atomic Bomb Casualty Commission -- set up to perform a life-time study of the more than 90,000 survivors of the atomic bombings at Hiroshima and Nagasaki -- since its transfer to RERF in 1975.[**56**] With a Ph.D. in nuclear / physical chemistry, and a medical degree, Dr. Gofman, Professor Emeritus in Molecular and Cell Biology at the University of California at Berkeley, and Lecturer at the Department of Medicine, UC School of Medicine at San Francisco, has had a great deal of experience with and knowledge of the workings of the nuclear industry. While a graduate student at Berkeley, Gofman co-discovered protactinium-232, uranium-232, protactinium-233, and uranium-233, and proved the slow and fast neutron fissionability of uranium-233. Post-doctorally, he continued work related to the chemistry of plutonium and the atomic bomb development. After the plutonium work, Gofman completed medical school. In 1947, he began his research on coronary heart disease and, by developing special flotation ultracentrifugal techniques, he and his colleagues demonstrated the existence of diverse low-density lipoproteins (LDL) and high-density lipoproteins (HDL). In the early 1960s, the AEC asked him if he would establish a Biomedical Research Division at the Lawrence Livermore National Laboratory, for the purpose of evaluating the health effects of all types of nuclear activities. From 1963-1965, he served as the division's first director, concurrently with service as an Associate Director of the entire Laboratory, for Biomedicine.[**57**] After Gofman and his colleague Arthur Tamplin published their initial findings stating their conclusion that there is no safe threshold below which exposure to low-level ionizing radiation will not increase the risk of cancer, funding for their work at the Livermore Lab was cut back to virtually nothing.[**44**]

Gofman sums up this sordid state of affairs with the following observation:

> Everybody knew, of course, that I didn't *want* to give up the research program. But I had to. It's really a rather common story: There's just no room for scientific truth in government-funded work when the truth in any way goes against a program that the government--*or* any of its special interests--wants to carry through. And I believe it's an outrage that we're *taxed* to support dishonest scientists ...or to finance science that's being paid to provide a fa&ccedilade....
>
> *That sort of information suppression is a violation of human rights and health!* I've taken care of a lot of cancer and leukemia patients and know--from personal observation--what a miserable disease cancer is. And realizing that millions of people may get that illness, and lose an average of 15 years from their lives, as the result of an activity that's sponsored by government and for which the government is prepared to buy prostituted information makes me *damned* angry.[**58**]

Gofman has articulated a partial list of 9 rules of research to measure the integrity of any bio-medical data, be it from a government, research institution, or any other source.[**59**] Describing the critical necessity of having trustworthy bio-medical databases as a sacred obligation of humanity, Gofman provides examples of rule-breaking in radiation research both in the Atomic-Bomb Survivor Study (Rule 7: "No Changes of Input after Any Results Are Known") as well as an IAEA 1991 study of Chernobyl (Rule 2: "A Real Difference in Dose", Rule 3: "A Sufficiently Big Difference in Dose", and Rule 4: "Careful Reconstruction of Dose"), and a 1989 World Health Organization opinion about the health problems from the Chernobyl experience (Rule 9: "No Pre-judgments").[**60**] Gofman writes at great length about how segments of the global radiation science community are exceedingly quick to embrace "data from any nation with a world-class record of distorting truth in the service of state policy, and punishing those who object," in "Chernobyl: A Crossroad in the Radiation Health Sciences".[**61**]

The crux of all we are considering here is the violation of the integrity of input data on biomedical health effects which, if accepted by the medical and science communities at large, will become the underlying basis of further research and "facts" as it already has in the past and create an insurmountable distortion of reality. Gofman's own references are significant:

The report of the Academic Senate of the University of California includes an immensely important warning, expressed by Karl Hittleman, Associate Vice Chancellor for Academic Affairs at the University of California San Francisco -- the medical center. Commenting on scientific misconduct-rates like one per 200 [according to an estimate from the U.S. Public Health Service, about one out of every 200 principal investigators is involved in some type of scientific misconduct], Hittleman said (Uni89, p2):

"It is the view of Congress, and should be the view of the scientific community, that no amount of fraud is acceptable, because of the corrosive effects on science and the bad effects on public trust."

Then the report paraphrased additional comments from Hittleman as follows: "Regarding science itself, he says, there is a ‘multiplier’ effect to fraud: Any instance of it can destroy the worth of related ‘downstream’ research. Worse, fraud can have potentially disastrous effects on those touched by research -- on patients involved in medical clinical trials, for example...."

Billions of people (many not yet born) will receive exposure from the Chernobyl accident, and people everywhere could pay the price if underestimated risk were to become accepted in this field. Everyone would face nuclear pollution not just from accidents, but also by *intention* (see Part 10).

Examination of the Chernobyl accident by this chapter will illustrate how very small dose-increases for millions and billions of people produce huge collective dose commitments. This is not even in dispute, as this chapter shows. The *consequences* are. The human race cannot afford serious underestimates of risk in this field. Readers will understand why, after they have compared various sets of numbers provided in this chapter.[**62**]

The ownership of other significant radiation databases by nuclear-committed governments continues. There is the central Chernobyl database under construction by the International Program on the Health Effects of the Chernobyl Accident (IPHECA), the primary sponsors of which, are the governments of the U.S., Britain, France, Germany, Japan, and Russia. This study is being conducted through the World Health Organization. In 1992, international arrangements were made to construct a database on radiation health effects for the exceedingly contaminated Russian region near Chelyabinsk, a center for nuclear weapons production. RERF -- the foundation sponsored by the DOE and the Japanese Ministry of Health to control the Hiroshima-Nagasaki database and its retroactive alterations -- has acquired a central role in creating the Chelyabinsk database.[**63**]. Such conflict-of-interest situations accentuates the urgent need to establish teams of independent "watchdog" scientists who participate and work inside these studies as well, on an on-going basis, with the authority to check that every Rule of Research is obeyed, to "blow the whistle" publicly if there are questionable practices, and to publish their own views as an integral part of every document.[**64**] It is essential that the integrity of these databases is beyond question and that they contain trustworthy data. Anything less is an abrogation of the response abilities we have to the health of ourselves, our children, and the sustainable future of our world.

Nuclear Guardianship: To Protect and Keep Safe From Harm

Beyond the necessity of verifying the integrity of input data on biomedical health effects in order to ascertain clearly and precisely the true extent of injury we have sustained to ourselves and the biosphere, another critical arena where we must exercise our very best response abilities centers on the question of exactly what *are we going to do* with all the man-made radioactive matter created over the past 50-plus years, which will remain with us for upwards of thousands of millenia? Current government "plans" -- such as the US consideration of Yucca Mountain -- for "final storage" of this material provide more of the same "out-of-sight"-"out-of-our-minds" self-deception, so absolutely lethal to ourselves and future generations.[**66**]

Professor Ryspek A. Ibraev, a geologist, geochemist, leader of the Inter-faculty Laboratory of the Kazakh State University, and head of the Independent Public Expert Council of Radioecology of Kazakhstan, is very familiar with "the consequences of objects of the Military Economic Complex of the former USSR in action -- these are uranium mines and plants, hundreds of thermoatomic explosions on the surface of the earth, in the air, and underground which have been carried out on the territory of the republic for military or civil purposes -- and how they effect the surroundings, i.e. the rock, the geological strata, the ground, the underground water, the surface water, the plants and the animal world."[**66**] He brings much expertize to this riddle of what are appropriate ways of responding to what has been created: "We are categorically against any proposal of underground storage. We suggest the surface proposals. Well, everybody knows that when the cobra is under the glass, in front of the eyes, it is clear that one can be quiet. And if one puts it into the cellar and there are also many cracks there then it is nearly impossible to guarantee safety."[**67**] There is great wisdom resonating in these words imbued with an understanding of what it means to be response able.

The "surface proposals" appear to offer the greatest promise of ongoing containment and truly response able action to address the conditions and situation we are now committed to whether or not we choose to recognize this fact. Joanna Macy has helped to articulate this recent understanding of what is termed Nuclear Guardianship.[**68**] To *guard* means to keep safe from harm; watch over and protect; defend; shield. It is now a fundamental truth that we find ourselves facing the necessity to protect present and future generations from the uranium we have taken out of the ground and all the radioactive chemicals we have generated from fissioning it. We must acknowledge our response ability to ensure that all this nuclear material is kept out of the biosphere for so much longer than the span of recorded history.

> To call this stuff "waste" is a misnomer, it is hardly an accurate term, because the strange and almost mythic character of the poison fire -- uranium -- and our processing of it has been that at every stage of the fuel cycle, everything that we have employed, every glove, every boot, every truck, every reactor, every facility, every mine, every heap of mill tailings, everything becomes not only contaminated, but contaminating. And governments and industry and scientists themselves don't know what on earth to do with it. They don't know what to do with this stuff, and it is our most enduring legacy. They say they have a final solution to bury it in the ground in deep geological disposal, hiding it out of sight and out of mind, as if the earth were dead, as if the earth were not a living being, shifting with underground waters and seismic activities, as if the containers themselves could outlast a generation, which they cannot! For nothing lasts as long, no container lasts as long as the poison fire itself. And it will leak out and out to contaminate. We know that that is true from our own personal lives. We try to hide something in our personal life, you know that happens, and it contaminates everything. And North of me, up at the Hanford Reservations they talk about clean up. Clean up! And even though Congress through the DOE has allocated millions of dollars for that now, they push around and they move the earth with their trucks and their bulldozers and their scoops. Try asking them where they are going to put it!
>
> This challenge -- it asks of us to evolve a different relationship with uranium, with plutonium, with the poison fire. It suggests perhaps it is not enough for it to be seen as a monster that we must outlaw. It's too late for that.... And more and more citizens are beholding, seeing, recognizing that this legacy must be guarded responsibly. Ground level storage on sight, and so we know better what to do with it, keep it visible with minimal transportation on sight where it is ecologically feasible.[**69**]

To see the plutonium we have created as a teacher is perhaps one of the most liberating challenges visionaries like Macy present us with:

> I have been reading reports of five years of meetings between Soviet and American scientists from the Federation of American Scientists about what to do with the separated plutonium. There is a tremendous pressure to use it. To maybe use it to have a whole new generation of plutonium-fueled energy and power. It is as if we don't know what to do with this unless we make it serve us, and that is exactly what I am beginning to think, that we cannot ask of the poison fire. If we want to make it serve us, it will kill us, and perhaps the plutonium is saying to us something like this: "Look at me, just look at me. I cannot be your slave, I cannot serve your ambitions and your comforts. You cannot use me to fight each other. Just look at me and if you look at me, guarding me, keeping me out of the biosphere for the sake of your future generations, then I will become your teacher. And in the act of beholding me and guarding me, you will awaken to your courage and to your faithfulness and to your solidarity with each other."[**70**]

Nuclear Guardianship is founded on the understanding that the only realistic, accountable response to nuclear "waste" is ongoing, on-site, monitored storage -- of keeping waste containment visible and accessible for monitoring and repair by present and future generations. The suggestion, that putting this material out-of-sight and out-of-mind underground is being response able and providing safe and sufficient containment for millenia, is a cruel omnicidal fantasy perpetrated on ourselves and future generations. We must design and initiate a system that keeps safe from harm, watches over and protects, defends, and shields this physical matter from our life-supporting world. We must be accountable to all our relations and all those who come after us.[**71**]

Transformation Of Our Outer And Inner Energy Values

There is only one nuclear furnace we have ever needed: the Sun we circle around and are completely sustained by. Over the past 15 years advancements in the development of alternative, de-centralizing energy technologies including solar, biomass, and wind have been significant: "between 1980 ...and 1992, the cost of electricity from solar thermal plants dropped from 55 cents per kilowatt hour to about eight cents per kilowatt hour.... the same story with respect to wind technology: Between 1980 and 1992, the cost dropping from nearly 40 cents per kilowatt hour to about seven cents per kilowatt hour today.... the same story with photovoltaics: Between 1980 and 1992, the cost dropping from nearly 90 cents per kilowatt hour to about a little over 20 cents per kilowatt hour."[**72**]

Such technologies offer the ultimate in response able sustainability. They are fundamentally de-centralizing by definition, thus providing the means for re-establishing locally-based communities and economies. By their nature such communities and economies foster self-reliance in the intrinsically sustainable areas of agricultural and energy production. After the effects of hundreds of years of the industrial age's socially centralizing technologies, these biosphere-conserving and authority-de-centralizing mechanisms offer all of us the chance to once again experience the dynamism afforded by local community-based participation and sustainable control over our own lives in a way that megalithic, centralizing technologies like nuclear energy can *never* provide.[**19**]

There is however a *great deal more* to the transformation required here than simply ceasing to ride on the back of the nuclear dragon and hopping onto a group of sustainable alternative energy creatures. Dr. Bill Keepin captures this well in the conclusion of a his own talk on going Beyond Nukes, The Promise of Renewable Energy:

> The Vietnamese monk Thich Nhat Hanh has said: "What we most need to do is to hear within ourselves the sounds of the earth crying." And I think when we do this, it becomes clear that what we label as a crisis in our environment is equally as much a crisis within ourselves, a crisis of human consciousness and values. And there are several dimensions to this that actually serve as hidden driving forces for the ecological crisis, and I'll just mention a couple of them. One is the psychological pollution of continual bombardment of corporate advertising and the consumer culture, another is the dominance by an hegemony of the masculine gender and related problems of class and racial oppression. A third is the epistemological tyranny of western science and market economics. And finally, the spiritual bankruptcy of secular technological modernism.
>
> Now, if we ignore these aspects of our current dilemma, then the solar technologies that I have outlined above could actually, I think, serve to hasten ecological collapse, because energy would be removed as a constraint on a forward stampede. However, if we embrace these deeper dimensions accounting for their physical, social, cultural and spiritual implications, then solar energy and renewable sources can provide abundant energy for all human societies on earth and free us once and forever from the ravages of fossil fuels and nuclear power.[**73**]

Clearly, there are *many* value systems we continue to unconsciously and consciously subscribe to which promote the unsustainability of technologies like that of nuclear. In our post-industrial society how many people still grow their own food? How many people harness the energy they use directly from renewable sources such as the sun or the wind? The low-percentage answers to these questions are the result of a continuing reliance on technologies that by *their* nature foster dependence upon centralized hierarchies of authority, the antithesis of sustainable, renewable life practices operating in synergistic concert with the natural world. The ability to grow one's own food clearly provides an element of the sort of "independence" many people still like to ascribe to increasingly irrelevant documents such as the US Constitution and Bill of Rights. Centralizing technologies have served to hasten the diminution of "these truths [we hold] to be self-evident."

The rise of these massively centralizing technologies parallels the rise of the twentieth century corporation. With such watershed events as the US Supreme Court 1886 *Santa Clara County v. Southern Pacific Railroad* decision, whereby it was decided that a private corporation was a "natural person" under the US Constitution sheltered by the 14th Amendment, (even though that amendment had been written and ratified in 1868 to protect the rights of freed slaves, not the "rights" of subordinate legal fictions) -- thus giving these subordinate legal fictions the same rights of free speech, the right to petition, etc., as human beings --, the foundation was laid for the emergence of such lethal, life-annihilating technologies as what has occured by playing with the poisonous nuclear fire. The need to revoke and rescind our present-day centralized plutocratic social system and supplant it with a de-centralized, natural habitat-sustaining system of guardianship practicing a response able conservator basis of co-existence has never been more paramount and imperative than it is today.[**74**]

Addressing this challenge of exploitation and destruction of our habitat Earth by legal fictions is also eminently possible, but requires the re-emphasis of an "wholistic thinking" way of perceiving reality. Such modes of perception are *still* practiced by ab-original peoples, but have been almost completely displaced by the analytic approach so favored by the empirical method of perceiving and describing reality practiced by western science. To analyze means to separate or break up (any whole) into its component parts to understand its nature. Such over-emphasis and reliance upon analyzing everything inside and outside of ourselves *without* the requisite "balancing" and "centering" means of perception provided by seeing the world, and our own existence within it, in its unitary wholeness, has created the preponderance of discord, fragmentation, and division we painfully see so evidently manifested in the present day.

Collectively as a species, we are now in a late stage of adolescence, on the brink of that transformative threshold known in the best sense as "coming of age". Humanity, as Elisabet Sahtouris has stated,

> stands on the brink of maturity -- in a position to achieve true humanity in the full meaning of that word. Like an adolescent in trouble, we have tended to let our focus on the crisis itself or on our frantic search for particular political, economic, scientific, or spiritual solutions depress us and blind us to the larger picture, to avenues of real assistance. If we humbly seek help instead from the nature that spawned us, we will find biological clues to solving all our biggest problems at once. We will see how to make the healthy transition into maturity.[**75**]

There is much such a critical "rite of passage" requires of us -- of *all* of us. The time is now to jettison such obsolete, constipated, and toxic notions as the glorified tribalism we still cling to which we label national sovereignty. Such "sovereignty" is the biggest single cause of and justification for the perpetual wars now ongoing every day around the world. We are all *one* single species regardless of what color or shape or age or sex each of us is physically, and regardless of what "nationality" we believe separates us and distinguishes us from the rest of our family of humankind.

One of the keys to enable us to pass beyond the threshold before us will be the ending of the short and deadly love affair some of us have had with the technology of nuclear weapons and energy. We have not discussed here such technologies as nuclear medicine, because of the fact of the benefits that it *has* provided, and that the nuclear materials produced creates very short-lived nuclear fission products and isotopes. Further, these radioactive materials are an exceedingly minuscule fraction of that produced by the gargantuan siamese twins of military and civilian nuclear energy-based technologies. It is time to stop playing in this arena of the poison fire. It is time to summon all our gifts and powers of creative and response abilities to end this nuclear dance of death and make the world, and our lives in it, once more a place that is safe for children to be born into and grow throughout the natural duration of their own lives. We are the era of human kind when the possibility of omnicide was first joined. But it is still our choice whether or not we allow that possibility to manifest, or we turn our backs on such a dead-end future and reassert our own best creative instincts for survival and promotion of life in all its supremely sacred forms. Quoting Buckminster Fuller,

> The political and economic systems and the political and economic leaders of humanity are not in final examination; it is the integrity of each individual human that is in final examination. On personal integrity hangs humanity's fate. You can deceive others, you can deceive your brain-self, but you can't deceive your mind-self -- for mind deals only in the discovery of truth and the interrelationship of all the truths. The cosmic laws with which mind deals are noncorruptible. Cosmic evolution is omniscient God comprehensively articulate.[**76**]

dave ratcliffe
Santa Cruz, CA
June, 1996

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1. The Fortune 500 listing in all its self-congratulatory details:
http://pathfinder.com/fortune/magazine/specials/fortune500/f500.html

2. *Fortune* Global 500, The World's Largest Corporations
http://pathfinder.com/fortune/magazine/1995/950807/global500/global500home.html

3. definition of "corpses" in *Ending Corporate Governance, We The People Revoking Our Plutocracy*
http://www.ratical.org/corporations/index.html#corpse

4. The World Bank and Ozone Destruction
http://www.greenpeace.org/~ozone/wbfacts/index.html

5. The World Bank Home Page
http://www.worldbank.org/

6. World Bank Energy Publications
http://www.worldbank.org/html/fpd/Energy/IENpubs.html

7. Richard Rhodes, *The Making of the Atomic Bomb*, Simon and Schuster, New York, 1986, pp. 510-511.

8. Jim Falk, "In The Name Of World Peace, Atomic Tests In Both Hemispheres," *Poison Fire, Sacred Earth, TESTIMONIES, LECTURES, CONCLUSIONS, THE WORLD URANIUM HEARING, SALZBURG 1992*, p. 164
http://www.ratical.org/radiation/WorldUraniumHearing/JimFalk.html#FATAL

9. Peter Bossew, "The True Price of Nuclear Power, The Economic, Environmental and Social Impacts of the Nuclear Fuel Cycle," *Poison Fire, Sacred Earth*, pp. 88-93.
http://www.ratical.org/radiation/WorldUraniumHearing/PeterBossew.html

10. Dr. Gordon Edwards, "Known Facts and Hidden Dangers of Uranium Mining" *Poison Fire, Sacred Earth*, p. 19-20

    > Hidden dangers: When we extract uranium from the ground, we dig up the rock, we crush it and we leave behind this finely pulverized -- it's like flour. In Canada, we have 200 million tons of this radioactive waste. 85 percent of the radioactivity is in that crushed rock. How long will it be there?
    >
    > Well, it turns out that the effective half-life of this radioactivity is 80,000 years. So it means in 80,000 years, there will be half as much radioactivity in these tailings as now. You know, that dwarfs the entire prehistory of the Salzburg region which goes way back to ancient, ancient times. Even archeological remains -- 80,000 years. We don't have any records of human existence going back that far. That's the half-life of this material. And as these tailings are left on the surface of the earth, they blow in the wind, they wash in the rain into the water systems, and they inevitably spread. Once the mining companies close down, who is going to look after this material forever? How do you in fact guard 200 million tons of radioactive sand safely forever?

    http://www.ratical.org/radiation/WorldUraniumHearing/GordonEdwards.html#TAILINGS

11. For an immensely informative and detailed lay-person's "primer" on Nuclear Radiation and its Biological Effects, see Rosalie Bertell, *NO IMMEDIATE DANGER, Prognosis for a Radioactive Earth*, The Book Publishing Company -- Summertown, Tennessee, 1985, "Part One, The Problem", pp. 15-63.
http://www.ratical.org/radiation/NRBE/NRadBioEffects.html

12. Ulrike Fink, "The Nuclear Guardianship, Concept for a Radioactive Future," *Poison Fire, Sacred Earth*, pp. 135-138.
http://www.ratical.org/radiation/WorldUraniumHearing/UlrikeFink.html

13. "Chernobyl becomes science lab without help funds," Reuter, Tuesday, November 28, 1995.
http://www.ratical.org/radiation/Chernobyl/Costs1.txt

14. "30 million still at risk from Chernobyl," Reuter, Thursday, March 21, 1996.
http://www.ratical.org/radiation/Chernobyl/Costs2.txt

15. "Kiev says Chernobyl repair leaves danger unchecked," Reuter, Wednesday, February 14, 1996. http://www.ratical.org/radiation/Chernobyl/Costs3.txt

16. "Deformities Found At Chernobyl," Reuter, Tuesday, March 26, 1996. http://www.ratical.org/radiation/Chernobyl/Costs4.txt

17. "Belarus puts $265 billion price tag on Chernobyl disaster," Reuter, Tuesday, February 13, 1996 http://www.ratical.org/radiation/Chernobyl/Costs5.txt

18. Yuri M. Shcherbak, "Ten Years of the Chornobyl Era, Confronting the Nuclear Legacy -- Part 1," *Scientific American,* April 1996, pp. 44-49.
http://www.sciam.com/0496issue/0496shcherbak.html

19. Sustainable/renewable energy technologies have come a *long* way in the past 20 years. The following resources provide an inkling of just how biospheric sustaining *and* economically competitive these fundamentally de-centralizing by definition alternative energy technologies currently are:

- http://www.foe.co.uk/CAT/ -- The Center for Alternative Technology
  "We are an educational charity striving to achieve the best cooperation between the natural, technological and human worlds. We test, live with and display strategies and tools for doing this. We are working for a sustainable future."
  Centre for Alternative Technology Charity Ltd. Charity No. 265239
  Machynlleth, Powys, SY20 9AZ, WALES, UK
  Phone: +44 1654 702400, Fax: +44 1654 702782
  Email: cat@gn.apc.org
- http://rredc.nrel.gov/solar/ -- Solar Radiation Resource Information
  contains 2 listings: data bases and publications
- http://www.slip.net/~ckent/earthship/-- Earthship
  innovative, truly self-sufficient home-building living with the land
  Solar Survival Architecture
  P.O Box 1041
  Taos NM 87571
  505.758.9870
  earthshp@taos.newmex.com
- http://solstice.crest.org/ -- Solstice
  Internet Information Service of the Center for Renewable Energy and Sustainable Technology
- http://www.essential.org/CMEP/home.html -- Critical Mass Energy Project,
  from http://www.essential.org/orgs/public_citizen/public_citizen.html -- Public Citizen
- http://www.ucsusa.org/textonly/text.ucs.energpub.html -- Energy Program listing of Publications and Videos from http://www.ucsusa.org/ -- the Union of Concerned Scientists
- http://www.xmission.com/~shea/straw/straw.html
  -- Resource Guide for Straw Bale Construction
- http://www.rmi.net/theSource/renewableEnergy/ -- The Source for Renewable Energy
  listing of 2200+ renewable energy-related businesses world-wide
- http://www.ttcorp.com/ubeca/bio_othr.htm -- Biomass web sites listing from the
  United BioEnergy Commercialization Assn
  1800 M Street, NW, Suite 300
  Washington, DC 20036-5802
  202/296-8663
- http://www.eren.doe.gov/ -- EREN
  U.S. DOE Energy Efficiency and Renewable Energy Network
- http://www.nrel.gov/ -- National Renewable Energy Laboratory (US DOE)
- http://www.nrel.gov/business/international/rsvp/electronic_access/intlist.html --
  Internet Resources for the Renewable Energy/Sustainable Village Power Community

20. For a still relatively unknown but portentous new initiative to rid the world of all nuclear bombs, see Kevin Sanders, "Abolition Panel Will Stop At Nothing", *WAR & PEACE DIGEST*, April/May 1996, Vol. 4, No.1, pp. 1-2.
http://www.ratical.org/ratville/StopAtNothing.html

21. The following, written more than ten years ago, describes some of the basic facts underlying the Price-Anderson Act as it stood in 1985:

> While the uninformed citizen was slowly and trustingly learning to live with the 'peaceful atom', the more realistic insurance industry, lacking actuarial data, was refusing to insure it. In the USA the clause 'not covered in the event of radioactive contamination' was written into all property insurance policies. In order to protect the desired new industry, the US Senate enacted the Price-Anderson Act in 1957 to provide insurance for nuclear industries for ten years. The hope was that ordinary insurance mechanisms would be able to take responsibility for insurance at that point, as is the custom in all high-risk ventures. (The entire transcript of senate deliberations on the 1975 extension of the Price-Anderson Act is reproduced in vol 3, no. 1 of *The Advocate*, 160 Chace Avenue, Providence, Rhode Island 02906. The historical perspective on this nuclear subsidy is given in the same issue, by Doug Wilson, former Washington correspondent of the *Providence Journal*. R. I. Senator John Pastore served on the US Joint Atomic Energy Commission as Vice-Chairman, and later Chairman. It was he who 'managed' the Price-Anderson victory.)
>
> However, the Price-Anderson Act had to be extended and amended in 1965, 1966 and 1975 [and 1988 --ratitor]. The present nuclear insurance policy in the USA, at tax payer expense, extends to 1 August 1987, assuring thirty years of federal insurance for the commercial industry.
>
> Under the law, public recovery of damage from nuclear electricity companies is limited to $560 million and recovery from the nuclear manufacturing industry is altogether prohibited. The US Nuclear Regulatory Commission estimates that a major nuclear accident would cost around $15 billion or more. Others have estimated damage at $17 billion to $280 billion from the 'maximum credible accident'. Assuming a low-cost $14 billion accident, the victims would receive 4 cents on each dollar actually lost. Besides its financial inadequacy, the philosophy behind the Price-Anderson subsidy is seen by many as directly opposed to the free-enterprise system. Price-Anderson is a good indicator of how much the commercial nuclear industry is desired by the US government, and how much it is protected from the usual market-place demands.
>
> Electricity companies operating nuclear power plants can purchase insurance from 'insurance pools': Mutual Atomic Energy Liability Underwriters for liability, and American Nuclear Insurers for property coverage. No other home, automobile, property or business owner can be insured against nuclear accidents....
>
> Meanwhile, the myth of cheap atomic generation of electricity was perpetuated. The hidden subsidies provided by governments were never included in the cost.

"Insuring the Uninsurable", *No Immediate Danger*, Bertell, pp.244-245.

22. Edwards, p. 20
http://www.ratical.org/radiation/WorldUraniumHearing/GordonEdwards.html#UendStates

23. Stewart Udall, *THE MYTHS OF AUGUST, A Personal Exploration of our Tragic Cold War Affair with the Atom*, Pantheon Books, 1994, pp. 21-22.

24. For meticulously documented sources of radiation injuries knowingly inflicted upon humans in the U.S. see *KILLING OUR OWN, Chronicling the Disaster of America's Experience with Atomic Radiation, 1945-1982* , by Harvey Wasserman & Norman Solomon with Robert Alvarez & Eleanor Walters, 1982 --
http://www.ratical.org/radiation/KillingOurOwn/
-- for law suits brought against the U.S. federal government see Chapters

- **3** Bringing the Bombs Home
  http://www.ratical.org/radiation/KillingOurOwn/KOO3.html
- **5** Continued Testing: Tragic Repetitions
  http://www.ratical.org/radiation/KillingOurOwn/KOO5.html
- **7** Nuclear Workers: Radiation on the Job
  http://www.ratical.org/radiation/KillingOurOwn/KOO7.html
- **9** Uranium Milling and the Church Rock Disaster
  http://www.ratical.org/radiation/KillingOurOwn/KOO9.html

25. Udall articulates a chronology that -- in spite of efforts by Joseph W. Grew, Ralph Bard, and John McCloy to end the war with Japan before the atomic bomb had been proven in the Trinity test in July (and that such an end to the war was a very real possibility in May and June) -- reveals the nature of how a single individual's personal perception of reality can result in the world-shattering effect Stimson's direction of the Manhattan Project's conclusion after the death of

FDR had.

> Available facts do not allow us to fix the precise date when Secretary Stimson decided to act as a de facto commander-in-chief and to execute his plan to use the atomic bombs as a "MasterCard" to end the war. Stimson would have been the last person in Washington to encroach on the prerogatives of a president, so we know with certainty that his "command decision" was made sometime between the death of President Roosevelt on April 12, 1945, and the meeting he had with Harry Truman on April 25 to tell the new president the secrets about the success of the Manhattan Project.
>
> Many entries in his diary help us to understand Stimson's acts and thought processes after Roosevelt's death. With FDR gone and a new president in the White House who knew absolutely nothing about this supersecret project, Stimson's authority as the surviving supervisor was paramount, and he apparently decided it was his duty to make the final decisions about the deployment and use of the new weapon.
>
> The upshot of this fateful decision was an obsession that influenced Secretary Stimson to personalize atomic issues and to dishonor the ethical principles he had long championed. Soon thereafter, he made a reference in his diary to "my secret," and it seems clear that, in his mind, the atomic weapons became "my bombs" and the plan to use the two bombs to destroy Japanese cities became the Stimson plan....
>
> When one studies Stimson's conduct in the spring of 1945, the overarching question that recurs again and again is: What influenced this magnanimous man to be so stubborn in his opposition to peace negotiations? The explanation, I am convinced, can be found in his obsession with his secret weapon as a war-ending *deus ex machina* . To understand Stimson's behavior, one must understand that his behavior was guided by the premise that the way to end the war was to "lay the atomic bomb on Japan" and then negotiate.

Later in his narrative, Udall goes on to describe what can happen when a man of 77 years with "impeccable credentials" is the only 'source', of how his statements become "facts" -- the catch-22 that can occur when only one person knows "the facts":

> The myth that administrators such as Ralph Bard and Dr. Vannevar Bush and scientists such as Oppenheimer, Compton, Fermi, and Lawrence were decision makers who helped guide the bombers to Hiroshima and Nagasaki is not only inaccurate, it places an unfair burden on these men. Henry L. Stimson was the author of this fable. He was the first member of the [Interim] committee to publish a memoir about the climactic events that launched the unveiling of the atomic age, and since all of the pertinent documents were official secrets, Stimson's account of what happened established a baseline of "facts" that historians and journalists could not question.

Udall, pp. 73, 75,75, 102-103

26. Dr. John Gofman, *What Is Factually Wrong with This Belief: "Harm from Low-Dose Radiation Is Just Hypothetical --- Not Proven,* The Committee for Nuclear Responsibility, Fall, 1995.
http://www.ratical.org/radiation/CNR/NoSafeThresh.html

27. Dr. John Gofman, *Radiation-Induced Cancer, from Low-Dose Exposure: An Independent Analysis,* The Committee for Nuclear Responsibility, 1990
http://www.ratical.org/radiation/CNR/RIC/

28. "Gofman on the health effects of radiation: 'There is no safe threshold'", *synapse* , University of California San Francisco, Volume 38, Number 16 , January 20, 1994
http://www.ratical.org/radiation/CNR/synapse.html#quote1 Number 16 , January 20, 1994
For the "nine studies of cancer being produced where we're dealing with up to maybe eight or 10 tracks per cell" see Part 1, "The Nine Human Epidemiological Studies Used in Chapter 18" from Chapter 21, "Decisive Epidemiological Evidence from Humans" of *Radiation-Induced Cancer, from Low-Dose Exposure*
http://www.ratical.org/radiation/CNR/RIC/chp21F.html#part1

29. John W. Gofman and Egan O'Connor, *The Law of Concentrated Benefit over Diffuse Injury*, November 1993:
http://www.ratical.org/radiation/CNR/CBoDI.html

30. *Ibid*

31. Dr. Jay M. Gould, "Chernobyl and the Collapse of Soviet Society" -- we are pleased to be able to provide the original complete essay before being edited and then published in *The Nation*, March 15, 1993.
http://www.ratical.org/radiation/Chernobyl/ChernobylCoSS.html

32. Dr. Jay M. Gould, Benjamin A. Goldman, *Deadly Deceit: Low-Level Radiation High Level Cover-Up*, Four Wall Eight Windows, New York, 1991, Chapter 7

33. Richard S. Norris, Thomas Cochran, William Arkin, *Known U.S. Nuclear Tests, July 1945 to December 1987*, Washington DC: National Resources Defense Counce, 1988; Natural Resources Defense Council, *Nuclear Weapons Handbook, Vol IV,* New York, NY; Harper and Row, 1989, p. 373; Dr. Jay M. Gould, Benjamin A. Goldman, *Deadly Deceit: Low-Level Radiation High Level Cover-Up*, Four Wall Eight Windows, New York, 1991, p. 96.

34. Shcherbak, p. 47

35. Vladimir M. Chernousenko, *Chernobyl, Insight From the Inside*, Springer-Verlag, 1991.
http://www.ratical.org/radiation/Chernobyl/ChernobylIftI.html

36. *Ibid*, p. 9

37. Bertell, p. 30.

38. "Christopher offers new aid to Chernobyl victims," Reuter, Tuesday, March 19, 1996.
http://www.ratical.org/radiation/Chernobyl/Blinders.txt

39. Statute of the International Atomic Energy Agency, ARTICLE III Functions, 23 October 1956
http://www.iaea.or.at/worldatom/glance/profile/statute.html#A1.3

40. *Poison Fire, Sacred Earth, TESTIMONIES, LECTURES, CONCLUSIONS, THE WORLD URANIUM HEARING, SALZBURG 1992*
http://www.ratical.org/radiation/WorldUraniumHearing/

41. Peter Weish, "The International Atomic Energy Organization (IAEO)," *Poison Fire, Sacred Earth*, p. 282.
http://www.ratical.org/radiation/WorldUraniumHearing/IAEO.html

42. "ONE DECADE AFTER CHERNOBYL: SUMMING UP THE CONSEQUENCES OF THE ACCIDENT," 19 March 1996, PR 96/4
http://www.iaea.or.at/worldatom/inforesource/pressrelease/prn496.html

43. Vladimir Chernousenko Testimony, *Poison Fire, Sacred Earth*, pp. 22-23.
http://www.ratical.org/radiation/WorldUraniumHearing/Chernousenko.html#BLIX

44. See the following two papers:

1. John W. Gofman and Arthur R. Tamplin, "Low Dose Radiation and Cancer," paper presented October 29, 1969 at the IEEE Nuclear Science Symposium, San Francisco. In *IEEE Transactions On Nuclear Science* Vol.NS-17, No.1: 1-9 February 1970. (Institute of Electrical and Electronics Engineering, New York City.) 1969.
2. John W. Gofman and Arthur R. Tamplin, "Epidemiologic Studies of Carcinogenesis by Ionizing Radiation," in *Proceedings Of The Sixth Berkeley Symposium On Mathematical Statistics And Probability*: 235-277. (University of California Press, Berkeley, California 94720.) 1971.

These two papers concluded overall that human exposure to ionizing radiation was much more serious than previously recognized or acknowledged. See also *Nuclear Witnesses*, Chapter 4, John W. Gofman, Medical Physicist (http://www.ratical.org/radiation/inetSeries/nwJWG.html), W W Norton & Company, 1981.

45. Daniel F. Ford and Henry W. Kendall, *Assessment of the Emergency Core Cooling Systems Rulemaking Hearings*, San Francisco: Friends of the Earth/Union of Concerned Scientists, 1974. Union of Concerned Scientist members Ford and Kendall demonstrated that the AEC didn't know whether the Emergency Core Cooling System would ever work or not. The Emergency Core Cooling System was the last barrier of safety in a major nuclear accident.

46. The campaign of the late 1980s and early 1990s to adopt BRC was yet another ploy by nuclear interests to find ways of declaring massive amounts of low-level nuclear wastes to be "below regulatory concern" so they would be able to

dump same into ordinary municipal landfills and incinerators thus absolving nuclear industry of the expensive requirements for handling large portions of radioactive wastes. The Environmental "Protection" Agency and NRC worked in concert to make this new form of "linguistic detoxification" a reality. See *Rachel's Hazardous Waste News #147* , "Mr. Reilly's EPA Develops Strategy For Solving Nation's Waste Problems: Full-Scale Linguistic Detoxification".
http://www.ratical.org/radiation/RHWN147.html

47. The Plowboy Interview: Dr. John W. Gofman, Nuclear *And* Antinuclear Scientist, *The Mother Earth News* , March/April 1981.
http://www.ratical.org/radiation/CNR/PlowboyIntrv.html#plutonium

48. Rhodes, pp. 497-498

49. quoted in *Killing Our Own*, by Wasserman, Solomon, Alvarez and Walters, pp. 207-208:

> Nuclear reactors had been in use in the U.S. since the early 1940s. chief function had been to generate plutonium for use on Nagasaki, and in later tests. But as a by-product these reactors also generated large quantities of heat. By harnessing this heat to boil water, steam would be created to turn turbines and generate electricity. Given the apparently infinite power of the atom, there seemed no reason why nuclear electricity could not also be infinitely inexpensive, or--as its supporters would later put it--"too cheap to meter." A new industry had been born.
>
> But America's private utilities were skeptical. With a few exceptions its generally conservative executives were worried about the dangers of a nuclear accident and the risks of sinking so much capital into an untested technology. It was only with government-insurance guarantees, fuel subsidies, and lavish research-and-development help that commercial atomic power moved ahead. Even at that, private utilities did not become heavily involved until faced with the threat of being squeezed out of business by federal competition in the form of the Tennessee Valley Authority and other government-owned utilities. To this day TVA remains the nation's single largest reactor buyer. As Sam Day, former editor of the *Bulletin of the Atomic Scientists*, told us: "The private electric companies did not jump into nuclear power. They were kicked in."**3**
>
> **3.** Sam Day, interview, June 1981. See also, Irwin Bupp and Jean-Claude Derian, *Light Water* (New York: Basic Books, 1978), p. 35.

http://www.ratical.org/radiation/KillingOurOwn/KOO11.html#KickedIn

50. Gerard H. Clarfield and William M. Wiecek, *Nuclear America, Military and Civilian Nuclear Power in the United States, 1940-1980*, 1984, p. 184

51. Bertell, p. 199

52. *Ibid*, pp. 235, 238-239

53. *Ibid*, pp. 186-187

54. *Killing Our Own*, p. 53.
http://www.ratical.org/radiation/KillingOurOwn/KOO2.html#DoubleTalk

Within the secret councils of government, there *was* opposition to development of the H-bomb. But, tragically, the deliberations were nonetheless conducted in the same manner as everything else had been since the inception of the Manhattan Project -- with*out* public debate or scrutiny. The preceding paragraphs to the one quoted above provide more background on the debate that *did* occur regarding the deeper moral issues of going ahead with creation of the hydrogen bomb:

> Albert Einstein was among those in 1950 who viewed current events with trepidation. Within the U.S. he warned of "concentration of tremendous financial power in the hands of the military, militarization of the youth, close supervision of the loyalty of the citizens, in particular, of the civil servants by a police force growing more conspicuous every day. Intimidation of people of independent political thinking. Indoctrination of the public by radio, press, school. Growing restriction of the range

of public information under the pressure of military secrecy."[143]

It was in this atmosphere that deliberations over whether to proceed with H-bomb research reached their climax. That secretive process is important to understand "because it is one of the relatively few cases where those who explicitly tried to moderate the nuclear arms race came within shouting distance of doing so," according to Herbert York, the first director of the Lawrence Livermore Laboratory where much of the hydrogen bomb R and D subsequently took place. Behind the scenes there was, in York's words, "a brief, intense, highly secret debate."[144]

Under federal law a key source of recommendations for the Atomic Energy Commission was its General Advisory Committee. Called upon by the AEC to take up the question of prospective H-bomb development, the Advisory Committee--chaired by J. Robert Oppenheimer and including such luminaries of nuclear physics as Enrico Fermi and I. I. Rabi--met in late October 1949. While urging continued efforts to magnify the power of atomic weaponry, the Advisory Committee urged that the United States *not* plunge ahead with developing the H-bomb, also known as the "super bomb."[145]

The panel presented arguments in terms of military strategies, technical aspects, and optimum use of present nuclear resources, concluding that the H-bomb was not needed for U.S. national security. The report also depicted the H-bomb choice as a profound moral issue: "It is clear that the use of this weapon would bring about the destruction of innumerable human lives; it is not a weapon which can be used exclusively for the destruction of material installations of military or semi-military purposes. Its use therefore carries much further than the atomic bomb itself the policy of exterminating civilian populations."[146]

An addendum to the Advisory Committee report, written by James B. Conant--later president of Harvard University--and signed by five other committee members including Oppenheimer, underscored the moral moment of the H-bomb decision: "Let it be clearly realized that this is a super weapon; it is in a totally different category from an atomic bomb.... Its use would involve a decision to slaughter a vast number of civilians. We are alarmed as to the possible global effects of the radioactivity generated by the explosion of a few super bombs of conceivable magnitude. If super bombs will work at all, there is no inherent limit on the destructive power that may be attained with them. Therefore, a super bomb might become a weapon of genocide."[147]

These and other anti-H-bomb scientists were in effect muzzled from openly expressing their viewpoints at critical junctures, held back by security-clearance status. Thus in the crucial months before Truman proclaimed his decision on H-bomb development, the public was allowed little information about a decision that could potentially result in millions of deaths and change the course of human history.

In top-secret circles the debate was fierce. Senator Brien McMahon, chairman of the Joint Committee on Atomic Energy, confided in Edward Teller that the anti-H-bomb Advisory Committee report "just makes me sick."[148] For their part McMahon and a constellation of atomic scientists, including Teller and University of California Radiation Laboratory director Ernest Lawrence, were determined to bring about development of the H-bomb as soon as possible, believing it to be the best possible response to Soviet possession of the atom bomb.[149]

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143. *The H Bomb*, (New York: Didier, 1950), pp. 13-14.
144. Herbert York, *The Advisors: Oppenheimer, Teller, and the Superbomb* (San Francisco: W. H. Freeman and Co., 1976), pp. ix, 2.
145. *Ibid.*, pp. 150-159.
146. *Ibid.*, p. 155.
147. *Ibid.*, pp. 156-157.
148. *Ibid.*, p. 60.
149. *Ibid.*, p. 45.

55. Dr. Anna Ledkova Testimony, *Poison Fire, Sacred Earth*, pp. 231.
http://www.ratical.org/radiation/WorldUraniumHearing/AnnaLedkova.html#SUGGEST

56. Dr. John Gofman, *Radiation-Induced Cancer, from Low-Dose Exposure: An Independent Analysis,*, The Committee for Nuclear Responsibility, 1990, Chapters 4-17.
At present, chapters 4 -- providing an "Overview of a Uniquely Valuable Database" -- and 5 -- introducing the scope of "A Growing Problem: Retroactive Alteration of the Study" -- are available on-line at:
http://www.ratical.org/radiation/CNR/RIC/

57. See "Curriculum Vitae of Dr. John W. Gofman, M.D., Ph.D." and John Gofman, 1992 recipient of the Right Livelihood Award for more details on Gofman's credentials and background.
http://www.ratical.org/radiation/CNR/JWGcv.html
http://www.ratical.org/radiation/CNR/RLA92.html

58. The Plowboy Interview: Dr. John W. Gofman
http://www.ratical.org/radiation/CNR/PlowboyIntrv.html#guvFundWork

59. John Gofman, *Bio-Medical "Un-Knowledge" And Nuclear Pollution: A Common-Sense Proposal,* on the occasion of the Right Livelihood Award, Stockholm, December 9, 1992, Section 4, Some Basic Rules of Believable Bio-Medical Research
http://www.ratical.org/radiation/CNR/BioMedUnknow.html#four

60. *Ibid,* Section 5, Some Examples of Rule-Breaking in Radiation Research
http://www.ratical.org/radiation/CNR/BioMedUnknow.html#five

61. Dr. John Gofman, *Radiation-Induced Cancer, from Low-Dose Exposure: An Independent Analysis,*, The Committee for Nuclear Responsibility, 1990, Chapter 24, "Chernobyl: A Crossroad in the Radiation Health Sciences"
http://www.ratical.org/radiation/CNR/RIC/chp24F.html

62. *Ibid*, p. 24-3
http://www.ratical.org/radiation/CNR/RIC/chp24F.html#DownStream

63. Gofman, *Bio-Medical "Un-Knowledge" And Nuclear Pollution: A Common-Sense Proposal,* Section 6, Achieving the Height of Foolishness
http://www.ratical.org/radiation/CNR/BioMedUnknow.html#six

64. *Ibid,* Section 7, The Nature of One Common-Sense Proposal
http://www.ratical.org/radiation/CNR/BioMedUnknow.html#seven

65. See Dr. John Gofman's *Seven Comments on Proposed Radiation "Standards" for the Yucca Mountain Rad-Waste Repository: October 26, 1995* addressed to the EPA's Radioactive Waste Management Branch in the Office of Radiation and Indoor Air. This paper provides a useful independent analysis of the "Technical Bases for Yucca Mountain Standards," a 1995 report from the National Research Council's Board on Radioactive Waste Management, Committee on Technical Bases for Yucca Mountain Standards. "Repository" means the proposed Yucca Mountain burial site for radioactive waste.
http://www.ratical.org/radiation/CNR/YuccaMtnRWR.html

66. Testimony of Prof. Ryspek A. Ibraev, *Poison Fire, Sacred Earth*, p. 141
http://www.ratical.org/radiation/WorldUraniumHearing/BillKeepin.html#Background

67. *Ibid*, p. 143
http://www.ratical.org/radiation/WorldUraniumHearing/RyspekIbraev.html#Cobra

68. For a selection of materials providing more background on this, see articles from the Spring 1992 issue of *Nuclear Guardianship Forum*
http://www.ratical.org/radiation/inetSeries/index.html#NGF

69. Joanna Macy, "Nuclear Guardianship, The Search for New Perspectives," *Poison Fire, Sacred Earth*, pp. 257-258
http://www.ratical.org/radiation/WorldUraniumHearing/JoannaMacy.html#Pu

70. *Ibid*, p. 258
http://www.ratical.org/radiation/WorldUraniumHearing/JoannaMacy.html#PuTeach

71. The following groups are some of those exploring possible practices of Nuclear Guardianship:

- **Nuclear Guardianship Project**
  1439 Santa Fe Avenue
  Berkeley, CA 94702
  510/559-8910
  510/559-8916 (fax)
  ngp@igc.apc.org

- **Plutonium Free Future**
  P.O. Box 2589
  Berkeley, CA 94702
  510/540-7645
  pff@igc.apc.org
- **Nuclear Waste Citizen’s Coalition**
  110 Maryland Avenue, NE
  Suite 307
  Washington, DC 20002
  202/547-5796
  202/543-0978 (fax)
  fmillar@essential.org
  http://www.essential.org/orgs/nwcc/nwcc.html
- **Nuclear Information and Resource Service (NIRS)**
  1424 16th Street NW, #404
  Washington, DC 20036
  202/328-0002
  202/462-2183 (fax)
  nirsnet@igc.apc.org
  http://www.nirs.org/

72. Dr. Bill Keepin, "Beyond Nukes, The Promise of Renewable Energy," *Poison Fire, Sacred Earth*, p. 39
http://www.ratical.org/radiation/WorldUraniumHearing/BillKeepin.html#AltEnergyCosts

73. *Ibid*, p. 40
http://www.ratical.org/radiation/WorldUraniumHearing/BillKeepin.html#Conclusion

74. For an entry point, see the information resource *Ending Corporate Governance, We The People Revoking Our Plutocracy* http://www.ratical.org/corporations/

75. Elisabet Sahtouris, *EARTHDANCE: Living Systems in Evolution*, 1995, Chapter 1
http://www.ratical.org/LifeWeb/Erthdnce/chapter1.html

76. R. Buckminster Fuller, *Critical Path*, 1981, p. xxxviii.
Bucky’s example of living his life to the fullest, in service to humanity, as a "comprehensivist" and a "generalist" was the supreme exercise of intelligence in the face of the twilight of the age of specialization and its inherently limiting nature:

> Each year I receive and answer many hundreds of unsolicited letters from youth anxious to know what the little individual can do. One such letter from a young man named Michael -- who is ten years old -- asks whether I am a "doer or a thinker." Although I never "tell" anyone what to do, I feel it quite relevant to this point to quote my letter to him explaining what I have been trying to do in the years since my adoption of my 1927-inaugurated self-disciplinary resolves. The letter, dated February 16, 1970, reads:
>
> > Dear Michael,
> >
> > Thank you very much for your recent letter concerning "thinkers and doers."
> >
> > The things to do are: the things that need doing: that *you* see need to be done, and that no one else seems to see need to be done. Then you will conceive your own way of doing that which needs to be done -- that no one else has told you to do or how to do it. This will bring out the real you that often gets buried inside a character that has acquired a superficial array of behaviors induced or imposed by others on the individual.
> >
> > Try making experiments of anything you conceive and are intensely interested in. Don’t be disappointed if something doesn’t work. That is what you want to know -- the truth about everything -- and then the truth about combinations of things. Some combinations have such logic and integrity that they can work coherently despite non-working elements embraced by their system.
> >
> > Whenever you come to a word with which you are not familiar, find it in the dictionary and write a sentence which uses that new word. Words are tools -- and once you

have learned how to use a tool you will never forget it. Just looking for the meaning of the word is not enough. If your vocabulary is comprehensive, you can comprehend both fine and large patterns of experience.

You have what is most important in life -- initiative. Because of it, you wrote to me. I am answering to the best of my capability. You will find the world responding to your earnest initiative.

Sincerly yours,

Buckminster Fuller

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