

# **The Military's Pandora's Box**

by Dr. Nick Begich and Jeane Manning

This article was prepared to provide a summary of the contents of a book written in 1995 which describes an entirely new class of weapons. The weapons and their effects are described in the following pages. The United States Navy and Air Force have joined with the University of Alaska, Fairbanks, to build a prototype for a ground based "Star Wars" weapon system located in the remote bush country of Alaska.

The individuals who are demanding answers about HAARP are scattered around the planet. As well as bush dwellers in Alaska, they include: a physician in Finland; a scientist in Holland; an anti-nuclear protester in Australia; independent physicists in the United States; a grandmother in Canada, and countless others.

Unlike the protests of the 1960s the objections to HAARP have been registered using the tools of the 1990s. From the Internet, fax machines, syndicated talk radio and a number of alternative print mediums the word is getting out and people are waking up to this new intrusion by an over zealous United States government.

The research team put together to gather the materials which eventually found their way into the book never held a formal meeting, never formed a formal organization. Each person acted like a node on a planetary info-spirit-net with one goal held by all -- to keep this controversial new science in the public eye. The result of the team's effort was a book which describes the science and the political ramifications of this technology.

That book, *Angels Don't Play this HAARP: Advances in Tesla Technology*, has 230 pages. This article will only give the highlights. Despite the amount of research (350 footnoted sources), at its heart it is a story about ordinary people who took on an extraordinary challenge in bringing their research forward.

## **HAARP Boils the Upper Atmosphere**

HAARP will zap the upper atmosphere with a focused and steerable electromagnetic beam. It is an advanced model of an "ionospheric heater." (The ionosphere is the electrically-charged sphere surrounding Earth's upper atmosphere. It ranges between 40 to 60 miles above the surface of the Earth.)

Put simply, the apparatus for HAARP is a reversal of a radio telescope; antenna send out signals instead of receiving. HAARP is the test run for a super-powerful radiowave-beaming technology that lifts areas of the ionosphere by focusing a beam and heating those areas. Electromagnetic waves then bounce back onto earth and penetrate everything -- living and dead.

**HAARP publicity gives the impression that the High-frequency Active Auroral Research Program is mainly an academic project with the goal of changing the ionosphere to improve communications for our own good. However, other U.S. military documents put it more clearly -- HAARP aims to learn how to "exploit the ionosphere for Department of Defense purposes." Communicating with submarines is only one of those purposes.**

**Press releases and other information from the military on HAARP continually downplay what it could do. Publicity documents insist that the HAARP project is no different than other ionospheric heaters operating safely throughout the world in places such as Arecibo, Puerto Rico, Tromso, Norway, and the former Soviet Union. However, a 1990 government document indicates that the radio-frequency (RF) power zap will drive the ionosphere to unnatural activities.**

**" ... at the highest HF powers available in the West, the instabilities commonly studied are approaching their maximum RF energy dissipative capability, beyond which the plasma processes will 'runaway' until the next limiting factor is reached."**

**If the military, in cooperation with the University of Alaska Fairbanks, can show that this new ground-based "Star Wars" technology is sound, they both win. The military has a relatively-inexpensive defense shield and the University can brag about the most dramatic geophysical manipulation since atmospheric explosions of nuclear bombs. After successful testing, they would have the military megaprojects of the future and huge markets for Alaska's North Slope natural gas.**

**Looking at the other patents which built on the work of a Texas' physicist named Bernard Eastlund, it becomes clearer how the military intends to use the HAARP transmitter. It also makes governmental denials less believable. The military knows how it intends to use this technology, and has made it clear in their documents. The military has deliberately misled the public, through sophisticated word games, deceit and outright disinformation.**

**The military says the HAARP system could:**

- Give the military a tool to replace the electromagnetic pulse effect of atmospheric thermonuclear devices (still considered a viable option by the military through at least 1986)**
- Replace the huge Extremely Low Frequency (ELF) submarine communication system operating in Michigan and Wisconsin with a new and more compact technology**
- Be used to replace the over-the-horizon radar system that was once planned for the current location of HAARP, with a more flexible and accurate system**
- Provide a way to wipe out communications over an extremely large area, while keeping the military's own communications systems working**
- Provide a wide area earth-penetrating tomography which, if combined with the computing abilities of EMASS and Cray computers, would make**

it possible to verify many parts of nuclear nonproliferation and peace agreements

- Be a tool for geophysical probing to find oil, gas and mineral deposits over a large area
- Be used to detect incoming low-level planes and cruise missiles, making other technologies obsolete

The above abilities seem like a good idea to all who believe in sound national defense, and to those concerned about cost-cutting. However, the possible uses which the HAARP records do not explain, and which can only be found in Air Force, Army, Navy and other federal agency records, are alarming. Moreover, effects from the reckless use of these power levels in our natural shield -- the ionosphere -- could be cataclysmic according to some scientists.

Two Alaskans put it bluntly. A founder of the NO HAARP movement, Clare Zickuhr, says "The military is going to give the ionosphere a big kick and see what happens."

The military failed to tell the public that they do not know what exactly will happen, but a Penn State science article brags about that uncertainty. Macho science? The HAARP project uses the largest energy levels yet played with by what Begich and Manning call "the big boys with their new toys." HAARP is an experiment in the sky, and experiments are done to find out something not already known. Independent scientists told Begich and Manning that a HAARP-type "skybuster" with its unforeseen effects could be an act of global vandalism.

## HAARP History

The patents described below were the package of ideas which were originally controlled by ARCO Power Technologies Incorporated (APTI), a subsidiary of Atlantic Richfield Company, one of the biggest oil companies in the world. APTI was the contractor that built the HAARP facility. ARCO sold this subsidiary, the patents and the second phase construction contract to E-Systems in June 1994.

E-Systems is one of the biggest intelligence contractors in the world -- doing work for the CIA, defense intelligence organizations and others. \$1.8 billion of their annual sales are to these organizations, with \$800 million for black projects -- projects so secret that even the United States Congress isn't told how the money is being spent.

E-Systems was bought out by Raytheon, which is one of the largest defense contractors in the world. In 1994 Raytheon was listed as number forty-two on the Fortune 500 list of companies. Raytheon has thousands of patents, some of which will be valuable in the HAARP project. The twelve patents below are the backbone of the HAARP project, and are now buried among the thousands of others held in the name of Raytheon. Bernard J. Eastlund's U.S. Patent # 4,686,605, "Method and Apparatus for Altering a Region in the Earth's Atmosphere, Ionosphere; and/or Magnetosphere," was sealed for a year under a government Secrecy Order.

The Eastlund ionospheric heater was different; the radio frequency (RF) radiation was concentrated and focused to a point in the ionosphere. This difference throws an unprecedented amount of energy into the ionosphere. The Eastlund device would allow a concentration of one watt per cubic centimeter, compared to others only able to deliver about one millionth of one watt.

This huge difference could lift and change the ionosphere in the ways necessary to create futuristic effects described in the patent. According to the patent, the work of Nikola Tesla in the early 1900's formed the basis of the research.

What would this technology be worth to ARCO, the owner of the patents? They could make enormous profits by beaming electrical power from a powerhouse in the gas fields to the consumer without wires.

For a time, HAARP researchers could not prove that this was one of the intended uses for HAARP. In April, 1995, however, Begich found other patents, connected with a "key personnel" list for APTI. Some of these new APTI patents were indeed a wireless system for sending electrical power. Eastlund's patent said the technology can confuse or completely disrupt airplanes' and missiles' sophisticated guidance systems. Further, this ability to spray large areas of Earth with electromagnetic waves of varying frequencies, and to control changes in those waves, makes it possible to knock out communications on land or sea as well as in the air.

The patent said:

"Thus, this invention provides the ability to put unprecedented amounts of power in the Earth's atmosphere at strategic locations and to maintain the power injection level particularly if random pulsing is employed, in a manner far more precise and better controlled than heretofore accomplished by the prior art, particularly by detonation of nuclear devices of various yields at various altitudes... "

"...it is possible not only to interfere with third party communications but to take advantage of one or more such beams to carry out a communications network even though the rest of the world's communications are disrupted. Put another way, what is used to disrupt another's communications can be employed by one knowledgeable of this invention as a communication network at the same time."

"... large regions of the atmosphere could be lifted to an unexpectedly high altitude so that missiles encounter unexpected and unplanned drag forces with resultant destruction."

"Weather modification is possible by, for example, altering upper atmosphere wind patterns by constructing one or more plumes of atmospheric particles which will act as a lens or focusing device.

... molecular modifications of the atmosphere can take place so that positive environmental effects can be achieved. Besides actually changing the molecular composition of an atmospheric region, a particular molecule or molecules can be chosen for increased presence. For example, ozone,

nitrogen, etc., concentrations in the atmosphere could be artificially increased."

Begich found eleven other APTI Patents. They told how to make "Nuclear-sized Explosions without Radiation," Power-beaming systems, over-the-horizon radar, detection systems for missiles carrying nuclear warheads, electromagnetic pulses previously produced by thermonuclear weapons and other Star-Wars tricks. This cluster of patents underlay the HAARP weapon system.

Related research by Begich and Manning uncovered bizarre schemes. For example, Air Force documents revealed that a system had been developed for manipulating and disturbing human mental processes through pulsed radio-frequency radiation (the stuff of HAARP) over large geographical areas. The most telling material about this technology came from writings of Zbigniew Brzezinski (former National Security Advisory to U.S. President Carter) and J.F. MacDonald (science advisor to U.S. President Johnson and a professor of Geophysics at UCLA), as they wrote about use of power-beaming transmitters for geophysical and environmental warfare. The documents showed how these effects might be caused, and the negative effects on human health and thinking.

The mental-disruption possibilities for HAARP are the most disturbing. More than 40 pages of the book, with dozens of footnotes, chronicle the work of Harvard professors, military planners and scientists as they plan and test this use of the electromagnetic technology. For example, one of the papers describing this use was from the International Red Cross in Geneva. It even gave the frequency ranges where these effects could occur -- the same ranges which HAARP is capable of broadcasting.

The following statement was made more than twenty-five years ago in a book by Brzezinski which he wrote while a professor at Columbia University:

"Political strategists are tempted to exploit research on the brain and human behavior. Geophysicist Gordon J.F. MacDonald, a specialist in problems of warfare, says accurately-timed, artificially-excited electronic strokes could lead to a pattern of oscillations that produce relatively high power levels over certain regions of the earth ... in this way one could develop a system that would seriously impair the brain performance of very large populations in selected regions over an extended period"

" ... no matter how deeply disturbing the thought of using the environment to manipulate behavior for national advantages, to some, the technology permitting such use will very probably develop within the next few decades."

In 1966, MacDonald was a member of the President's Science Advisory Committee and later a member of the President's Council on Environmental Quality. He published papers on the use of environmental control technologies for military purposes. The most profound comment he made as a geophysicist was, "the key to geophysical warfare is the identification of environmental

instabilities to which the addition of a small amount of energy would release vastly greater amounts of energy." While yesterday's geophysicists predicted today's advances, are HAARP program managers delivering on the vision?

The geophysicists recognized that adding energy to the environmental soup could have large effects. However, humankind has already added substantial amounts of electromagnetic energy into our environment without understanding what might constitute critical mass. The book by Begich and Manning raises questions:

- Have these additions been without effect, or is there a cumulative amount beyond which irreparable damage can be done?
- Is HAARP another step in a journey from which we cannot turn back?
- Are we about to embark on another energy experiment which unleashes another set of demons from Pandora's box?

As early as 1970, Zbigniew Brzezinski predicted a "more controlled and directed society" would gradually appear, linked to technology. This society would be dominated by an elite group which impresses voters by allegedly superior scientific know-how. *Angels Don't Play This HAARP* further quotes Brzezinski:

"Unhindered by the restraints of traditional liberal values, this elite would not hesitate to achieve its political ends by using the latest modern techniques for influencing public behavior and keeping society under close surveillance and control. Technical and scientific momentum would then feed on the situation it exploits," Brzezinski predicted.

His forecasts proved accurate. Today, a number of new tools for the "elite" are emerging, and the temptation to use them increases steadily. The policies to permit the tools to be used are already in place. How could the United States be changed, bit by bit, into the predicted highly-controlled technosociety? Among the "steppingstones" Brzezinski expected were persisting social crises and use of the mass media to gain the public's confidence.

In another document prepared by the government, the U.S. Air Force claims: "The potential applications of artificial electromagnetic fields are wide-ranging and can be used in many military or quasi-military situations... Some of these potential uses include dealing with terrorist groups, crowd control, controlling breaches of security at military installations, and antipersonnel techniques in tactical warfare. In all of these cases the EM (electromagnetic) systems would be used to produce mild to severe physiological disruption or perceptual distortion or disorientation. In addition, the ability of individuals to function could be degraded to such a point that they would be combat ineffective. Another advantage of electromagnetic systems is that they can provide coverage over large areas with a single system. They are silent and countermeasures to them may be difficult to develop... One last area where electromagnetic radiation may prove of some value is in enhancing abilities of individuals for anomalous phenomena."

Do these comments point to uses already somewhat developed? The author of the government report refers to an earlier Air Force document about the uses of radio frequency radiation in combat situations. (Here Begich and Manning note that HAARP is the most versatile and the largest radio-frequency-radiation transmitter in the world.)

The United States Congressional record deals with the use of HAARP for penetrating the earth with signals bounced off of the ionosphere. These signals are used to look inside the planet to a depth of many kilometers in order to locate underground munitions, minerals and tunnels. The U.S. Senate set aside \$15 million dollars in 1996 to develop this ability alone -- earth-penetrating-tomography. The problem is that the frequency needed for earth-penetrating radiation is within the frequency range most cited for disruption of human mental functions. It may also have profound effects on migration patterns of fish and wild animals which rely on an undisturbed energy field to find their routes.

As if electromagnetic pulses in the sky and mental disruption were not enough, T. Eastlund bragged that the super-powerful ionospheric heater could control weather.

Begich and Manning brought to light government documents indicating that the military has weather-control technology. When HAARP is eventually built to its full power level, it could create weather effects over entire hemispheres. If one government experiments with the world's weather patterns, what is done in one place will impact everyone else on the planet. *Angels Don't Play This HAARP* explains a principle behind some of Nikola Tesla's inventions -- resonance -- which affect planetary systems.

### Bubble of Electric Particles

*Angels Don't Play This HAARP* includes interviews with independent scientists such as Elizabeth Rauscher. She has a Ph.D., a long and impressive career in high-energy physics, and has been published in prestigious science journals and books. Rauscher commented on HAARP. "You're pumping tremendous energy into an extremely delicate molecular configuration that comprises these multi-layers we call the ionosphere."

"The ionosphere is prone to catalytic reactions," she explained, "if a small part is changed, a major change in the ionosphere can happen."

In describing the ionosphere as a delicately balanced system, Dr. Rauscher shared her mental picture of it -- a soap-bubble-like sphere surrounding Earth's atmosphere, with movements swirling over the surface of the bubble. If a big enough hole is punched through it, she predicts, it could pop.

### Slicing the Ionosphere

Physicist Daniel Winter, Ph.D., of Waynesville, North Carolina, says, "HAARP high-frequency emissions can couple with longwave (extremely-low-frequency, or ELF) pulses the Earth grid uses to distribute information as vibrations to synchronize dances of life in the biosphere." Dan terms this geomagnetic action 'Earth's information bloodstream,' and says it is likely that coupling of HAARP HF (high-frequency) with natural ELF can cause unplanned, unsuspected side effects.

David Yarrow of Albany, New York, is a researcher with a background in electronics. He described possible interactions of HAARP radiation with the ionosphere and Earth's magnetic grid: "HAARP will not burn *holes* in the ionosphere. That is a dangerous understatement of what HAARP's giant gigawatt beam will do. Earth is spinning relative to thin electric shells of the multilayer membrane of *ion-o-spheres* that absorb and shield Earth's surface from intense solar radiation, including charged particle storms in solar winds erupting from the sun. Earth's axial spin means that HAARP -- in a burst lasting more than a few minutes -- will slice through the ionosphere like a microwave knife. This produces not a hole but a long tear -- an incision."

### Crudely Plucking the Strings

Second concept: As Earth rotates, HAARP will slice across the geomagnetic flux, a donut-shaped spool of magnetic strings -- like longitude meridians on maps.

HAARP may not 'cut' these strings in Gaia's magnetic mantle, but will pulse each thread with harsh, out-of-harmony high frequencies. These noisy impulses will vibrate geomagnetic flux lines, sending vibrations all through the geomagnetic web. "

"The image comes to mind of a spider on its web. An insect lands, and the web's vibrations alert the spider to possible prey. HAARP will be a man-made microwave finger poking at the web, sending out confusing signals, if not tearing holes in the threads. "

"Effects of this interference with symphonies of Gaia's geomagnetic harp are unknown, and I suspect barely thought of. Even if thought of, the intent (of HAARP) is to learn to exploit any effects, not to play in tune to global symphonies. "

Among other researchers quoted is Paul Schaefer of Kansas City. His degree is in electrical engineering and he spent four years building nuclear weapons.

"But most of the theories that we have been taught by scientists to believe in seem to be falling apart," he says. He talks about imbalances already caused by the industrial and atomic age, especially by radiation of large numbers of tiny, high-velocity particles "like very small spinning tops" into our environment. The unnatural level of motion of highly-energetic particles in the atmosphere and in radiation belts surrounding Earth is the villain in the weather disruptions, according to this model, which describes an Earth discharging its buildup of heat, relieving stress and regaining a balanced condition through earthquakes and volcanic action.

## **Feverish Earth**

**"One might compare the abnormal energetic state of the Earth and its atmosphere to a car battery which has become overcharged with the normal flow of energy jammed up, resulting in hot spots, electrical arcing, physical cracks and general turbulence as the pent-up energy tries to find some place to go."**

**In a second analogy, Schaefer says "Unless we desire the death of our planet, we must end the production of unstable particles which are generating the earth's fever. A first priority to prevent this disaster would be to shut down all nuclear power plants and end the testing of atomic weapons, electronic warfare and 'Star Wars'." Meanwhile, the military builds its biggest ionospheric heater yet, to deliberately create more instabilities in a huge plasma layer -- the ionosphere -- and to rev up the energy level of charged particles.**

## **Electronic Rain From The Sky**

**They have published papers about electron precipitation from the magnetosphere (the outer belts of charged particles which stream toward Earth's magnetic poles) caused by man-made very low frequency electromagnetic waves. "These precipitated particles can produce secondary ionization, emit X-rays, and cause significant perturbation in the lower ionosphere."**

**Two Stanford University radio scientists offer evidence of what technology can do to affect the sky by making waves on earth; they showed that very low frequency radio waves can vibrate the magnetosphere and cause high-energy particles to cascade into Earth's atmosphere. By turning the signal on or off, they could stop the flow of energetic particles.**

## **Weather Control**

**Avalanches of energy dislodged by such radio waves could hit us hard. Their work suggests that technicians could control global weather by sending relatively small 'signals' into the Van Allen belts (radiation belts around Earth). Thus Tesla's resonance effects can control enormous energies by tiny triggering signals.**

**The Begich/ Manning book asks whether that knowledge will be used by war-oriented or biosphere-oriented scientists.**

**The military has had about twenty years to work on weather warfare methods, which it euphemistically calls weather modification. For example, rainmaking technology was taken for a few test rides in Vietnam. The U.S. Department of Defense sampled lightning and hurricane manipulation studies in Project Skyfire and Project Stormfury. And they looked at some complicated technologies that would give big effects. *Angels Don't Play This HAARP* cites**

an expert who says the military studied both lasers and chemicals which they figured could damage the ozone layer over an enemy. Looking at ways to cause earthquakes, as well as to detect them, was part of the project named Prime Argus, decades ago. The money for that came from the Defense Advanced Research Projects Agency (DARPA, now under the acronym ARPA.) In 1994 the Air Force revealed its Spacecast 2020 master plan which includes weather control. Scientists have experimented with weather control since the 1940's, but Spacecast 2020 noted that "using environmental modification techniques to destroy, damage or injure another state are prohibited." Having said that, the Air Force claimed that advances in technology "compels a reexamination of this sensitive and potentially risky topic."

#### **40 Years of Zapping the Sky?**

As far back as 1958, the chief White House advisor on weather modification, Captain Howard T. Orville, said the U.S. defense department was studying "ways to manipulate the charges of the earth and sky and so affect the weather" by using an electronic beam to ionize or de-ionize the atmosphere over a given area.

In 1966, Professor Gordon J. F. MacDonald was associate director of the Institute of Geophysics and Planetary Physics at the University of California, Los Angeles, was a member of the President's Science Advisory Committee, and later a member of the President's Council on Environmental Quality.

He published papers on the use of environmental-control technologies for military purposes. MacDonald made a revealing comment: "The key to geophysical warfare is the identification of environmental instabilities to which the addition of a small amount of energy would release vastly greater amounts of energy. " World-recognized scientist MacDonald had a number of ideas for using the environment as a weapon system and he contributed to what was, at the time, the dream of a futurist. When he wrote his chapter, "How To Wreck The Environment," for the book *Unless Peace Comes*, he was not kidding around. In it he describes the use of weather manipulation, climate modification, polar ice cap melting or destabilization, ozone depletion techniques, earthquake engineering, ocean wave control and brain wave manipulation using the planet's energy fields.

He also said that these types of weapons would be developed and, when used, would be virtually undetectable by their victims. Is HAARP that weapon? The military's intention to do environmental engineering is well documented, U.S. Congress' subcommittee hearings on Oceans and International Environment looked into military weather and climate modification conducted in the early 1970's. "What emerged was an awesome picture of far-ranging research and experimentation by the Department of Defense into ways environmental tampering could be used as a weapon," said another author cited in *Angles Don't Play This HAARP*.

The revealed secrets surprised legislators. Would an inquiry into the state of the art of electromagnetic manipulation surprise lawmakers today? They may find out that technologies developed out of the HAARP experiments in Alaska could deliver on Gordon MacDonald's vision because leading-edge scientists are describing global weather as not only air pressure and thermal systems, but also as an electrical system.

### **Small Input - Big Effect**

HAARP zaps the ionosphere where it is relatively unstable. A point to remember is that the ionosphere is an active electrical shield protecting the planet from the constant bombardment of high-energy particles from space. This conducting plasma, along with Earth's magnetic field, traps the electrical plasma of space and holds it back from going directly to the earth's surface, says Charles Yost of Dynamic Systems, Leicester, North Carolina. "If the ionosphere is greatly disturbed, the atmosphere below is subsequently disturbed."

Another scientist interviewed said there is a super-powerful electrical connection between the ionosphere and the part of the atmosphere where our weather comes onstage, the lower atmosphere.

One man-made electrical effect -- power line harmonic resonance -- causes fallout of charged particles from the Van Allen (radiation) belts, and the falling ions cause ice crystals (which precipitate rain clouds). What about HAARP? Energy blasted upward from an ionospheric heater is not much compared to the total in the ionosphere, but HAARP documents admit that thousandfold-greater amounts of energy can be released in the ionosphere than injected. As with MacDonald's "key to geophysical warfare," "nonlinear" effects (described in the literature about the ionospheric heater) mean small input and large output. Astrophysicist Adam Trombly told Manning that an acupuncture model is one way to look at the possible effect of multi-gigawatt pulsing of the ionosphere. If HAARP hits certain points, those parts of the ionosphere could react in surprising ways.

Smaller ionospheric heaters such as the one at Arecibo are underneath relatively placid regions of the ionosphere, compared to the dynamic movements nearer Earth's magnetic poles. That adds another uncertainty to HAARP -- the unpredictable and lively upper atmosphere near the North Pole.

HAARP experimenters do not impress commonsense Alaskans such as Barbara Zickuhr, who says "They're like boys playing with a sharp stick, finding a sleeping bear and poking it in the butt to see what's going to happen."

### **Could They Short-Circuit Earth?**

Earth as a spherical electrical system is a fairly well-accepted model. However, those experimenters who want to make unnatural power connections between parts of this system might not be thinking of possible consequences. Electrical motors and generators can be caused to wobble when their circuits are affected. Could human activities cause a significant change in a planet's electrical circuit or electrical field? A paper in the respected journal *Science* deals with manmade ionization from radioactive material, but perhaps it could also be studied with HAARP-type skybusters in mind:

"For example, while changes in the earth's electric field resulting from a solar flare modulating conductivity may have only a barely detectable effect on meteorology, the situation may be different in regard to electric field changes caused by manmade ionization... " Meteorology, of course, is the study of the atmosphere and weather. ionization is what happens when a higher level of power is zapped into atoms and knocks electrons off the atoms. The resulting charged particles are the stuff of HAARP. "One look at the weather should tell us that we are on the wrong path," says Paul Schaefer, commenting on HAARP-type technologies.

*Angels Don't Play This HAARP: Advances in Tesla Technology* is about the military's plan to manipulate that which belongs to the world -- the ionosphere. The arrogance of the United States government in this is not without precedent.

Atmospheric nuclear tests had similar goals. More recently, China and France put their people's money to destructive use in underground nuclear tests. It was recently reported that the US government spent \$3 trillion dollars on its nuclear program since its beginnings in the 1940's. What new breakthroughs in life science could have been made with all the money spent on death?

Begich, Manning, Roderick and others believe that democracies need to be founded on openness, rather than the secrecy which surrounds so much military science. Knowledge used in developing revolutionary weapons could be used for healing and helping mankind. Because they are used in new weapons, discoveries are classified and suppressed. When they do appear in the work of other independent scientists, the new ideas are often frustrated or ridiculed, while military research laboratories continue to build their new machines for the killing fields.

However, the book by Manning and Begich gives hope that the military industrial academic bureaucratic Goliath can be affected by the combined power of determined individuals and the alternative press. Becoming informed is the first step to empowerment.