DR. BILL WATTENBURG

December 2002

Background report and major public-service contributions by Dr. Willard Harvey (Bill) Wattenburg, Research Scientist, Research Foundation California State University, Chico; and consultant to the Lawrence Livermore National Laboratory.

Very few scientists in the U.S have contributed more to public service than W. H. (Bill) Wattenburg has done in the form of simple but very workable solutions to major national security and public problems. Typically, government agencies had failed to solve these problems after spending enormous sums of money and time before Wattenburg was asked to step in by top state and federal officials. His clever creations have saved many thousands of lives and untold amounts of public resources. Dozens of scientific journal articles and major newspaper stories have chronicled his exploits and accomplishments over the past thirty years.

Some of his better-known accomplishments are summarized below. These are more fully reported in the scientific journal articles and major newspaper stories listed at the end of this report. They include:

- Performance of Coaxial Cable in the Vicinity of a Nuclear Explosion **(1962), U.C. Radiation Laboratory Report UCRL-7164, 1962 (Classified).** (This was the experiment that led to the nuclear test verification technology known as CORTEX.)
- Helping Put Out the Oil Well Fires in Kuwait **(1991).**
- Dropping Food Packages to Refugees without Parachutes **(1993)** (Now being used in Afghanistan.)
- Protecting Suspension Bridges from Terrorist Attacks **(2001).**
- Hijacked Truck-Stopping Device **for Police (2001).**
- Stopping the Waste of Blood from Blood Banks **(1965).**
- **Fixing the BART Train Control System for the State of California (1971-73).**
- **Rapid Clearing of Minefields with Helicopters (1990-91).**
- **Designing Temporary Freeway Bridges for Rapid Earthquake Repair (1994-95).**

Bill Wattenburg grew up on farms and worked with his father in the heavy-construction industry before he was given a scholarship to U.C. Berkeley. He was appointed to the faculty at the University of California, Berkeley, at the completion of his Ph.D. in

electrical engineering and nuclear physics at the age of 25. He specialized in the design of digital computers for computations in nuclear physics. He took a leave of absence from Berkeley in 1962 to join the physics division at the Lawrence Livermore National Laboratory, the nuclear weapons "A Division," where he worked on the initial designs of some of the nuclear weapons in the U.S. inventory today. He spent a year at the Nevada Test Site where he tested the warhead designs on which he had worked and helped develop and improve underground nuclear testing technology. He continued working at Livermore part-time after he returned to teaching at Berkeley in 1964. He has continued as an unpaid consultant to the Livermore Laboratory since 1975. In turn, the Livermore Laboratory has provided equipment and resources for many of Wattenburg's scientific experiments described herein. Bill Wattenburg was the co-founder in 1966 (along with Nobel Prize–winning physicist Dr. Donald Glaser) of Berkeley Scientific Laboratories. Wattenburg was the president of Berkeley Scientific Laboratories from 1966 to 1975 when he returned to university teaching and research.

A colorful history of Bill Wattenburg's career is also given in an extensive private investigative report posted on the Web site drbill.org—part of pushback.com—a site created and maintained by the technical editor of a well-known computer magazine.

Bill Wattenburg's contributions to science and computer technology are well known to scientists around the world. His work in several fields and his publications in scientific journals while he was on the faculty at the University of California at Berkeley are listed below. But the public and press know him best for his impressive and often bizarre solutions to major problems in our society. He typically does basic experiments on his own to prove that his ideas are feasible before he presents them to government agencies and the press. This sometimes irritates bureaucracies that are left with no excuse to ignore his ideas when the public already knows that they are workable. In turn, he has demonstrated a profound impatience with slow-moving government agencies.

It is significant that since he left the faculty at U.C. Berkeley thirty years ago, Bill Wattenburg has never taken pay of any sort from government agencies for his public service activities. He has assigned his most significant patents to the university. His often-stated position is that the public gave him a free education at two great universities—California State University, Chico, and the University of California, Berkeley. He has said that he can well afford to return a little of the good fortune that the public provided to him.

He does most of his work today as a research scientist at the Research Foundation, California State University, Chico, and as an unpaid consultant for the Lawrence Livermore National Laboratory. Many times over the last 25 years he has teamed up with top scientists and engineers at the Livermore Laboratory to test and develop his solutions to national security problems.

Public Service Efforts

The following items briefly describe many of Wattenburg's most visible contributions to public security.

Performance of Coaxial Cable in the Vicinity of a Nuclear Explosion

While working at the Nevada Nuclear Test Site in 1962, Bill Wattenburg invented a particularly simple and inexpensive way to measure the performance of nuclear weapons detonated underground. He devised a simple experiment that he "piggybacked" at the last minute onto one of the nuclear tests that was being conducted. His experiment was a success beyond everyone's expectations. This technology quickly provided a very inexpensive way to measure the performance of underground nuclear detonations. It became an important part of our underground nuclear test-ban treaties. The details of how this invention works are still classified.

Putting Out the Oil Well Fires in Kuwait:

In April 1991, a committee of top U.S. scientists and oil industry representatives met in Washington, D.C., at the request of the U.S. Department of Energy. The purpose was to help the Kuwaiti government in putting out the 500 or more oil well fires that were raging in Kuwait after the Gulf War. The committee was chaired by Dr. Henry Kendall, MIT, and Dr. Richard Garwin, IBM. Bill Wattenburg was invited as one of several Livermore scientists in attendance. At the conclusion of the meeting, the conference co-chairmen asked Bill Wattenburg to go back with the Kuwait representatives to help them implement many of the technical ideas that came from the two-day scientific meeting in Washington. He left immediately to fly to London to assist the Kuwaiti Government and Kuwaiti Oil Company (KOC) engineers (**Scientists Present New Ways to Snuff Kuwait Oil Fires**, Wall Street Journal Europe, 5–6 April 1991, page 8).

Over the next three weeks, he helped formulate the plans and procedures that resulted in the fires being extinguished in the totally unexpected short time of seven months (well known oil well fire–specialists had predicted three to five years).

The plans that Wattenburg helped formulate for extinguishing the fires are documented in the many reports that he transmitted to the U.S. Department of Energy and the University during his daily meetings with the Kuwaiti government chiefs in London. Some of his ideas were very controversial, as reported in the press.

In his first memo to the Kuwaiti leaders Wattenburg suggested that they announce certain requirements to the many contractors in the world who were vying to do the work of putting out the fires. He insisted that putting out the fires was not the major problem. The major requirement was that contractors had to be able to cap the wells and stop the flow of raw oil very quickly after they snuffed out the flames. Many would-be contractors sending proposals to Kuwait had assumed that all they had to do was extinguish the fires at the wellheads and the rest would be easy. Wattenburg also insisted that dozens of damaged wells that were not on fire had to be re-ignited as soon as possible because they were spewing thousands of barrels of crude oil over the desert floor, which would make it impossible to reach the wells later. The Kuwaiti engineers published these requirements immediately and sent teams to re-ignite the wells that were pouring raw oil on the desert floor.

Wattenburg's next plan became the most controversial—and the most successful. In around-the-clock meetings in the London headquarters of the Kuwaiti Oil Company,

Wattenburg and the Kuwaiti engineers worked out a plan to divide the burning Kuwaiti oil fields into many working zones. Each qualified contractor from the many nations who wanted to send fire-fighting crews would be assigned a zone. The contractors would be paid a handsome, fixed price for each flaming oil well successfully capped (like $500,000), with a bonus for accelerated performance. Failure to perform within two months would disqualify a contractor. Its zone would be assigned to others. Two famous oil well fire-fighting contractors from the U.S. and Canada complained loudly because they were already on the scene and assumed that they would get most of the work, which they had stated would take several years to complete. Nevertheless, the Kuwaiti government leaders approved Wattenburg's plan.

The rest is history. The last oil well fire in Kuwait was extinguished seven months later in November 1991.

Wattenburg's reports from London and newspaper articles document another interesting event. The Kuwaiti chiefs asked Wattenburg before he left London if he could suggest something appropriate that the Kuwaiti government could do to express its appreciation to the British people for their help in the Gulf War. At that time, the newspapers were reporting that the famous London Zoo, the first in the world, was in great financial trouble and might have to be closed. In his last memo to the Kuwaiti leaders, Wattenburg suggested that they might rescue the London Zoo as a "thank you" to the British people. A few weeks later, the London Times reported that the government of Kuwait had donated over $10,000,000 to the London Zoo. Wattenburg accepted no payment from Kuwait other than his travel and living expenses during his stay in London.

Wattenburg's reports on his activities and meetings with the Kuwaiti engineers and Kuwaiti royalty in London are on file with the U.S. Department of Energy.

Dropping Food Packages to Refugees without Parachutes (1991–93)

During the first months of the attack on Afghanistan in the fall of 2001, there were daily news reports about how the U.S. was dropping millions of food packages to the Afghan refugees who could not be safely reached by relief agencies on the ground. Bill Wattenburg was the one who first did the experiments (1991) that proved that our military could and should drop food packages to refugees from high altitude without parachutes when the refugees are in hostile areas. This is now standard operating procedure for the U.S. military.

In 1991, Bill Wattenburg was the first person to demonstrate that small food packages can be safely dropped by cargo planes at high altitude, as is now being done to fed the refugees in Afghanistan. (see **"Dropping food packages to refugees without using parachutes**," Science, 2 April 1993, page 27. Also **San Francisco Chronicle, 23 March 1993, front page).** This eliminates the great expense of parachutes and the danger to our flight crews when they must fly at low altitude to drop large food pallets by parachute over hostile areas. But relief officials and the U.S. military would not try his idea for several years—until a fortunate sequence of events took place.

Bill Wattenburg was asked by the U.S. Government in April 1991 to be the U.S. scientific advisor to the Kuwaiti Government and help them put out the 500 oil well fires in Kuwait. In the course of this effort, he received daily reports on the continuing conflict in northern Iraq and saw films of the Kurdish refugees in northern Iraq being machine gunned by Iraqi soldiers when the refugees flocked to the large food pallets that U.S forces were dropping by parachute in remote areas.

Wattenburg insisted that small food packages could be dropped from high altitude without the packages breaking up when they hit the ground. (See the San Francisco Chronicle article below.) He proved that air resistance would limit the vertical speed to the same terminal velocity no matter how high the altitude of the airplane. Dropping individual packages from high altitude would also scatter the food over larger areas so that refugees would not be easy targets for hostile soldiers who could target parachutes as they dropped. Records show that he did his first experiments at the Lawrence Livermore National Laboratory in May 1991 by dropping supermarket food packages from a small plane flying at 5,000 ft. altitude (granola bars, cereal boxes, and plastic wrapped items of all sorts).

Relief officials would not try his idea in northern Iraq. But he pestered the Pentagon for the next two years. In 1993, our military began dropping food by parachute on large pallets to refugees in the war in Bosnia. Again, our cargo planes had to fly dangerously low over hostile territory. Hostile forces were targeting the refugees on the ground when they flocked to the food pallets, or the hostile forces would simply take the food. Bill Wattenburg told Dr. Jane Hull in the White House National Security Office about his experiments and how well they worked. She immediately called the Joint Chiefs of Staff's Office in the Pentagon (see Science article below).

The Joint Chiefs of Staff ordered the Air Force to try Wattenburg's idea as soon as possible over Bosnia by dropping thousands of regular military "Meals Ready to Eat" (MREs) packages from high altitude without parachutes by just kicking them out the back of a cargo plane flying at 5,000 feet. Quaker Oats Company quickly contributed 100,000 sealed granola bars to go along with the MREs. The procedure was an instant success for all. As Bill predicted, most of the packages dropped without parachutes were unbroken and the food was scattered over a wide area so that all refugees had an equal chance of picking up the food. The kids in particular were most successful (as one would expect in any Easter-Egg hunt).

The Pentagon soon announced that this would be the new military standard operating procedure for dropping food to refugees over hostile areas. (Of course, a Pentagon spokesperson soon suggested to the press that the military had been thinking about this idea for many years.)

Thousands of starving refugees can be thankful that Bill Wattenburg took the time to test one of his seemingly silly ideas one afternoon from a light plane at 5,000 ft. over a farmer's field near Livermore.

Protecting Suspension Bridges from Terrorist Attacks (2001)

Since September 11, 2001, Bill Wattenburg has been helping state and federal agencies reduce our national vulnerability to terrorism. In early October 2001, he and another scientist at the Livermore Laboratory, Dr. David McCallen, found a very dangerous vulnerability in the suspension bridges of the Bay Area. The problem was that the suspension cable anchor points at each end of a bridge were very vulnerable to attack. Any terrorist with a small amount of explosives or common cutting tools could easily sever one of the main suspension cables and cause the entire bridge to collapse. They immediately reported this to the California Highway Patrol and the Governor's office. McCallen and Wattenburg worked with state engineers in an around-the-clock, three-week construction project to harden the sites where a terrorist could have easily damaged the anchor points of the suspension cables of the Bay Bridge or the Golden Gate Bridge. The media and public were informed on November 1, 2001, only after the work had been completed and other states had been notified to check their bridges (see

San Jose Mercury News, 4 Nov. 2001, New York Times, 6 Nov. 2001, and San Francisco Chronicle stories below).

Hijacked Truck-Stopping Device for Police (2001)

The California Highway Patrol then asked Bill Wattenburg if he could devise some way to allow police to stop runaway or hijacked trucks on the highways. Hijacked trucks are one of the major terrorist vulnerabilities that the nation faces today. A fuel tanker truck in the hands of a terrorist can be as dangerous as the airplanes that were crashed into the World Trade Center. However, law enforcement has had no means or procedures to stop hijacked large trucks other than to attempt to shoot the driver or the tires on the truck. Even when it is possible to shoot either the driver or the tires, these actions can still lead to great damage when the truck goes out of control.

On November 6, 2001, Bill Wattenburg demonstrated a simple device that can be installed on the back of any large truck that will allow any police patrol car to stop the moving truck on the highway—and stop it quickly and safely. And the truck driver is helpless to avoid the stop.

Wattenburg found a simple mechanical way to let a pursuing policeman realize his dream of being able to jump into a speeding truck and step on the brakes. But the policeman does not have to risk his life. He only has to push or tap the rear bumper of the truck or trailer with his police car. This is something that is usually easy and safe for a police car to do because the rear of a speeding truck-trailer cannot be swerved dangerously by the truck driver without the truck going out of control. In fact, hijacked trucks are usually followed for hours by scores of police cars that are essentially helpless to stop the truck, even when they attempt dangerous collisions with the truck. Wattenburg's solution requires much less than that.

The California Highway Patrol has successfully tested Wattenburg's "Truck Stopping Device" at their CHP Academy test track (see New York Times, 18 Nov 2001, story below). This is the first workable solution to this major problem that has frustrated law enforcement agencies for decades. His solution does not require any new equipment to be installed in police cars. It does not require that electronic devices be installed in trucks. It is simply mechanical. It costs no more than $500 installed on any large truck.

The CHP worked with the Lawrence Livermore National Laboratory to do more extensive testing and development of the truck-stopping device at the U.S Department of Energy Nevada Test Site, with the testing completed in mid-December 2002.

Stopping the Waste of Blood from Blood Banks (1965)

Bill Wattenburg's first reported public service project began when he was a young professor at U.C. Berkeley in the Electrical Engineering Department. In 1964, he and his graduate students at Berkeley were designing and building a special-purpose computer. Up to 64 Teletype remote data terminals could be hooked up over telephone lines to their special purpose computer, which could then feed remote data to and from larger mainframe computers of that era such as the IBM 709/7090. NASA and its contractor, Lockheed Missiles and Space Company, were interested in using Wattenburg's telecommunication computer for their space programs.

Two doctors at Alta Bates Hospital, Berkeley, Dr. David Singman and Dr. William Palmer, approached Bill Wattenburg with a serious problem. They were members of the Alameda-Contra Costa Blood Bank advisory board. They explained that blood banks

around the world were losing a lot of the blood they collected because many bottles of blood became outdated while they sat on the shelves in various hospitals.

The shelf-life for whole blood was about 30 days. After that, the blood had to be thrown away. The problem was that a bottle of blood would be sent from a central blood bank to a hospital to be cross-matched and reserved for a particular patient. But there was no way for the blood bank to learn on a timely basis whether the bottle of blood was actually used for that patient. So, this unused bottle of blood could sit on the shelf in one hospital until it became outdated, while other hospitals were asking for the same type of blood. At best, someone might occasionally notice that the blood was unused and send it back to the blood bank. But, by that time, the blood was getting old. Hospitals and doctors prefer to have the freshest blood available for their patients. So, old blood that was returned to the central blood bank would not be sent back out to another hospital unless there was a shortage of new blood of the same type. Hence, even the returned blood was most often discarded.

The blood bank wanted to be able to send an unused bottle of blood sitting at one hospital directly to the next hospital that requested the same type of blood—before the blood became outdated. But, the blood bank and the hospitals were not willing to assign personnel to do the bookkeeping manually. And there was another problem: the hospitals often jealously guarded the unused blood they had on hand in case they needed it for an emergency.

Bill Wattenburg told the doctors how they could build a remote data collection system to solve their problem. The difficulty was that the blood bank could not afford the computer and the special programs that were needed to do this.

Lockheed Missiles and Space Company in Sunnyvale, California, wanted a copy of the remote communication computer that Wattenburg and his graduate students were building at Berkeley. Lockheed wanted to use it as soon as possible for a contract they had in the NASA Apollo program. As a senior executive at Lockheed later reported, Wattenburg approached Lockheed officials with an offer. He would help the Lockheed engineers build a copy of his remote data communication computer. However, in return, he wanted Lockheed to contribute a few minutes of time on their IBM 709 mainframe computer each evening (he also showed them how to save an hour's worth of processing time per day on that computer, making plenty of time for the blood bank inventory program). This computer time would be used by the Alameda–Contra Costa Blood Bank so that they could collect data on the blood inventory at hospitals in their region.

The rest is history. Wattenburg instructed the blood bank to buy inexpensive Teletype machines for all the hospitals they served. He wrote a computer program for the blood bank that let each hospital use its Teletype machine to send into the Lockheed computer the ID number and type of each unused bottle of blood that the hospital had on the shelf at the end of each day. The Lockheed computer then matched the inventory of unused blood on the shelves in the hospitals with the orders for new blood that the blood bank had received from all hospitals that day. The computer at Lockheed then made up a delivery list for which bottles of unused blood at each hospital should be sent directly to another hospital requesting the same blood type for the next day. Each night, the computer-generated blood delivery reports were sent back to each hospital and the blood bank over the Teletype machines. Thereafter, new blood was sent out from the blood bank only when there was no unused blood at another hospital that could be utilized.

Within three months the system was working smoothly. The result was an immediate savings of thirty percent of the blood that was previously thrown away

because it became outdated on hospital shelves. This meant that there was in fact an instant thirty percent increase in available blood, with no increase in blood collections. But equally important from a medical standpoint, there was also a decrease in the average age of blood being transfused into sick patients because blood was not aging as much while it sat on hospital shelves unused.

Both Lockheed and NASA soon recognized the tremendous public health benefit of the blood bank inventory system that Wattenburg had designed. For the very small amount of computer time required, there was an enormous improvement in the efficiency and quality of blood delivered to the public. Lockheed soon assigned a full-time staff of engineers and programmers to expand the system for blood banks across the country. The Red Cross adopted the system for its operations around the world, as did other blood banks around the country.

The history and results of this project were reported in the **Journal of the American Medical Association**, Nov 8, 1965, pp583–586. All staff members at Lockheed who took charge of the system were listed as authors along with W. H. (Bill) Wattenburg.

Bill Wattenburg was presented with an award by the Red Cross several years later for his public service in designing the first blood bank inventory control system. The presenter of the award from the Red Cross noted that Wattenburg had given his substantial commercial and patent rights to this very marketable design to the public by assigning his rights to the U.S. Government. (Lockheed built a substantial commercial business providing the computer system to blood banks around the country for many years thereafter.)

Scientific journal publications on simple solutions to formerly very expensive problems by Dr. Bill Wattenburg working with the Lawrence Livermore National Laboratory

"A Modular Steel Freeway Bridge: Design Concept and Earthquake Resistance"
Science, v268, pp. 261–262, 279–281, 14 April 1995.
Science, v 264, p 27, 1 April 1994.

"Robot Mine Detector"
Science, v270, p 1929, 22 December 1995.

"Dropping food packages to refugees without using parachutes"
Science, 2 April 1993, page 27.
San Francisco Chronicle, **23 March 1993 (front page)**.

"Fluorescent Barriers to Infiltration"
Science, v 265, pp 1184–1185, **26 August 1994**;
Science, v 266, p 1461, 2 December 1994 (letter).

Oil and Gas Journal
21 February 1994, p19 (editorial)

"The Spiral Tube Robot"
Discover Magazine, **July 1997**, p 56, finalist, Inventions of the Year Award

"Plastic Buckets for Refugee Sanitation"
Science, v 284, p409, 16 April 1999

"The Burning of Yellowstone—Another Perspective"
Letter, **Science**, 6 Nov 99, p1051.

"It's All Gas"
Science News, v157, p355, 3 June 2000 (Scientists report that MTBE or ethanol in reformulated gasoline is a fraud and leads to environmental damage and consumer robbery)

"Terrorist Vehicle Barrier Successfully Tested by Lawrence Livermore National Laboratory"
San Jose Mercury News, 8 October 1998 (front page).

"Clearing land mines by Helicopter"
San Francisco Chronicle, 8 March 1991 (front page).

"Scientists Present New Ways to Snuff Kuwait Oil Fires"
Wall Street Journal Europe, 5–6 April 1991, page 8.

Dr. Bill Wattenburg's Scientific and Technical Articles

Articles and papers written or co-authored by Dr. Bill Wattenburg that have appeared in scientific or technical journals.

Bounds on the Transient Response of Ladder Networks

Thesis (M.S. in Electrical Engineering)—University of California, Berkeley, Jan. 1959.

Transform Methods and Time-Varying Systems

Electronics Research Laboratory, University of California, Berkeley Series No. 60, Issue No. 321, September 23, 1960.

Generalized compiling techniques

Thesis (Ph.D. in Electrical Engineering)—University of California, Berkeley, Jan. 1961.

Compiling Techniques for Boolean Expressions and Conditional Statements in ALGOL 60

(with H. D. Huskey)
Communications of the ACM
January 1961.

A Basic Compiler for Arithmetic Expressions

Communications of the ACM
(Association for Computing Machinery)
Vol. 4 No. 1, pp. 3–9 (1961).

A NELIAC Generated 7090-1401 Compiler

(with J. B. Watt)
Communications of the Association of Computing Machinery
February, 1962
Also presented at the 16th National Meeting of the ACM, Los Angeles, September 1961.

On the Efficient Construction of Automatic Programming Systems

A report on the experimental results of the NELIAC Compiler project at U.C. during 1961–1962.
Association for Computing Machinery, National Convention Abstracts, 1962, Syracuse, New York, August 1962.

The Programming Problem in Command and Control

DATAMATION
September 1962.

Performance of Coaxial Cable in the Vicinity of a Nuclear Explosion

(Classified, with R.E. Duff)
U.C. Lawrence Radiation Laboratory Report UCRL-7164-7164, December 1962.

Fourier and Laplace Transforms

Encyclopedia of Electronics
McGraw Hill, 1962.

Techniques for Automating the Construction of Translators for Programming Languages

Electronics Research Laboratory, Report No. 64-45
University of California, January 13, 1964.

An Automated System for the Growth and Analysis of Large Numbers of Bacterial Colonies Using an Environmental Chamber and a Computer Controlled Flying-Spot Scanner

(with D. A. Glaser)
Annals of the New York Academy of Sciences
New York Academy of Sciences Conference on Axenic Cultures and Defined Media, October 9, 1965.

Computerized Blood Bank Control

Journal of the American Medical Association
November 8, 1965 v194 n6.

Design Automation for Computer Software

IEEE Transactions on Electronic Computers
Vol. EC-15, No. 3, June 1966.

A Note on the Formation of Polar Bodies During Oögenesis

ACTA CYTOLOGIA
Vol. 14, No. 8, 1970.

Fluorescent barriers to infiltration

SCIENCE
August 26, 1994, Vol. 265 Issue 5176, p1184.

A modular steel freeway bridge: design concept and earthquake resistance

SCIENCE
April 14, 1995 v268 n5208 p279(3)
W. H. Wattenburg, D. B. McCallen, R. C. Murray.

Published Reports on Solutions to Major Problems

Urgent Efforts to Bar Use of Stolen Trucks as Bombs

The New York Times, p B8, Nov 18, 2001 (http://www.nytimes.com/2001/11/18/national/18TRUC.html).

Bay Bridge Vulnerability Corrected

San Jose Mercury News, Nov 4, 2001 (front page). (http://www0.mercurycenter.com/premium/front/docs/bridge04.htm) and *The New York Times*, Nov 6, 2001. (http://www.nytimes.com/2001/11/06/national/06CALI.html).

An Immediate Southern Crossing to Relieve Bay Bridge Congestion

San Francisco Chronicle, February 21, 2000 (http://www.sfgate.com/cgi-bin/article.cgi?file=/chronicle/archive/2000/02/21/MN86238.DTL)

How to Feed Refugees Quickly, Cheaply, and Safely, Even in War-Torn Areas

San Francisco Chronicle, March 23, 1993 (front page).
SCIENCE, April 2, 1993, p27.
ABCnews.com, October 8, 2001 (http://abcnews.go.com/sections/GMA/GoodMorningAmerica/GMA011008Guns_butter.html)

Utilities to test slight cut in voltage to save electricity

San Francisco Chronicle, June 28, 2001 (http://www.sfgate.com/cgi-bin/article.cgi?file=/chronicle/archive/2001/06/28/MN228304.DTL)

Simple Way to Clean Up Refugee Camps' Mess Plan for buckets backed by White House

San Francisco Chronicle, April 19, 1999 (http://www.sfgate.com/cgi-bin/article.cgi?file=/chronicle/archive/1999/04/19/MN28866.DTL)

Scientists Present New Ways To Snuff Kuwait Oil Fires

Wall Street Journal Europe, April 5–6, 1991, page 8.

Clearing Mine Fields with Helicopters

San Francisco Chronicle, March 8, 1991 (front page).

Movable barrier to prevent head-on collisions on Golden Gate Bridge

Marin Independent Journal, Jan. 6, 1983
San Francisco Chronicle, Jan. 6, 1983 (front page); Jan. 8, 1983; March 22, 1983; Dec. 23, 1983.

Remote measurement of oil tank levels (to investigate hoarding during embargo)

"How to 'See' Inside Their Oil Tanks," *San Francisco Chronicle*, Feb. 6, 1974.

Fixing the BART Train Control System

Dozens of articles in the *San Francisco Chronicle*, 1971–1973.

Automated Dial-a-Ride car pool database (using phone co. address database)

San Francisco Chronicle, Dec. 22, 1973; Dec. 30, 1973; Dec. 18, 1973.

Stopping the Counterfeiting of Magnetic Stripe Credit Cards

San Francisco Chronicle, June 4, 1973, p22.
Business Week, Aug 11, 1973, p120.

Drop Money not Bombs

SF Chronicle, Tues Sept 19, 1972.

Stopping the Waste of Blood from Blood Banks

Journal of the American Medical Association, Nov 8, 1965, pp583–586.

DR. BILL WATTENBURG

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1980–PRESENT:

Research scientist and adjunct professor of science, University Foundation, California State University, Chico.

Consultant, Lawrence Livermore National Laboratory. Formerly staff member, Physics Division, nuclear weapons design.

Talk show host, "The Open Line to the West Coast" (Sat. & Sun. 10pm to 1am) KGO Radio AM-810, American Broadcasting Company, San Francisco (since 1972).

1965–1980:

Co-founder of Berkeley Scientific Laboratories, in Berkeley, California (1966) with Dr. Donald Glaser (Nobel Prize winner in physics, 1960).

President, Berkeley Scientific Laboratories, 1966–70.

Co-founder and chairman of the board, comprehensive health services (later, reorganized as comprehensive computer services and Bakte Bennett laboratories, Berkeley), 1970–1980.

Member, U.S. air force scientific advisory board, 1967–70, subcommittee on nuclear defense systems (Dr. Edward teller).

1961–67:

Assistant professor, electrical engineering, U.C. Berkeley, and staff member, Lawrence Livermore National Laboratory, Physics Division.

CONSULTANT:

Lockheed Missiles And Space Company
IBM Corporation
General Electric Co.
Bellcom (NASA Apollo Project)

EDUCATION:

1961: Ph.D., electrical engineering and nuclear physics, U.C. Berkeley.
1959: Master's degree, electrical engineering, U.C. Berkeley.
1958: B.S., electrical engineering, California State University, Chico.

REFERENCES:

Dr. John Nuckolls, former Director, Lawrence Livermore National Laboratory, Livermore, California
Mr. Michael Luckoff, president, KGO radio, San Francisco
Dr. Edward teller, Hoover Institute, Stanford University