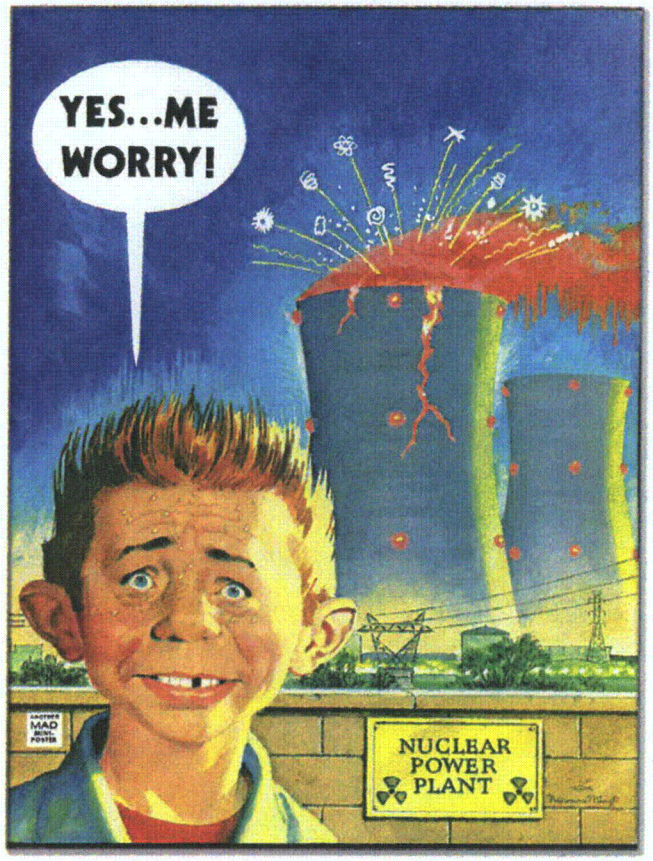
CONCLUSION

Renewables give us all the energy we need, and waiting to switch is deadly.

Some say "politics" is stopping Yucca Mountain, or stopping an expansion of nuclear power, or stopping reprocessing from restarting, or stopping "mini-nukes," nuclear airplanes, etc. etc..

But actually, politics is stopping the CLOSING of the nukes. Politicians prevent the proper public debates. Politicians pontificate from their oval offices and microphone-bedecked speaking platforms, declaring "it's politics that's prevents solutions to our energy problems."

Don't fall for yesterday's lies about nuclear power, spewed now by some politician who has never explored the issues half so much as you have by simply reading this book. The decision to use nuclear power was wrong, and MUST be rescinded. Otherwise, our species (and all the others) will die. Our DNA will be invaded, changed, destroyed. Nuclear power is useless as an energy source or as a weapon -- whether we're talking about D.U. or atomic bombs. Radiation is very dangerous and virtually useless, a few medical uses of very tiny amounts notwithstanding.



Global warming is real. It has been known for many decades, but nuclear power is no more a solution now than it was at any other time. There IS a solution: Renewable energy. Fossil fuels and nuclear power are economic disasters and then ecological disasters, each in their own way.

But pound-for-pound, nuclear power is about 100 million times worse for the planet than fossil fuels. It is not an alternative power source.

After Three Mile Island, Mad Magazine expressed the world's opinion -- the world's fears -- with the cartoon shown above. Since then, Chernobyl, Davis-Besse, and Kashiwazaki-Kariwa -- to name just three blatant examples -- have further shown that nuclear power is going to bite us very badly one day, unless . . . unless we shut down the plants and begin the long, slow process towards reducing the dangers of the waste. The author does not advocate "phaseouts." The author advocates immediate and permanent shut-down.

In a 1979 publication (included in the list that follows), a highly-honored pro-nuker called the nuclear waste problem "trivial." Right now (2008), Yucca Mountain, the only proposed solution, is deeply flawed, and expected to cost about $100,000,000,000.00. It will probably cost far more -- if it ever opens -- even if there are no accidents. This is *not* a trivial problem.

3H Tritium.
3He Light Helium.
6Li A stable isotope of Lithium.

ABCC Atomic Bomb Casualty Committee. Established in 1948 (too late!) and renamed RERF (Radiation Effects Research Foundation) in 1975.

absorbed dose An amount of radiation, given in terms of joules per kilogram, which is the same as a gray.

AEC Atomic Energy Commission. Forerunner of the DOE and the NRC; as inept as either.

ALARA As Low As Reasonably Achievable. This really stands for As Low As Is Still Profitable for the corporations involved, or as low as will allow the operation to move forward as planned.

alpha particle Two protons and two neutrons ejected together from the nucleus of an atom at very high speed. When an alpha particle slows down it will grab two electrons and be a (stable) helium atom. Alpha particles are about 7,345 times more massive than beta particles. Symbolized by the greek letter α.

AMU Atomic Mass Unit. One 1/12th the mass of a C^{12} atom.

ARS Acute Radiation Syndrome. The health effects which show up after a large dose of radiation has been given, accidentally or on purpose. Often extremely painful and can last weeks or even months (or minutes).

atom For any chemical element, an atom is the minimum amount of that element that retains its chemical properties. An atom contains a nucleus, made of at least one proton and perhaps one or more neutrons. Normally it also has as many electrons as protons. The electrons can be thought of as orbiting the nucleus, and those orbits occupy most of the space of the atom.

atomic bomb Another name for a nuclear bomb or nuclear device.

atomic number The number of protons in the nucleus of an atom gives it its atomic number.

atomic mass The number of protons plus the number of neutrons gives an atom its approximate atomic mass in AMUs.

atomic weight On earth, in layman's language, the same as the atomic mass, but professionals speak almost exclusively in units of "mass" instead, so that if they're on another planet or lost in space (as many of them seem to be), or operating under different accelerations than the rest of us couch potatoes, they won't get confused.

background radiation Typical 1940s estimate: About 100 mrem per year. Today: 360 mrem. Reason for the increase? Some say it's just due to better measuring devices and more careful observation. Most just won't mention the increase at all.

Becquerel One Becquerel is exactly one radioactive decay per second. Abbreviated Bq.

BEIR VII Committee Biological Effects of Ionizing Radiation #7 Committee.

beta particle A type of ionizing radiation. Symbolized by the greek letter β. Beta particles have an electrical charge of either -1 or +1 and as they slow down, this charge causes most of the damage to biological systems. Because of this fact, so-called "soft" or "low-energy" beta emissions can be just as damaging as high-energy beta emissions. Once they slow down, β^- emissions become normal electrons.

bioaccumulation The increase over time of a toxic substance in living tissue, especially when the substance (whether chemical or radioactive) concentrates in a particular part of the body. A related term, which is sometimes used interchangeably, is biomagnification. However, biomagnification is usually defined as the concentration of toxic materials via the food chain, leading to animals that eat higher in the food chain (such as humans) getting a disproportionate dose of the toxin -- another good reason to be a vegetarian. Bioconcentration is another, less commonly used, term for the overall phenomenon of an organism absorbing something toxic faster than it can eliminate that substance.

biological half-life The average amount of time it takes for the first half of a substance to leave the body. Does not always asymptote at zero like a radiological half-life.

breeder reactor Any reactor which produces enough Pu^{239} from the U^{238} in its core to be profitably reprocessed later for a future reactor. Usually uses "fast" neutrons.

BWR Boiling Water Reactor. Typical BWRs in the United States are older, smaller, and less efficient than PWRs.

cancer	A type of disease that develops due to DNA damage and causes abnormal cells to proliferate uncontrollably. According to the American Cancer Society, "Cancer is the general name for a group of more than 100 diseases in which cells in a part of the body begin to grow out of control. Although there are many kinds of cancer, they all start because abnormal cells grow out of control." Note that "out of control" does not necessarily mean faster. They may die slower than normal and that can be a problem, too, for instance.
CANDU	A type of Canadian reactor which releases about 10 times more tritium into the environment than most other reactors, and produces about 30 times more.
carcinogen	Any substance or energizing ray which causes cancer.
Cassini	A space probe launched by NASA in Oct. 1997, containing a record 72.3 pounds of Pu^{238} (in dioxide form) and used as a cover for a military program of launching similar plutonium power packs into earth orbit. Russia is even worse, having launched dozens of nuclear reactors, and China is the worst of all, launching hundreds of thousands of projectiles into earth orbit, which will destroy the casings of the various radioactive power packs when they inevitably collide, since none are anywhere near strong enough to resist such impacts.
cerium-144	A beta-emitting isotope with a half-life of 285 days, ***abundantly manufactured*** in LWRs: About 60 X 10^{12} Bq/MW year of electrical power (source: JSTOR). A significant hazard in any spent fuel or reactor accident, mainly from inhalation.
cesium-137	A beta-emitting isotope with a half-life of 30.23 years. One of the most dangerous fission products of nuclear reactors.
chain reaction	A situation possible only with fissile isotopes such as U^{235} and Pu^{239}, which sustains itself, usually by neutron bombardment of other fissile atoms in the mixture. A bomb if very fast, a nuclear power plant if very slow. The maximum speed is in part determined by the blend of uranium and / or plutonium isotopes. May require a trigger to get started, such as tritium. Can be controlled, sometimes.
Chernobyl	Site near Kiev, Ukraine, of the world's worst nuclear accident (so far), in **1986**. A meltdown and explosion spread radioactive debris globally.
CIA	Central Intelligence Agency. Investigates activists' friends abroad. Passes carefully selected information, or carefully crafted rumors (depending on the perceived need of the State at the time) to foreign entities. Known to have a huge clandestine budget as well as virtually unlimited access to corporate and private computer information networks. Can control most media. Also has a nearly complete lack of normal legislative and / or judicial oversight.
cold water accident	A meltdown caused by flooding the core of a light water reactor with too much cold water. Operators are told not to do this, which isn't much protection against it.
cosmic rays	A broad spectrum of radiation coming from a wide variety of sources deep in space. About 90% of cosmic rays are protons. 90% of the rest are alpha particles. Most of the rest (~1%) are beta particles.
committed dose	The quantity of radiation expected from a given absorbed dose over the life of the radioactive materials involved.
cumulative dose	The total radiation received in a given period of time, for example, a lifetime. Your risk probably goes up more or less proportional to your cumulative dose, and you've already had too much radiation.
criticality	For a pro-nuker intent on making a bomb or a nuclear reactor, the moment of success. For everyone else, the moment of failure. During criticality, more energy is released as time goes on, until the available supply of fissile material is used up or the build-up of fission products poisons the reaction.
CRS	Cutaneous Radiation Syndrome. Burns and other skin inflammations due to radiation exposure. Can lead to fatal infections and be extremely painful.
curie	An amount of radioactivity defined as $3.7 * 10^{10}$ decays per second. Not officially used anywhere, but it's still actually used everywhere, and it's still about equal to the radioactivity of one gram of pure radium. Replaced by the Becquerel (Bq).

Glossary D - F

daughter products — Also called decay products, they are the isotopes, usually radioactive, which result from the decay of a radioactive substance.

Davis-Besse — A PWR in Ohio which nearly melted down in 2002. The incident was almost completely ignored by the news media.

depleted uranium — A mixture of around 99.5% U^{238} and the rest all sorts of other things, usually U^{235} and U^{234}, but sometimes also fission products if the DU comes from reactors. Used by the military for the ballistic and pyrophoric military advantage it gives.

deuterium — An isotope of hydrogen having one neutron and one proton. Not radioactive.

dirty bomb — Any bomb using conventional (non-nuclear) methods to spread radiation. The DOE defines a radiological dirty bomb as having 1,000 Curies or more of radioactivity. Thus, one nuclear power plant equals about 100,000 dirty bombs in the reactor core alone. Typical U.S. reactors release one dirty bomb every five weeks of tritium -- plus many other substances. "ALARA" allows this crime by massive dilution.

DNA — Deoxyribonucleic acid. A self-duplicating polymer which contains the genetic code of life uniquely defining you. DNA is found in the nucleus of nearly every cell in your body (red blood cells and a few others have no DNA).

DOE — Department of Energy. AKA "Death of the Earth Squad" because they are responsible for poisoning the planet, but not responsible for protecting it.

dose equivalent — A standardized radiation amount, so one can attempt to compare different isotopes and / or different elements.

dosimeter — A device for measuring how badly you were irradiated. Some are hundreds of times more accurate than others.

dry casks — Dry Cask Storage is a dangerous but relatively inexpensive way to hold nuclear spent fuel. Deaths will occur as much as 500 miles downwind from a dry cask fire.

$e = mc^2$ — The equation expressing the conversion factor between mass and energy. First realized by Albert Einstein.

effective dose — Another way to standardize the measurement of the dose received so that assessments (and conversations) can begin. Effective dose attempts to quantify how different parts of the body react to different types of radiation. Effective dose is measured in sieverts.

electron — A beta particle after it has slowed down. Also the outer subatomic particle of an atom, having an electrical charge of **-1**.

enrichment — The process of lowering the U^{238} concentration while raising the U^{235} concentration.

EPA — Environmental Protection Agency. A toothless federal agency which permits the DOE and NRC to do whatever they want.

eV — Electron Volt. Molecular bonds are about one eV. The "thermal bath" we all live in (and which is a part of us) is about 1/40th eV. Hydrogen can be ionized (its electron can be stripped off) at about 13.6 eV.

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fallout — NOT just any repercussion. Fallout is a technical term for the radioactive poison that "falls out" of the sky for days, weeks, months, years, and decades after a radioactive release, whether from a bomb, a nuclear power plant, or an accident. Whenever you hear the phrase referring to anything else, just remember it really describes the ugliest horror bestowed on civilians by war or by industry, and should be prevented at all costs.

Fat-man — The first (and only) plutonium bomb used on a civilian population. Its radioactivity still kills today, and will continue to kill for many millennia.

FBI — Informants in activist groups often are Federal Bureau of Investigation agents or local police. The FBI charter says public corruption is one of their top investigative priorities. But, when this author contacted them about a clear violation of the law by one of their agents, which allowed a Congressman to go free after the attempted murder (by head-on collision) of *this citizen and his wife*, he was told -- as if it were law: "We police our own."

fission — Splitting the atom. Smashing the atom. Harnessing the energy of the mighty atom.

fusion — Combining two atoms to make one, while releasing energy at the same time. Usually done with tritium and deuterium. Although there has been much speculation about fusion reactors, so far only fusion bombs (hydrogen bombs) exist. Except in stars.

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gamma ray	One of several types of ionizing radiation, comprised of high-energy photons. Symbolized by the greek letter γ. Just like an x-ray only stronger.
Geiger counter	A device to let you know how badly you'd rather be somewhere else. It counts decays. and indicates them by a clicking noise. A common problem in an emergency is that there are so many decays, the machine stops emitting any clicks (information) at all.
genetic effect	Injury to the sperm or egg.
ground zero	Another term stolen from the nuclear vocabulary. Used universally to mean the center of attention. The original meaning of the term was the point at which a nuclear burst -- a ground burst, to be more specific -- took place.
Gy	Gray. An amount of absorbed (by a living organism) ionizing radiation equivalent to one joule of energy per kilogram of body mass.

H	Hydrogen. The lightest and most abundant element on earth, in our bodies, and in the universe.
H3	Tritium. Also called 3H, T, H^3, H-3, etc.. Abundantly manufactured in nuclear reactors.
half-life	The average time it takes for half the atoms of a pure isotope to decay into something else.
He	Helium.
HP	Health Physics. A corrupt bunch of technicians who can calculate the effective dose, the accumulated dose, the LD50 dose, grays, rads, sieverts and so on, but cannot bear to study the effects in carefully-controlled situations to see if their founding father, Karl Z. Morgan, was correct when he denounced the then-current standards as utterly unsafe, and, of course, explained his reasons. HP has worn blinders ever since.
HEU	Highly Enriched Uranium. Generally considered to be any uranium with the U^{235} content enriched above 20%. Can be used for atomic bombs without further enrichment.
Hex	Uranium Hexafluoride (UF_6). UF_6, a hazardous substance, is concentrated to make bombs. or reactor fuel.
HLRW	High Level Radioactive Waste. Usually means spent nuclear fuel rods, but also less "hot" things like the reactor pressure vessels, and various military waste. A safe way to contain HLRW would defy the known laws of physics -- both Einstein's and Newton's.
HO	Hydrogen-Oxygen molecule. A potent free radical. Also symbolized as OH.
Hot Particle	A tiny, probably microscopic, particle made of radioactive isotopes, causing a small area of the body to experience local high doses of radiation. May lead to excess cancers.
HTO	Hydrogen-Tritium-Oxygen molecule. (Water (H_2O), but with a tritium atom for one of its hydrogen atoms.)

ICRP	International Committee on Radiological Protection.
inverse square law	A mathematical progression which describes (among other things) the proportional decline in intensity of something which is spreading out evenly in all directions from a point source. Pro-nukers always assume you don't know this. They also always assume that all dispersals follow this pattern exactly, if it's convenient for them to assume so. In fact, none do.
ionization	The process of removing electrons from atoms (or adding electrons to atoms) with radiation or with some other energy.
ionizing radiation	Energetic emissions of light and / or high-speed particles, often emanating from the nucleus of atoms, and having enough energy to break chemical and other bonds.
isomer	Molecules having the same number of atoms in the same proportions, but different structures, are called isomers. Ionizing radiation can create different isomers of proteins and other molecules, which may be poisonous or, at best, useless. The term can also refer to similar nuclides in different states of excitation.
isotope	Atoms with the same number of protons but different numbers of neutrons are called isotopes. Some isotopes of all elements are radioactive, and some elements have no stable isotopes. Prior to the nuclear age, many of the elements on earth had no radioactive isotopes.

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jellyfish The cause of many shutdowns of coastal reactors over the years, including again today, as I create this glossary, at the Diablo Canyon plants, where one reactor's coolant system was clogged and had to be shut down, and the other was cut to half power "just in case." This is what they keep telling us is reliable baseline power!

joule A unit of measure for energy. One joule is the energy required to exert a force of one Newton through a distance of 1 meter. One joule per second equals one watt.

K40 A naturally-occurring radioactive form of potassium.

KeV Kilo-electron Volts (pronounced kay-ee-vee).

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latent period The time after a radiation exposure when you still feel fine, before a cancer or other health effect sets in. Could be decades, or seconds.

LBL Lawrence Berkeley Labs (aka LBNL).

LBNL Lawrence Berkeley National Laboratories (aka LBL).

LD50 Lethal Dose 50. When determining how toxic something is, scientists have concluded that the amount that kills everyone (every dog, every guinea pig, every cockroach) is less useful, and more difficult to establish with certainty, than the amount that will kill half of the exposed group.

LEU Low Enriched Uranium. Uranium enriched somewhat, but not above 20% U^{235} content.

Little-boy The bomb used against Hiroshima. The first intentional atomic attack on civilians.

LLNL Lawrence Livermore National Laboratories, Livermore, California.

LLW So-called Low-Level Waste. There used to be three classifications, and before that, four. Now there are just two levels of dilution: Extremely diluted waste which is still hazardous (LLW) and everything else (HLRW). LLW is also called LLRW. HLRW is also called HLW.

LOCA Loss of Coolant Accident. When the water drains out of a nuclear reactor. Presumably quickly becomes a meltdown, if it lasts very long. How long depends on such factors as: How hot the water was, how much (if any) water is left, how cold the replacement water is (if any is available), how old the fuel is, and whether the control rods insert properly.

LOFA Loss of Flow Accident. Due, for example, to pump failure. Can quickly lead to a meltdown if the right combination of other things goes wrong, too.

LRI Local Radiation Injury. What you get when you are too close to something too much like a point source.

LWR Light Water Reactor. Any reactor using water which has not had the concentration of deuterium and / or tritium increased above normal isotopic percentages.

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meltdown An overused expression which actually refers to something far worse than anything we've ever seen on Wall Street. When referring to nuclear reactors (the only proper use of the term) a meltdown is a terrible accident in which the reactor core melts and vast amounts of radioactivity are released. Chernobyl is usually described as a meltdown, while TMI is usually described as a partial meltdown. An older term for meltdown is "rapid disassembly."

MeV Million electron Volts (pronounced emm-ee-vee).

mitochondrial DNA One of two forms of DNA passed on from generation to generation. MDNA does not undergo joining of the sperm DNA with the egg DNA. Virtually all MDNA comes directly from the female. It is easily damaged by radiation.

moderator (1) A substance -- water in LWRs -- which slows neutrons in a reactor core.
(2) Someone at a meeting or hearing, usually an employee of the government, who slows down information flow and prevents free discussion.

MPC Maximum Permissible Concentration.

Glossary N-Q

N	Denotes a neutron. In relation to the number of protons in a nucleus (Z), N denotes the number of neutrons in a nucleus. Different Ns for the same Z are known as different isotopes of that element.
NCRP	National Committee on Radiological Protection and Measurements.
neutron	One of the two sub-atomic particles found in the nucleus of an atom. Has a net electrical charge of zero.
neutron activation	The process of increasing the number of neutrons in the nucleus of an atom by bombarding the nucleus with neutrons.
non-stochastic effects	Effects which do not occur below a certain dose. Radiation, on the other hand, shows distinctly stochastic effects (usually). Pro-nukers can fudge the data to show otherwise occasionally.
NPP	Nuclear Power Plant.
NRC	Nuclear Regulatory Commission. The federal organization which permits nuclear waste to be created and dispersed but has virtually no responsibility for human health consequences.
NTLF	National Tritium Labeling Facility, a defunct division of LBNL.
nuclear energy	An expensive, dirty, and dangerous way to boil water (sometimes sodium, etc.).
nuclear fuel cycle	All the many steps in the fuel-intensive, dangerous, and dirty process of splitting atoms to boil water.
nuclear reactor	A weapon of mass destruction which creates mountains of fission products then releases them in varying amounts and at various times.
nuclei	When talking about more than one atomic nucleus, you can say "nuclei."
nucleus	The center of an atom, made of protons and neutrons.

OH	A potent free radical, sometimes created when tritium decays, if the tritium atom was taking the place of a normal (nonradioactive) hydrogen atom in a water molecule at the time of decay.
ostrich	pro-nuker's choice of animal to imitate concerning the facts in this book.

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pCi	picoCurie, a trillionth of a curie.
photon	A discrete and measurable amount of energy emanating from ... more energy. Light. Photons have no electrical charge and no rest mass, but they do have momentum.
Po-210	Polonium-210. An alpha emitter with a half-life of about 138 days.
Price-Anderson Act	A notorious piece of legislation which negates virtually all legal right to compensation after a nuclear accident at a power reactor. Also used by NASA for space missions launched over foreign countries, and probably by the CIA (in secret) for domestic spy satellites containing plutonium.
proton	One of two components of the nucleus of an atom. Neutrons are the other. The number of protons determines the type of element each atom is.
Pu-238	An isotope of plutonium having a half-life of about 87.75 years. An alpha emitter. Used by NASA (and presumably the CIA) as a heat source for power generation; it is extremely hazardous and the containers NASA (and presumably the CIA) uses are utterly inadequate. About 280 times ***more*** carcinogenic than Pu^{239}.
Pu-239	The well-known form of plutonium, used in bombs and some reactors. An alpha emitter with a half-life of ~24,100 years. Lethal down to millionths of a gram.
PWR	Pressurized Water Reactor. About 2/3rds of all U.S. reactors are PWRs. The rest are BWRs (Boiling Water Reactors).

Q	Quality Factor. A series of assigned values estimating the radiation effect by considering which isotopes and which organs are involved. The Radiation Weighting Factor is a more modern and more accurate method.
QC	Quality Control. As far as the author can tell, this term does not appear anywhere in the nuclear industry's lexicon. Usually replaced with "Cover-up" and intimidation of workers who might think about registering complaints.

rad	Radiation Absorbed Dose. A measure of radiation equal to 0.01 Joule per kilogram, or 100 ergs per gram.
radiation	Any emission; but for this book, specifically ionizing emissions.
radiation sickness	Anything that shows after an exposure to radiation. Otherwise, pro-nukers believe you are not harmed in any way.
radiation weighting factor	This is more current (2008) than Q, and more accurate because it more carefully accounts for different exposures from different isotopes to different organs of the body. Works better with computers, too.
radioactivity	The emission of high-energy, high-speed particles and / or waves, usually from the nucleus of atoms.
radon	A noble gas emitted by uranium mine tailings and many kinds of rock. Considered especially hazardous because of its short half-life and inhalation risk.
RBE	Relative Biological Effect. Similar to Q. The mathematical relationship between the effect of a reference dose (for example, 1 rad to the whole body) and the same effect of a dose in question (for example, a piece of DU stuck in the gut). What it has most in common with Q is inexactness.
REM	Roentgen Equivalent Man. Rads times a Q factor of some sort. Inexact.
Roentgen	A measure of radioactivity named after a man named Roentgen, who was greatly admired, and still is, for discovering x-rays (and then irradiating his wife's hand). One Roentgen of beta or gamma emissions delivers a dose of one Rad, which is equivalent to 1 Rem. Old-fashioned and largely unused; replaced by the gray (gy).
RPV	Reactor Pressure Vessel. Usually about eight inches thick with a stainless steel liner.
RPVH	RPV Head -- the top of the RPV. Dr. Richard Webb has calculated that a core melt and steam explosion could blow an RPVH half a mile into the air, right through the containment dome. Weighs about 20,000 pounds and is heavily bolted down. In PWRs, the control rods come down into the reactor core through the RPVH. Rusts easily due to the extremely corrosive environment, the radiation, the heat, etc.
rubblize	To turn the reactor core into minute particles of intense heat and reactivity. Inevitably will result in a massive radiation leak and global fatalities in excess of most wars. Depending on the winds at the time, of course.

Shippingport	The United States' first "commercial" or "civilian" power reactor, came online a year after Russia's first civilian reactor, and was based on naval propulsion units. It was inefficient and prone to outages, and was used unofficially mainly for nuclear weapons production. It was finally mothballed in 1982. Neither the waste from Shippingport, nor the reactor pressure vessel, nor anything else from it has been safely disposed of, yet somehow it is presented as a shining example of a "successful" decommissioning!
SI	Systeme Internationale units, used mainly by the IAEA for additional confusion.
sievert	A unit of measure of energy absorbed by a body, equal to 100 rems. One Sv is the energy equivalent to one rad, or one gray (Gy), of x-rays. One chest x-ray is 0.1 millisieverts or less; a chest CT-scan is about 8 millisieverts (according to one British news source). CT-scans can lead to measurable increases in cancer later, especially for younger patients. When equipment is poorly maintained, it can deliver a much higher dose. The most modern dental x-ray equipment uses digital cameras and delivers less than 1/5th the typical film x-ray dose. Find doctors and dentists who care about these issues for their patients.

specific activity	The amount of radiation eminating from a given amount of a substance in a given amount of time. Usually expressed in curies per gram.
spent fuel pool	Where used nuclear reactor cores are placed after use in a reactor. Most SFPs in America are overcrowded and therefore more susceptible to fires following a loss of water. The amount of spent fuel in the pool is usually dozens of times more than is in the reactor itself, yet the SFPs have relatively little protection from jet crashes and other dangers. Somewhat safer, in this author's opinion, than Dry Cask Storage (also known as Dry Storage Casks).
SRP	Savannah River Project (now known as the SRS).
SRS	Savannah River Site (formerly known as the SRP).
stability curve	As you go up the Periodic Table of the Elements, the number of neutrons needed for stability (non-radioactivity) goes up disproportionately to the number of protons in the atom. When viewed on a chart, a gentle curve is seen.
Strontium-90	Sr^{90} is a radioactive fission product from reactors and bombs, with a half-life of **29.1** years. Decays by beta emission into yttrium-90 (Y^{90}), which decays by beta and gamma emission with a half-life of **64** hours.

T	Tritium.
T2	Tritium Gas.
tailings	Uranium mining waste. Releases enormous amounts of radon gas and other daughter products -- may be the main source of radon gas poisoning for many people. Large piles endanger nearby rivers with radioactive debris inundation. The Colorado River is one such threatened river.
thyroid	A gland in the neck of vertebrates (including humans) which produces hormones that primarily help to control metabolism.
TMI	Three Mile Island. Unit II was permanently damaged in 1979 during a partial core melt.
transuranic	Another fancy term to keep beginners on their toes, it just refers to elements which have more protons than uranium (which has 92 protons).
Trinity	The first atomic explosion, in Alamogordo, New Mexico. Turned desert sand to glass, night into day, and democracy on its ear.
tritium	A radioactive isotope of hydrogen having two neutrons. H^3 has a half-life of about 12.3 years. It decays by beta emission into helium. Created with wild abandon in all NPPs.

UNSCEAR	United Nations Scientific Committee on the Effects of Atomic Radiation.
U-238	So-called "Depleted Uranium" has a half-life of 4,500,000,000 years, but will still emit a million decays per day (of alpha particles) per milligram.
U-235	So-called "Fissile Uranium" is used for atomic bombs and reactors. All reactors except CANDU reactors use "enriched" uranium, which has a higher percentage of U^{235} than natural uranium (natural uranium is about **~0.7%** U^{235}, **99.3%** U^{238}, and a little U^{234}).

Windscale	The worst nuclear accident on British soil; it caused a name change to Sellafield. Attempts by scientists to study the environmental damage have been consistently thwarted by the British government and the nuclear industry.
whole body exposure	Generally taken to mean exposure from something big. That is, not a point source.

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x-ray A lower-powered energy ray than a gamma-ray, but still a strong ionizing radiation. Used by doctors to look at bones and other structures. Often over-used since they are very profitable.

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yellowcake Uranium which has been mined, milled, and chemically processed. Usually comprised of **70%** to **90%** U_3O_8. Also called urania. "Hex" is made from yellowcake.

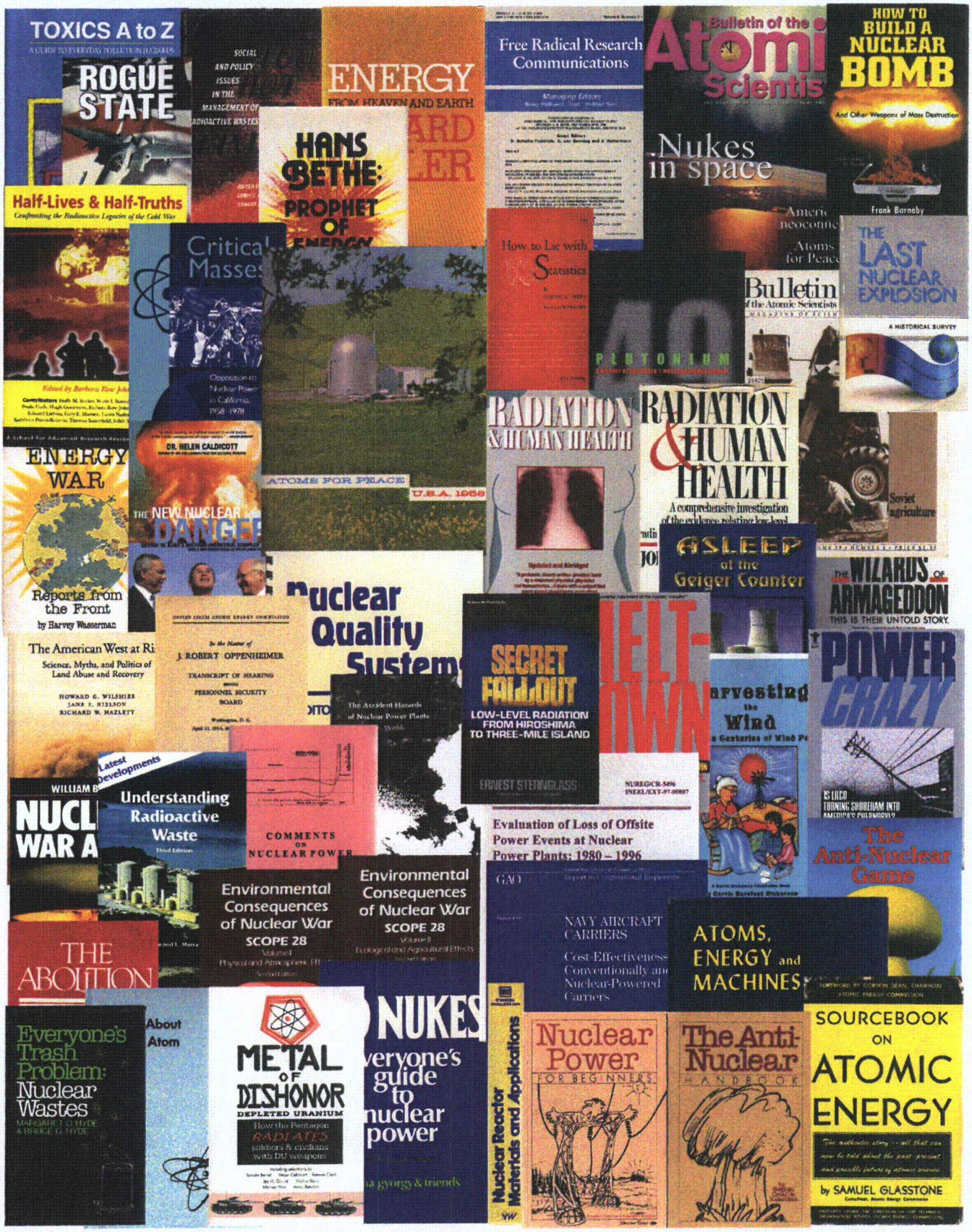
Yucca Mountain A place where all the radioactive waste in America will safely and conveniently be transported, then stored at very low cost and with essentially no risk to the environment. Actually, none of the above.

Z Often used to denote the number of protons in a nucleus when comparing the number of neutrons (denoted as N) to the number of protons. As depicted in the "stability curve," as Z goes up, N goes up even faster, and then faster still. Above a certain Z (83), there are no known stable isotopes, though pro-nukers dream of an "island of stability" high above the highest known element. The search has yielded only jobs for those searching.

Zirconium A pyrophoric (ignites spontaneously in air) metal used as a cladding for nuclear reactor fuel, which may contain nearly two dozen tons of this dangerous metal. Once burning, cannot be easily extinguished because water, for example, will only make things worse.

Some of the resources used to create this document (1/8)

Some of the resources used to create this document (2/8)



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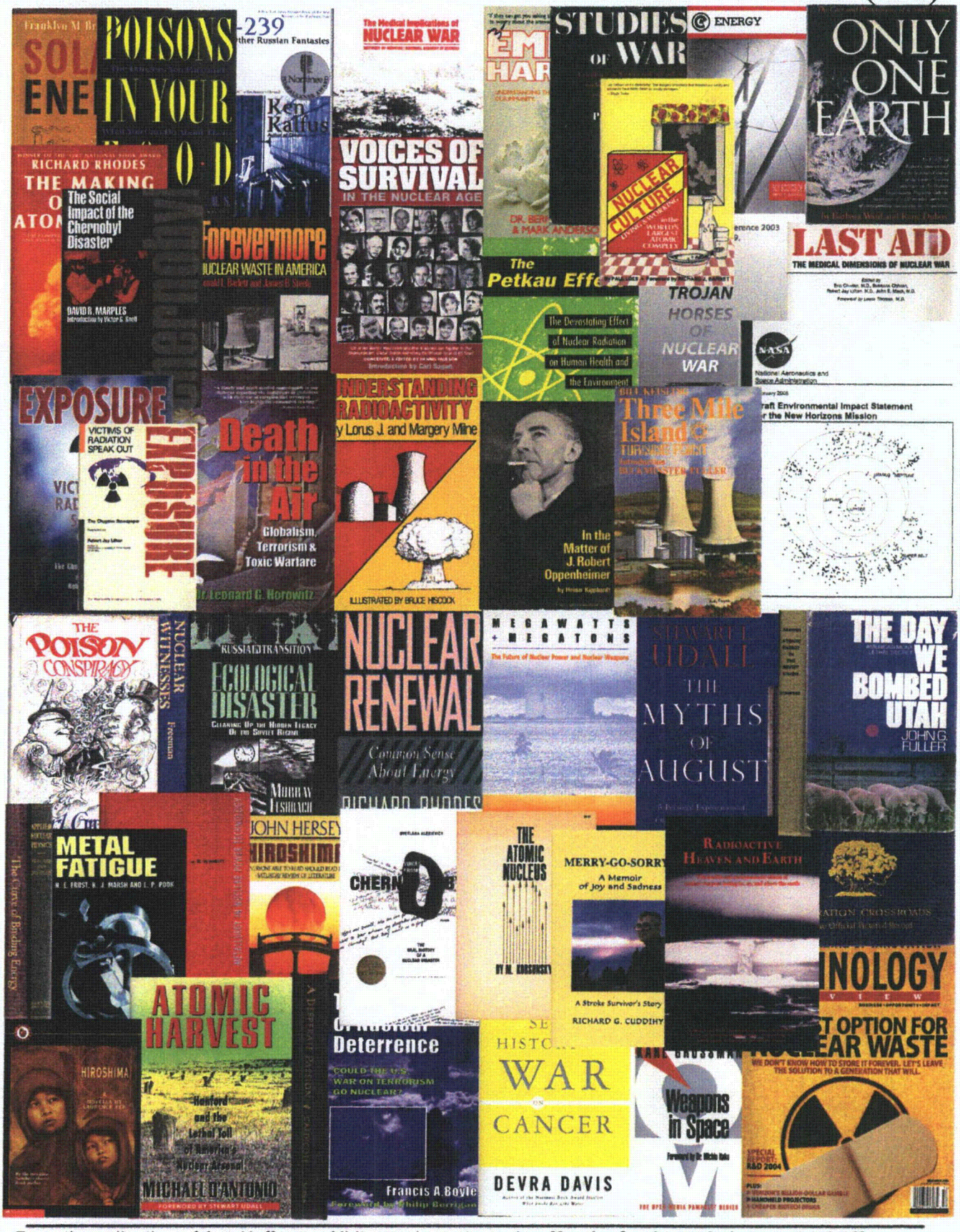

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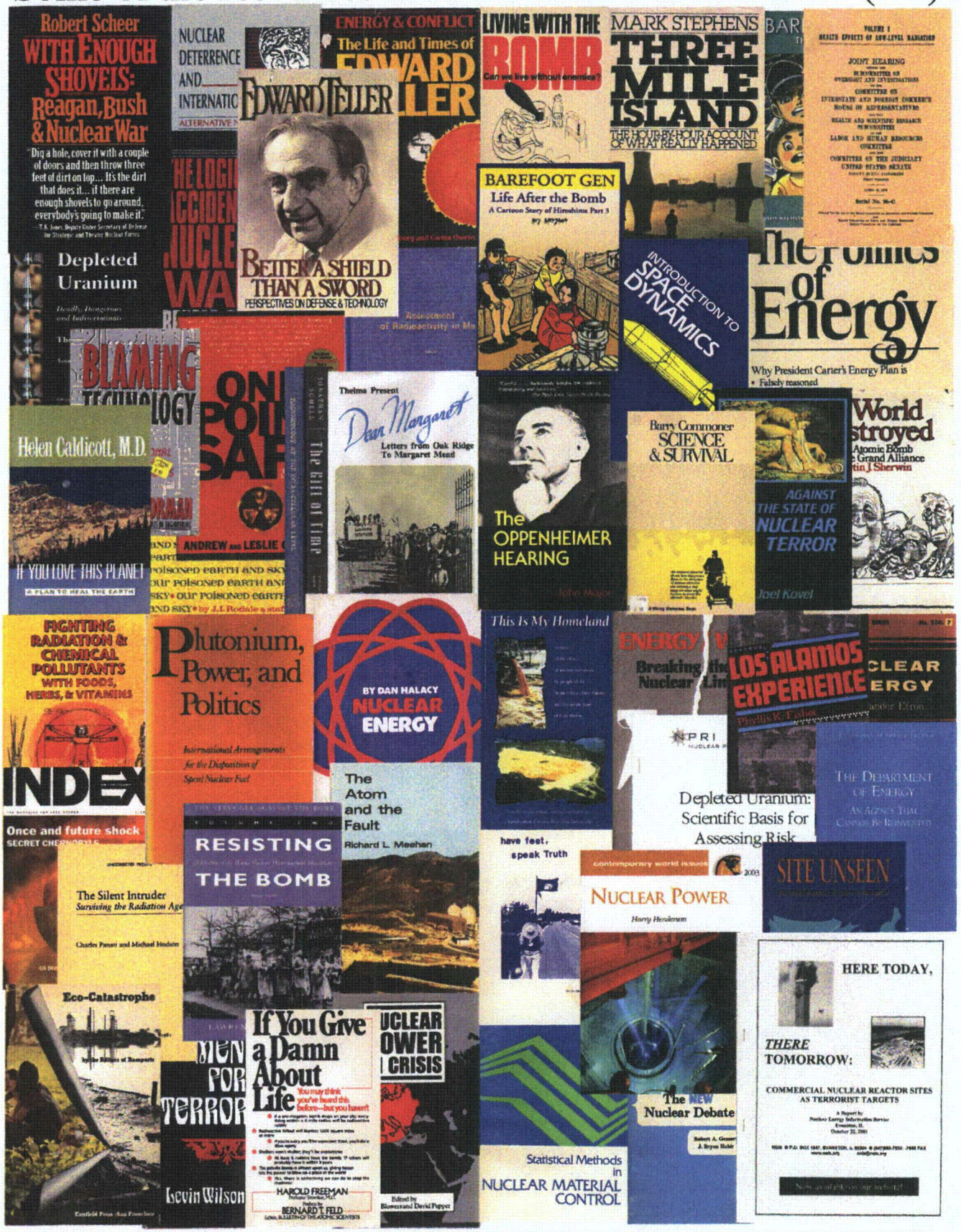

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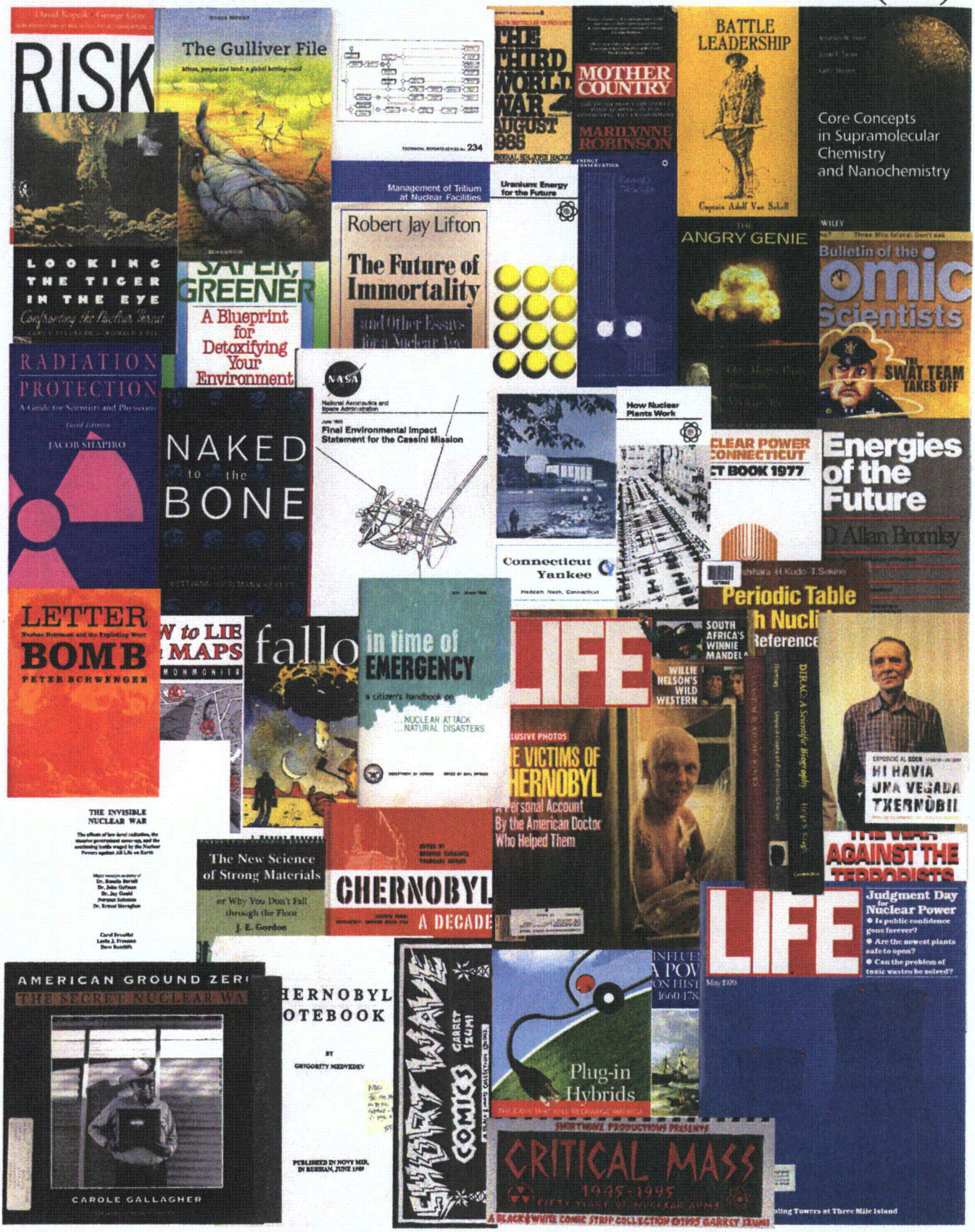

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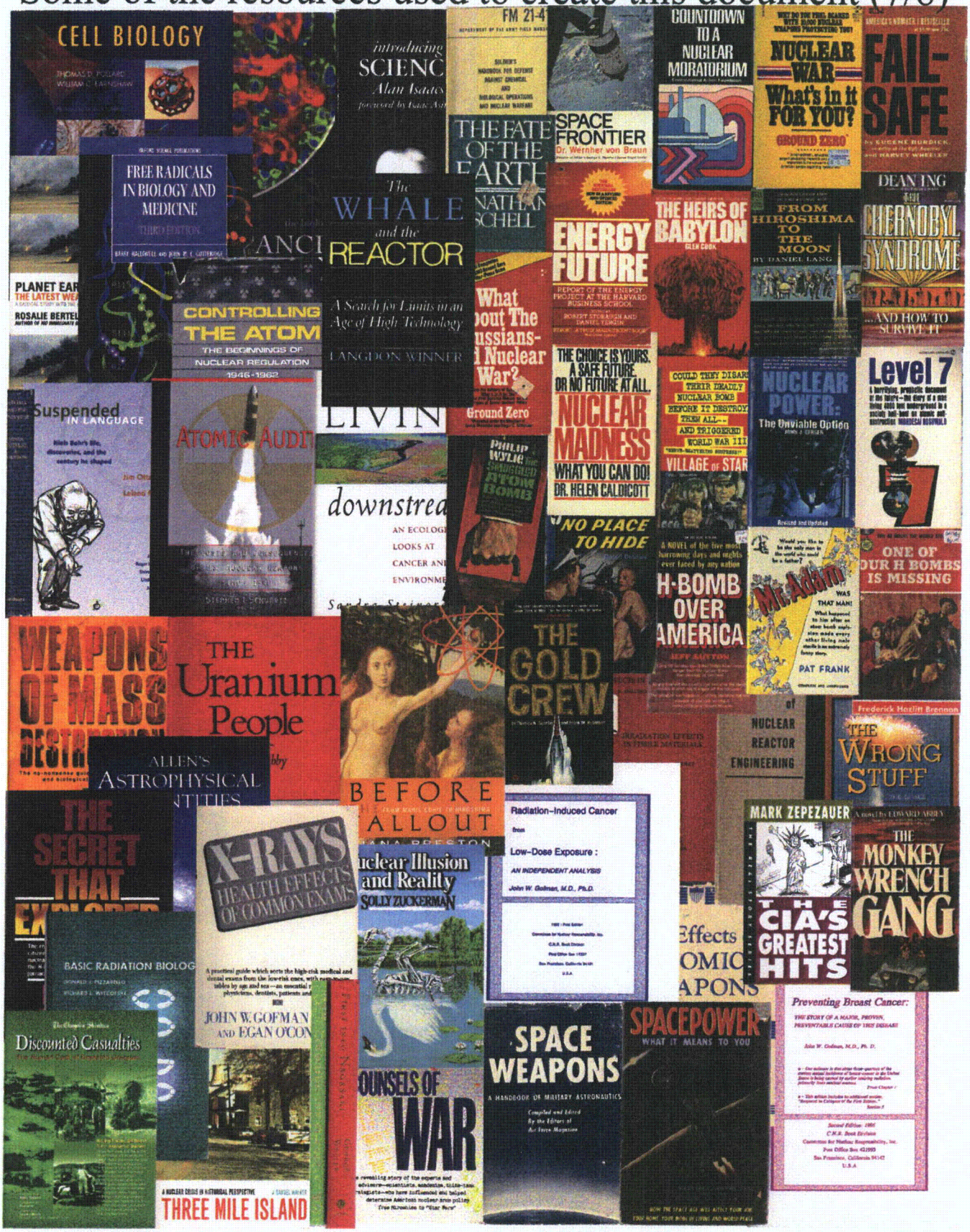

Some of the resources used to create this document (8/8)

About the Author

Ace Hoffman, b. August 14th, 1956, is a computer programmer. His educational software is used worldwide, in universities, hospitals, factories, military, EMT, nurse training, etc.. He has written software for statistics, mechanical pumps, the human heart, and his most recent program, released in 2006, is an award-winning animated interactive Periodic Table of the Elements. He is the owner of The Animated Software Co..

Hoffman is also a writer. His essays have been published by various media outlets in more than a dozen countries, plus over 100 "letters-to-the-editor." He or his work has also appeared in documentaries and on TV.

Hoffman has interviewed thousands of scientist on hundreds of topics. His free electronic newsletter, now over ten years old and almost exclusively about nuclear power, is read by scientists, lawyers, and activists, and has several hundred subscribers. The authors of more than two dozen books about nuclear issues have contributed to his newsletter and many of them are subscribers. He has interviewed -- and, more importantly, was educated by -- Karl Z. Morgan, John W. Gofman, and many other nuclear scientists from the "early days."

Hoffman has studied nuclear issues for over 35 years, and for nearly 25 years he has been a developer of educational software products. Hoffman has attended over 100 public hearings about nuclear power, and scores of other public hearings on a variety of topics. He nearly always speaks and presents documents for the officials. He has given over 100 presentations to computer user groups throughout the country. He has also created several comedy skits.

This document was created because the author recognized a need for a handy visual reference to the many complex issues involved in the debate over nuclear power. It is designed mainly to introduce new people to the issues, but also to help "old-timers" keep track of what's what, and to stop pointless arguments. Invariably, some pro-nukers will *still* challenge many of these points, but without any scientific basis. It will be just so much radioactive hot air.

The author does hope that some pro-nuke scientist will take on the task of answering this document, in its entirety, point for point, along with answering Hoffman's treatises on tritium (available at his web site: www.acehoffman.org).

Hoffman lives with his wife Sharon in Carlsbad, CA, way too close to San Onofre Nuclear Waste Generating Station.

Written, designed, and colorized by Ace Hoffman (2008) ***May be freely copied*** **www.acehoffman.org**

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We've sent them over 150 copies of this book!

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and their staff-members, too!

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Join – or form – an organization.

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Write a letter to an editor!

Learn more.

Demand media divest itself from the mega-corporations.

Never give up!

Boycott nuclear corporations...

Contacts:

Please note that there are hundreds of organizations around the world which are working on these issues. *(My apologies for not listing them all!)* Watch out for false friends, foolish goals, and fake organizations. The organizations listed here are well-known to the author.

Nuclear Information and Resource Service (NIRS / WISE)
6930 Carroll Avenue, Suite 340
Takoma Park MD 20912
Phone: (301) 270-NIRS
((301) 270-6477)
email: nirsnet@nirs.org
www.nirs.org

Nuclear Energy Information Service (NEIS)
3411 W Diversey Avenue, #16
Chicago IL 60647
Phone: (773) 342-7650
email: neis@neis.org
www.neis.org

Physicians for Social Responsibility (PSR)
1875 Connecticut Avenue, NW, Suite 1012
Washington DC 20009
Phone: (202) 667-4260
email: psrnatl@psr.org
www.psr.org

Three Mile Island Alert
4100 Hillsdale Rd
Harrisburg PA 17112
Phone: (717) 541-1101
email: tmia@tmia.com
www.tmia.com

Riverkeeper
828 South Broadway
Tarrytown NY 10591
Phone: (800) 21-RIVER
email: info@riverkeeper.org
www.riverkeeper.org

The Guacamole Fund
P.O. Box 699
Hermosa Beach CA 90254
Phone: (310) 374-4837
email: guacamole@bigplanet.com
www.guacfund.org

CANE - Coalition Against Nuclear Energy South Africa
www.cane.org.za

Also please visit: **www.ratical.org**, where much of Dr. John W. Gofman's research has been made available online.

Beyond Nuclear at Nuclear Policy Research Institute
6930 Carroll Avenue, Suite 400
Takoma Park MD 20912
Phone: (301) 270-2209
email: info@beyondnuclear.org
www.beyondnuclear.org

Institute for Energy and Environmental Research (IEER)
6935 Laurel Ave., Suite 201
Takoma Park MD 20912
Phone: (301) 270-5500
email: info@ieer.org
www.ieer.org

Citizens Awareness Network (CAN)
P.O. Box 83
Shelburne Falls MA 01370
Phone: (413) 339-5781
www.nukebusters.org

Southern Alliance for Clean Energy (SACE)
P.O. Box 1842
Knoxville TN 37901
Phone: (865) 637-6055
email: info@cleanenergy.org
www.cleanenergy.org

New England Coalition on Nuclear Pollution (NECNP)
P.O. Box 545
Brattleboro VT 05302
Phone: (802) 257-0336
email: necnp@necnp.org
www.newenglandcoalition.org

Canadian Coalition for Nuclear Responsibility (CCNR)
c.p. 236, Station Snowdon,
Montréal QC
H3X 3T4 CANADA
email: ccnr@web.ca
www.ccnr.org

European Committee on Radiation Risk (ECRR)
Avenue de la Fauconnerie 73,
B-1170 Bruxelles,
BELGIUM
email: info@euradcom.org
www.euradcom.org

Contacts: (cont.)

NJPIRG
NJPIRG Citizen Lobby
143 East State Street, Suite 6
Trenton, NJ 08608
Phone: (609) 394-8155
www.njpirg.org

NCWARN
North Carolina Waste
Awareness & Reduction Network
P.O. Box 61051
Durham NC 27715-1051
Phone: (919) 416-5077
email: ncwarn@ncwarn.org
www.ncwarn.org

Hanford Watch
email: paigeknight@comcast.net
www.hanfordwatch.org

Int'l Inst. of Concern for Public Health
PO Box 80523
RPO White Shields
2300 Lawrence Ave. East
Toronto Ontario Canada M1P 4Z5
Phone: (416) 786-6128
email: info@iicph.org
www.iicph.org

Nukefree.org
Harvey Wasserman,
Senior Advisor & Website Editor:
email: windhw@mac.com
Mary Skerrett,
Program Director and Outreach Coordinator:
email: mary@nukefree.org
www.nukefree.org

The Global Network Against Weapons and Nuclear Power in Space
Bruce K. Gagnon; Secretary / Coordinator
PO Box 652
Brunswick, ME 04011
Phone: (207) 443-9502
email: globalnet@mindspring.com
www.space4peace.org

(Please contact the author to have your organization added to this list. Thank you!)

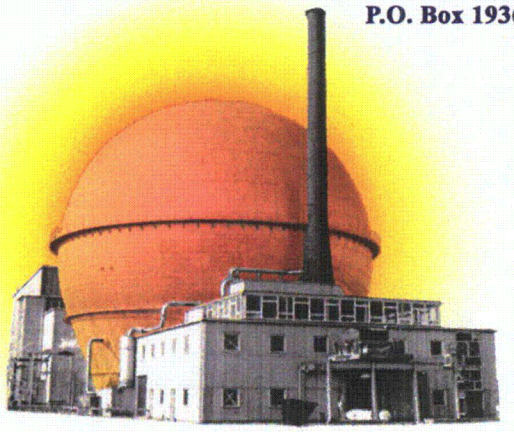
Google: "**Davis Besse 2002**" ... "**Genpatsu-Shinsai**" ... etc....

Suggestions, comments, or corrections?
Please email the author: ace@acehoffman.org

This book may be downloaded (at no charge) from the author's web site. If you print it for others, you may charge enough to cover your printing costs, plus an appropriate donation for your organization.

www.acehoffman.org

P.O. Box 1936 Carlsbad, CA 92018



Back Cover:

Mayak was a plutonium extraction plant in Russia which blew up September 29, 1957. Estimates are that almost half a million people were poisoned with radiation; 10,000 were evacuated; and hundreds died. The area is now among the worst-polluted on earth. Yet Western authorities to this day claim they never noticed! Surely they DID notice -- but decided not to let the public know, lest it reject this terrible and dangerous technology. Mayak, appropriately enough, means "beacon."

If you would like a printed, bound copy on acid-free 28-lb paper, signed by the author, for bringing to hearings, rallies, court cases, etc., or for your (or somebody's) library, you can purchase elegant print-on-demand copies directly from the author:

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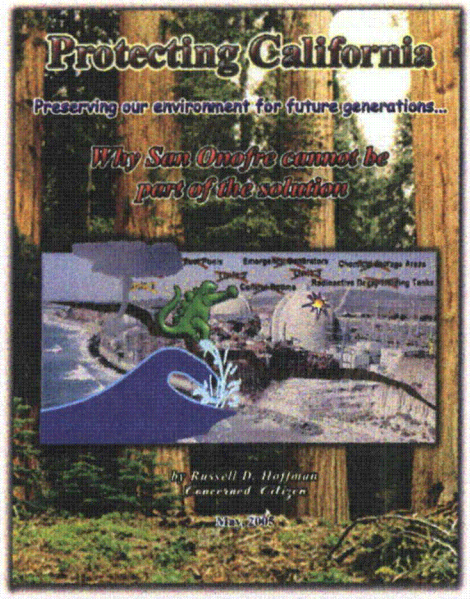
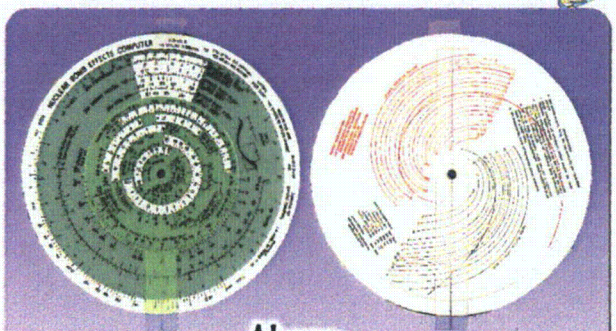


The seeds of this project originally appeared as a booklet for California activists



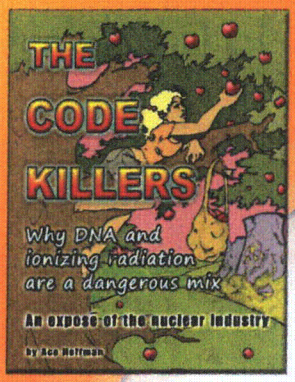
Above:

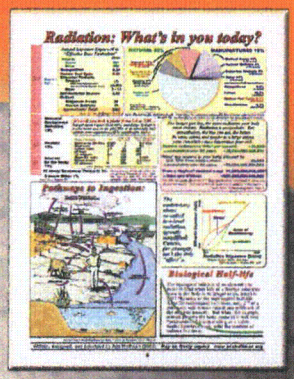
Nuclear Bomb Effects Computer

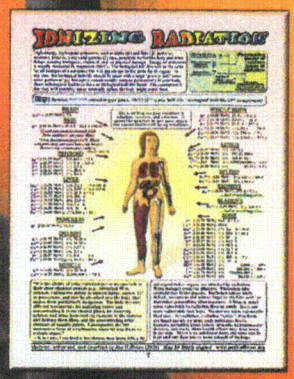
These were available in the early 1960s and were used to calculate the damage that could be achieved from any given bomb size. For a digitized Nuclear Bomb Effects Computer and many other animated versions of images in this book, please go to the author's web site.

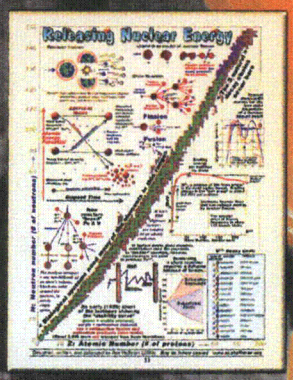
The more you know, the worse they look.

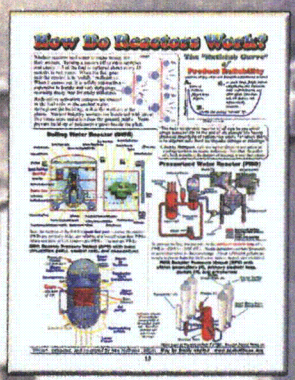
NO NUKES!











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