Chapter 4

CLASSIFICATION UNDER THE ATOMIC ENERGY ACT

INTRODUCTION

The Atomic Energy Act of 1946 was the first and, other than its successor, the Atomic Energy Act of 1954, to date the only U.S. statute to establish a program to restrict the dissemination of information. This Act transferred control of all aspects of atomic (nuclear) energy from the Army, which had managed the government's World War II Manhattan Project to produce atomic bombs, to a five-member civilian Atomic Energy Commission (AEC). These new types of bombs, of awesome power, had been developed under stringent secrecy and security conditions. Congress, in enacting the 1946 Atomic Energy Act, continued the Manhattan Project's comprehensive, rigid controls on U.S. information about atomic bombs and other aspects of atomic energy. That Atomic Energy Act designated the atomic energy information to be protected as "Restricted Data" and defined that data. Two types of atomic energy information were defined by the Atomic Energy Act of 1954, Restricted Data (RD) and a type that was subsequently termed Formerly Restricted Data (FRD).

Before discussing further the Atomic Energy Act of 1946 and its unique requirements for controlling atomic energy information, some of the special information-control activities that accompanied the research, development, and production efforts that led to the first atomic bomb will be mentioned. Realization that an atomic bomb was possible had a profound impact on the scientists who first became aware of that possibility. The implications of such a weapon were so tremendous that the U.S. scientists conducting the initial, basic research related to nuclear fission voluntarily restricted the publication of their scientific work in this area. Such restrictions on scientific publications were extraordinary, considering the long tradition of academic scientists (the early "atomic energy" researchers were mostly associated with universities) to disseminate research results freely.[*]

In addition to reviewing events preceding establishment of the Manhattan Project, a brief look at this project's information-control activities is of interest because the totality of this project's information-control activities was unprecedented in the United States. That rigorous information control encompassed not only military and civilian government employees but also included, for the first time, many employees of private corporations, colleges, and universities.

[*] Generations of scientists had developed this tradition of free exchange of new scientific knowledge, which came to be accepted as an article of faith, as an elementary requirement of the scientific profession (B. and F. M. Brodie, *From Crossbow to H-Bomb*, Indiana University Press, Bloomington, Ind., 1973, pp. 241–242). An essential part of the scientific method is that subsequent criticism and evaluation establishes whether the information is correct. Also, since prompt publication of new knowledge establishes priority of discovery, the scientist who first publishes a discovery generally gets all the credit for that discovery; therefore, most scientists oppose secrecy on basic scientific research so that their priority of discovery can readily be established (Brodie, p. 242). However, sometimes scientists at the forefront of their field do not readily talk about their current work to "outsiders" (i.e., they keep it "classified") until the work is published (or has been accepted for publication) so that someone else does not steal their idea and publish it first.

The Manhattan Project is also the most outstanding example, because of its size and the far-reaching effect of its efforts, of the rapid application of basic scientific research and technology to provide a weapon that influenced the ending of a major war. One of the consequences of the depth and breadth of the active participation of many top U.S. academic scientists in this very secret wartime project was that the subsequent peacetime control of scientific and technical information did not seem as unusual or unacceptable to those scientists as similar measures would have been prior to World War II.

ATOMIC ENERGY INFORMATION CONTROL BEFORE THE ATOMIC ENERGY ACT OF 1946

The possibility of generating large amounts of energy by the neutron-induced fission of relatively small amounts of uranium was first recognized in the December 1938–January 1939 time period. Experiments at the Kaiser-Wilhelm Institute in Berlin in December 1938 by chemists Otto Hahn and Fritz Strassmann proved that the nucleus of the uranium atom was split by neutrons. Those results were soon confirmed at laboratories in other countries, where the large amount of energy released during fission was also measured. Additional experimental and theoretical studies, in February and March 1939, indicated that two or three neutrons were produced during uranium fission and that U-235 was probably the fissionable uranium isotope.[1] This knowledge led many physicists to recognize the distinct possibility that an extremely powerful bomb might be made with uranium enriched in the U-235 isotope and that such a bomb would have a revolutionary effect on warfare.

Some scientists working in the United States, especially those who were emigrés or refugees from Germany, Hungary, Italy, and other European countries, were very concerned that Nazi Germany, where the basic discovery was made, would rapidly exploit this possibility. Therefore, those scientists sought, by informal agreement (primarily between U.S., English, and French physicists), to withhold voluntarily from publication that scientific information (experimental results and theoretical studies) related to the fission of uranium and production of plutonium. Leo Szilard, then at Columbia University, was one of the first to initiate such efforts,* beginning in February 1939. Because of communication difficulties, principally with Frederic Joliot (Joliot-Curie), the leader of the French research in that area, the initial attempts did not succeed. However, most of the U.S. and English scientists working in this area were receptive to a proposal that they submit their results for publication (to establish priority of discovery) but request the journal to withhold publication until a later date. The editors of the major scientific journals also agreed to that procedure. However, because of the communication difficulties noted

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* "Contrary to perhaps what is the most common belief about secrecy, secrecy was not started by generals, was not started by security officers, but was started by physicists. And the man who is mostly responsible for this certainly extremely novel idea for physicists was Szilard" [E. Fermi, *Physics Today* **8**, 12-16 (Nov. 1955), p. 13 (this statement may have been made somewhat in jest by Fermi, but it is based on what happened)].

"In ordinary times I would say that scientific discoveries should be made public. At that particular time [1939-1940] with the war impending and critical political situations and so on, I joined with a group of others, the leader of the group or the most active member of that group was Leo Szilard, in a voluntary censorship to keep [secret] certain results that could lead in the direction of the atomic bomb" (testimony of E. Fermi during the l954 Oppenheimer hearings, *In the Matter of J. Robert Oppenheimer, Transcript of Hearings Before Personnel Security Board,* U.S. Atomic Energy Commission, U.S. Govt. Printing Office, Washington, D.C., 1954, p. 398).

above and because there was not complete agreement among U.S. scientists of a need to withhold such information, the procedure was not implemented in 1939.

After unsuccessful initial attempts to restrict the dissemination of nuclear-fission information, Szilard and other U.S. scientists continued to press for voluntary controls on this information. The subject was discussed with a U.S. Government committee (The Advisory Committee on Uranium) that was formed in October 1939 to coordinate nuclear fission work in the United States.[2] The Advisory Committee on Uranium was not interested in establishing controls on information. However, Admiral H. Bowen, present as an observer at an April 27, 1940, Committee meeting, suggested that the scientists themselves impose whatever censorship they felt necessary; the government would do nothing.[2] The scientists did, in fact, withhold several significant papers from publication, Szilard perhaps being the first to do so, in February 1940.[3] Probably the most important of those papers to be voluntarily withheld was a report concerning the neutron-absorption cross-section of carbon. That report indicated that carbon (e.g., graphite) would be an excellent moderator for a nuclear reactor. The subsequent, very successful, U.S. nuclear-reactor effort was therefore oriented toward using graphite as a moderator. German scientists made similar measurements, obtained erroneous results, and concluded that graphite was not a good moderator.[4] For the remainder of World War II, the Germans ignored graphite as a moderator, turning instead to heavy water (deuterium oxide). They were never able to obtain sufficient quantities of heavy water to do key experiments. Had German scientists learned of the U.S. results, their efforts to develop nuclear weapons might have been significantly different from their actual program.

Another significant paper voluntarily withheld from publication by U.S. scientists concerned the preparation of a new, fissionable element (plutonium) by a new process, bombarding U-238 with neutrons in a nuclear reactor. Information in this paper, written by Princeton physicist L. A. Turner, might have led German scientists to try to use plutonium in a nuclear weapon, a different and, perhaps in some aspects, easier path for obtaining fissionable materials than using uranium highly enriched in U-235.[2,*]

The secrecy issue concerning scientific papers on nuclear fission was finally resolved in early June 1940. At the initiative of Gregory Breit,[†] a member of the National Academy of

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[*] However, a report prepared a few weeks earlier by Berkeley scientists on the discovery of neptunium (the first transuranic element) was published in *Physical Review* shortly after Turner decided to withhold his publication. Information in that report provided a clue to the possibility of using plutonium in a nuclear weapon. Some British scientists were, in fact, so irritated because the U.S. published that information, that an official protest was made through the British embassy (Richard Rhodes, *The Making of the Atomic Bomb*, Simon and Schuster, New York, 1986, p. 351).

[†] Breit was a colleague of Eugene Wigner and also knew Szilard; probably through those associations, Breit was aware of the desirability to limit publication of uranium-fission research [S. R. Weart, "Scientists with a Secret, *Physics Today* **29** (2), 23, 30 (February 1967)]. At about the same time (about early June 1940) as the creation of the Reference Committee (see following text in this document), Breit became a member of an advisory committee of scientific experts to the Advisory Committee on Uranium (Richard G. Hewlett and Oscar E. Anderson, *The New World, 1939/1946*, The Pennsylvania State University Press, University Park, Pa., 1962, p. 24; William Lanouette with Bela Szilard, *Genius in the Shadows, A Biography of Leo Szilard*, Charles Scribner's Sons, New York, 1992, p. 220). Later in the summer of 1940, Breit started providing assistance to the Advisory Committee on Uranium on theoretical matters, including slow-neutron fission matters (*The New World*, p. 32). Still later, Breit coordinated fast-neutron research at several laboratories (*The New World*, p. 56). Breit and Lyman Briggs, the chairman of the Advisory Committee on Uranium, were both quite secretive regarding uranium-fission bombs. Brigg's failure to disseminate an early draft of the British MAUD Committee's 1941 report on the feasibility of an atomic bomb and Breit's secretiveness concerning fast-neutron research probably delayed U.S. efforts on an atomic bomb for a significant time. In early 1942, Breit was assigned responsibility for fast-neutron research within the Manhattan Project's Metallurgical Laboratory in Chicago. In May

Sciences, the National Research Council established a committee to control the publication of militarily significant research.[5] Breit was chairman of a subcommittee on uranium (Reference Committee[6]) and he put into effect a procedure whereby papers concerning nuclear fission would be reviewed by his committee before their publication.[7] "Sensitive" papers would be distributed only to a limited number of researchers. Those papers would ultimately be published with their original date, to establish priority of discovery. Therefore, long before the United States entered World War II, U.S. scientists were severely restricting the dissemination of certain scientific information,[*] without governmental urging or participation.[8,9,†]

In June 1940, the government's Advisory Committee on Uranium became a subcommittee of the National Defense Research Council (NDRC), which was established, largely through the efforts of Vannevar Bush, by the Council of National Defense with the approval of President Roosevelt on June 27, 1940.[10] President Roosevelt appointed Bush (president of the Carnegie Institution in Washington, D.C.) as chairman of the eight-member NDRC. Other appointees were R. C. Tolman (Vice-Chairman, professor of physical chemistry and mathematical physics at the California Institute of Technology, although then in Washington working for the Navy[11]), K. T. Compton (president of the Massachusetts Institute of Technology), J. B. Conant (president of Harvard University), C. P. Coe (Commissioner of Patents), Adm. H. G. Bowen (Department of the Navy), F. B. Jewett (president of the National Academy of Sciences and also president of Bell Telephone Laboratories), and Gen. G. V. Strong (War Department).[12]

The NDRC's purpose was to have civilian scientific and technical experts become familiar with the military's weapons needs so that these civilian experts could inform the military on how the latest advances in science could help the military.[13] Although this arrangement had the approval of the top military leaders, many in the lower echelons were skeptical of such a program. The NDRC leaders recognized that they would have to gain the confidence of the military to establish an effective working relationship. In this regard, the NDRC realized that one of the first things they had to do was to convince the military that this organization of civilian scientists could keep secrets. Therefore, each committee member took an oath of allegiance to the United States and required all staff members and appointees to do likewise.[14] Chief investigators were required to sign secrecy pledges.[15] "The Committee felt it desirable to place such stress upon secrecy because the tradition of scientists in academic institutions is to give wide distribution to the results of their research."[16]

1942, he resigned his position for several reasons, one of which was that he thought the Laboratory's attitude towards security practices was too lax. His successor was J. Robert Oppenheimer (Richard G. Hewlett and Oscar E. Anderson, *The New World, 1939/1946*, The Pennsylvania State University Press, University Park, Pa., 1962, pp. 102, 227-228).

[*] The dearth of articles about the atomic nucleus in U.S. scientific journals in 1940 and 1941 led a Russian expert in this field to conclude that the U.S. had classified the information in this area ["The Origin of the Soviet Atomic Bomb—A Letter to Stalin," *USSR Technology Update* **3**(21), pp 1, 4, 5, 8 (Nov. 16, 1988); David Holloway, *Stalin and the Bomb, The Soviet Union and Atomic Energy, 1939-1956*, Yale University Press, New Haven, 1994, p. 78].

[†] In August 2002, the American Society for Microbiology adopted a policy of screening, for "information that could be put to inappropriate use," of papers submitted for publication in its journals. This was a response to increasing national concern that certain information that would normally be published might, under certain circumstances, be inappropriate for publication because of its possible use by terrorists in developing and using biological weapons of mass destruction.

The NDRC also adopted the "compartmentalization" principle: no person "would be given any classified information except that needed for the performance of the particular tasks which had been entrusted to him."[17] Although, in retrospect, the secretary of the NDRC stated that the rigid compartmentalization practiced by the NDRC was not needed,[*,18] he also stated, "It is highly probable, however, that the existence of compartmentalization made the armed services more willing to entrust their classified information to the NDRC during the early period when the ability of the organization to keep secrets had not yet been demonstrated."[19] Thus, it appears that rigid "compartmentalization" of scientific and technical information on military projects, about which many scientists involved in the Manhattan Project later complained, was not first instituted by the military, as has been so often presumed, but was initially imposed by some of the nation's top scientific and technical administrators to convince the military that scientists and engineers could be trusted to keep secrets.[†]

Procedures for classifying information and for handling classified information were adopted by the NDRC at its second meeting, held in August 1940.[20] Army and Navy procedures were adopted. In case of conflict, the more stringent rule was to be used. Originators of information would provisionally classify it; the NDRC secretary made the final classification decision.[21] The NDRC also required security clearances from the Army and the Navy, depending upon which service was sponsoring the research, for all key NDRC employees.[22]

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[*] The NDRC secretary, who was also the Deputy Director of the Office of Scientific Research and Development (OSRD), which incorporated the responsibilities of the NDRC, also stated that "compartmentalization of information can be carried too far, and probably was by the OSRD . . . . Even programs which should be carried on independently of each other may have components which are common and on which an exchange of information would save valuable time and manpower" (I. Stewart, *Organizing Scientific Research for War*, Little, Brown, and Co., Boston, 1948, p. 331).

[†] This hypothesis is supported by remarks made by General L. R. Groves, head of the Manhattan Project, during the 1954 hearings on J. R. Oppenheimer's security clearance. General Groves commented as follows with respect to security during his military career.

> Q. (R. Robb, counsel for the Personnel Security Board) "During your entire Army career, I assume you were dealing with matters of security?"
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> A. (Gen. Groves) "Never before this thing started. We didn't deal with matters of security in the Army, really, until this time." (*In the Matter of J. Robert Oppenheimer, Transcript of Hearings Before Personnel Security Board*, U.S. Atomic Energy Commission, Washington, D.C., U.S. Government Printing Office, 1954, p. 170.)

It would thus appear that General Groves did not bring the rigid classification and security measures to the Manhattan Project (for which it subsequently became noteworthy and for which Gen. Groves was given most of the "credit" by the scientists on that project) but that he "merely" enforced and perhaps made more stringent the rules that were in place (initiated by the NDRC and the OSRD) when he assumed command of the Manhattan Project.

An indication that stringent enforcement was not entirely General Groves' initiative was supplied by testimony of Gen. Groves before the U.S. Senate in 1946. At that time he stated that "all of the security measures taken by the Manhattan project during the war and to date are in accordance with the written instructions of President Roosevelt to me, emphasized by oral instructions from him, and by the very pointed verbal instructions of General Marshall" (Gen. L. R. Groves in *Atomic Energy Act of 1946*, Hearings before the Special Committee on Atomic Energy on S. 1717, U.S. Senate, 79th Congress, 2nd Sess., Part 4, Feb. 18, 19, and 27, 1946, p. 468). It would be of interest to know what was contained in those written instructions from President Roosevelt and to have more specifics on the verbal instructions from President Roosevelt and General Marshall. President Roosevelt wrote a letter to J. Robert Oppenheimer, dated June 29, 1943, who was then director of the Los Alamos laboratory, in which he emphasized the importance of security at Los Alamos: "The fact that the outcome of your labors is of such great significance to the Nation requires that this program be even more drastically guarded than other highly secret war developments. I have therefore given directions that every precaution be taken to insure the security of your project and feel sure that those in charge will see that these orders are carried out. . . . Though there are other important groups at work I am writing only to you as the leader of the one which is operating under very special conditions, and to General Groves." *In the Matter of J. Robert Oppenheimer*, pp. 29-30.

On June 28, 1941, the NDRC and its Committee on Uranium became part of the Office of Scientific Research and Development (OSRD),* which was established by President Roosevelt's Executive Order 8807.[23] The name of the Committee on Uranium was changed to "Section on Uranium" to correspond to OSRD terminology. Later, the name "uranium" was dropped (for security reasons), and the organization was called Sect. S-1.[24] Classification and security arrangements remained about the same because the OSRD patterned its classification and security systems after those implemented earlier by the NDRC.[25,26] Security clearances were required of all OSRD employees before they could have access to classified information.[27]

On October 9, 1941, Bush briefed President Roosevelt and vice-President Henry A. Wallace on the uranium program. President Roosevelt decided that the work should be expedited. He also created a Top Policy Group to guide atomic energy matters. That group included Secretary of War Stimson and Army Chief of Staff George C. Marshall, thereby essentially deciding that the Army would manage administration and construction when the effort became a "major" project.[28] This responsibility was transferred to the Army on June 17, 1942.[29] However, the Army had begun planning for assumption of this responsibility some time earlier, perhaps in mid-to-late March 1942.[30]

The U.S. Army Corps of Engineers' Manhattan Engineering District was subsequently formed to manage the atomic bomb project (the Manhattan Project). The Army reorganized and expanded the OSRD (NDRC) security system and brought it under the control of the Manhattan Engineering District. "The system that finally evolved was in many respects unique and introduced a number of innovations in technique and organization that subsequently would be adopted as standard features of government security programs."[31] Secrecy conditions within the Manhattan Project were said to be "quite exceptional as compared with those in other scientific projects engaged in the work of the war just ended."[32] The degree of control and secrecy imposed was "unprecedented in the annals of military technological development."[33]

Information concerning the Manhattan Project was tightly controlled by the Army throughout that project. In applying Army Regulation 380-5 (see Chapter 2), which dealt with safeguarding military information, particular emphasis was placed on limiting the amount of classified information available to individuals or groups. General Groves insisted on strict compartmentalization of knowledge—the "need to know" requirement.† He was said to have "a passion for 'security' exceptional even in a military commander."[34] The Manhattan Engineering District established two basic rules on access to classified information: (1) "a person must need the information to carry out his job," and (2) a person could "have access only to the amount of information 'necessary for him to execute his function.' "[35,36] This stringent compartmental-

*V. Bush was appointed head of the OSRD by President Roosevelt. J. B. Conant became head of the NDRC, replacing Bush. Concurrently, a major change was made to the NDRC. As a committee (headed by Bush) of the Council of National Defense, it had authority to act. As a committee of the OSRD it could only recommend to the OSRD (Bush) (I. Stewart, *Organizing Scientific Research for War*, Little, Brown and Company, Boston, 1948, p. 38).

† Some equipment orders specified that items not be manufactured and assembled at the same location. Production plant blueprints were broken down and distributed to reduce the overall knowledge of the project that an individual might obtain. Orders for raw materials were parceled out to a number of suppliers to obfuscate the purpose for which they were being used. [V. C. Jones, "Manhattan: The Army and the Atomic Bomb," *United States Army in World War II, Special Studies*, Center of Military History, United States Army, Washington, D.C., 1985, p. 269.]

ization policy was applied to all aspects of the Manhattan Project and caused a significant delay in progress in at least one instance.*

Compartmentalization may also have been used to keep the scientists' attention focused on their particular task and to keep them from becoming interested, at the expense of their

* Leo Szilard had this to say, in December 1945, about compartmentalization in the Manhattan Project:

"Compartmentalization of information . . . is a special technique which is used in the services for keeping secret military operations, and applied in its proper sphere is an effective method for keeping secrets. Both its meaning and its effectiveness undergo a profound change when it is attempted to apply this special technique to research and development work" (*Atomic Energy*, Hearings Before the Special Committee on Atomic Energy, U.S. Senate, 79th Cong., 1st Sess., Pursuant to S. Res. 179, A Resolution Creating a Special Committee to Investigate Problems Relating to the Development, Use, and Control of Atomic Energy, Part 2, Dec. 5, 6, 10, and 12, 1945, U.S. Government Printing Office, Washington, D.C., 1946).

"Compartmentalization of information was practiced in the atomic energy project from the very first day on; that is, from November 1940 on, or before the Army was in the picture. The situation was not better when we had to deal with the NDRC, which had to "play ball" with the Army and Navy, than later on, when we had to deal with the Army direct. If anything, dealing with the Army direct appears to be preferable, since the Army is afraid only of Congress, while agencies like the NDRC are afraid of both Congress and the Army" (ibid., p. 290).

"I shall be glad to demonstrate, if required, that compartmentalization of information was the cause of our failure to realize that light uranium might be produced in quantities sufficient to make atomic bombs. We should have known that in the fall of 1940. We might have failed to realize this altogether, just as the Germans failed to realize it, if we hadn't the good fortune the British scientists were not compartmentalized. They were able to put two and two together and communicated their conclusions to the United States Government in the middle of 1941. Had we in the United States reached those conclusions in the fall of 1940, we most likely would have had [atomic] bombs ready before the invasion of Europe" (ibid, p. 291).

"At first, we all observed rules on compartmentalization because we did not realize ourselves how damaging it was. Later on, the rules were purposedly [sic] violated, because we would rather violate rules than slow down our work. Men coming from different sites would drop into my office and they would tell me things which I was not supposed to know, but which they felt that I ought to know. They usually told me that they did not expect me to conceal the fact that I was in possession of this information. All they asked me to do was not reveal to the Army that they had given me the information" (ibid., p. 293).

"Some of you saw at Oakridge [sic] a certain installation and were told by a representative of the Army that it shortened the war by 1 week. [Note: This was the liquid thermal diffusion plant for enriching uranium hexafluoride that was built at the K-25 site in Oak Ridge, Tennessee.] That installation was based on a pilot plant which was built by the Navy. The installation was recommended at the recommendation of Dr. Oppenheimer after an interview he had with Dr. Bush. But if you investigated how Dr. Oppenheimer got the idea of recommending this to Dr. Bush, you would find that at least two patriotic scientists deliberately violated the rules and broke through compartments. Afterward, everything was covered up nicely. Dr. Oppenheimer's projects officially asked for the information which was already unofficially in their possession, and made an official study of what they already knew, and then finally Dr. Oppenheimer approached Dr. Bush and wrote to General Groves" (ibid., pp. 293–294).

"I am very sorry that I had nothing to do with this chain of events. As a matter of fact, I should have done something about it, because one of the men came to me six months earlier and complained that nothing was done along that line and asked me if I knew what could be done to get some action along that line" (ibid., p. 294).

See also the testimony of R. Gunn, Naval Research Laboratory scientist, in December 1945, concerning the Army's (Manahttan Project's) disinterest (until June 1944) in the thermal diffusion process for enriching uranium, which the Navy had been developing prior to 1942. The Navy became interested in atomic energy in March 1939 and initiated development of the gas centrifuge and liquid thermal diffusion methods for enriching uranium. Even though General Groves was, in December 1942, aware of the operation of a thermal diffusion pilot plant for enriching uranium at the Naval Research Laboratory, that method of enriching uranium was not integrated into the Manhattan Project until 1944. It appears that the Naval Research Laboratory personnel working on uranium enrichment were not kept informed about the activities of the Manhattan Project nor was this resource utilized by that project until late in the project's efforts to enrich uranium (R. Gunn, in *Atomic Energy*, Hearings Before the Special Committee on Atomic Energy, U.S. Senate, 79th Cong., 1st Sess., Pursuant to S. Res. 179, A Resolution Creating a Special Committee to Investigate Problems Relating to the Development, Use, and Control of Atomic Energy, Part 3, Dec. 13, 14, 19, and 20, 1945, U.S. Government Printing Office, Washington, D.C., 1946, pp. 364–382).

On the matter of the Manhattan Project's not using the Naval Research Laboratory's expertise in uranium enrichment, Admiral Purnell's 1945 testimony indicated that R. Gunn's requests of the Manhattan Project for information went through Admiral Purnell to the Military Policy Committee, and were to have been handled by Dr. Briggs, chairman of one of the subcommittees. It appears that Dr. Briggs never gave Dr. Gunn any of the information he requested (ibid, pp. 397–404) [which may not be too surprising considering Brigg's prior close control of the Advisory Committee on Uranium's information and finances].

primary responsibilities, in other intriguing scientific questions not directly related to their tasks.[*] Because of this compartmentalization policy, extensive protocols had to be established to regulate information exchange between, for example, the Los Alamos laboratory and the Metallurgical Laboratory in Chicago. Also because of compartmentalization, a nuclear criticality incident allegedly almost occurred at the Y-12 electromagnetic separation plant in Oak Ridge.[†]

As a consequence of the previously mentioned classification and security restrictions, the Manhattan Project was one of the best-kept secrets of World War II.[‡] Relatively few persons, even in the highest levels of government, knew its purpose until the first atomic bomb was dropped on Hiroshima, Japan, on August 6, 1945.[§,**]

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[*] See, for example, the testimony of General L. R. Groves before the Oppenheimer Hearing Board. With respect to compartmentalization of information, General Groves said that he did not keep the Manhattan Project's leaders (e.g., Compton, Lawrence, Oppenheimer, etc.) informed as to all aspects of the project because "if I brought them into the whole project, they would never do their own job. There was just too much of scientific interest, and they would just be frittering from one thing to another." (*In the Matter of J. Robert Oppenheimer, Transcript of Hearing Before Personnel Security Board*, U.S. Atomic Energy Commission, U.S. Government Printing Office, Washington, D.C., 1954, p. 164).

[†] The Y-12 Plant made the final enrichment of U-235 to obtain weapons-grade uranium. Part of the process involved handling aqueous solutions of highly enriched uranium. The Y-12 Plant personnel were made aware of nuclear criticality problems with those solutions only because "compartmentalization" with respect to that knowledge broke when a Los Alamos scientist happened to visit the Y-12 Plant prior to generation of those highly enriched uranium solutions (statement of H. C. Urey in hearings before the U.S. Senate's Special Committee on Atomic Energy, *Atomic Energy*, Hearings pursuant to S. Res. 179, U.S. Senate, 79th Congress, lst Sess., Nov. 27–30, Dec. 3, 1945, p. 90).

The word "alleged" is used because it is not clear that there was a real danger. The Y-12 Plant personnel were aware of the possibility of criticality in their process and had designed their equipment accordingly. The Los Alamos scientist suggested a larger safety factor, which was implemented, although as later measurements showed, the original equipment would have been safe from a criticality standpoint (private communication from J. M. Googin, July 1988). But see Richard P. Feynman, *Surely You're Joking, Mr. Feynman!*, Bantam Books, New York, 1985, pp. 103-107.

[‡] However, H. C. Urey, in discussing the difficulties that a nation would have in hiding a major project to produce atomic weapons, stated, in 1945, that "the development of the Manhattan [P]roject was quite obvious to all our scientific friends not working on the project during the last few years" (H. C. Urey, in *Atomic Energy*, Hearings Before the Special Committee on Atomic Energy, Pursuant to S. Res. 179, U.S. Senate, 79th Congress, lst Sess., Nov. 27–30, Dec. 3, 1945, pp. 84–85).

A few days later, J. R. Oppenheimer said much the same thing: "If you take our place at Los Alamos, a year ago I think there were no physicists in this country that did not know what we were doing there. They did not talk about it, because it was contrary to the national interest. But this peculiar conglomeration of scientific talent in a very remote place aroused that suspicion, and they made quite a good guess as to what we were actually about" (J. R. Oppenheimer at p. 189 in *Atomic Energy*, Hearings before the Special Committee on Atomic Energy, Pursuant to S. Res. 179, U.S. Senate, 79th Cong., 1st Sess., Nov. 27–30, Dec. 3, 1945, U.S. Government Printing Office, Washington, D.C., 1946).

Another example of widespread knowledge in the United States of secret government activity using uranium was some information published in the *Minerals Yearbook of 1943*. The following statements appeared on p. 828 of that book:

> "Uranium production in 1943 was greatly stimulated by a Government program having materials priority over all other mineral procurements, but most of the facts were buried in War Department secrecy."
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> "Most of the 1943 uranium supply was used by physics laboratories for research on uranium isotopes as a source of energy" (Remarks by Alexander Sachs, in *Atomic Energy*, Hearings Before the Special Committee on Atomic Energy, U.S. Senate, 79th Cong., 1st Sess., Pursuant to S. Res. 179, A Resolution Creating a Special Committee to Investigate Problems Relating to the Development, Use, and Control of Atomic Energy, Nov. 27–30, Dec. 3, 1945, U.S. Government Printing Office, Washington, D.C., 1946, p. 16).

[§] Perhaps a more accurate statement would be that relatively few persons knew about *all* aspects of the Manhattan Project until the first atomic bomb was dropped and the information was released.

[**] One reason for the stringent information controls imposed by General Groves may not have been related to national security. Major General K. D. Nichols, Groves' principal deputy in the Manhattan Project, has recently written a book on his experiences (K. D. Nichols, *The Road to Trinity*, William Morrow, New York, 1987). On page 281 of this book, Gen. Nichols describes a 1950 conversation that he had with the Secretary of the Air Force, who asked about the possibility of establishing a Manhattan Project-type organization to develop guided missiles. In discussing the difficulties in establishing Manhattan Project-type authority in peacetime, Gen. Nichols quotes himself as stating, "I consider it impossible [in 1950] to set up a Manhattan Project, and in particular, *to establish the degree of secrecy that is essential to avoid interference with any such command*. You can only do it in time of war" [emphasis added]. This tends to indicate that perhaps one reason for Gen. Groves' stringent information controls in the Manhattan Project was to avoid interference by others with his "command."

Administratively, classification aspects of the Manhattan Project were initially the responsibility of the District's "Protective Security Section."[37] By February 1943 a "Protective Security Manual" had been prepared. In August 1943 the Plant Security Section for Safeguarding Military Information (SMI) was established. An intelligence bulletin issued in November 1943 detailed how military information was to be safeguarded. In May 1944, a separate SMI section was established, and an expanded classification and security program was implemented. This section was designated the SMI Branch in 1945.

In November 1945, the Manhattan District issued a security manual that covered all aspects of classification and security.[38] "Classified information" was defined as information that had been officially designated Top Secret, Secret, Confidential, or Restricted. Examples were given of information that should be classified as Secret Matter, Confidential Matter, or Restricted Matter. Examples of Top Secret information were given in another document. Restricted Matter encompassed "relatively unimportant administrative matters" and also "relatively unimportant technical and operating information," both of which "should not be disclosed to the general public except on a controlled basis."

ATOMIC ENERGY INFORMATION CONTROL UNDER THE ATOMIC ENERGY ACT OF 1946

The devastating power of the atomic bomb, its dramatic role in ending the war, and the secrecy surrounding its development had a major impact on Congress and the American public.* Postwar discussions on the control of the U.S. atomic-energy program produced consensus that some special statutory control over atomic energy was necessary. Some persons wanted continued tight control on all information related to nuclear weapons. Others were concerned that continued strict control of basic research in this area would hinder progress in the development of atomic energy, to the detriment of the nation.† The first draft of what was to become the

* One author has suggested that "partly because they themselves were successfully kept from knowing about the [atomic] bomb until it had burst, many Americans have considerable faith in the feasibility of keeping secrets" (W. Gellhorn, *Security, Loyalty, and Science*, Cornell University Press, Ithaca, New York, 1950, p. 9).

† The first bill that was proposed in Congress to deal with atomic energy was the May-Johnson Bill, introduced in early October 1945. This bill was actually drafted by an Army general (Brig. Gen. Kenneth C. Royall) and a civilian employee of the War Department (William L. Marbury). Royall and Marbury were assisted by two Army Lieutenants, Lt. George S. Allan and Lt. George M. Duff, Jr., also both lawyers. [*Notes of Interim Committee Meeting*, Thursday, July 19, 1945 (Available at http://nuclearfiles.org/ docs/1945/470719-1c.html).] At the request of Secretary of War Patterson, this bill was introduced in the Congress by Senator Johnson and Representative May. The Royall-Marbury bill was in turn said to be substantially based on a draft prepared by V. Bush and J. B. Conant (see previous descriptions of those individuals' earlier roles in the atomic bomb project) during 1944–1945. Bush and Conant were members of a committee ("Interim Committee") established by Secretary of War Henry L. Stimson for that purpose. The Interim Committee was appointed in May 1945, to recommend legislation for the development and control of atomic energy. (*Atomic Energy*, Hearings before the Committee on Military Affairs, House of Representatives, 79th Congress, 1st Session, on H.R. 4280, "An Act for the Development and Control of Atomic Energy," October 9 and 18, 1945, U.S. Government Printing Office, Washington, D.C., p. 4) Secretary Stimson was chairman of the eight-member committee, and General Groves was an advisor. Membership included Secretary of State James F. Byrnes, Vannevar Bush, James B. Conant, Karl T. Compton, and three others. [One author states that I. Stewart, an assistant to Bush and Conant, prepared the draft in July 1944. (A. Steiner, "Scientists, Statesmen, and Politicians; The Competing Influences on American Policy 1945-1946," *Minerva* **12**, 469–509, 498 (October 1974). Secretary of War Patterson stated, in 1946 testimony, that a Captain Davis was the actual draftsman, under the direction of Brigadier General Royall and Mr. Marbury, a Baltimore lawyer then in the employ of the War Department. (*Atomic Energy Act of 1946*, Hearings Before the Special Committee on Atomic Energy, U.S. Senate, 79th Congress, 2nd Session, Part 3, February 7, 8, 11, 13, and 14, 1946. U.S. Government Printing Office,

Atomic Energy Act of 1946, introduced by Senator McMahon on December 20, 1945, attempted to distinguish between "basic scientific information" and "related technical information." Information concerning basic nuclear energy research would not be controlled, but the dissemination of related technical information would be restricted. However, it was found to be difficult to establish a dividing line between those two types of information,* and the final version of the Atomic Energy Act of 1946 (also known as the McMahon Act), which became law on August 1, 1946, stringently controlled all atomic-energy information.

The legislative history of the Atomic Energy Act of 1946 indicates that Congress was, at that time, much more interested in tight control of atomic-energy information than in its dissemination. Congress was influenced, during its deliberations on this Act, by concerns that the Espionage Act of 1917 was inadequate to protect atomic-energy information to the extent determined necessary by Congress. Those worries were reinforced by the news, in early 1946, of Soviet espionage activities in the United States and Canada that were directed toward atomic-energy information. Congress ultimately decided that the subject of atomic energy required unique controls because its component parts (atomic weapons, atomic power, and atomic science) were largely inseparable. Consequently, Congress adopted controls on this subject that went beyond those ever imposed by Congress, before or after.[39]

In the final version of the Atomic Energy Act of 1946, Congress established a special category of information called "Restricted Data." Restricted Data (RD) was defined to encompass "all data concerning the manufacture or utilization of atomic weapons, the production of fissionable material, or the use of fissionable material in the production of power." Thus, by operation of law, nearly all atomic (nuclear) energy information fell within the definition of RD. The Atomic Energy Act authorized the AEC to control the dissemination of RD, specifying as a prerequisite to access to this information that an individual must have a security clearance. The controls imposed by Congress on the dissemination of RD were unusually rigorous, leading two authors to comment as follows on the information-control provisions of the Atomic Energy Act:

> The information section of the Act reveals the atavistic depths that have been stirred by the release of atomic energy. The response to this greatest of all triumphs of scientific method and creative intelligence has been in some respects closely akin to the practice of magic among the most primitive of tribes. Having in their possession a fearful image of the god of war, which makes them stronger than all their enemies, the tribe is obsessed with the fear that the image may be stolen or duplicated and their exclusive claim to the

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Washington, D.C., 1946, p. 390.) Another source says that the bill was first drafted in General Groves' office by Lt. Col. John Lansdale, Jr., an attorney and also the chief security officer on General Grove's staff, as told by Mr. Lansdale to W. Lawren in about 1985. (W. Lawren, *The General and the Bomb*, Dodd, Mead, and Co., New York, 1988, p. 262.)] However, the May-Johnson Bill ran into substantial opposition, led to a large extent by "atomic" scientists at Chicago and Oak Ridge, and was not enacted. Major problems with the May-Johnson Bill included disagreement with the significant controls over atomic energy given to the military and with the overly stringent security provisions [R. G. Hewlett and O. E. Anderson, Jr., *The New World, 1939/1946*, Pennsylvania State University Press, University Park, Pa., 1962, pp. 408-439].

* The first version of S. 1717, which became the Atomic Energy Act of 1946, described "basic scientific information" in Sect. 9(a) as including "in addition to theoretical knowledge of nuclear and other physics, chemistry, biology, and therapy, all results capable of accomplishment, as distinguished from the processes or techniques of accomplishing them." However, as one witness appearing before the Senate's Special Committee on Atomic Energy that was considering S. 1717 stated, it is hard to separate "basic scientific knowledge and practical know-how. My experience is that they run into one another in indescribable confusion, and it would be very difficult to separate them" (W. H. Davis, in *Atomic Energy Act of 1946*, Hearings Before the Special Committee on Atomic Energy, U.S. Senate, 79th Cong., 2nd Sess., on S. 1717, A Bill for the Development and Control of Atomic Energy, Part 1, Jan. 22 and 23, 1946, U.S. Government Printing Office, Washington, D.C., 1946, p. 53).

> deity's favor lost. So a temple is built, ringed about by walls, and guarded by untiring sentinels. Those whose function it is to attend the deity are carefully chosen and subjected to purification rites; they are forbidden ever to look upon the whole image or to speak of what they have seen. They are guarded with unceasing vigilance, and at the slightest sign of defection condign punishment is visited upon them.[40]

Two particularly unique and significant aspects of RD warrant emphasis. First, a positive action is not required to put information into the RD category. If information falls within the Act's definition of RD, it is in this category from the moment of its origination; that is, it is "born classified." The government has no power to determine that information is RD,[*] only the power to declassify RD. (The Atomic Energy Act of 1954 gave the AEC the power to remove RD to another classification category, to transclassify RD.) The "born classified" concept is unique with RD.[†] This concept assumes that newly discovered atomic-energy information might be so significant with respect to the nation's security that it requires immediate and absolute control.[41,‡] Information classified by executive order (currently termed classified national security information) is not so designated until an original classifier makes a positive determination that the information falls within the definition of classified national security information.[§] Donald B. Woodbridge, former Department of Energy Contractor Classification Officer, has characterized the term "born classified" as words that "give the professional classificationist unanswerable authority."[42]

Although RD is said to be born classified, the Atomic Energy Act does not specifically designate it as "classified" information. The Act defines RD and prescribes very strict methods for its control without stating that it is "classified" information. However, the Act does describe declassification of RD; therefore, by implication, RD is "classified."

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[*] That statement is not strictly true. The government (Department of Energy) determines whether information falls within the definition of Restricted Data.

[†] "The NSA [National Security Agency] has tried to extend the 'born secret' concept to the cryptography area by voluntary agreement rather than by legislative process." Sissela Bok, *Secrets. On the Ethics of Concealment and Revelation*, Pantheon Books, New York, 1982, p. 166, footnote.

[‡] There appears to be one anomaly to the "born classified" concept. That anomaly is for those methods of isotope separation that can be used to produce special nuclear materials (e.g., to enrich uranium in the U-235 isotope, an isotope useful in nuclear weapons). According to current DOE procedures, research and development on methods of isotope separation other than gaseous diffusion or gas centrifuge can be carried out on an unclassified basis until that research shows a "reasonable potential for the separation of practical quantities of special nuclear material." At that point, classification restrictions must be applied [*Fed. Reg.* **37**, 15393 (Aug. 1, 1972); *Fed. Reg.* **32**, 20869 (Dec. 28, 1967)]. Thus, this area of atomic-energy information is not "born classified" but is classified only when it reaches "adolescence."

[§] Once the Manhattan Project started, essentially all atomic-energy information developed in this country was "born" in that "classified" project. Even after the Manhattan Project organization was terminated and its functions assigned to the Atomic Energy Commission (AEC), for many years most of the atomic-energy information in the U.S. was "born" in AEC facilities. During the Manhattan Project and also under the Atomic Energy Act of 1946, the government controlled all aspects of atomic energy—mining the uranium ore, research and development on the materials, fabrication of the final products (e.g., nuclear weapons and reactor fuel elements)—and had ownership of essentially all of the fissionable materials in the U.S. In contrast, conventional "defense" (NSI) technology relied mostly on information "born" outside of government facilities (and government control) (i.e., developed by private entities seeking to sell their products or ideas to the government) that therefore could not be readily considered to be "born classified." A positive act was required by the government to classify this information when it was applied to defense purposes.

A second unique aspect of RD is that information does not have to be owned or controlled by the government to be classified as RD.* Private individuals or organizations may originate RD, which then becomes controlled by the Atomic Energy Act.[43] The circumstance could even arise in which an individual could originate RD and then not be allowed to possess it because of lack of security clearance or "need to know." The Atomic Energy Act does not forbid an individual to generate RD, but, once RD is generated, the Act prohibits its communication to persons not authorized to receive it. Recent (1998) DOE regulations state that "In order for information privately generated by persons to be classified as RD, the Secretary or Deputy Secretary shall make the determination personally and in writing. This authority shall not be delegated."[44]

The first classification of privately generated RD under this regulation occurred on June 26, 2001. The Secretary of Energy determined that certain privately generated information concerning the Separation of Isotopes by Laser Excitation (SILEX) process was RD.[45]

Controversies over the governmental control of privately generated RD have arisen several times. In March 1950, the AEC requested the magazine *Scientific American* to delete certain portions of an article by H. A. Bethe concerning the hydrogen bomb. The magazine complied with the AEC's request by deleting several sentences from the article, destroying the printing plates of the deleted material, and destroying 3000 copies of the magazine that had already been printed.[46] In the mid-to-late l960s, four companies, initially granted access permits to carry out private research on gas-centrifuge uranium enrichment, were requested by the AEC to discontinue this research. The companies complied.[47] In the late 1960s and early 1970s, questions arose about the control of RD generated by a private company that was investigating controlled thermonuclear reactions. Another instance occurred in 1979 when *The Progressive* magazine planned to publish an article on the hydrogen bomb. The government obtained a preliminary injunction, at the Federal District Court level, preventing publication of that article. This is the only instance of governmental litigation dealing with the control of RD against a noncomplying private party.[48] The government discontinued the lawsuit, and the injunction was lifted when essentially the same information was published elsewhere.[49]

The Atomic Energy Act of 1946 was amended by Congress in 1951 to make certain atomic-energy information available to other countries. The information that could be provided included "refining, purification, and subsequent treatment of source material; reactor development; production of fissionable materials;" and related research and development.[50] Before providing other countries with such data, the President had to obtain a written recommendation from the National Security Council and then determine, in writing, that the information transfer would not endanger the common defense and security of the United States.[51] The Joint Committee on Atomic Energy had to be fully informed of these matters.[52]

* Note that a 1917 statute gave the Commissioner on Patents authority to designate certain privately developed patents as secret (Act of October 6, 1917, Ch. 95, 40 Stat. 394).

ATOMIC-ENERGY INFORMATION CONTROL UNDER THE ATOMIC ENERGY ACT OF 1954

The Atomic Energy Act of 1946 was replaced on August 30, 1954, by the Atomic Energy Act of 1954.[53] Major changes from the 1946 Act included an increased emphasis on wider dissemination of atomic-energy information to make more of it accessible to U.S. industry and to the world. Access to more atomic-energy information by U.S. industry was necessary for the development of nuclear reactors for commercial production of electric power. U.S. industry showed considerable interest in the commercial possibilities of atomic energy, and Congress showed significant support for industry's participation in the development of atomic energy. This information was provided to the rest of the world as a consequence of President Eisenhower's Atoms For Peace initiative, which was presented in a speech to the United Nations on December 8, 1953, and the President's desire to provide certain RD concerning industrial applications of atomic energy to "friendly" nations.[54,*]

With the passage of the Atomic Energy Act of 1954, the United States had changed a basic assumption on atomic-energy information control. Whereas in the 1946 Act the assumption was that helping countries to build nuclear reactors helped them to build atomic weapons[†] and that such help should not be provided except under very special circumstances, the 1954 Act supported assistance to other nations to build reactors and relied on the use of safeguards to prevent diversion for military purposes.[55] Because of the generally accepted fact that nations with nuclear reactors would gain the capability to produce nuclear weapons,[‡,56] a consequence of the 1954 Atomic Energy Act was an implicit acceptance of the risk that nations that the United States provided with nuclear reactors would use them to make nuclear weapons.

With respect to atomic-energy-information *classification*, the Atomic Energy Act of 1954 substantively differed little from the 1946 Act. Atomic-energy information continued to be "born classified," and it remained in the total control of the AEC. Restricted Data was defined in the

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[*] See Richard G. Hewlett and Jack M. Hall, *Atoms for Peace and War, 1953-1961: Eisenhower and the Atomic Energy Commission*, Univ. of Calif. Press., Berkeley, 1989, for an extensive, well-documented, historical account of the efforts by industry and the Joint Committee on Atomic Energy to make nuclear-reactor information available (e.g., declassify that information) to industry for commercial-nuclear-power purposes. This was done with the knowledge that declassification of such information, providing it to industry, and providing it to other nations under the Atoms for Peace Program, would contribute to nuclear weapons proliferation.

[†] Senator Johnson was a member of the U.S. Senate committee that conducted hearings on the bill that later became the Atomic Energy Act of 1946. In January 1946, he stated: "This committee had many noted physicists and scientists before it . . . but I don't recall a single one . . . who did not say in almost these words . . . first, that it is impossible to separate the military uses of atomic energy from peacetime uses, that there is great difficulty in that; and, second, that the peacetime usage is a step towards military usage. You gather your uranium; you process it to a certain extent; you make plutonium out of it in the process of using it for power, and then it is only one small step–which they describe as being 75 percent along the way to a weapon–when you use uranium for peacetime power" (Sen. Johnson in *Atomic Energy Act of 1946*, Hearings Before the Special Committee on Atomic Energy, U.S. Senate, 79th Cong., 2nd Sess., on S. 1717, A Bill for the Development and Control of Atomic Energy, Part 2, Jan. 25, 28, 29, 30, 31, and February 1, 1946, U.S. Government Printing Office, Washington, D.C., 1946, p. 118).

General Groves' testimony was consistent with the above information. In November 1945, he had said that the development of atomic energy for peaceful purposes could not be separated from its use for weapons. He said that the hardest task in the Manhattan Project was obtaining the uranium or plutonium for the atomic bomb, not building the bomb once the materials were available (Gen. L. R. Groves in *Atomic Energy*, Hearings before the Special Committee on Atomic Energy, U.S. Senate, 79th Cong., lst Sess., Nov. 27–30, Dec. 3, 1945, U.S. Government Printing Office, Washington, D.C., 1946, pp. 52–53).

[‡] "[The peaceful atom program] has made the incremental cost of developing a nuclear weapon by a country who has the technological capability very low, considerably lower than if we didn't have a peaceful nuclear program going" [A. S. Fisher, "Panel—The Executive Views Classification Management," *J. Natl. Class. Mgmt. Soc.* **1** (2-4), 84-98 (1965), pp. 97-98].

1954 Act as "all data concerning (1) design, manufacture, or utilization of atomic weapons; (2) the production of special nuclear material; or (3) the use of special nuclear material in the production of energy, but shall not include data declassified or removed from the Restricted Data category pursuant to section 2162 of this title."[57] This definition of Restricted Data differed only slightly from that in the 1946 Atomic Energy Act, which stated that "the term 'restricted data' as used in this section means all data concerning the manufacture or utilization of atomic weapons, the production of fissionable material, or the use of fissionable material in the production of power, but shall not include any data which the Commission from time to time determines may be published without adversely affecting the common defense and security."[58] Note that the 1954 Act included information on the *design* of atomic weapons as being RD. The 1946 Act mentioned only information on the manufacture or utilization of atomic weapons as being RD. Also, the term "fissionable material" in the 1946 Act was replaced with the term "special nuclear material"[*] and its use in the production of "power" was replaced with production of "energy."

With respect to the control of information, the 1954 Act stated:

> It shall be the policy of the Commission to control the dissemination and declassification of Restricted Data in such a manner as to assure the common defense and security. Consistent with such policy the Commission shall be guided by the following principles:
>
> (a) Until effective and enforceable international safeguards against the use of atomic energy for destructive purposes have been established by an international arrangement, there shall be no exchange of Restricted Data with other nations except as authorized by section 2164 of this title; and
>
> (b) The dissemination of scientific and technical information relating to atomic energy should be permitted and encouraged so as to provide that free interchange of ideas and criticism which is essential to scientific and industrial progress and public understanding and to enlarge the fund of technical information.[59]

It is interesting to compare Sect. (b) with the comparable section of the 1946 Act, which stated that

> the dissemination of scientific and technical information relating to atomic energy should be permitted and encouraged so as to provide that free interchange of ideas and criticisms which is essential to scientific progress.[60]

The 1954 Act added "industrial progress," "public understanding," and "enlarge the fund of technical information" as reasons to disseminate atomic-energy information. Those additions provided the basis for the subsequent declassification or downgrading of much atomic-energy information.

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[*] The major reason for the change from "fissionable material" to "special nuclear material" was that the U.S. had begun a program directed toward the control of thermonuclear energy (nuclear fusion processes), and the term "special nuclear material" was meant to encompass fusion reactor fuel (e.g., tritium). [Senate Report No. 1699 on S3690, *Amending the Atomic Energy Act of 1946, As Amended, and for Other Purposes*, June 30, 1954, 83d Congress, 2d Sess., pp. 8–9, as reported in *Legislative History of the Atomic Energy Act of 1954 (Public Law 703, 83rd Congress)*, U.S. Atomic Energy Commission, Washington, D.C., Vol. 1, 1955, pp. 756–757.]

With respect to declassification of information, the 1954 Act stated:

> The Commission shall from time to time determine the data, within the definition of Restricted Data, which can be published without undue risk to the common defense and security and shall thereupon cause such data to be declassified and removed from the category of Restricted Data.[61]

The 1946 Act had permitted declassification of RD only when the AEC determined that it could be published without "adversely affecting the common defense and security."[*,62] The 1954 Act changed "adversely affecting" to "undue risk," thereby shifting the balancing test towards declassification of more information. The "without adversely affecting" test was a severe one. The "undue risk" test allows more judgment in a declassification decison[†] and was intended to allow declassification of more atomic-energy information.[63]

The increased emphasis of the 1954 Act in disseminating atomic energy information is further exemplified by a continuous review requirement:

> The Commission shall maintain a continuous review of Restricted Data and of any Classification Guides issued for the guidance of those in the atomic energy programs with respect to the areas of Restricted Data which have been declassified in order to determine which information may be declassified and removed from the category of Restricted Data without undue risk to the common defense and security.[64]

The 1954 Act allowed the removal of certain weapons-related information from the RD category and specified that this information could be placed in a new category (subsequently designated as Formerly Restricted Data,[‡] or FRD):

> The Commission shall remove from the Restricted Data category such data as the Commission and the Department of Defense jointly determine relates primarily to the military utilization of atomic weapons and which the Commission and the Department of Defense jointly determine can be adequately safeguarded as defense information: Provided, however, That no such data so removed from the Restricted Data category shall be transmitted or otherwise made available to any nation or regional defense organization, while such data remains defense information, except pursuant to an agreement for co-operation entered into in accordance with Section 2164(a) of this title.[65,§]

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[*] Although Congress considered the use of the term "national security," it finally settled on the terms "common defense and security" (C. Allardice and E. R. Trapnell, *The Atomic Energy Commission*, Praeger Publishers, New York, 1974, p. 140).

[†] Note that, with Restricted Data "born classified," in theory the only subjective classification decisions are those which arise during declassification actions, when one must determine what constitutes "undue risk to the common defense and security." With information classified under executive order, the subjective determinations arise during both classification and declassification.

[‡] The term "Formerly Restricted Data" has caused much confusion among personnel handling atomic-energy information. Since Restricted Data is classified information, then one might reasonably conclude that "Formerly Restricted Data," information that used to be Restricted Data (classified information), was no longer classified. However, FRD has been defined as another category of classified atomic-energy information, separate from RD.

[§] It is believed that the first "transclassification" of RD to FRD was approved by the AEC on June 12, 1956. Actually, the term "Formerly Restricted Data" may not have been invented by that date.

"Defense information" was defined by the Act to mean "any information in any category determined by any Government agency authorized to classify information respecting, relating to, or affecting the national defense."[*,66] This new FRD category of atomic energy information dealt dealt mainly with military *utilization* of nuclear weapons, not their design and development. FRD could be made accessible to military personnel on the basis of their military security clearances; special security clearances required for access to atomic energy information were not required.

The 1954 Act provided that RD placed in the FRD category may also be published (presumably after being declassified):

> In the case of Restricted Data which the Commission and the Department of Defense jointly determine to relate primarily to the military utilization of atomic weapons, the determination that such data may be published without constituting an unreasonable risk to the common defense and security shall be made by the Commission and the Department of Defense jointly, and if the Commission and the Department of Defense do not agree, the determination shall be made by the President.[67]

Note that the test for declassification of FRD is "unreasonable risk" as contrasted to "undue risk" for declassification of RD. The same "unreasonable risk" test is used in the sections of the 1954 Act dealing with international cooperation. Restricted Data may, if special conditions have been met, be shared with other nations if such sharing "will not constitute an unreasonable risk to the common defense and security."[68] Yet another test is described with regard to access to RD by employees of the AEC (now the Department of Energy and the Nuclear Regulatory Commission) and its contractors. For such access, a determination must be made that such access "will not endanger the common defense and security."[69]

Information concerning atomic-energy programs of other countries is also encompassed by the 1954 Act:

> The Commission shall remove from the Restricted Data category such information concerning the atomic energy programs of other nations as the Commission and the Director of the Central Intelligence Agency jointly determine to be necessary to carry out the provisions of Section 403(d) of Title 50 and can be adequately safeguarded as defense information.[70]

Thus, the Atomic Energy Act specifically implies that atomic-energy information originating from foreign countries is RD[†] and that this RD may be placed in the "classified national security information" category by joint DOE-Central Intelligence Agency (CIA) determination.[‡,§]

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[*] The current counterpart of "defense information" is "classified national security information" as defined by Executive Order 12958.

[†] An AEC *Guidebook for the Authorized Classifier* stated, with respect to Sect. 2162(e), that "indeed, the Act indicates that information on foreign atomic energy programs constitutes Restricted Data unless specifically removed from the Restricted Data Category by the Commission" (U.S. AEC, Division of Classification, issued about 1973, p. 2).

[‡] The Atomic Energy Act of 1954 is silent with respect to who has the authority to declassify this "classified national security information" that has been transclassified from the RD category.

[§] It is believed that the first transclassification of RD to NSI was approved by the AEC on September 22, 1954.

Prior to the Atomic Energy Act of 1954, access to RD by private persons for commercial purposes (e.g., development of commercial nuclear power reactors) was very limited. Generally, the only reason for allowing private persons to have access to such data was on a need-to-know basis, in connection with national-defense work. However, in 1951 the AEC initiated a program of "study group agreements" allowing private industry to participate on the study teams; eighteen such study teams had been established by December 1954.[71] Although the 1954 Act envisioned the commercial development of nuclear energy, the Act contained no express provisions permitting access to RD for commercial purposes. This hurdle was overcome when the AEC used its administrative powers to establish, on April 20, 1955, an Access Permit Program.[72,73] Under this program, a permittee is able to have access to RD "applicable to civil uses of atomic energy for use in his business, trade or profession."[74] A description of the Access Permit Program shortly after it was established is contained in an article by H. P. Green.[75]

The 1954 Act also encouraged wider dissemination of classified atomic-energy information to commercial enterprises by establishing different kinds of personnel clearances that depended upon the classification of the information that an individual could receive. Full clearances (access to any classified data) continued to require "Q" clearances, but under the 1954 Act the Commission established "L" (limited" access) clearances whose holder could have access to Confidential atomic-energy information (also termed, at that time, "gray areas" of information).[76]

The cumulative effect of the above-mentioned changes in the Atomic Energy Act were substantial, although the statutory expression of policy changes were mostly implicit, rather than explicit, in the 1954 Act.[77] The Atomic Energy Act of 1954 neither significantly changed the definition of RD nor relinquished the AEC's statutory control of RD. However, the Act loosened restrictions on providing RD or FRD to others and on its declassification, thereby ultimately releasing much atomic-energy information to the public.

The Energy Reorganization Act of 1974[78] divided the AEC into the Energy Research and Development Administration (ERDA) and the Nuclear Regulatory Commission. ERDA became operational on January 19, 1975.[79] One major purpose of the split was to separate the regulation of commercial uses of atomic energy from the government's programs that promoted such uses. ERDA was assigned authority for the control and declassification of atomic-energy information. ERDA was abolished by the Department of Energy Organization Act of August 4, 1977,[80] and its activities were assigned to the Department of Energy (DOE). Statutory authority to declassify RD and FRD was assigned to the Secretary of Energy. That authority was subsequently delegated to the Director of Security Affairs.

DEPARTMENT OF ENERGY CLASSIFICATION REGULATIONS - 10 CFR 1045

In 1998, DOE published regulations concerning its policies and procedures on the identification of classified information and its declassification.[81] Those regulations encompassed RD and FRD as well as information classified under Executive Order 12958. This was the first time that regulations on classification and declassification of RD and FRD were codified by DOE or its predecessors.

Section 1045.15 of the regulations establishes presumptions about classification and declassification. Information in 14 identified areas is to be presumed unclassified unless application of specified criteria indicate otherwise. Information in 6 identified areas is presumed to be classified unless application of specific criteria indicate otherwise.

Criteria for evaluating information with respect to RD and FRD matters are in Sect. 1045.16. Section 1048.16(d) lists six criteria to be considered when determining whether to "classify" information as RD or FRD or whether to declassify RD or FRD. One "directive" in Section 1045.16 is particularly noteworthy:[82]

> The DOE Director of Declassification shall not classify information and the DOE Director of Security Affairs shall declassify information if there is significant doubt about the need to classify the information.

This "directive" implies that an individual has authority to "classify" information as RD or FRD. However, such classification is by the Atomic Energy Act (RD and FRD are "born classified"). In practice, when newly identified atomic-energy information[*] is evaluated to determine whether it fits within the definition of RD or FRD, then it is also evaluated (if it fits within that definition) to determine whether it should be classified (i.e., to determine whether it can be immediately "declassified"). The Director of Declassification determines whether newly identified atomic-energy information is RD or FRD. The Director of Security Affairs is the only authority who can make the declassification decision. Therefore, in order to comply with the Atomic Energy Act, the above-quoted section should read "The DOE Director of Declassification shall not *determine that information falls within the definition of RD* and the DOE Director of Security Affairs shall declassify information if there is significant doubt about the need to classify the information." However, there is "significant doubt" that the Atomic Energy Act allows the Director of Declassification such discretion or whether the Director of Security Affairs can use such a standard to declassify RD.

Another section of this regulation that is of interest is Sect. 1045.18. That section states that the Director of Declassification may evaluate newly generated information in a previously declassified subject area and classify it as RD if warranted and if the information has not been widely disseminated in the public domain. Previous interpretations of the Atomic Energy Act were that once RD was declassified, it could not be reclassified.

UNCLASSIFIED INFORMATION CONTROLLED BY THE ATOMIC ENERGY ACT

Because this chapter concerns classification under the Atomic Energy Act, a section entitled "Unclassified Information Controlled by the Atomic Energy Act" may seem out of place. However, two sections of the Atomic Energy Act of 1954, as amended, specifically permit the control of unclassified information related to atomic-energy matters. The first such section, Sect. 147, "Safeguards Information," was added in 1980 at the request of the Nuclear Regulatory

[*] In this context, "newly identified atomic-energy information" means atomic-energy information that has not previously been evaluated to determine if it falls within the Atomic Energy Act's definition of RD.

Commission (NRC). The second such section, Sect. 148, was added in 1981 at the request of DOE. Those two types of controlled atomic-energy information will be discussed in the following subsections.

Safeguards Information

In the late 1970s, the NRC concluded that, in the interest of public health and safety, it was desirable to protect certain unclassified information on safeguarding special nuclear material.* The information was licensee information about protection, against sabotage or other terrorist acts, of nuclear facilities (e.g., commercial nuclear power reactors), of the shipment and storage of reactor fuels (new and highly radioactive spent fuel), and of other licensee activities. Although the NRC had authority under then-applicable Executive Order 12065[83] to classify United States Government programs for safeguarding nuclear materials or facilities, the information of concern to the NRC did not concern a government progam. Therefore, the NRC sought specific statutory authority to protect this type of *unclassified* information. Congress granted this authority in 1980 by adding Sect. 147[84] to the Atomic Energy Act.

Section 147 of the Atomic Energy Act gave the NRC authority, for materials and facilities under NRC cognizance (i.e., commercial nuclear production or utilization facilities), to control certain information (i.e., "Safeguards Information") concerning (1) safeguards or security measures for the physical protection of special nuclear material at fixed sites or in transit; (2) security measures for the physical protection of source material or by-product material at fixed sites or in transit; and (3) security measures for the physical protection of and location of certain plant equipment vital to the safety of production or utilization facilities involving special nuclear material, source material, or by-product material.

Safeguards Information (not usually owned by the government) was defined by the NRC as:[85]

> [I]nformation not otherwise classified as National Security Information [currently, "classified national security information"] or Restricted Data which specifically identifies a licensee's or applicant's detailed (1) security measures for the physical protection of special nuclear material, or (2) security measures for the physical protection and location of certain plant equipment vital to the safety of production or utilization facilities.

Section 147 of the Atomic Energy Act prohibits the unauthorized disclosure of certain Safeguards Information "if the unauthorized disclosure of such information could reasonably be expected to have a significant adverse effect on the health and safety of the public or the common defense and security by significantly increasing the likelihood of theft, diversion, or sabotage of such material or such facility."[86]

Concerning the adverse-effect test, it is interesting that the initial version of Sect. 147 had a broader standard under which the NRC could withhold information. That standard was that the

* "Special nuclear material means: (1) Plutonium, uranium-233, uranium enriched in the isotope U^{233} or in the isotope U^{235}, and any other material which the Commission, pursuant to the provisions of section 51 of the Atomic Energy Act of 1954, as amended, determines to be special nuclear material, but does not include source material; or (2) Any material artificially enriched by any of the foregoing, but does not include source material." [10 CFR §74.4]

unauthorized disclosure "could have a significant adverse effect."[87] The Senate-House Conference Committee was concerned that this "could have" standard would allow the NRC "to withhold information without demonstrating even the slightest probability that disclosure of the information would have a significant adverse effect."[88] An "is likely to" standard was considered as an alternative but was rejected because that standard would require the NRC "to find that there would be a better than 50-50 chance that a significant adverse effect would result from the disclosure."[89] Congress adopted as the standard "could reasonably be expected to have" because that standard had been applied by judicial interpretation to another statutory exemption from the Freedom of Information Act (FOIA) [Phillippi v. CIA, 546 F.2d 1009 (D.C. Cir 1976)] and because it was the standard used in Executive Order 12065 (a predecessor of Executive Order 12958) to protect classified national security information from disclosure.[90] The "could reasonably be expected to have" standard requires showing some probability that unauthorized disclosure would have a significant adverse effect but does not require a showing that there would be a greater than 50-50 chance of such an adverse effect.[91]

Section 147 is codified in the U.S. Code at 42 U.S.C. Sect. 2167. The NRC's requirements for the protection of certain Safeguards Information are given in 10 CFR Part 73, §73.21. The initial version of §73.21 required all Safeguards Information to be protected against unauthorized disclosure.[92] Subsequently, the scope of the regulations was reduced so that the regulations are imposed only upon licensees who handle "a formula quantity of strategic special nuclear material,"[*] more than 100 grams of irradiated reactor fuel, or operate a nuclear reactor, and upon others who possess Safeguards Information.[93]

Unclassified Controlled Nuclear Information

Seventeen months after granting the NRC authority to control certain unclassified information as Safeguards Information, Congress added Sect. 148 to the Atomic Energy Act, thus granting to DOE information-control authority comparable to that granted to the NRC by Sect. 147 (i.e., authority to control certain unclassified information concerning security measures for the physical protection of production and utilization facilities, nuclear material in those facilities, and nuclear material in transit). *However*, additional information-control authority was granted to DOE in Sect. 148 so that it was much broader in scope than Sect. 147. Section 148 allowed DOE to control certain technical information in addition to safeguards and security information [i.e., authority to control (1) certain production and utilization facility design information; and (2) certain information concerning the design, manufacture, or utilization of any atomic weapon or component if that information was once Restricted Data (RD) but which had been declassified or removed from the RD category]. Atomic-energy information controlled under Sect. 148 is termed Unclassified Controlled Nuclear Information (UCNI).

The Atomic Energy Act Sect. 148 authority to control declassified RD represented a significant departure from past practices with respect to the control of atomic-energy information. Prior to the addition of Sect. 148, declassified RD could not be controlled by the

[*] "Strategic special nuclear material" means uranium-235 (contained in uranium enriched to 20% or more in the U-235 isotope), uranium-233, or plutonium. [10 CFR §73.2(aa)] "Formula quantity" means strategic special nuclear material in any combination in a quantity of 5000 grams or more computed by the formula, grams = (grams contained U-235) + 2.5(grams U-233 + grams plutonium). [10 CFR §73.2(bb)]

government.* This is in contrast to declassified information that was originally classified under an Executive Order (formerly designated as National Security Information, or NSI, now called "classified national security information"), which can be reclassified under certain circumstances.† More recently (i.e., effective June 29, 1998), DOE regulation 10 CFR Part 1045, *Nuclear Classification and Declassification*, permits reclassification of *newly generated* information in a previously declassified subject area (but not if that information has been widely disseminated in the public domain).[94]

In the early 1980s, some governmental control over declassified RD seemed appropriate because of the realization that some RD that had been declassified during the extensive declassifications of RD in the years 1955 through 1978, in retrospect should not have been declassified. Principal incentives for declassification during that period included the desire to "commercialize" nuclear energy for the production of electricity and other purposes and to exert some influence over the development of nuclear energy in other nations.‡ However, in some

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* The Atomic Energy Act, and its predecessor Atomic Energy Act of 1946, was very explicit in stating that RD within the U.S. was controlled exclusively by that Act. Chapter 12 (Sects. 141-146) of the Atomic Energy Act dealt with the control of RD, and Sect. 146(a) stated that:

> Sections 141 to 145, inclusive, shall not exclude the applicable provisions of any other laws, except that no Government agency shall take any action under such other laws inconsistent with the provisions of those sections. [Atomic Energy Act of 1954, 68 Stat. 943; 42 U.S.C. §2166(a).]

The equivalent of Sect. 146(a) was in the Atomic Energy Act of 1946 [Atomic Energy Act of 1946, §10(b)(6), 60 Stat. 768 (August 1, 1946)]. Note that the second part of Sect 146(a) states that the Atomic Energy Act provisions for the control of RD take precedence over any other law.

Section 146(b) of the Atomic Energy Act stated that:

> The [Department of Energy] shall have no power to control or restrict the dissemination of information other than as granted by this or any other law. [Atomic Energy Act of 1954, 68 Stat. 943; 42 U.S.C. §2166(b).]

Section 146(b) was not present in the Atomic Energy Act of 1946. The Report of the Joint Committee on Atomic Energy on the proposed Atomic Energy Act stated that "Section 146 continues the application to restricted data and to persons in the atomic energy program of other laws relating to the protection of information. It also forbids the [Department of Energy] from controlling or restricting any information outside of any powers granted by any law." [*Amending the Atomic Energy Act of 1946, as Amended, and for Other Purposes*, Senate Report No. 1699 on S. 3690, U.S. Senate, 83d Cong., 2d Sess., June 30, 1954, p. 24.] Section 146(b) indicates, and has been so interpreted by the government [See, for example, F. N. Parks, "Classification and the Atomic Energy Act," in *Proceedings of the First Classification Symposium*, (Official Use Only), U.S. Atomic Energy Commission, Washington, D.C., March 16, 17, 18, 1965, p. 58], that when RD was declassified, it could not be reclassified or otherwise controlled because a determination had been made that its dissemination could not cause adverse effects.

Therefore, the addition of Sect. 148 to the Atomic Energy Act represented a major departure from past practice and allowed declassified RD to again be controlled by the Government.

†Executive Order 12958 permits reclassification, in certain circumstances, of declassified information "that has not previously been disclosed to the public under proper authority." [Exec. Order No. 12958,§1.8(d)]

‡ Addressing this point in a speech before the Executive Club of Chicago on February 5, 1965, Glenn T. Seaborg, Chairman of the Atomic Energy Commission, stated:

> There were many who felt in the early days, as some feel today, that we could somehow hold back the hands of time–arrest scientific progress–and not cooperate with other countries in providing this nuclear technology and materials for peaceful purposes. Science cannot for long be kept under lock and key. We knew that other countries could independently achieve a nuclear capability. We also knew that many countries of the world had their own supplies of natural uranium and, perhaps more importantly, their own scientists. We also considered that if we failed to cooperate in sharing our peaceful nuclear technology and nuclear materials, there would be other countries which might be willing to provide nuclear materials and technology without a firm assurance as to their eventual peaceful end use.

The task of the United States has thus become not a matter of forbidding the further spread of nuclear science, but rather one of helping other nations to develop the peaceful uses of nuclear energy while, at the same time, encouraging the development of a system of international controls, or safeguards, to guarantee the peaceful use of nuclear equipment and materials supplied between nations. [As reported in "Remarks," by G. F. Tape, Commissioner, U.S. Atomic Energy Commission, in *Proceedings of the First Classification Symposium*, (Official Use Only), March 16, 17, 18, 1965, U. S. Atomic Energy Commission, Washington, D.C., pp. 73-74.]

instances, declassification proceeded further than subsequently proved desirable. Some declassified RD provided greater-than-expected assistance towards proliferation of nuclear-weapons capabilities in other countries. India's "peaceful" nuclear explosion in 1974 was one factor that contributed to the increased proliferation concerns. The inability to reclassify declassified RD of nuclear-weapon-proliferation significance was probably the reason Congress gave DOE the Sect. 148 authority to control certain declassified RD.

The Sect. 148 authority for DOE to control certain unclassified atomic-energy information was somewhat reduced in scope by a 1983 amendment[95] to Sect. 148 that limited the application of Sect. 148 to information concerning "atomic energy defense programs."[*]

Section 148(a)(1) of the Atomic Energy Act gives DOE the authority, with respect to atomic-energy defense programs, to prohibit the unauthorized dissemination of unclassified information pertaining to:

> (A) the design of production facilities or utilization facilities;
>
> (B) security measures (including security plans, procedures, and equipment) for the physical protection of (i) production or utilization facilities, (ii) nuclear material contained in such facilities, or (iii) nuclear material in transit; or
>
> (C) the design, manufacture, or utilization of any atomic weapon or component if the design, manufacture, or utilization of such weapon or component was contained in any information declassified or removed from the Restricted Data category by the Secretary (or the head of the predecessor agency of the Department of Energy) pursuant to section 142.

Section 148(a)(2) stated that this prohibition could be instituted only if the unauthorized dissemination of such information could reasonably be expected to have a significant adverse effect on the health and safety of the public or the common defense and security by significantly increasing the likelihood of (1) illegal production of nuclear weapons or (2) theft, diversion, or sabotage of nuclear materials, equipment, or facilities.

The Sect. 148(a)(2) "adverse-effect test" for determining whether information is UCNI is essentially similar to the adverse-effect test in Sect. 147 except that Sect. 147 is limited to "theft, diversion, or sabotage" while Sect. 148 also includes "illegal production of nuclear weapons."

Section 148 is codified in the U.S. Code at Sect. 2168. Regulations implementing Sect. 148 are contained in the Code of Federal Regulations at 10 CFR Part 1017, *Identification and Protection of Unclassified Controlled Nuclear Information*. There are two significant requirements imposed by the regulations that are not in the statute. The first is the requirement that, to be controlled as UCNI, the information has to be government information [10 CFR 1017.6(a)(1)]. The second is that documents or materials that have been widely disseminated in

[*] That limitation was part of Sect. 148 as introduced into the Senate in 1981 [*Congressional Record* **127**, 26304 (Nov. 3, 1981)] and as passed by the Senate. However, that limitation and two subsections of Sect. 148 were dropped during subsequent conference with the House of Representatives with respect to the 1981 enactment but were restored to Sect. 148 by the 1983 amendment. [*Congressional Record* **128**, 4865 (Mar. 22,1982).]

the public domain (e.g., to a public library or university library) can not be controlled as UCNI [10 CFR 1017.6(b)(2)]. However, dissemination in the public domain of a document that contains UCNI does not preclude control of the same information as UCNI in another document. DOE policies and procedures for the identification of UCNI are contained in DOE Order 471.1A, *Identification and Protection of Unclassified Controlled Nuclear Information*.

Many criticisms have been made about UCNI. DOE initiated a Fundamental Classification Policy Review in 1995, which also encompassed a review of UCNI policy. The final report of that review group recommended that "the use of UCNI should be limited to nuclear safeguards and physical security information that is clearly unclassified."[96] With respect to scientific and technical information, the review group stated that "if information needs to be withheld for reasons of national security, it should remain classified."[97] Because declassified atomic energy information cannot be reclassified (see above), the review group recommended that the Atomic Energy Act be revised to allow reclassification of declassified information under certain circumstances.[98]

It should be noted that there have been six major reviews of DOE atomic-energy information-control matters since 1988, and all have essentially agreed that there is some unclassified atomic-energy information that needs to be controlled for nuclear-weapon-proliferation reasons.

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