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May 30, 2005

Honorable Nils Diaz, Chairman
US Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Chairman:

Long-Neglected Energy Challenges: Need for a New Approach

The attached letter and enclosures to The President are in response to a letter from him about long-neglected energy challenges. They describe the adverse consequences of management of complex energy and nuclear technology by the Department of Energy and its laboratories, a system identical to that of the former Soviet Union. Since America works through free enterprise of competent corporations, the DOE system works against America's interests.

The letter and enclosures also present ideas to resolve energy challenges, based on lessons learned from experiences. Several leaders have expressed support for these ideas, which include:

1. The U.S. Energy and Nuclear Technology Board
2. Full and accurate information to Americans about energy and nuclear technology
3. Competent corporate instead of government/laboratory management of complex technology
4. Efficient use of nuclear energy resources and responsible disposal of nuclear wastes
5. President Dwight D. Eisenhower's Atoms for Peace with strengthened IAEA safeguards

I hope that you and other leaders of America will support a new approach to resolve long-neglected energy challenges, and would be pleased to provide more detailed information.

Best wishes!

Sincerely,

Clinton Bastin

Clinton Bastin (Chemical Engineer, US Department of Energy, Retired)
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May 30, 2005

The President
The White House
Washington, D.C. 20500

Dear Mr. President:

Long-Neglected Energy Challenges: Need for a New Approach

I appreciate your letter about long-neglected energy challenges. The Department of Energy was created in 1977 to address these challenges, has spent about one-half trillion dollars but provided little of value and is unlikely to provide future value. The adverse impact from inappropriate DOE actions greatly exceeds its wasteful expenditures.

The major problem is management of complex technology by DOE officials and its national laboratories - a system identical to that of the former Soviet Union. Since America works through free enterprise of competent corporations, the DOE system works against America's interests.

Officials of the DOE and its laboratories lack incentives of free enterprise and appreciation of the discipline needed for safe, cost-effective operations, and do not apply lessons learned from successes and failures. Following are some consequences of inappropriate DOE actions:

1. A thirty year moratorium on new nuclear power plants, our safest, least polluting, most reliable and potentially most abundant energy resource
2. Dismissal of all competent corporations that achieved past successes
3. Loss of capability to produce nuclear materials for important national programs
4. Greatly increased costs paid to exporting nations for oil, with resulting huge trade deficits
5. Poor proliferation threat assessment and failures of nonproliferation initiatives
6. Production of tritium for weapons in commercial nuclear power plants, a violation of good and long-standing nonproliferation policy and practice of the U.S. and most nations
7. Tripling the cost of natural gas used to heat homes and produce chemicals and electricity
8. Loss of programs and facilities to develop capability for efficient use of nuclear resources
9. Thirty year delay in deploying more energy efficient technology for uranium enrichment
10. National and global security challenges and poor assessments of nuclear intelligence
11. No policy, program or plan for responsible disposition of used nuclear fuel
12. Wasteful expenditure of scores of billions of dollars for "nuclear waste cleanup" that caused more dangers and radiation exposure to humans than if the work had not been done, and compromised integrity of some of the wastes stored at DOE sites
13. Reliance on competent scientists in government laboratories for activities other than basic research, their appropriate role, which leads to safety and other problems

14. Funds for development and subsidies for energy technologies that have little or no potential for benefit, which preclude efforts that would resolve energy challenges
15. Environmental and potential climatic challenges
16. Americans that are misinformed about energy and nuclear technology issues

Enclosure 1, "Long Neglected Energy Challenges" and Enclosure 2, "Success with Nuclear Technology vs. Sixty Years of Misinformation and Misdirection of America's Energy and Nuclear Programs" provide more detail about consequences of DOE and predecessor agencies misdirection.

These enclosures also present ideas for a new approach to resolve energy challenges, which were discussed with Senate Energy Committee Chairman Frank Murkowski during a visit to Japan in December 1996, and with staff of Senator Pete Domenici after my return. The ideas include:

1. The U.S. (Energy and) Nuclear Technology Board
2. Full and accurate information to Americans about energy and nuclear technology
3. Competent corporate instead of government/laboratory management of complex technology
4. Efficient use of nuclear energy resources and responsible disposal of nuclear wastes
5. President Dwight D. Eisenhower's Atoms for Peace with strengthened IAEA safeguards

Nuclear Regulatory Commission Chairman Nils Diaz said at a Global Foundation conference a year later that Senators Domenici and Murkowski supported ideas for a new approach for (energy and) nuclear technology. A recent letter from the Office of Vice President Dick Cheney said that the suggestion for a U.S. Energy and Nuclear Technology Board would be evaluated by appropriate staff. There were several expressions of support from other reviewers, particularly for competent corporate instead of government management of complex technology.

I hope that you and other leaders of this nation will support a new approach to resolve long-neglected energy challenges, and would be pleased to help and provide more detailed information. Enclosure 3 is a biographical sketch, including lessons learned from experiences.

Best wishes!

Sincerely

Clinton Bastin

Clinton Bastin

Enclosures: 1. Text of talk "Long-neglected Energy Challenges" to the Kiwanis Club of Alpharetta, GA, March 30, 2005

2. Paper "Success with Nuclear Technology vs. Sixty Years of Misinformation and Misdirection of America's Energy and Nuclear Programs"

3. Biographical sketch of Clinton Bastin, including lessons learned from experiences

cc: See next page

Recipients of copies of letters to The President about Need for a New Approach to Resolve Long-neglected Energy Challenges

The Vice President, The White House
Honorable Pete Domenici, Chairman, Senate Committee on Energy and Natural Resources
Honorable Joe Barton, Chairman, House Committee on Energy and Commerce
Honorable Saxby Chambliss, United States Senate
Honorable John Isakson, United States Senate
Honorable Sam Bodman, The Secretary of Energy
Honorable Nils Diaz, Chairman, U.S. Nuclear Regulatory Commission
Mr. David Ratcliffe, Chief Executive Officer, Southern Company
Dr. G. Wayne Clough, President, Georgia Institute of Technology
Dr. James Tulenko, President, The American Nuclear Society

Enclosure 1

Long-Neglected Energy Challenges

A talk for Kiwanis Club of Alpharetta, GA, March 30, 2005

For most of the past century, unlimited supply of cheap oil has been the foundation of our economy, our lifestyle, our transportation and - except for 40% of Navy Ships and Submarines that use nuclear power - our national defense.

Oil supply is limited. At planned rates of use, proven world reserves would be fully depleted in thirty years. Despite extensive exploration, no major deposit has been discovered in thirty years, and a future major discovery is unlikely.

Cheap oil ended last year. It should have ended in 1970, when the United States was no longer able to produce enough oil to meet U.S. demands. We recognized then that world ability to meet world demands would last only a few decades and that a transition from overdependence on oil was needed.

Electric utilities stopped converting coal-fired power plants to burn oil and ordered nuclear power plants - which do not produce atmospheric pollutants or greenhouse gases. Oil companies invested in nuclear technology. The U.S. Navy built more nuclear powered ships and submarines. President Richard Nixon declared a national commitment to efficient use of nuclear materials, which would have become our most abundant energy source.

The US Atomic Energy Commission made changes to avoid earlier mistakes that had resulted in proliferation of nuclear weapons, failures and other problems resulting from use and export of inappropriate laboratory concepts for reprocessing of nuclear fuels, and strengthened efforts to provide full and accurate information about nuclear technology to Americans.

Europeans and Japanese were already using small, energy efficient automobiles, and relying heavily on electric powered rail for travel within and between cities. But most Americans continued to use large, energy inefficient automobiles for inter and intracity travel, and became increasingly dependent on imported oil. Dangers of this dependence were demonstrated during the oil embargo in 1973, the OPEC price rises in 1974, and long lines for gasoline in 1979.

Our response to these warnings was to buy smaller, more energy efficient automobiles, organize car and van pools, insulate our homes, reduce speed limits on highways, build rapid rail intracity transport such as MARTA and establish a strategic petroleum reserve.

From 1978 to 1982, U.S. consumption of oil decreased by 19 percent. We had learned our lesson. But so had OPEC, who helped lull us back to sleep.

President Gerald Ford created the Energy Research and Development Administration (ERDA), who canceled efforts to provide full and accurate information to Americans about nuclear technology, de-emphasized efficient use of nuclear resources and requested the National Academies of Sciences and Engineering to undertake a comprehensive study of energy issues.

Major conclusions of this study were:

1. Nuclear materials, if used efficiently, are a virtually inexhaustible energy source. (Existing plants use less than 1% of the energy from nuclear materials.)

2. Coal is our most abundant fossil fuel.

3. The most critical near-term problem in energy supply for the United States is fluid fuels - oil and natural gas. World supplies of oil will be severely strained due to peaking of world oil production at the end of the twentieth century. World reserves of natural gas are comparable to those of oil. Next to demand-growth reduction, therefore, highest priority should be given to development of a coal-based synthetic fuels industry for liquids and gas.

4. The ecological damage per unit of energy produced is greater for hydroelectricity than for any other energy source.

5. Because of their higher economic costs, solar energy technologies other than hydroelectric power will probably not exceed a few percent in the near term unless there are massive government subsidies. The danger of such subsidies lies in the possibility that they may lock us into obsolete and expensive technologies with high materials and resource requirements, with their own adverse environmental impact.

A major effort of ERDA was to develop technology for liquefaction and gasification of coal to produce synthetic oil and gas.

President Jimmy Carter indefinitely deferred programs for efficient use of nuclear resources and created the Department of Energy. Development of technology for synthetic oil and gas continued, and development and subsidies for solar energy technologies were initiated.

President Ronald Reagan was elected on a platform to abolish the Department of Energy and resume programs for efficient use of nuclear resources but did neither. Development of technology for liquefaction and gasification of coal was discontinued, and subsidies were provided for oil exploration. No new deposit was found. Production of plutonium-238, which provides essential energy for instruments on missions into deep space, such as Galileo and Cassini at Planets Jupiter and Saturn, was discontinued. Legislation for permanent disposal of unreprocessed used nuclear fuel was enacted, which would preclude efficient use of existing nuclear resources and create geologic deposits of accessible weapons usable material. Oil companies abandoned nuclear ventures. Energy was deregulated, which has led to expanded use of natural gas to produce electricity and increased potential for abuses in energy markets.

Use of natural gas for virtually all new electricity generating capability has resulted in:

1. Tripling the cost of natural gas for heating homes
2. Shortages of electricity in California with resulting huge deficits
3. Noncompetitiveness of U.S. companies who use natural gas to produce chemicals and many other products that are vital to civilization. Sixty-five percent of U.S. chemical production depends on natural gas, compared with Europe's 15% and Asia-Pacific's 10%
4. Imports of liquified natural gas with global security and potential fire/explosion/terrorist challenges. Energy potential of highly flammable natural gas on an LNG ship is comparable to that of nuclear explosions at Hiroshima and Nagasaki during WWII
5. Likely further shortages and increased costs for home heating, electricity generation and chemical production.

U.S. consumption of oil increased by 30% during the past two decades, and continues to rise. Oil use in India and China is also rapidly increasing. The U.S., with 5 percent of the world's population, uses 20% of the world's oil. Most of it is imported. Trade deficits - indefinite transfer of wealth to other nations of hundreds of billions of dollars each year for oil - does not portend a viable economic future for Americans.

Former President Bill Clinton recently said that energy was our greatest challenge. He's right. In a letter to me President George W. Bush described US energy challenges as long-neglected. He's right too. But he then described programs and plans of the Department of Energy.

My reply points out that the Department of Energy was created in 1977 to address energy challenges, has spent about one-half trillion dollars but provided little of value and is unlikely to provide future value. The adverse impact from this neglect and other inappropriate actions greatly exceeds DOE's wasteful expenditures.

Most DOE problems result from government- laboratory management of complex technology, a management style identical to that of the former Soviet Union, whose leaders recognized almost thirty years ago that its organizational structure was a certain path to bankruptcy. Since America works through free enterprise, the DOE management style works against America's interests.

Chairmen and staff of the Senate Energy Committee, Vice Presidents Al Gore and Dick Cheney, and others expressed interest in or support for some of the following ideas for a better approach for resolving energy and nuclear challenges:

1. An independent, Presidential-appointed and Senate-confirmed US Energy and Nuclear Technology Board, carefully selected to reflect different views based on substantial knowledge and expertise. They would function in an open manner to ensure that energy and nuclear challenges are resolved with sound policies, programs and plans and Americans and their leaders are provided full and accurate information about these issues.

2. Focus on efficient use of nuclear energy resources and long term isolation of nuclear wastes from which weapons/energy materials have been removed for transmutation to preclude their use for weapons.

3. Competent corporations to build and operate needed facilities, including engineered or geologic repositories for nuclear waste that are colocated with nuclear fuel recycle centers.

4. Partnership interactions between workers and managers, and between regulators and those regulated for resolution of safety and other concerns

5. Full cooperation among nations and with the International Atomic Energy Agency for well-safeguarded, peaceful uses of nuclear technology, including reenactment and revitalization of President Eisenhower's vision of U.S. "Atoms for Peace."

I will conclude with a brief discussion of some energy issues.

Air lines are experiencing problems because of increased fuel costs. These problems will worsen with further increases in cost and diminishing supplies of petroleum. Air travel - and travel in private automobiles - are energy inefficient, and use our most precious, least abundant fuels.

Electric powered, high speed rail for both inter- and intracity travel is energy efficient, uses our most abundant fuels, avoids traffic and highway gridlock and is not usually impeded by weather.

Hydrogen does not exist in nature on Earth in a form usable for energy and must be produced by use of another energy source. The cost in both dollars and environmental impact of producing hydrogen will always be greater than the cost of direct use of the energy source. Hydrogen is particularly dangerous for domestic use because it burns with a colorless, virtually invisible flame. It is difficult to handle and has a very low energy density. An article in the May 2004 issue of *Scientific American* points out that hydrogen fuel cells cost about 100 times as much per BTU as internal combustion engines. The hydrogen economy is a myth.

Nuclear fusion is the energy of thermonuclear weapons and thermonuclear explosions in our Sun and other stars, occurs only at temperatures of many million degrees and releases enormous amounts of energy, including radiation. The only continuous thermonuclear energy that we know of is controlled - most of the time - by the enormous gravitational forces of stars. Neither materials that could contain thermonuclear reactions nor forces comparable to those on stars exist on Earth. There is no scientific basis to conclude that continuous thermonuclear reactions on Earth could ever provide usable energy.

California leads the nation in use of solar and wind energy and problems from energy shortages. Its good citizens replaced the 850-megawatt Rancho Seco Nuclear Power Plant with a two-megawatt solar electric plant. That's two megawatts at high noon on a clear day in late June, 10 to 20% average overall, none at night. Productivity of the Georgia Tech Aquatic Center's solar electric generators has averaged 11%.

Former House Speaker Newt Gingrich recently described tar sands and methane hydrate as abundant energy sources. Recovery of oil and methane from these sources and processing for beneficial use will require energy - perhaps more than is obtained from their use. For example, ten barrels of tar sands and large amounts of natural gas and other chemicals are required for one barrel of oil. The extent of these resources is conjecture and not proven.

Coal is our most abundant life-based fuel and will be needed, with other life-based or biomass fuels, for production of fluid fuels for defense, space exploration, transportation and production of chemicals and other essential materials.

Nuclear energy is the ultimate source of all energy. Radiation from decay of nuclear materials within the Earth keeps our planet warm and makes life here possible. Radiation from thermonuclear explosions in the Sun provides warmth during the day that partially offsets heat lost from Earth's surface at night. Nuclear materials in the Earth's crust and waters can meet energy needs for thousands of years.

All of the used fuel from all nuclear power plants operated in the U.S. could be stored on a football field in a stack less than 20 feet high. However, used fuel contains significant energy values that must be used, and highly radioactive wastes that must be isolated from the biosphere for a few hundred years to permit decay of radioactivity to harmless levels. This is not a difficult challenge.

Radiation is energy; high levels burn and are dangerous; low levels warm and are beneficial to health. Hundreds of billions of our tax dollars have been expended to protect us from non-existent dangers.

We are using bio-mass fuels, which include fossil fuels, at rates many thousands of times the rate they were produced or can be produced.

Energy for our children and grandchildren will require good direction and well-managed technology. Most important is recognition of need to drastically reduce all uses of energy, particularly oil and natural gas. It should have begun many years ago. It must begin now.

Enclosure 2

Success with Nuclear Technology vs. Sixty Years of Misinformation and Misdirection of America's Energy and Nuclear Programs

by Clinton Bastin, May 20, 2004

PROLOGUE

The New World, 1939/1946 (Volume I of the history of the US Atomic Energy Commission), by Richard G. Hewlett and Oscar E. Anderson, Jr.(1962), describes one of the greatest technological achievements ever, the Manhattan Project of the US Army Corps of Engineers during World War II. Success of this project was made possible by an understanding by project directors of the need for competent corporations to build and operate nuclear facilities; partnership type interactions among US Army Corps of Engineers officers, the corporations and laboratory scientists; and the fact that the first use of nuclear technology was by DuPont. DuPont's core values of safety, health and the environment, ethics and respect for people have been exceptional constants since the Company was formed more than 200 years ago. Its ability to select, adapt and develop ideas from scientists for first of a kind complex technology are unequaled. But this book also describes the disappointments of Manhattan Project scientists who believed that their accomplishments had earned them the right to carry the project through to completion and that they were capable of doing so.

History of DuPont at the Savannah River Plant, by William P. Bebbington (1990), describes the outstanding program for production of nuclear materials for strategic nuclear deterrence, space exploration, research and other important national programs for the US Atomic Energy Commission. DuPont at SRP also achieved best-ever safety for the AEC. Critical to the success at SRP were full corporate management by DuPont, identical to that provided for its commercial plants, and former Army Corps of Engineers officers who stayed with the US Atomic Energy Commission to direct nuclear materials production programs. They explained to President Harry S. Truman the outstanding achievement by DuPont for the Manhattan Project and critical need for DuPont for the expanded effort for the AEC. DuPont responded to President Truman's personal request because of its recognition of the national importance of the effort. Partnership type interactions among officials and staff of AEC Production Division, AEC Savannah River Office and DuPont, and among officials and staff of DuPont, Los Alamos Scientific Laboratory and AEC SRO for weapons programs, were also critical for success of the effort. Full corporate management by DuPont for SRP programs was unique for AEC activities.

General Electric Company and Westinghouse Electric Company carried out research at laboratories for US Navy Nuclear Programs, built nuclear propulsion plants for Navy ships and submarines, and built the first commercial nuclear power plants, which incorporated important design features of Navy nuclear propulsion plants. GE, Westinghouse and other US corporations built additional - and successively larger - nuclear power plants in the US and many other nations. The Institute of Nuclear Power Operations, formed by nuclear power plant operators in response to the accident at Three Mile Island, has been coordinating efforts by nuclear power plant operators in the U.S. for improved safety and performance through commitment to excellence - with great success. The World Association of Nuclear Operators, formed after the accident at Chernobyl, has been coordinating similar efforts for nuclear power plants throughout the world - with similar success.

Well-managed nuclear power is our safest, least polluting and potentially most abundant energy resource. But used nuclear fuel contains energy/weapons usable plutonium and highly radioactive fission products. Safeguards cannot be assured for the time period needed for full decay of plutonium. Nuclear power began in the U.S. with full understanding that plutonium would be separated from the fission products and transmuted by use as fuel in existing and advanced nuclear power plants. The fission products require isolation from the biosphere for several hundred years.

In 1957, DuPont was assigned responsibility for disposition of used fuel from nuclear power plants in the US and those in other nations supplied by US vendors. Facilities were built to receive and store used fuel, research and design effort was carried out to modify SRP facilities to permit partitioning of plutonium from fission products so that it could be transmuted in existing and advanced nuclear power plants, negotiations were carried out with nuclear power plant operators in the US and other nations for terms and conditions for acceptance of used fuel, and approvals were obtained from major ports on the US East Coast for import of used fuel.

Unfortunately, based on misinformation and misdirection, the AEC in 1962 supported use, licensing and export of a laboratory concept for reprocessing of used nuclear fuel. This led to failure of commercial reprocessing in the US, proliferation in India, proliferation threats and problems in other nations, loss of the success-based program for disposition of used fuel, and loss of credibility for nuclear power.

During its final year, the AEC reassigned responsibility to DuPont for commercial nuclear fuel recycle. Facilities were designed to meet best criteria for safe, well-safeguarded and proliferation resistant management of potentially weapons usable materials and disposal of nuclear wastes.

Unfortunately, when AEC programs were transferred to the Energy Research and Development Administration, new leaders transferred responsibility back to laboratories and set aside most former Army Corps of Engineers officers experienced in direction of successful nuclear programs.

The DOE determined that used fuel should be disposed of without reprocessing, but did not address the issue that this would create geologic deposits of weapons usable material that would be accessible for diversion by future populations or terrorists and thus would not be a responsible action.

A moratorium on new nuclear power plants has existed in the US since 1974 because of lack of responsible programs for disposition of used fuel, transmutation of by-product weapons usable material, and permanent disposal of radioactive wastes. Yucca Mountain in Nevada is appropriate for isolation of radioactive wastes, but does not address the issue of partitioning and transmutation of plutonium and other potentially weapons usable materials, or the need for more efficient use of nuclear energy resources. Failure of the DOE to provide full and accurate information to Americans about clean, safe and abundant nuclear power is also a major reason for the moratorium.

MISINFORMATION AND MISDIRECTION BY THE DEPARTMENT OF ENERGY AND PREDECESSOR AGENCIES

Following are examples of misinformation and misdirection by the DOE and predecessor agencies, and recommendation for corrective actions:

1. In 1944, after completion of experiments by DuPont in the Clinton Reactor and Reprocessing Pilot Plant at Oak Ridge, TN, Manhattan Project Director Leslie Groves approved a "productivity" run in this facility to be operated by Clinton Laboratory scientists. According to Oak Ridge National Laboratory officials documented in the 1995 report of the history of the ORNL Chemical Technology Division, the "first kilograms of plutonium for atom bombs were produced in the year long run in the pilot plant." This showed, as Director Alvin Weinberg would later explain to those at ORNL, "national laboratories could carry out projects that were beyond the capability of US corporations." The amount actually recovered was not several kilograms but about 300 grams.

2. Based on claimed high productivity of the pilot plant, the AEC selected ORNL to build and direct startup operation of the Idaho Chemical Processing Plant to reprocess all highly enriched uranium, including that for production of tritium for nuclear deterrence. ICPP failure threatened completion of nuclear deterrence, but successful modification and operation of a reprocessing plant by DuPont at the Savannah River Plant to reprocess HEU fuels resolved the problem.

The proper role of government laboratories is basic research, not selection of research for further development or use in safe, sustained operations. DOE and predecessor agencies' reliance on laboratories for activities beyond their proper role is a major reason for failures, weapons proliferation, wasteful expenditures, adverse impact on America's economy and other problems.

3. Statements that commercial used fuels could be reprocessed for $17.30 per KgHM were made in the report WASH 743, issued in 1957 by the AEC Division of Civilian Applications. The report was prepared by ORNL Chemical Technology Division; costs were based on stated "successful experience at 80% productivity in the ORNL built Idaho Chemical Processing Plant." Actual ICPP productivity was about 3% and there were other problems.

Acceptance of misinformation in this report led not only to cancellation of the AEC success-based program for receipt, storage and reprocessing of used nuclear power plant fuels and support for the destined-to-failure reprocessing venture of NFS; but also to the supply of reprocessing technology for the production of unsafeguarded weapons grade plutonium in India and similar capability in other nations.

4. The WASH 743 report addressed used fuels from "Generation 1" reactors that were supported by the AEC Division of Reactor Development during the late 1950s and early 1960s. These reactors were of essentially no value for nuclear power. Some failed only a few days after startup and gave nuclear power its first loss of credibility.

5. In 1954, USAEC Chairman Lewis Strauss made a prediction that electricity would be available from nuclear fusion that would be too cheap to meter. India AEC Chairman Homi Bhaba made a prediction that energy from fusion would be available within twenty years. More recently, US scientists have predicted that fusion energy would be available with fifty years. Nuclear fusion, the energy source for stars and thermonuclear weapons, occurs on a continuing basis only at the center of stars, at temperatures of many millions of degrees. This energy is contained - most of the time - by the enormous forces of gravity of stars. Comparable forces are not attainable on Earth. There is no scientific basis for a conclusion that fusion energy on Earth will ever supply energy needs.

6. In 1967 the US General Accounting Office conducted a review of nuclear waste management practices at USAEC sites. Staff of the Atlanta GAO office spent all summer at the Savannah River Plant in a thorough review, found and reported to SR AEC officials some minor problems that were corrected, and in a closeout meeting made several remarks commending SRP nuclear waste management practices. But the report issued by the GAO headquarters office described several dangers associated with SRP practices that did not exist. The false information in the report had been provided by AEC headquarters personnel. The GAO Atlanta Office Director apologized to the AEC SR Office Manager. SR AEC and DuPont staff attempted to make corrections in the AEC report, but were only partially successful. The false information has led to wasteful expenditures to address non-existing dangers, and Americans that are misinformed about dangers of nuclear wastes.

7. The AEC report and statements in 1968 that High Temperature Gas-cooled Reactor fuel could be reprocessed commercially in a facility costing about $100 million, and that an AEC demonstration of HTGR fuel reprocessing would be done at ICPP with modifications that would cost $1 million resulted in an investment of $500 million by Gulf and Shell Oil Companies (then major owners of General Atomics) for commercializing HTGRs. All of the investment was lost when careful assessments led to recognition that cost for facility modifications for demonstration would be not $1 million but $300 million, and cost of a commercial HTGR fuel reprocessing facility would be not $100 million but at least $800 million.

During this same time period, exaggerations of ICPP productivity by a factor of five led to investments by Gulf and Shell Oil Companies and Allied Chemical Company of $240 million for the Barnwell reprocessing plant, which was based largely on the ORNL/ICPP design.

A credible accident mentioned in the Barnwell Safety Analysis Report would have released more than a hundred times the amount of highly radioactive cesium released at Chernobyl, from radioactive wastes stored at concentrations hundreds of times those at DOE facilities.

This misinformation led not only to problems as indicated, but also to loss of credibility of nuclear power with Gulf and Shell Oil Companies. Atlantic Richfield, Exxon, Getty, Phillips Petroleum, and other competent American corporations had similar experiences, and their earlier enthusiasm for nuclear fission technology has disappeared. Shell's brochures emphasize no involvement in nuclear.

8. Maximum allowable radiation exposure to workers is 5 REM per year, which is one-fifth of 25 REM, the minimum threshold level between beneficial and possible adverse health effects. In 1962, AEC policies were changed to require "radiation exposures as low as reasonably achievable." AEC managers and staff were told that there was no technical basis for this, that the standard of 5 REM per year would remain, and that operations and programs would not be changed. This action led to acceptance of false information that low levels of radiation were dangerous.

9. In 1975, ERDA officials cancelled the nuclear fuel cycle program developed by the AEC during its final year based on lessons learned from successes and failures, in order to support development and planned demonstration by ORNL of a reprocessing concept using a research-type maintenance system used by ANL at Idaho. The ORNL development was cancelled after expenditure of several hundred million dollars. The DOE then decided to support development and planned demonstration by ANL of its research-type maintenance system of an alternative fuel cycle process that was claimed to be proliferation resistant but was not.

10. The Oak Ridge Gaseous Diffusion Plant spent billions of dollars for gas centrifuge development for uranium enrichment, Boeing spent more for commercialization, but then DOE said no, let's develop lasers for uranium enrichment. Other nations have deployed centrifuges which have much greater energy efficiency than gaseous diffusion, and the U.S. will some day, forty years late.

11. The August/September 1988 issue of *Technology Review*, publication of the Massachusetts Institute of Technology, contained the article "Radioactive Waste: Hidden Legacy of the Arms Race" by two anti-nuclear extremists, Robert Alvarez and Arjun Makhijani. This article made false claims of great dangers, including a Chernobyl-scale accident from hydrogen in waste tanks at DOE sites. A similar article "Nuclear Waste: The $100-Billion Mess" by the same authors and with the same false and inflammatory allegations, was the entire first page of the "Outlook" section of the September 4, 1988, issue of *The Washington Post*. *The Post* article included the statement that it was an excerpt from the MIT publication, giving it special credibility.

The DOE had a report from DuPont which refuted all allegations of dangers, and could have corrected the misinformation but did not. My letter to the editor of both publications with correcting information from the DuPont report and my own experiences was published in *Technology Review*. The Editor-in-Chief admitted at a meeting of the Washington, D.C. MIT Alumni Association that the article was a serious mistake. *The Washington Post* did not publish any correcting information.

Mr. Alvarez joined the staff of the Senate Governmental Affairs Committee in 1989, worked with staff of the Office of Technology Assessment to develop justification for spending hundreds of billions of dollars for "Cleanup of Nuclear Waste," and in 1993 joined the DOE as a Deputy Assistant Secretary for Environmental Restoration and National Security Policy. Shortly after Mr. Alvarez's arrival at DOE, the cost estimate for "Cleanup of nuclear waste" was raised to $400 Billion.

More than sixty billion dollars have been spent by DOE on "Nuclear Waste Cleanup" since publication of the false and misleading information in *Technology Review* and *The Washington Post* in 1988. Many billions of dollars have been spent on radioactive waste management and monitoring at Hanford since 1967. Some of the work has compromised the integrity of the stable waste configuration in old tanks and in the soil; little of value has been accomplished. All of the work has resulted in more radiation exposure and more dangers to humans than if the work were not done.

Former Energy Deputy Secretary Bill White started our initial partnership meeting in July 1994 by recalling a thought he had while on the speakers' platform for ceremonies of the completion of a multimillion dollar mill tailings removal project at Grand Junction, Colorado. He asked if the pile was a hazard where it had been, why was it not also at the new site - and if it was not a hazard, why was it moved? We both knew that the only justification for removal was jobs, promotion, power and prestige for DOE managers and staff, and profits for dirt moving companies.

12. The need for a new reactor for production of medical isotopes, plutonium-238 for space exploration and tritium to maintain the strategic nuclear deterrent has been recognized for more than twenty years. A major effort was lost during the Administration of President George H. Bush because DOE did not consider in its Environmental Impact Statement the difference in productivity and thus environmental impact of the different reactor types. The DOE then decided to use accelerators for tritium production and ignored other needs, and later decided that accelerators would not be efficient. The final decision to use commercial nuclear power plants to produce tritium was a major compromise of good and long-standing nonproliferation practice of the US and other nations. There is no capability to produce plutonium-238 for space exploration and other nuclear materials for important national programs.

13. The Fast Flux Test Facility at Hanford, which was needed for a demonstration on an engineering scale of passive safety features of Argonne National Laboratory's Experimental Breeder Reactor-II, was shut down and scheduled for termination in order to support the ANL fuel cycle process that was claimed to be proliferation-resistant but was not.

14. The American Nuclear Society "Blue Ribbon Committee on Nonproliferation" of the Special Committee on Nonproliferation, recommended major emphasis on ANL's electrorefining process that was claimed to be proliferation resistant but was not. The electrorefining process was initially developed to recover very pure plutonium from scrap. One of the claims was that electrorefining could not be used to produce plutonium pure enough for a nuclear weapon.

15. The note of my telephone conversation with Glenn Seaborg in April 1997 discusses the success-based program for production and processing of transcalifornium elements at the Savannah River Plant while he was Chairman of the US Atomic Energy Commission, and the claims by scientists at Lawrence Berkeley National Laboratory of production of these elements by accelerators. The SRP program was subsequently cancelled by AEC Chairman James Schlesinger, and claims of LBNL scientists were later discovered to be false.

16. At the ANS meeting in New Orleans in November 2003, DOE-NE provided its report "Understanding Radiation," which says "the major effect (to humans of low level radiation) is a very slight increase in cancer risk." There is no scientific basis for this statement. Quite the contrary, there is a significant amount of scientific data indicating benefit to human health from exposure to low levels of radiation. For many years organizations within DOE and its predecessor agencies have supported false claims of dangers to support programs that could lead to jobs, promotions, power and prestige - and increased cost and loss of credibility for virtually everything nuclear.

17. President Dwight D. Eisenhower's December 1953 vision of "U.S. Atoms for Peace" was magnificent. Its implementation by the AEC was not. Weapons grade plutonium production technology and facilities were supplied to India which resulted in weapons proliferation; laboratory-type reprocessing technology was supplied to many nations which led to proliferation threats and other problems; and weapons usable highly enriched uranium (HEU) was supplied to many nations and is a continuing problem.

Many Americans are aware of the problems from AEC implementation of Atoms for Peace, but not aware that well designed and well-managed nuclear power plants form the basis for the international safeguards regime, which is essential to limit proliferation. They are also not aware that proper implementation of US Atoms for Peace would have resulted in much less proliferation, proliferation threats, and problems between and among nations.

The Nuclear Non-Proliferation Act of 1978 cancelled the U.S. Atoms for Peace policy and precluded success of the U.S. nonproliferation initiative with the Government of India.

Review of experiences with US Atoms for Peace for lessons learned, and application of those lessons for future policies, plans and programs, will reduce proliferation and proliferation threats. Unfocused applied research by DOE and its laboratories will be of no value and will likely mislead.

18. Responsible disposition of used nuclear fuel and disposal of nuclear wastes are imperative for viable nuclear power, but there has been no responsible program, plan or policy for such effort since 1975. At the ANS Winter meeting in November 2003, there were three major proposals for disposition of used fuel: (1) The MIT proposal, prepared by the architects of the policies of former President Jimmy Carter, to create geologic deposits of weapons usable material that would be accessible for use or diversion by future populations or terrorists; (2) The DOE proposal for another unevaluated laboratory; and (3) The Georgia Tech paper to partition and transmute potentially weapons usable materials in used fuel to preclude their use for weapons, based on criteria lessons learned from evaluations of fuel recycle successes and failures.. Prominent publicity was provided for the MIT and DOE proposals, but not for the Georgia Tech proposal.

19. U.S. intelligence and national security agencies rely on the DOE and its national laboratories for assistance in analyzing nuclear information for proliferation threat assessment and nonproliferation initiatives. Such assistance was flawed for the U.S. nonproliferation initiative with India from mid-1974 until late-1977, and for the proliferation threat assessment of Pakistan in 1982. Early CIA estimates of the number of nuclear weapons (if any) in North Korea are based on DOE laboratory estimates of plutonium produced in North Korea's nuclear power plant and are probably high.

20. The DOE's National Renewable Energy Laboratory does not provide full and accurate information to Americans about limitations of renewable energy technologies. For example, time operating efficiency of solar electricity generation is limited to 10 to 20%; wind energy is available at only certain locations and is limited to about 30% to 40%.

21. During the administration of President George H. Bush, Energy Secretary James Watkins wanted to support nuclear power. But the DOE National Energy Plan submitted to the White House proposed expanded use of hydropower, the most ecologically damaging of any energy resource. The proposal was rejected by the White House.

22. Hydrogen does not exist naturally on Earth in a form usable for energy, but must be produced from other energy sources at monetary and environmental costs greater than direct use of the other energy source. It is difficult to handle, has a low energy density and is particularly dangerous because a flame from a small or moderate leak would be difficult to see. Hydrogen fuel cells are much more expensive than internal combustion engines. Hydrogen is important as a chemical for processing of high carbon chemicals for use as fluid fuels, but is unlikely to be used as a significant fluid fuel.

CONCLUSIONS AND RECOMMENDATIONS

1. The great benefits of nuclear technology were provided by competent, experienced corporations. National laboratory scientists made important contributions to achieve these benefits through basic research that was selected by these corporations for further development and use.

2. Failures, proliferation and other problems resulted from laboratories attempting to manage major projects or programs, government officials attempting to manage projects based on laboratory research, and corporations inexperienced in the technology accepting research results or other information from laboratory or government officials without competent review. In some cases secrecy precluded access by corporations to data needed for an accurate assessment.

3. Applied research by national laboratories almost always leads to wasteful, expenditures, failures and other problems unless the research is kept in focus through competent review by engineering managers of competent, experienced corporations.

4. Date for intelligence analysis from national laboratories is often based on concepts and not experience. This has resulted in inaccurate threat assessments and flawed nonproliferation efforts.

5. Operation of production-type nuclear facilities by laboratory or development personnel and organizations is inappropriate and results in safety and other problems.

6. The DOE has dismissed virtually all corporations that provided past successes and relies almost exclusively on national laboratories and support contractors to manage complex nuclear and energy technology, under direction of government officials. The system of laboratories reporting to government officials is identical to that of the former Soviet Union. Other nations, including Britain, Canada, France and Japan created corporations to manage complex energy and nuclear technology. These nations have separate commissions, authorities or boards who ensure that policies programs and plans are based on national need and sound science, technology and management principles.

7. The DOE was created in 1977 to address major energy, environmental, economic and national security challenges to the US resulting from overuse of fossil fuels and overdependence on fuels from other nations. It has spent more than one-half trillion dollars but has provided little of value and future value is unlikely. The negative impact on the US economy is many times the amount of money spent.

8. An independent, Presidential-appointed and Senate-confirmed US Energy and Nuclear Technology Board, carefully selected to reflect different views based on substantial knowledge and expertise and who would function in an open manner, could help avoid these and other problems, and ensure that Americans and their leaders are provided full and accurate information about energy and nuclear technology issues and their environmental, economic and national security consequences.

9. Nuclear power is our safest, least polluting, most reliable and potentially most abundant energy resource. But appropriate partitioning and transmutation of weapons usable material in used nuclear fuel is essential for full use of nuclear resources and disposal of nuclear wastes. Partitioning integrated with fuel refabrication should be done only in well-safeguarded, well-designed and well-managed fuel cycle centers in nations with large nuclear power programs or in regional (multinational) fuel cycle centers.

10. With inability of the world to meet increasing demands for oil, nuclear power will be needed worldwide. Legislation for President Dwight D. Eisenhower's "Atoms for Peace" should be enacted and international safeguards should be strengthened. considered.

Clinton Bastin - May 14, 2005
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Enclosure 3

Biographical Sketch of Clinton Bastin, Including Lessons Learned from Experiences

Clinton Bastin is listed in Who's Who in Engineering - Ninth Edition, and is Vice President of the World Council of Nuclear Workers, a signer of the Eagle Alliance[1], Vice-Chair/Chair Elect of the Georgia Section of the American Nuclear Society and President of the Kiwanis Club of Northlake Golden K in Decatur, GA. He writes and talks to community groups and others about energy, the environment, national and global security aspects of nuclear technology and materials, and improved interactions between humans through partnerships. Mr. Bastin worked for the US Department of Energy and predecessor agencies for more than 40 years in roles ranging from manager for nuclear programs, leader for U.S. nuclear nonproliferation initiatives, coordinator for collaborative nuclear research and technology exchange with other nations, to lead technical consultant to US national security agencies on nuclear proliferation threats. He worked as a fire protection engineer for South-Eastern Underwriters Association in Atlanta, GA, prior to work in nuclear programs for the U.S. Government.

At retirement in March 1997 he received the DOE's Distinguished Career Service Award recognizing him as "the U.S. authority on reprocessing; an advocate and initiator of total quality management and partnering agreements; and, as President of the Employees' Union, selflessly ensuring the recognition and rights of DOE's greatest resources, its people." He also received a note from Energy Secretary Hazel O'Leary stating "Thanks for the wonderful and productive partnership," and messages from leaders of the Russian Ministry for Atomic Energy and Russian Nuclear Workers Union informing him that they had adopted his ideas for their plan to improve safety for nuclear activities through partnerships. He was invited to address delegates to the first national convention of the 900,000-member Nuclear Workers Union, and delegates voted to adopt the plan.

Mr. Bastin's lead responsibilities, experiences and lessons learned from those experiences with the DOE and predecessor agencies included:

- Supply of the first US "Atoms for Peace" - heavy water for the "CIRUS" reactor in India, 1956 (This reactor, supplied by Canada, and a laboratory type reprocessing plant supplied by the Oak Ridge National Laboratory, were the source of plutonium for India's nuclear explosive in 1974. Details of this and other US-India nuclear interactions are described in Mr. Bastin's letter of June 12, 1998 to Naresh Chandra, Ambassador of India to the United States, and the responses by Mr. Chandra and the US National Security Council on behalf of President Clinton)
- Initial Atomic Energy Commission (AEC) quality assurance program for tritium components for nuclear weapons at the AEC Savannah River Plant (SRP), 1957-1958
- Participant in a summer seminar on nuclear fuel reprocessing for chemical engineering professors at the AEC Hanford Site, 1958 (Study assignment was on paths in the ground of radioactive wastes leaking from waste tanks and disposed of in cribs and swamps. During the 1950s, Hanford managers determined that permanent disposal of radioactive waste in the ground at Hanford was appropriate. Mr. Bastin did not agree with that decision, but his and other studies confirmed the technical basis for the Hanford decision to commit the site as a permanent repository.

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[1]The Eagle Alliance is a declaration by representatives of organizations who have worked to develop peaceful uses of nuclear technology of their belief that nuclear science and technology are proper, safe and essential elements of advanced civilizations, and their commitment to preserve, enhance and fully utilize nuclear technology for the benefit of humanity.

He learned that Hanford PUREX reprocessing plant problems resulted from close coupling of solvent extraction process equipment, which resulted in long time to reach productive operation after any shutdown. Problems were "resolved" by continuing to operate with failed equipment which required disposal of large amounts of radioactive waste to the ground. He also learned of concerns of General Electric Company senior executives that unlike DuPont at the SRP, GE was not funded by the AEC for corporate management of Hanford operations. Decisions for disposal of radioactive wastes to ground were made without full review of GE corporate officials. Also, GE corporate managers did not have full opportunity to learn lessons from Hanford experiences, such as the difficulties from close coupling of process steps in reprocessing. As a consequence, GE made this same mistake at its Midwest Fuel Recovery (commercial fuel reprocessing) Plant (MFRP) in Illinois. Close coupling, and the resulting long time for productive operations, were identified in the GE corporate review as one of several reasons for MFRP failure)

- Initial program for disposition of used fuel from nuclear power plants in the US and abroad, including shipping cask criteria development, 1959-1962 (Cancellation of this program and implementation of a laboratory concept for reprocessing led to proliferation in India, proliferation threats in other nations, reprocessing failures in the US and serious problems elsewhere.)
- First production and subsequent processing of plutonium-238, which provides reliable power for instruments for missions into deep space such as Voyager, Galileo and Cassini, 1961-1972 (Initial reprocessing of irradiated neptunium for plutonium recovery was in hot cells of the Savannah River Laboratory. Despite high priority, this operation was discontinued because of safety concerns, prior to availability of a separate reprocessing facility installed in "H" Canyon. The initial experience demonstrated problems inherent in use of development facilities and staff for a production mission. The criticality accident in Japan in 1999 was in a development facility used for a production mission. **Note:** The DOE discontinued production of plutonium-238 in 1983)
- Receipt of the first shipment of spent fuel returned to the US from abroad, at Savannah, GA, port facilities, 1964 (There was no adverse publicity for this receipt or subsequent transshipment to AEC facilities in Idaho and there were no problems. There have been no problems with similar shipments throughout the world, except those resulting from a misunderstanding by Americans of the safety of such shipments)
- Chemical processing and nuclear waste management programs at the SRP, including studies for waste disposal, 1962-1972 (These facilities were the most comprehensive, diverse and successful in the world and part of a complex that set AEC and DOE best ever safety records)
- Processing and supply of americium, californium, curium, deuterium, heavy water, plutonium, uranium, and other isotopes for research, test, space exploration, and other programs throughout the US and to other nations, including supply of heavy water for the Georgia Tech and MIT research reactors, 1955-1972 (Duties included responsibility for transportation of materials supplied. There was never an accident of these shipments that released radioactive materials)
- Technical program manager for reprocessing at SRP of spent fuel from Canadian NRX reactor to recover plutonium for US nuclear weapons, under a mutual security agreement between the US and Canada, 1964-1970 (NRX was the model for India's CIRUS reactor.)

- Receipt at the Charleston Navy Yard and disposition at SRP of plutonium contaminated debris from the US Air Force nuclear weapons' accident at Palomares, Spain, including interviews by news media at the Navy Yard and at the SRP, 1966 (There was extensive news coverage of this accident and return of debris to the U.S., and concern that there would be adverse publicity about its receipt at Charleston and transhipment to and disposal at the SRP, but there was not.)
- Disposition of plutonium contaminated debris from US Air Force nuclear weapons' accident at Thule, Greenland, 1968 (Despite the lack of adverse publicity associated with receipt in the US and disposal at SRP of plutonium contaminated debris that were fully open to the public and the news media, decisions were made by senior AEC managers that receipt in the U.S. and transhipment and disposal at SRP would not be open to the public. This was a mistake, made as a result of false information about the dangers of plutonium, and concerns about public fears
- Participant with DuPont Company design engineering and corporate managers in monthly design reviews for construction and major equipment projects for chemical processing, nuclear waste, and tritium programs at SRP, 1964-1972 (This experience led to appreciation of the importance of competent corporate management for complex technology and early involvement and integration of design engineering and experienced operations staffs with research and development for complex technology. Lack of competent corporate management and failure to ensure this type integration and involvement resulted in failed programs and flawed US policies)
- USAEC technical contact for US commercial reprocessing activities, US coordinator for reprocessing technology exchange with the United Kingdom and host for visits of reprocessing authorities of other nations, 1962-1975 (These experiences led to an early understanding of commercial reprocessing problems in the U.S. and other nations, and vision for commercial fuel recycle based on successful experience.
- Tritium production and processing and all nuclear weapons' activities at SRP, 1962-1970
- Development of gas centrifuge for separations of plutonium isotopes, and member of the AEC Steering Committee for Gas Centrifuge Development, 1968-1972
- Participant in team for briefing of Nova Scotia's Premier about the Glace Bay, NS, heavy water plant failure, 1969 (This failure, which resulted from Canada's reliance on the discoverer of the heavy water production process as chief executive officer for the heavy water production activity, jeopardized Canada's nuclear power program. AEC supply of heavy water, and major assistance by DuPont at SRP for subsequent plants, were crucial in resolving the problem)
- Team leader for AEC plutonium facilities' safety review after major fire at Rocky Flats, 1970
- AEC Central Scrap Manager for mixed plutonium-uranium, 1970-1972 (Plutonium was recovered from scrap at SRP by dissolution and processing in the large, remotely operated and maintained reprocessing plants, which was the major reason for unique success at SRP in avoiding accumulations of plutonium scrap)
- Lead consultant to US national security agencies on nuclear proliferation threats, 1972- 1982
- Technical leader for efforts by the AEC to resolve reprocessing and nuclear waste management problems in government and commercial sectors by assistance from those with successful experience and focus on building on that experience, 1972-1975 (The effort was canceled by leaders of ERDA and DOE to support unevaluated ideas of scientists and engineers that had little understanding of the complexities of reprocessing. The design integration studies by DuPont were allowed to continue, were completed in 1978, provided a sound basis for proliferation-resistant fuel recycle and resolution and avoidance of many problems, but were rejected by DOE nuclear program leaders and not provided to political leaders

- After major leak in waste tank at AEC Hanford site, assigned lead headquarters responsibility for all AEC reprocessing and waste management programs, 1973-1974
- Identified major problems at the Idaho Chemical Processing Plant (ICPP), discussed those problems with senior executives of Allied Chemical Company (ICPP contractor) and the AEC, and made arrangements with experienced reprocessing personnel from another AEC site for assistance in attempts to resolve problems, 1972-1974 (One of the problems identified was overstating ICPP productivity by a factor of five.)
- Advised senior AEC officials that the ICPP was the model for the commercial reprocessing plant under construction at Barnwell, S.C., and that Allied Chemical Company and General Atomics Corporation (partners for the Barnwell plant) were not aware of problems, including overstating of productivity, when they made decisions to build the plant, 1974
- Provided detailed information to AEC Hanford Operations Office General Counsel staff about radioactive waste and reprocessing experience at the Hanford site, 1974 (This was followed by an AEC decision to settle a lawsuit by the Natural Resources Defense Council. AEC agreed not to restart the PUREX reprocessing plant, which could not be operated without gross releases of radioactivity to the ground (a violation of AEC regulations) unless multi hundred million dollar modifications were made)
- Leader of AEC task force that recommended advanced reactor fuel cycle development include focus on successful experience, 1974, and participant in AEC team that met with the Edison Electric Institute Nuclear Fuel Cycle Committee who supported a success-based program
- Identified to AEC High Temperature Gas-cooled Reactor (HTGR) program manager major problems with ICPP plans for demonstration of HTGR reprocessing technology, and to General Atomics Corporation (GAC) that cost of the AEC reprocessing plant model being relied on for HTGR commercialization was underestimated by a factor of ten, 1974 (After task force review, plans for demonstration were canceled, and GAC abandoned plans for HTGR commercialization)
- Provided AEC direction for the first joint ERDA/nuclear power industry survey of potential spent fuel storage problems and report "ERDA-25" of survey results, 1975
- Lead technical consultant to International Atomic Energy Agency for its studies of Regional Nuclear Fuel Cycle Centres, a non-proliferation initiative of the United States, 1976
- Technical leader for the US non-proliferation initiative with India, 1977-1978 (Technical effort was successful because information was supplied to Chairman of India's Atomic Energy Commission of technical problems with the reprocessing pilot plant concept planned for use by India for commercial fuel reprocessing)
- Under assignment to the DOE Office of Non-proliferation, provided direction for a study and report for the US Department of State for disposition of spent fuel of US origin from the two US supplied light water reactors at Tarapur, India, 1979 (This report was to be used as a briefing paper for President Jimmy Carter in negotiations with India Prime Minister Morajai Desai, but Mr. Desai was replaced by Ms. Indira Gandhi prior to completion of the study.)
- Briefings and other information for Central Intelligence and National Security Agency staffs and others on reprocessing programs throughout the world and their viability, 1968-1996

- Assigned by DOE as "teacher" of reprocessing and related radioactive waste management issues to Luther J. Carter, an environmental author whose book, *Nuclear Imperatives and Public Trust (Dealing with Radioactive Wastes)*, led to focus on Yucca Mountain for permanent disposal of unreprocessed commercial spent nuclear fuel, 1981-1986 (Near the end of this period it became apparent that Mr. Carter was being heavily influenced by plans in Sweden for permanent disposal of spent fuel, and by others with little understanding of the complexities of reprocessing. Major disagreement with Mr. Carter is documented in Mr. Bastin's letter in the Summer 1994 issue of *Issues in Science and Technology*)
- DOE headquarters program manager for the Fast Flux Test Facility, 1978 and 1989 (During the latter period, preparations were underway for engineering-scale demonstration in FFTF of advantages of metal fuel identified by Argonne National Laboratory at the EBR-II. The demonstration was canceled to use the FFTF for other purposes, which were never realized)
- Principle US Coordinator for collaborative nuclear fuel recycle development with Japan Power Reactor and Nuclear Fuel Development Corporation (PNC), 1982-1994 (PNC was the Government corporation that built and for many years operated the fuel cycle development complex at Tokai Mura, Japan, site of the criticality accident in 1999. The development facility where the accident occurred was being operated in a production mode, compromise of an important quality principle)
- Technical Program Manager for University and Small Business Innovation Research for robotics systems and advanced nuclear fuel recycle, 1984-1992
- Member of the Office of Nuclear Energy team that reviewed Challenger Space Shuttle accident for lessons learned, 1986 (Response by launch managers to engineers' warnings of dangers of launch under cold weather conditions could have avoided the accident. This experience was discussed in Mr. Bastin's April 1996 address in Moscow about the importance to safety of employees empowered for input on safety concerns through partnerships with managers.)
- Met with engineers from the Kurchatov (Reactor Design) Institute in Moscow who had complained to Soviet authorities about potential dangers of the Chernobyl Nuclear Power Plant design, had lost their job because they complained and were forced to defect to the United States, leaving their families behind, May 1986 (This information was featured in the address in Moscow, see above)
- Member of faculty for seminars on nuclear technology for future flag officers at the Industrial War College of the US Armed Forces, 1988, and for nuclear journalists at the Knight School of Journalism at the University of Maryland, 1989 (Future Admirals and Generals demonstrated a very strong interest in nuclear technology, particularly for the nuclear fuel cycle. Journalists demonstrated virtually no interest in information provided by experienced nuclear professionals, strong interest in false and inflammatory information provided by nuclear extremists, and displeasure to nuclear professionals that tried to clarify false information)
- Developed criteria for evaluation of a planned demonstration of "proliferation resistant" nuclear fuel cycle technology, 1991 (A review of demonstration plans showed that the process ideas as configured could not meet reasonable criteria for a commercial nuclear fuel cycle)
- President of the Federal Employees Union representing DOE headquarters employees and editor of its award-winning newsletter, 1983-1996

- During a visit to Chernobyl, learned from the widow of one of the firefighters that no information about potential dangers had been provided to plant operators, 1996 (This information was featured in his April 1997 address to leaders of the Russian Nuclear Workers Union at their first national convention, during which they voted to adopt plans for worker-manager partnerships)

Mr. Bastin's published papers include:

- "Nuclear Fission: Doomsday or Dream" (Chambersburg, Pennsylvania, Torch Club International runner up award for best paper of 1986)
- "Importance of Labor-Management Partnerships to Safe Operation of Nuclear Power Plants and Nuclear Facilities" (Keynote address to International Conference of Nuclear Workers Unions on Nuclear Safety, on tenth anniversary of the Chernobyl accident, Moscow, 1996)
- "Workers and Managers as Partners in Nuclear Programs - an Essential Key to the Future Greatness of Russia" (Moscow, 1997)
- "United States Nuclear Technology - Need for a New Approach" (Miami, 1996) (Copies of this paper were provided to President Bill Clinton, Vice President Al Gore and Senators Pete Domenici and Frank Murkowski. President Clinton's response was complimentary, Vice President Gore said that the ideas would be considered and some were adopted, and in a later Global Foundation Conference in Washington, DC, NRC Commissioner Nils Diaz said that Senators Domenici and Murkowski supported a "New Approach" for US nuclear technology)
- "Principles of Quality for Nuclear Technology: Essential for Sustainable Energy in a Clean Environment" (Washington, D.C., 1997)
- "Nuclear Technology: Need for New Vision" (Washington, D.C., 1999)
- Letter in MIT's *Technology Review*, April 1989, refuting false allegations of great danger of DOE stored radioactive wastes. (The allegations were made in articles by Robert Alvarez and Arjun Makhijani in *Technology Review*, August-September 1988 and *The Washington Post*, September 4, 1988, and led to wasteful expenditures by DOE of scores of billions of dollars.)
- Letter in *Issues in Science and Technology*, Summer 1994, which points out that permanent disposal of unreprocessed spent fuel would be irresponsible Deputy Energy Secretary Bill White sent a note agreeing with the statement and requesting a meeting, which led to a partnership and subsequently a partnership with Secretary Hazel O'Leary and other senior DOE officials
- Letter in *Science*, August 18, 2000, which explains why reprocessing and fast reactor operation are essential for best nuclear non-proliferation practice, responsible programs for disposal of nuclear wastes and efficient use of nuclear resources. This letter also points out that DOE leaders in the late 1970s and early 1980s rejected DuPont facility designs based on best technology that would have assured meeting these objectives and resolving major problems.
- "Criteria for Partitioning and Transmutation of the Fissionable Material Byproducts of Nuclear Power," co-authored with Daniel W. Tedder, Assoc Professor of Chemical and Biochemical Engineering at Georgia Tech, presented at the American Nuclear Society Winter Meeting on November 17, 2003, and published in the proceedings of the meeting.

Clinton Bastin served in the US Marine Corps during World War II and graduated as a Chemical Engineer from the Georgia Institute of Technology in 1950. He lives in Avondale Estates, GA with his wife Barbara; they have two sons, two daughters, one grandson and a cat named "Moe."

May 30, 2005