



DOE Openness: Human Radiation Experiments: Roadmap to the Project

## DOE Roadmap


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## Chapter 2. Narratives and Records Series Descriptions

### Introduction

This chapter contains two kinds of information. The first consists of brief narrative histories that discuss the involvement of the Department of Energy (DOE) and its predecessor agencies with human radiation experiments. These histories cover agency headquarters elements and the various field sites that had significant involvement in experiment activities.

The second category of information is series descriptions for groups of original records that are pertinent to either individual experiments or to the organizational context in which they took place. Since many of these records still reside at DOE sites, series descriptions are appended to the narrative for each facility. Where records are not in the custody of DOE, they are listed under their custodial organization (such as the National Archives).

### The Narratives

Narratives are included for nine different DOE organizations and facilities, past and present. Two universities that operated under contract with the Government are also discussed. These organizations had the most significant involvement in human radiation experiments sponsored or conducted by DOE and its predecessors. Summaries of the sites= current activities, their history, and their role in experimentation are provided. This summary approach was adopted for both conceptual and practical reasons. Conceptually, DOE's task was to find pertinent records and make them available. Judgements drawn from this material are made by independent bodies, including the Advisory Committee on Human Radiation Experiments.

From a practical perspective, summary narratives also present useful contextual information for the records series descriptions. Archivists typically use "scope and background statements" in published finding aids to help researchers better understand an organization's records. It is, for example, important to know when an organization began, what its purpose was, what its principal parts were, and how it changed over the years. Such information helps researchers plan a records search.

## The Records Series Descriptions

Records series are groups of related files, such as a hospital's medical records or a laboratory's research notebooks. A series can be small (one binder or notebook), large (100+ boxes of files), or any size in between. The determining factor is how the records were created and maintained. Records series descriptions are a technique for effectively cataloging large collections. Such a catalog provides intellectual control: it tells people where specific records are and what is in them. For many years, the National Archives and Records Administration (NARA) and other archival institutions have used the concept of records series to manage historical records.

DOE chose to develop records series descriptions for human radiation experiment-related records because it was the best method for quickly gaining control over the Department's vast holdings. Dozens of DOE records collections spread around the Nation may have useful information. Often, a document by document search was required. A requisite for the assignment of national priorities for the search was to gain an overview of the records universe and identify the most important collections. DOE also recognized that the credibility of the search is enhanced by leaving behind a record of what was done and a means for others to take it further. The series will permit independent record searches, provide long-term public access, and aid in transferring DOE records to archival custody.

In compiling the series descriptions, the intention was to cover as many collections relating to human radiation experiments as possible. Some collections may have eluded the search. If new materials are found, they will be added to the listings below and their availability publicized.

It is recognized that there are inconsistencies in the records series. These differences reflect varying histories, cultures, and recordkeeping practices throughout the agency. The goal is to present uniform and accurate information about each series. We encourage individuals to give us more and better information: this listing will be updated through a sustained dialog with its users.

The listed records series have been culled from the larger DOE records universe. For example, records relating to occupational radiation exposures, plant production emissions, nuclear weapons testing, waste management, environmental monitoring, general administration, and many other topics have not routinely been included. While occasionally the project scope expanded to include documents requested by the Advisory Committee, the search focused on activities relating to human radiation experiments and intentional radiation releases as defined in the January 1994 White

House guidance.

***Dozens of DOE records collections spread around the Nation may have useful information.***

The difference between document collections and records series is important. Part of the DOE project has involved copying significant individual documents and providing them to interested parties, including the Advisory Committee. A collection containing electronic document images and indexes has been created, consisting of about 150,000 pages. This collection is available on the Internet through the DOE/OHRE Home Page. (World Wide Web address: <http://www.eh.doe.gov/home.htm>) Users should understand that these individual documents represent only a fraction of the records covered by the series descriptions. Researchers may wish to use both the special document collection and the original files.

Finally, it should be understood that the records represented by the series descriptions are not instantly accessible. Most are still kept in agency warehouses and basements, and some contain classified documents that will require declassification before they are publicly available. Other restrictions, such as personal privacy, may also apply to some files. Those wishing to use records described in this guide--except those in the legal custody of the National Archives and Records Administration--should contact the DOE Office of Human Radiation Experiments at (202) 254-5020. We will work with the custodial organizations to facilitate access. Note that records at NARA are typically open for use; some files are classified, but DOE is systematically reviewing those files for declassification.

## **DOE Predecessor Agencies and Human Radiation Experiments: A Headquarters Overview**

### **Introduction**

DOE inherited a legacy of human radiation experiments from predecessor agencies, including the Manhattan Engineer District (MED) and the Atomic Energy Commission (AEC). The Manhattan Project engaged in human radiation experimentation as part of its mission to build the atomic bomb. This mission included studying the health effects and hazards posed by nuclear energy. The AEC, postwar successor to the MED, had jurisdiction over both peaceful and military nuclear development and investigated related biomedical issues.

Shortly after the war's end, cancer research assumed a prominent place on the national agenda. At the direction of Congress, the

AEC funded considerable research into cancer diagnosis and therapy. After the AEC was abolished in 1975, the Energy Research and Development Administration (ERDA) briefly had responsibility for all AEC functions except those related to nuclear regulation, which devolved upon the Nuclear Regulatory Commission (NRC). DOE came into existence in 1977 and in turn assumed responsibility for nuclear biomedical research and weapons production.

***The Manhattan Project engaged in human radiation experimentation as part of its mission to build the atomic bomb.***

Attempts to understand radiation and its impact on the human body began shortly after the discovery of x rays in 1895. The Federal government, however, did not sponsor human radiation experimentation until the Manhattan Project was on the verge of building the atomic bomb. This project required development of a new industry that created hazardous radioactive materials, some of which did not exist until the war effort. MED biomedical researchers began research and experimentation with animals to establish exposure standards for the workers. Yet animal experimentation proved incapable of providing all needed data. The Manhattan Project leadership therefore authorized studies with radioactive materials in human subjects.

**Origins of the Manhattan Project**

In December 1938, while conducting experiments in their Berlin laboratory, German scientists Otto Hahn and Fritz Strassman discovered that uranium could be broken into two lighter elements while releasing energy. Scientists soon realized that this "fission" process could release enormous amounts of energy, providing the basis for a weapon of unprecedented explosive power. American scientists quickly grasped this possibility when news of the discovery of fission crossed the Atlantic.

A month after Nazi Germany invaded Poland, Albert Einstein wrote President Roosevelt urging the President to launch a program to build atomic weapons. Spurred by the possibility that the Germans could already be working on an atomic bomb, Roosevelt organized an advisory committee that began considering how to separate the fissionable isotope of uranium from uranium ore. Soon after Glenn Seaborg of the University of California and his colleagues discovered plutonium in 1941, the committee expanded its scope to explore the feasibility of large-scale production of this second fissionable metal.

The uranium and plutonium projects began slowly due to the great technical and logistical problems involved. In June 1942, Vannevar Bush and James B. Conant, who led the bomb project,

recommended that the country commit all possible resources to production of an atomic bomb. Bush and Conant further suggested that the Army run the project. Roosevelt agreed, and in August 1942 the Army Corps of Engineers established the Manhattan Project to build an atomic bomb as quickly as possible.

### **Creating a New Industry**

The task called for creation of an enterprise greater in scope and complexity than any single contemporary private industry on "a pressing, almost desperate time schedule." Moreover, the project would incorporate new industrial processes and would have to deal with radioactivity on a previously unknown scale. Nevertheless, given the exigencies of wartime, the leader of the Manhattan Engineer District, General Leslie Groves, decided to bypass pilot plant stage and go directly to full production.

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Unsure which (if any) would succeed, the Manhattan Project simultaneously pursued three methods to produce the fissionable isotope of uranium: electromagnetic separation, gaseous diffusion, and thermal diffusion. Plants for all three were built at Oak Ridge, a thinly settled area in eastern Tennessee selected by the Government as an atomic reservation. Hanford, a large arid tract in eastern Washington bounded by the Columbia River, was selected for the plutonium project. Nuclear reactors, a plutonium separation plant, and a variety of associated facilities were constructed there. These sites were chosen for their access to water and power and for their remoteness, which enhanced security. Virtual armies of workers moved into Oak Ridge and Hanford to construct and operate plants. To design a weapon, the Manhattan Project built a separate research laboratory at Los Alamos, NM.

### **Wartime Medical Problems**

Creating the atomic bomb involved many unique and little-understood health hazards. The most novel was radiation. Scientists knew that radiation was hazardous; for example, the health effects suffered by radium dial painters earlier in the century had been well documented. What was not known was how much radiation would harm workers.

*But the plutonium work, which produced highly radioactive and toxic materials, presented the greatest hazards.*

Other hazards included chemical agents, high-voltage electricity,

and the potential for explosions in experimental work that involved the use of gas and liquids under great pressure. To protect workers from these hazards, the Manhattan Project organized a Medical Section.

The Medical Section's most immediate problem was to identify and control the hazards associated with the various production processes. Data were collected on the potentially damaging effects of radioactive and toxic materials. The medical personnel provided advice on the design of plants and production processes and prepared to treat cases of radiation and chemical poisoning. Because the Manhattan Project oversaw entire communities at Oak Ridge, Hanford and Los Alamos, the Medical Section also ran clinical medicine programs to treat a variety of routine health problems. But the plutonium work, which produced highly radioactive and toxic materials, presented the greatest hazards.

### **The Plutonium Injection Experiments**

Most project medical research involved experimentation with animals through programs established at the University of Rochester and elsewhere. Manhattan Project researchers, however, also used humans as research subjects; the most widely known example of this is the plutonium injection experiments.

As early as January 1944, Glenn Seaborg warned that "the physiological hazards" of plutonium might "be very great" and suggested that "a program to trace the course of plutonium in the body should begin as soon as possible." Animal studies had shown plutonium to be toxic and that different species excreted it from the body at different rates. Project physicians therefore wanted human data to obtain reliable information for the establishment of exposure levels for workers. In presenting these considerations to Los Alamos laboratory director J. Robert Oppenheimer on March 26, 1945, Louis Hempelmann asked that the MED "help make arrangements for a human tracer experiment." Such arrangements were made, and a series of human experiments began in 1945. (See the section, "Human Plutonium Injection Experiments," under Topical Areas later in this chapter.)

Other human radiation experimentation was conducted under the Manhattan Project. In the mid-1940s, University of Rochester researchers gave five patients radioactive polonium to obtain excretion data. Rochester researchers also injected six patients with uranium salts to investigate the metabolism of uranium by the body and to observe its effect on kidney function. To detect radiation skin effects, MED contractor researchers in Tennessee also exposed 10 subjects to beta radiation. (Individual experiments are detailed in Chapter 3.)

## Distribution of Radioisotopes

The Manhattan Project also assisted postwar radiation experiments by non-Government physicians and researchers. In 1946, Oak Ridge began shipping radioisotopes to private physicians and other researchers. This distribution made radioisotopes available in far greater quantities and at much lower cost than previously. The isotope distribution program was the earliest, and for many years the most successful, aspect of the postwar promotion of "the peaceful atom." Researchers used isotopes to study the body's metabolic processes and to conduct experimental treatments for diseases, principally cancer. Some of this work involved experimentation with human subjects. The same distribution program provided isotopes to agency and contractor researchers.

## Creation of the Atomic Energy Commission

Because the atomic bomb was a wartime military project, the Manhattan Project had built its facilities behind a curtain of secrecy. It was only with the bombing of Japan that the American public learned about the project. After the war, President Truman submitted legislation to Congress to set up a permanent atomic energy program under military control. After vigorous debate, however, Congress decided to charge a civilian agency with atomic energy and weapons development. The Atomic Energy Act of 1946 created the Atomic Energy Commission (AEC) to oversee both peaceful and military development of the atom. The law also created the Joint Committee on Atomic Energy to provide congressional oversight. Reflecting increasing tensions with the Soviet Union, the Atomic Energy Act ordered the AEC to develop atomic energy 'subject at all times to the paramount objective of ensuring the common defense and security.' In its early years, the AEC's overriding task was the development of a nuclear weapons arsenal.

In January 1947, the AEC inherited the programs of the Manhattan Project. Coming to the agency were 254 officers; 1,688 enlisted men; 3,950 Government workers; 37,800 contractor employees; and plants and laboratories worth over \$1 billion. The major facilities included the Los Alamos laboratory, the Oak Ridge enriched-uranium production plants, and the Hanford plutonium production complex. The AEC also assumed responsibility for uranium mining and refining activities. In addition, nonmilitary atomic research laboratories were under development at Argonne, near Chicago; Brookhaven on Long Island; and Oak Ridge.

***Some information, such as medical research and treatment with radioisotopes, was openly available. Despite these exceptions, most atomic energy activities remained behind a congressionally mandated wall of secrecy.***

The Atomic Energy Act of 1946 gave the agency responsibility for atomic energy activities from weapons production to scientific and medical research. The act also placed security restrictions on most information pertinent to atomic-energy development. Legally mandated classification restrictions applied to biomedical information associated with uranium or plutonium production, weapons production, or weapons design. Some information, such as medical research and treatment with radioisotopes, was openly available. Despite these exceptions, most atomic energy activities remained behind a congressionally mandated wall of secrecy.

The Manhattan Project had used a small headquarters staff to oversee the operation of atomic energy facilities throughout the country. The AEC continued this practice, leaving substantial responsibility with agency and contractor field facilities. In some areas, such as weapons research and development, the AEC commissioners maintained central management control. In other areas, such as biomedical research, the AEC exercised less management oversight.

### **Medical Problems Facing the AEC**

During the war, the Manhattan Project medical program gained only preliminary information about the hazards of radioactive substances. There was a desire to find out much more about how uranium, plutonium, and other fission products acted in the human body: What amounts of radioactive dusts and gases were harmful to man? Exactly how toxic were uranium, plutonium, and their compounds? What was the most hazardous means by which radioactive substances were introduced into the body--by ingestion, by inhalation, or by skin absorption? Physicians had no means available to stop or delay radiation injuries, nor did they possess therapeutic measures to treat injury from radioactive substances. To address these issues, an organizational unit to do the work was required.

### **The AEC and Human Radiation Experimentation, 1940s-1950s**

The Atomic Energy Act mandated four AEC program divisions: military applications, production, research, and engineering. This arrangement left the agency temporarily without an organization to oversee biomedical research, but the AEC extended ongoing research on an interim basis. An Advisory Committee on Biology and Medicine was established in 1947, and a Division of Biology and Medicine in 1948. The AEC charged the new division with overseeing biomedical research programs, including human experimentation. Until the closed communities of Los Alamos, Oak Ridge, and Hanford were opened, the division also supervised clinical medicine programs for the treatment of resident workers



and their families. By fiscal year 1949, the division was managing an operating budget of \$14.6 million.

Although the AEC biomedical division was charged with protecting the public from the hazards of atomic energy, its initial focus continued to be upon atomic workers. Thus, one area of human subject research in which the AEC built upon precedents was investigation of the biomedical hazards of uranium, plutonium, and fission products. Biomedical research projects devoted to investigating these hazards were authorized at the Argonne, Brookhaven, and Los Alamos Laboratories, and at the University of Rochester, the University of California (Berkeley and Los Angeles), Columbia University, and Case Western Reserve University. Most of these research projects involved experimentation with animals.

Another area in which the AEC built upon Manhattan Project foundations was isotope distribution, headquartered in Oak Ridge. The AEC stimulated private research with radioisotopes by providing funding to private physicians and researchers. The isotope distribution program was the AEC's first significant peaceful application of nuclear science, and the agency vigorously promoted it. By the end of 1954, Oak Ridge had made 64,202 shipments of radioisotopes, most to non-Government institutions. Some of this research involved human subjects.

***Popular and scientific interest in the potential uses for radiation in cancer treatment was growing.***

In other areas, the AEC broke new ground. Perhaps, the most visible of these was the use of radiation in cancer therapy. Popular and scientific interest in the potential uses for radiation in cancer treatment was growing as the AEC came into being. In 1948, Congress gave the AEC \$5 million for the express purpose of developing a cancer research program. With the funds, the AEC built cancer research hospitals at the University of Chicago, Brookhaven Laboratory, and the Oak Ridge Institute of Nuclear Studies.

Cancer therapy was not the only new area of AEC sponsored or supported human radiation studies in the late 1940s and 1950s. Calibration of improved radiation measuring equipment involved volunteers ingesting small amounts of radioactive material. The AEC also sponsored human x-ray tests and studies of skin absorption of radioactive substances, and also began studying radium dial painters and other groups who ingested radium before World War II.

**The AEC and Human Subject Consent, 1940s-1950s**

To establish guidance for private research using radioisotopes on people, the AEC looked to its Subcommittee on Human Applications. The subcommittee, part of the larger Committee on Isotope Distribution, drew up a list of radioisotopes deemed safe for use in humans. The subcommittee also compiled lists of medical schools, hospitals, clinics, and other institutions qualified to conduct human radioisotope research. After the subcommittee reviewed an institution's qualifications and granted approval for use of an isotope in human research, the subcommittee expected each institution to form a local use committee to monitor individual research projects. This procedure limited AEC oversight of the clinical procedures and ethical practices of individual private physicians who used radioisotopes for human subject research. There was no requirement imposed by the AEC that private researchers obtain consent from subjects.

Ethical issues were, however, considered in the context of research performed directly by AEC employees or in AEC-owned, contractor-operated facilities. In an April 1947 letter to Stafford Warren, chairman of the Interim Medical Advisory Committee, AEC General Manager Carroll Wilson stated that radiation should not be administered to medical patients unless there was "expectation that it may have therapeutic effect." Any human experimentation would have to be susceptible of proof from official records that the patient was "in an understanding state of mind, was clearly informed of the nature of the treatment and its possible effects, and expressed his willingness to receive the treatment."

While written consent from the patient was not required, doctors were instructed to attest that the subject had willingly consented. Wilson's directive applied to AEC officials and to employees of its contractor-operated facilities.

The record does not show that the AEC distributed or enforced Wilson's policy. Indeed, the directive was quickly superseded. During March 1951, Shields Warren, the first director of the AEC Division of Biology and Medicine, listed "guiding principles" for human experimentation for a Los Alamos Laboratory official. Warren drew upon another Wilson letter, a report from the AEC's Medical Board of Review, minutes of the September 1948 meeting of the Advisory Committee on Biology and Medicine, and his own experiences. Warren did not mention or refer to Wilson's April 1947 directive. Warren's principles for human subject research included five requirements:

1. There must be hope of therapeutic benefit;
2. There must be a provision requiring written informed consent;
3. The subject would have the right to revoke consent at any time during an experiment;

4. The research must require only limited use of classification or secrecy; and
5. Any experimental work involving humans, including self-experimentation, would have to be supervised by a physician.

Charles Dunham, who replaced Warren as Division of Biology and Medicine head, modified this policy. Thomas Shipman, the Los Alamos Health Division leader, wrote Dunham in 1956, noting widespread ignorance of Warren's human experimentation policy. Shipman, who was proposing research on normal volunteers, confessed that he had heard about the policy but had never seen it in writing. In his response to Shipman's request for guidance, Dunham did not require that experiments carry some prospect of therapeutic benefit for the subject, but did mandate that all subjects provide informed consent. Dunham also added two provisions:

1. Radioactive substances must be used in amounts judged small enough to avoid harming subjects; and
2. Approval for human experimentation must be obtained by a senior medical officer.

Like Warren before him, Dunham did not refer to Wilson's April 1947 directive.

These letters suggest that the AEC lacked a firmly established policy regarding human radiation experiments during the 1940s and 1950s and used different policies at different times. On their face, these policies appear to be strict regarding both expected therapeutic benefit and written consent. What is not clear, except by negative inference, is whether any effort was made to widely distribute and enforce the policies. No documents have been found indicating that the AEC did either.

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### **The Impact of the Cold War**

The five AEC commissioners devoted most of their attention to problems other than human radiation experiments. Throughout the agency's first years, the commissioners attended mostly to military applications, particularly weapons development. Increasing Cold War tensions spurred the nuclear arms race, and by 1949 the agency was on the front line of the Cold War. The international event having the greatest impact on AEC activities was Soviet detonation of a nuclear device in August 1949. This occurred before it was expected and caused a secret Government debate over whether to develop a hydrogen, or "super," bomb. Truman concluded the debate during January 1950, when he ordered the

AEC to build the super bomb, whose explosive power promised a "quantum jump" over atomic bombs. To produce the tritium required for the hydrogen bomb program, the AEC built a new production reactor facility near Aiken, SC, known as the Savannah River plant. In response to debates over the adequacy of the scientific resources devoted to hydrogen weapons development, the AEC also built a second weapons research laboratory at Livermore, CA, which, like Los Alamos, was administered by the University of California.

The Cold War spurred other AEC activities, including those related to radiological warfare. Unlike atomic bombs, which achieve their destructive power from explosive effect, radiological warfare would cause damage by the direct dispersal of radioactive material on a targeted area. By 1951, the agency had concluded that the limitations of such weapons outweighed their usefulness; this decision was based partially on field tests. Cold War competition with the Soviet Union also contributed to the agency's decision to conduct the Green Run test at Hanford in 1949. The Green Run, occurring soon after the first Soviet atomic detonation, was an intentional release of radioactive material to test methods for monitoring the Soviet nuclear program.

### **The Korean War**

International tensions increased when the Korean War broke out in June 1950. This conflict spurred the first deployment of nuclear weapons overseas, vast expansion of AEC production facilities, and establishment of a continental nuclear weapons testing facility at the Nevada Test Site. By the mid-1950s, the AEC operated 13 nuclear production reactors and 12 gaseous diffusion plants for producing fissionable uranium. Both the Hanford and Oak Ridge plants were enlarged and new production complexes were constructed at Paducah, KY, and Portsmouth, OH.

### **The Hydrogen Bomb**

The Korean war ended in July 1953, but the AEC's intensive programs to refine nuclear weapons continued. Atmospheric nuclear tests were conducted in Nevada during 1951, 1952, 1953, 1955, 1957, and 1958; and at the Pacific proving grounds during 1951, 1952, 1954, 1956, and 1958. The most important tests were the Castle series of 1954, which took place in the Pacific. Soon after the series, the AEC possessed a hydrogen weapon and a new plan to produce mass quantities of a few weapons types. Bravo, the first Castle shot, also ultimately affected agency biomedical programs.

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Los Alamos scientists fired the Bravo shot during March 1954. The blast size and amount of radioactive fallout were far greater than planned for: Bravo fallout contaminated 7,000 square miles, some of it with very high radiation. Fallout descended upon the military and scientific task force conducting the test series, Marshallese islanders, and the crew of a Japanese fishing vessel, the *Lucky Dragon*.

### **The Test Ban Debate**

These fallout incidents, combined with the large number of atmospheric weapons tests conducted by both the United States and the Soviet Union, sparked public debate in the United States over a proposed test ban. A closely related debate also followed over the health hazards posed to the public by atmospheric nuclear testing. AEC assertions that fallout posed little threat to Americans were challenged, and public controversy raged until President Kennedy signed a limited test-ban agreement with the Soviet Union in August 1963. The treaty prohibited testing in the atmosphere, underwater, and in outer space.

### **The Impact of the Fallout Controversy**

The fallout debate had caught the AEC unprepared and the Division of Biology and Medicine in a difficult position. Biomedical research into the hazards of fallout would take years to bear fruit, yet there was an urgent demand for information. To provide answers, the division gathered data from all relevant ongoing research projects, including one called Project Sunshine. This project had begun as an evaluation of the hazards associated with nuclear war and grew into a worldwide investigation of radioactive fallout levels in the environment and in human beings. Work in this area included collecting human tissues and samples of plants and animals from around the world.

The fallout controversy compelled the AEC to focus more attention on questions related to public protection. It also gave greater public visibility to AEC biomedical research. The Joint Committee on Atomic Energy pushed the agency to place greater resources into investigating the health effects of fallout. As a result, in 1958, the AEC nearly doubled its prior level of spending on biomedical programs over a 5-year period. The director of the Division of Biology and Medicine, Charles Dunham, stated that this effort would require "studies on human subjects," because data from animal experiments could not be applied directly to human experience. Dunham stated that human experiments were safe because of technical advances that allowed the use of radioactivity in very small amounts. These experiments required special equipment found in hospitals or large medical centers. Dunham urged the agency to expand its contractual support for human

experiments at such institutions and increase funding for work in AEC-owned clinical facilities.

The director of the Division of Biology and Medicine stated that this effort would require "studies on human subjects," because data from animal experiments could not be applied directly to human experience.

During the 1950s, AEC contractor researchers participated in work in which subjects were injected with small amounts of radioactive strontium, calcium, or other substances to help determine the efficiency of chelating agents in removing radiation from the body. The fallout controversy imparted greater urgency to other AEC-sponsored research efforts to learn about human retention and excretion of radioactive materials. In the 1960s, the agency conducted tests in which human subjects were exposed to environmental releases of radioiodine to provide data on its absorption by the human body.

### **The AEC in Transition**

By the time the United States signed the Limited Test Ban Treaty in 1963, the AEC's production and research efforts had created a nuclear weapons stockpile that met the military's needs. Accordingly, President Johnson in 1964 instructed the AEC to reduce production activities. This resulted in the gradual shutdown of eight Hanford production reactors, two Savannah River production reactors, and two Oak Ridge gaseous diffusion plants. The remaining gaseous diffusion plants were run at a reduced rate. Weapons research did not cease, but both the Los Alamos and the Livermore Laboratories diversified some of their effort into other activities. Nuclear weapon testing, although now performed underground, continued at a steady pace.

The AEC reached a crossroads in 1963. Up to that time, the problems of the military atom had commanded the most time, attention, and energy from agency leaders. Over the next 10 years, the problems of the peaceful atom drew increasing negative attention to the AEC.

### **Atoms for Peace**

Always anxious to promote the peaceful atom, the AEC was unable to do so effectively until after Congress amended the Atomic Energy Act in 1954. The 1954 Act encouraged private participation in atomic energy development, giving the AEC authority to remove entire topical areas of nuclear science and technology from secrecy restrictions. This law permitted the agency to foster a commercial nuclear power industry and to participate in international peaceful

atomic energy activities. Both meshed with President Eisenhower's desire to reap practical benefits from America's lead in nuclear technology. Eisenhower proposed atomic energy development under United Nations auspices in his heralded "Atoms for Peace" speech. As a result, the AEC actively participated in the creation of the International Atomic Energy Agency, helped build research reactors abroad and, over a 10-year period, helped to organize three international peaceful atomic energy conferences in Geneva, Switzerland.

*The 1954 Act gave the Atomic Energy Commission authority to remove entire topical areas of nuclear science and technology from secrecy restrictions.*

At home, the AEC also promoted potential peaceful atomic energy applications. Among them were medical uses of radioactive tracers, fusion research, nuclear-powered rockets, nuclear batteries, and nuclear canal excavation. Many of these ambitious ideas never came to fruition. The largest single effort, however, was the push to develop a commercial nuclear power infrastructure.

### **Building a Commercial Nuclear Power Industry**

In 1955, the AEC launched the Power Demonstration Reactor Program, designed to transform nuclear reactors into commercial electric power generators. Offering private industry financial and other assistance to design and build power reactors, the AEC attracted cooperation in building first-generation experimental power reactors, all of which were more expensive than comparable fossil-fuel-fired electric generating plants. In the expectation that power reactors would soon become economically competitive and that the utility industry would invest heavily in the new technology, the agency geared up its staff to license private utilities to construct and operate nuclear power reactors, a mission mandated by the 1954 Atomic Energy Act.

By 1965, however, the program was languishing. Only 12 power reactors were then in operation in the country, and of those, industry had built only three with wholly private funds. All others had required substantial governmental financial assistance to attract industry participation. The goal of making reactors economically competitive with fossil-fuel-fired power plants had not yet been realized, 10 years after initiation of the program. In 1966-1967, however, industry suddenly ordered 50 nuclear power plants, and commercial nuclear power continued to grow robustly for another decade.

### **The AEC and Human Radiation Experiments, 1960-1970s**

As the AEC devoted more time to the peaceful atom, its biomedical research program continued along lines set earlier. This included substantial research into fallout and the occupational hazards of atomic energy. During the 1960s, the Division of Biology and Medicine gradually devoted greater resources to the hazards of the peaceful atom. Some of this research involved human radiation experiments.

In the 1960s and 1970s, researchers in AEC-owned and private facilities expanded into new areas. The AEC funded experimentation in which prisoners in Oregon and Washington were

administered radiation from x rays to obtain data on radiation effects upon testicular cells. Contractor researchers used particle accelerator beams and total body neutron activation analysis in other human radiation experiments.

### **Radioisotopes and Nuclear Medicine**

The direct applications of nuclear science and technology to medicine grew rapidly after World War II. By the early 1960s, the Government had made one-half million shipments of radioisotopes to physicians and other users. Nuclear medicine had become an accepted field of specialty and most human radiation experimentation was, in fact, being conducted by private physicians and private hospitals. The agency placed radioisotope licensing activities under its regulatory staff. All other radioisotope programs were the responsibility of officials charged with overseeing promotional activities.

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### **Biomedical Research and Institutional Decision Making**

By the 1960s, the Division of Biology and Medicine had systematized a decision-making process for biomedical research projects and proposals, including those which involved human subject research. The Division of Biology and Medicine approved most biomedical research through an annual budget cycle. Proposals for new research originated with doctors and scientists in AEC contractor laboratories or in AEC-funded university research projects. The proposals were drafted on a Proposal and Authorization for Research or Development form, also known as Form 189, which contained project descriptions, justifications, and cost estimates. After laboratory directors and university project



leaders approved them, completed Form 189s were forwarded to the Division of Biology and Medicine, where they were reviewed by the branch chief who oversaw research in that discipline. Costs were then rolled into a consolidated division budget request. At that level, individual projects were no longer identified.

***By 1970, the Atomic Energy Commission encouraged its sites to form institutional review boards to review human subject research projects.***

When the division director and his senior managers approved the consolidated budget and the research that it would fund, the budget went to the AEC general manager and commissioners for approval. Approval at this stage was given for spending levels, not for individual research projects, or even for groups of them. By approving the Division of Biology and Medicine budget, and incorporating it into the agency budget submitted to Congress, the AEC general manager and commissioners authorized the biomedical research that it would fund.

The agency used the Advisory Committee on Biology and Medicine to provide advice on general biomedical research and health policies and programs. Except for a short period in the early years of the agency, the committee did not review individual research projects. Although the committee in theory presented its recommendations to the AEC commissioners, in practice the committee functioned as an advisor to the division director.

Occasionally, the agency did consider biomedical research programs or projects outside the budget review process. This was generally limited to programs or projects considered controversial or unusually expensive. For these projects, the division director would incorporate project proposals and recommendations into an agency decision paper and seek approval of the paper through the agency's formal policy decision process.

### **The AEC and Subject Consent, 1960s-1970s**

The U.S. National Institutes of Health (NIH) adopted formal guidelines for the protection of human subjects in 1966. The Division of Biology and Medicine informed AEC facilities of this and some sites chose to apply elements of the guidelines, although there was not yet a requirement to do so. By 1970, the AEC encouraged its sites to form institutional review boards to review human subject research projects. The NIH guidelines required informed consent from subjects before experimentation and required that subjects be told that they could withdraw consent to experimentation at any time. Many local institutional review boards formed at AEC laboratories did require written consent from subjects.

## **Controversies Over Radioactive Effluents, Thermal Pollution, and Reactor Safety**

The quieting of the fallout issue caused by the cessation of atmospheric nuclear testing in 1963 did not end the debate over the health effects of radiation. By the late 1960s, issues were raised about the potential environmental impacts of radioactive emissions from nuclear power plants. The agency maintained, however, that its authority did not extend to environmental impacts. The AEC was eventually directed by court order to consider the full range of environmental impacts of nuclear power plants during the licensing process. Compelled by this decision to strengthen its environmental assessment capability, the agency renamed the Division of Biology and Medicine the Division of Biomedical and Environmental Research and channeled more funds and scientific effort into environmental research.

Another public controversy erupted during the early 1970s, again over nuclear power plants. Critics charged that plant safety devices would not prevent a catastrophic meltdown of a nuclear reactor core, which could spread radioactive contamination over hundreds of square miles. The AEC was unable to provide conclusive proof of the adequacy of safety systems. A formal hearing on this subject gave national publicity to critics of the agency, raised significant questions about nuclear reactor safety, and revealed that the AEC had been less than forthcoming about reactor safety problems.

By 1973, the AEC was severely buffeted by controversy. Critics asserted that the agency had sacrificed its responsibility to regulate the atom in the public interest to its desire to promote nuclear science and technology. Many charged that the agency faced an inherent conflict of interest between its roles of regulating and promoting the atom. Sentiment grew for abolishing the agency and vesting protection of public safety in an independent regulatory agency.

### **Impact of the Energy Crisis**

The AEC faced credibility problems as the country faced an energy crisis. Energy problems had started with the northeast power blackout of 1965, which had interrupted electric power for nearly 30 million people. Over the next 2 years, 20 other major power failures occurred across the nation. By decade's end, many sensed that an energy crisis was approaching and expected greater Federal action to solve the problem. The oil embargo of 1973-1974 deepened the sense of crisis.

One result of the energy crisis was a movement to unify scattered Federal energy programs under a single organization. In 1973, President Nixon unsuccessfully proposed a Department of Energy

and Natural Resources. Then, in late 1974, Congress passed the Energy Reorganization Act of 1974, which abolished the AEC and established the Energy Research and Development Administration (ERDA), a single energy research agency, and another agency, the Nuclear Regulatory Commission, which was given the AEC's regulatory functions. ERDA also inherited the nuclear development and weapons-related programs of the AEC.

### **The Energy Research and Development Administration**

ERDA had a much broader energy mission than did the AEC. The new agency conducted energy research and development in wind, solar, geothermal, and fossil-fuel energy technologies as well as nuclear energy technologies. ERDA also began comprehensive Federal energy research and development planning, publishing annual research and development plans. In addition, the agency created a new solar energy research institute. The bulk of ERDA's facilities, personnel, and contractors, however, came from the AEC.

***In 1974, the Government adopted uniform regulations requiring independent institutional review boards to approve all experiments and requiring written informed consent.***

ERDA inherited the AEC biomedical research programs, facilities, and its Division of Biomedical and Environmental Research, as well as its weapons research and production missions. In 1974, the Government adopted uniform regulations for all Federal agencies involved in human experimentation, including ERDA. These regulations required independent institutional review boards to approve all experiments before they took place. All subjects also had to provide written evidence of informed consent.

The most controversial biomedical problem ERDA inherited involved the wartime plutonium injection experiments. By now, documents related to the experiments had been declassified, although knowledge about them was largely confined to biomedical circles. In 1967, Patricia Durbin, a radiobiologist at the Lawrence Radiation Laboratory, learned that several patients injected in 1945 were still alive. She urged that the AEC examine them to obtain additional data about the retention and excretion of plutonium.

The University of Rochester, which still operated under an AEC biomedical research contract, was authorized in 1973 to conduct medical examinations of three of the four surviving subjects. While official agency policy mandated full disclosure, the three were not told that they had been injected with plutonium nor was the reason for their reexamination revealed. After learning of this, the AEC commissioners ordered an investigation and directed that full disclosure be made to the subjects. The AEC did not, however,

reveal the experiments to the public. ERDA officials later published detailed information about the experiments in 1976.

### **The U.S. Department of Energy**

ERDA had little time to build energy research and development programs. The perceptions that the Nation was in an energy crisis deepened, fueled by a natural gas shortage that closed plants, businesses, and schools in New England during the severe winter of 1976-1977. Spurred by the crisis, President Carter sent a proposal to Congress in 1977 to unify Federal energy policy planning and research and development units in one Cabinet-level department. Congress acted on the proposal promptly, and the Department of Energy (DOE) came into existence in October 1977.

The Department of Energy absorbed the Federal Power Commission, the Federal Energy Administration, and other smaller energy programs as well as all ERDA facilities, laboratories, production plants, and its division of biomedical and environmental research. The Department also became responsible for nuclear and other energy technology development, for nuclear weapons development, and for energy-related biomedical and environmental research, including human radiation experimentation activities. DOE inherited ERDA's radiation research activities and the regulations that the agency had promulgated to protect human subjects. Biomedical research activities were assigned to the office of energy research. By this time, predecessor agencies had established a legacy of research in biomedical research, including human radiation experiments.

### **Headquarters Records Collections**

DOE headquarters records are rich and comparatively easy to find and use. The Department has custody of most AEC and ERDA headquarters records, while nearly all Manhattan Project headquarters records have been transferred to the National Archives and Records Administration. AEC records are extraordinarily valuable, covering agency activities in a breadth and depth seldom found in government records collections. All records for AEC regulatory activities are in the custody of the Nuclear Regulatory Commission.

For material pertinent to human radiation experiments, the records of the AEC Secretary (1958-1975) and of its Division of Biology and Medicine are the most valuable. Both document AEC decision-making on biomedical issues and agency oversight over biomedical programs. Beyond the institutional context of human radiation experiments, both collections contain some documentation about individual clinical experiments and both contain crucial documentation about the AEC's 1974 investigation of the

plutonium injection experiments.

Most AEC headquarters records are in the custody of archivists or historians and are preserved either in the DOE History Division or Office of Human Radiation Experiments. Recently DOE has transferred some important AEC records to the National Archives, including portions of the AEC Secretary's files (1946-1958) and of the Division of Biology and Medicine files. DOE will transfer additional AEC records to the National Archives in the future. More recent records are in the custody of DOE program offices and are, at this time, more difficult to access. The agency is, however, working to bring these records under intellectual control.

There are limitations on documentary access due to classification and privacy. Although most AEC biomedical program data--including information about human radiation experiments--was never classified, it may be intermixed with other information or documents which were, or are, classified. DOE has recently devoted substantial resources to declassifying AEC records, but researchers may still encounter classified headquarters documentation. Researchers may request declassification reviews of collections, or portions of them. Few headquarters records have privacy restrictions. Researchers can also request that such documents be released to them, with the deletion of information which would identify individuals.

***Department of Energy headquarters records are rich and comparatively easy to find and use.***

AEC headquarters records are divided between National Archives and DOE custody. Because some AEC headquarters units operated out of Oak Ridge in the agency's early days, some AEC headquarters records are stored in Oak Ridge in DOE custody or in Atlanta in National Archives custody. The series described in the portion of Chapter 2 dealing with Oak Ridge, contain some headquarters records.

### **Atomic Energy Commission**

**SERIES TITLE** *Office of the Secretary (Secretariat Records), Correspondence Files*

**INCLUSIVE DATES** 1958-1975

**DATES**

**ARRANGEMENT** AEC Subject/Numeric Filing System (subject files)

Chronological order (Commission meeting minutes)

**VOLUME** 435 cubic feet

**DESCRIPTION** These files were compiled by the Secretary to the U.S. Atomic Energy Commission (AEC) to create the official record of Commission decisions and actions. They contain documentation on agency policies, origins, structure, functions, missions, controversies, and activities at the highest level of the agency. The Department of Energy has custody of portions of the Secretary's files pertaining to promotional matters. They document agency policy formulation on budgets, nuclear weapons programs, nuclear reactor programs, special nuclear materials production programs, biomedical programs, environmental programs, contracts, security matters, and organizational problems. They contain information on agency policies and standards for human subject research. They also contain letter reports of Advisory Committee on Biology and Medicine meetings, reports and meeting minutes of other advisory committees, and documentation on the AEC's 1974 investigation of the plutonium injection experiments. The series includes AEC information and division staff paper, letters, and memorandums showing implementation of policy decisions, excerpts of minutes of formal Commission meetings, and complete minutes of Commission meetings. Collection numbers 6, 8, 9, 10, 20.

**RESTRICTIONS** This series contains privacy material and classified information.

**LOCATION OF RECORDS** DOE Germantown Building, Room FB036

19901 Germantown Road

Germantown, MD 20585

**SERIES TITLE** *Office Files of Chairman Gordon E. Dean*

**INCLUSIVE DATES** 1949-1953

**DATES**

**ARRANGEMENT** Chronological

**VOLUME** 4 cubic feet

**DESCRIPTION** The Dean office files consist of a typescript copy of Dean's office diary and a set of his reader files. They were compiled by Dean's

secretary and document the issues and problems that came before Dean as an AEC commissioner and as AEC chairman. The major subjects covered are AEC weapons programs, expansion of special nuclear materials production programs, the hydrogen bomb program, security problems such as atom spy cases, and AEC budget and personnel matters. The diary contains scattered entries on biomedical policies, programs, and activities. The Dean office files include diary materials, letters, memorandums, and reports. A folder title inventory is available. Collection number 1110.

**RESTRICTIONS** This series contains privacy material and a small amount of classified information.

**LOCATION OF RECORDS** DOE Germantown Building, Room FB036

19901 Germantown Road

Germantown, MD 20585

**SERIES TITLE** *Office Files of Commissioner Willard F. Libby*

**INCLUSIVE DATES** 1946; 1954-1966; 1969

**ARRANGEMENT** Subject

**VOLUME** 11 cubic feet

**DESCRIPTION** The Libby office files were created by Libby's office staff and they primarily document his service as an AEC commissioner. One box of materials consists of classified documents compiled by Libby after he left the AEC. The series documents top agency policy formulation and includes files on nuclear weapons programs, Project Sunshine, agency basic research programs, biomedical programs, and radioisotopes programs. The Sunshine files (2 boxes) document Libby's leadership of the project. The Libby office files include memorandums, letters, reports, handwritten notes and calculations, clippings, and published articles. Save for a set of reader files, they are arranged by a subject filing system devised by Libby's staff. A folder title inventory is available. Collection number 1114.

**RESTRICTIONS** This series contains privacy material and a small amount of classified information.

**LOCATION OF RECORDS** DOE Germantown Building, Room FB036

19901 Germantown Road

Germantown, MD 20585

**SERIES TITLE** *Office Files of Commissioner James T. Ramey*

**INCLUSIVE DATES** 1962-1973

**ARRANGEMENT** Subject

**VOLUME** 68 cubic feet

**DESCRIPTION** The Ramey office files were compiled by his office staff and document his services as an AEC commissioner. They capture top agency policy formulation on matters in which Ramey was most interested. These include civilian nuclear power programs, regulatory programs, nuclear desalting programs, and the liquid metal fast breeder reactor program. They also contain files on the artificial heart program, cancer research, and research in AEC laboratories. The Ramey office files consist of correspondence files of memorandums, letters, reports, meeting notes and minutes, news clippings, handwritten notes, and published reports. They are arranged by a subject filing system devised by Ramey's staff. A folder title inventory is available. Collection number 326741.

**RESTRICTIONS** This series contains privacy material and a small amount of classified information.

**LOCATION OF RECORDS** Washington National Records Center

Suitland, MD 20409

**SERIES TITLE** *Office Files of Chairman Dixy Lee Ray*

**INCLUSIVE DATES** 1972-1975

**ARRANGEMENT** Subject

**VOLUME** 30 cubic feet

**DESCRIPTION** The Ray office files were compiled by her staff to document her tenure as AEC commissioner and as AEC chairman. They document top agency policy formulation and include materials on civilian nuclear power



programs, reactor safety programs, the liquid metal fast breeder program, Plowshare programs, and nuclear weapons programs. They also contain files on biomedical research, nuclear medicine, laboratory research activities, and minutes and reports of meetings of AEC advisory committees. The Ray office files consist of correspondence files of memorandums, letters, reports, meeting notes and minutes, news clippings, handwritten notes, and published reports. They are arranged by a subject filing system used by the AEC chairman's office. A folder title inventory is available. Collection number 326765.

**RESTRICTIONS** This series contains privacy material and a small amount of classified information.

**LOCATION OF RECORDS** Washington National Records Center

Suitland, MD 20409

**SERIES TITLE** *Office Files of Chairman James R. Schlesinger*

**INCLUSIVE DATES** 1971-1974

**ARRANGEMENT** Subject

**VOLUME** 35 cubic feet

**DESCRIPTION** The Schlesinger office files were compiled by his office staff to document his tenure as AEC chairman. They capture top agency policy formulation and include material on Schlesinger's reorganization of agency operational and regulatory activities. They include files on laboratory and other research programs, civilian nuclear power programs, reactor safety programs, the liquid metal fast breeder reactor program, nuclear weapons programs and other national security matters. They also contain minutes and reports of meetings of AEC advisory committees. The Schlesinger office files consist of correspondence files of memorandums, letters, reports, meeting minutes and notes, news clippings, handwritten notes, and published reports. A folder title inventory is available. Collection number 326765.

**RESTRICTIONS** This series contains privacy material and a small amount of classified information.

**LOCATION OF RECORDS** Washington National Records Center  
Suitland, MD 20409

**SERIES TITLE** *Office Files of Chairman Glenn T. Seaborg*

**INCLUSIVE DATES** 1961-1971

**ARRANGEMENT** AEC Subject/Numeric Filing System

**VOLUME** 250 cubic feet

**DESCRIPTION** The Seaborg office files were compiled by the chairman's office staff and document Seaborg's tenure as AEC chairman. They capture top agency policy formulation and contain files on virtually all subjects that came before Seaborg including nuclear test ban negotiations, nuclear weapons programs, the fallout controversy, civilian nuclear power programs, basic research programs, laboratory research programs, special nuclear materials programs, the liquid metal fast breeder reactor program, and others. They include files on the formulation of biomedical policies and on biomedical programs and activities as well as reports of the Advisory Committee on Biology and Medicine and Seaborg's correspondence with the committee. The Seaborg office files consist of correspondence files of memorandums, letters, reports, meeting notes and minutes, news clippings, handwritten notes, and published documents. A folder title listing is available. Collection number 326766.

**RESTRICTIONS** This series contains privacy material and classified information.

**LOCATION OF RECORDS** Washington National Records Center  
Suitland, MD 20409

**SERIES TITLE** *Files of the General Manager's Office*

**INCLUSIVE DATES** 1947-1975

**ARRANGEMENT** Subject

**VOLUME** 184 cubic feet

**DESCRIPTION** The General Manager's office files were largely compiled by deputy general managers and assistant general managers so the General Manager's office files largely document

policy implementation by these officials. The series includes documentation on Atoms for Peace programs, civilian nuclear power programs, security matters, agency organization and management, special nuclear materials production programs, and nuclear waste programs. It contains a few files on biomedical programs. It is an important source for program council meeting minutes, which contain information on early agency policy formulation pertaining to biomedical and other programs. The series also contains the office diaries of general managers Carroll L. Wilson and Marion W. Boyer and of deputy general managers Walter Williams and Carlton Shugg. The diaries may contain scattered references to biomedical programs and activities. Other files which may contain references to biomedical programs and activities are the office reader files and chairman and commissioner memorandum files. The general manager's office files consist of correspondence files of memorandums, letters, reports, meeting notes and minutes, news clippings, handwritten notes, and technical reports. A folder title inventory is available. Collection number 1135.

**RESTRICTIONS** This series contains privacy material and classified information.

**LOCATION OF RECORDS** DOE Germantown Building, Room FB036

19901 Germantown Road

Germantown, MD 20585

**SERIES TITLE** *Division of Biology and Medicine, Central Correspondence and Related Files*

**INCLUSIVE DATES** 1947-1974

**ARRANGEMENT** AEC Subject/Numeric Filing System

**VOLUME** 53 cubic feet

**DESCRIPTION** The Division of Biology and Medicine (DBM) files were compiled to document the implementation of agency biomedical policies and programs. Most were compiled by a central mail room unit. They include documentation on biomedical research programs at agency laboratories, university

biomedical research funded by the AEC, the 1950s fallout controversy, Project Sunshine, biomedical activities at nuclear weapons tests, and the 1974 investigation of the plutonium injection experiments. The division files consist of correspondence files of memorandums, letters, staff papers, contracts, reports, meeting minutes, handwritten notes, and published reports. They are organized into several individual collections. They include a complete set of minutes of the meetings of the Advisory Committee on Biology and Medicine, a statutory body which provided advice to the division director. A folder title inventory is available. Collection numbers 1129, 1132, 1133, 1194, 1353, 1709.

**RESTRICTIONS** This series contains privacy material and classified information.

**LOCATION OF RECORDS** DOE Germantown Building, Room FB036

19901 Germantown Road

Germantown, MD 20585

**SERIES TITLE** *Division of Biology and Medicine, Central Correspondence Files*

**INCLUSIVE DATES** 1956-1975

**ARRANGEMENT** AEC Subject/Numeric Filing System

**VOLUME** 37 cubic feet

**DESCRIPTION** These Division of Biology and Medicine (DBM) files were compiled by a central mail room unit. They include documentation on biomedical research programs at agency laboratories, university biomedical research funded by the AEC, the 1950s fallout controversy, the thermal pollution controversy, and the AEC's implementation of the National Environmental Policy Act. The series consists primarily of subject files of correspondence for the years 1970, 1971, 1973, and 1975. The series contains memorandums, letters, staff papers, contracts, reports, handwritten notes, and published reports. Collection numbers 7239, 6586, 6793, 7249, 7723.

**RESTRICTIONS** This series contains a small amount of

classified information.

**LOCATION OF RECORDS** DOE Germantown Building, Room GB017

19901 Germantown Road

Germantown, MD 20585

**SERIES TITLE** *Division of Biology and Medicine,  
Plutonium Injection Investigation Files*

**INCLUSIVE DATES** ca.1945-1988

**ARRANGEMENT** Numerically by human subjects case number  
(Medical files)

Subject (case files)

**VOLUME** 3.3 cubic feet

**DESCRIPTION** The records were created or collected by AEC staff during the 1974 investigation of the plutonium injections. They document information on persons who were injected with plutonium between 1945 and 1947 and provide information on the measurement of the plutonium excretion rate and the plutonium body content of several subjects by the staff of Argonne National Laboratory many years after injection. The files also contain medical information relating to health status at the time of injection, medical status at the time of measurement in the mid 1970s, and death certificates for those deceased. They contain documentation relevant to the 1972-1974 search and contact efforts, and to the scientific investigations conducted as part of the Argonne National Laboratory follow-up efforts. The follow-up studies focused on three persons who were alive in the 1970s and four persons who had died. For the living subjects the purpose was to determine the excretion rate long after injection. For the deceased subjects, the purpose was to determine the amount of plutonium retained by the body at the time of death and to evaluate the degree to which the plutonium had redistributed within the skeleton. The files contain original records created by AEC/division and Argonne staff, ANL's copies of records created by others before Argonne's follow-up studies. The series consists of patient records, letters,

memorandums, reports, handwritten notes, and charts. No index is available. Collection number OHRE 1.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** U.S. DOE, Office of Human Radiation Experiments

1726 M Street NW, Suite 200

Washington, DC 20036

**SERIES TITLE** *Division of Biology and Medicine, Radiation Exposure ("Special Case") Files*

**INCLUSIVE DATES** 1945-1962

**ARRANGEMENT** AEC Subject/Numeric Filing System

**VOLUME** 4 cubic feet

**DESCRIPTION** This series consists entirely of files which document exposures of individuals and groups to radiation. Most seem to be occupational or accidental exposures. The series includes files on exposures of named individuals, the Marshallese Islanders in 1954, the *Lucky Dragon* crew in 1954, radium cases, and weapons testing personnel. The series was consolidated into a special collection by the AEC Division of Biology and Medicine. The series contains letters, memorandums, reports, and telegrams. A folder title listing is available. Collection number 326783.

**RESTRICTIONS** This series contains a small amount of classified information.

**LOCATION OF RECORDS** DOE Germantown Building, Room GB017

19901 Germantown Road

Germantown, MD 20585

**SERIES TITLE** *Office of the General Counsel, Central Correspondence Files*

**INCLUSIVE DATES** ca. 1947-ca. 1977

**ARRANGEMENT** AEC Subject/Numeric Filing System

**VOLUME** approximately 210 cubic feet

**DESCRIPTION** The series consists of central correspondence files compiled by the General Counsel to advise the AEC commissioners on legal and

policy issues. Some files which were once a part of the series have been destroyed. The remaining files document General Counsel advice on issues such as weapons testing, compliance with the National Environmental Policy Act, land acquisition, and other matters. The files may contain documentation on biomedical policy, including General Counsel advice on procedures and ethics for human subject research. Access to some documents may be restricted due to attorney-client privilege. The series contains correspondence files of letters, memorandums, AEC staff papers, handwritten notes, and reports. No folder title inventory or listing is available. No collection number.

**RESTRICTIONS** This series contains privacy material and a small amount of classified information.

**LOCATION OF RECORDS** James Forrestal Building, Room 7EB054

1000 Independence Avenue, SW

Washington, DC 20585

**SERIES TITLE** *Office of the General Counsel, Contract Files*

**INCLUSIVE DATES** ca. 1947-ca. 1977

**ARRANGEMENT** Name of institution

**VOLUME** approximately 145 cubic feet

**DESCRIPTION** The series is primarily composed of information copies of contracts sent to the General Counsel's Office. It includes information about activities covered under contracts, but does not appear to include General Counsel's opinion about the contents. It does not include copies of all AEC contracts, but does include copies of AEC contracts with University of California (Berkeley and Los Angeles) and Brookhaven. The series consists of copies of contracts, modifications to them, and correspondence pertaining to contracts. No folder title inventory or listing is available. No collection number.

**RESTRICTIONS** This series contains privacy material and a small amount of classified information.

**LOCATION OF RECORDS** James Forrestal Building, Room 7EB054

1000 Independence Avenue SW

Washington, DC 20585

**SERIES TITLE** *Division of Military Applications, Central Correspondence Files*

**INCLUSIVE DATES** 1947-1974

**DATES**

**ARRANGEMENT** AEC Subject/Numeric Filing System

**VOLUME** 43 cubic feet, exclusive of films

**DESCRIPTION** The Division of Military Application (DMA) files were compiled by a central mail facility to document the organization's role in implementing policy decisions pertaining to nuclear weapons testing, nuclear weapons accidents, and the 1969 Rocky Flats plant fire. They contain a few scattered documents on radiological warfare activities. The DMA files consist of correspondence files of memorandums, letters, staff papers, reports, and handwritten notes. They are organized into several collections and most are arranged according to the agency's Subject/Numeric Filing System. A folder title inventory is available. Collection numbers 1178, 1179, 1185, 1188, 1189, 1336.

**RESTRICTIONS** This series contains classified information.

**LOCATION OF RECORDS** DOE Germantown Building, Room FB036

19901 Germantown Road

Germantown, MD 20585

**SERIES TITLE** *Division of Personnel, Directives Case Files*

**INCLUSIVE DATES** 1947-1971

**DATES**

**ARRANGEMENT** Numbered directive

**VOLUME** 33 cubic feet

**DESCRIPTION** The series contains regulations covering most agency activities. The regulations were issued in different series such as GM (General Manager) Bulletins or AEC Manual Chapters. The directives also include official statements of responsibilities and authorities for most AEC program offices. The series consists of copies of official regulations and



the documentation pertaining to them. A folder title listing is available. Collection numbers 4802, 6578, 6286, 5674.

**RESTRICTIONS** This series contains a small amount of classified information.

**LOCATION OF RECORDS** DOE Germantown Building, Room GB017

19901 Germantown Road

Germantown, MD 20585

**SERIES TITLE** *Division of Personnel, Federal Advisory Committee Records*

**INCLUSIVE DATES** 1948-1974

**ARRANGEMENT** AEC Subject/Numeric Filing System

**VOLUME** 4 cubic feet

**DESCRIPTION** The series documents the organization and management of AEC advisory committees, including the Advisory Committee on Biology and Medicine, the Advisory Committee on Isotopes and Radiation Development, and the Advisory Committee on Medical Use of Isotopes. It does not include minutes of meetings of the committee or reports of committee meetings. The series consists of correspondence files of letters and memorandums. A folder title listing is available. Collection number 6693.

**LOCATION OF RECORDS** DOE Germantown Building, Room G017

19901 Germantown Road

Germantown, MD 20585

**SERIES TITLE** *Office Files of L. Joe Deal*

**INCLUSIVE DATES** 1945-1981

**ARRANGEMENT** Subject

**VOLUME** 14 cubic feet

**DESCRIPTION** The Deal office files are comprised of materials assembled by Deal during his service in Atomic Energy Commission, Energy Research and Development Administration, and Department of Energy organizations with responsibilities for biomedical research and operational safety matters. They include extensive

documentation on nuclear weapons testing activities and their health effects. They also include documentation on other operational safety matters. The Deal office files consist of correspondence files of letters, memorandums, reports, handwritten notes, and charts. They are arranged by a subject filing system devised by Deal's secretary. A folder title inventory is available. Collection number 1368.

**RESTRICTIONS** This series contains a small amount of classified information.

**LOCATION OF RECORDS** DOE Germantown Building, Room F036

19901 Germantown Road

Germantown, MD 20585

**SERIES TITLE** *Office Files of Thomas McCraw*

**INCLUSIVE DATES** 1949-1986

**ARRANGEMENT** Subject

**VOLUME** 23 cubic feet

**DESCRIPTION** The McCraw office files consist of materials assembled by McCraw during his service in Atomic Energy Commission, Energy Research and Development Administration, and Department of Energy organizations with responsibility for biomedical and operational safety activities. They contain extensive documentation on safety of nuclear weapons testing and health effects of weapons testing. They also include files on the fallout controversy of the 1950s, the nuclear rocket program, and advisory committee on biology and medicine meetings. The office files consist of letters, memorandums, reports, handwritten notes, meeting minutes, and charts. A folder title inventory is available. Collection number 1320.

**RESTRICTIONS** This series contains classified information.

**LOCATION OF RECORDS** DOE Germantown Building, Room FB036

19901 Germantown Road

Germantown, MD 20585

**SERIES TITLE** *Field Office Progress Reports*

**INCLUSIVE DATES** 1947-1963

**DATES****ARRANGEMENT** Field site**VOLUME** 10 cubic feet

**DESCRIPTION** The series documents construction, routine operations, and extraordinary activities at AEC field sites such as Hanford, Oak Ridge, and Savannah River. Virtually all early AEC field activities are documented by this series. It contains materials on subjects such as weapons production, special nuclear materials production, aircraft nuclear propulsion, and reactor development. The Hanford weekly report for the first week of December 1949 contains a reference to the Green Run. The series consists entirely of periodic progress reports. A folder title inventory is available. Collection number 1708.

**RESTRICTIONS** This series is entirely classified.

**LOCATION OF RECORDS** DOE Germantown Building, Room FB036

19901 Germantown Road

Germantown, MD 20585

**SERIES TITLE** *Periodic Progress Reports***INCLUSIVE** 1947-1965; 1967-1968**DATES****ARRANGEMENT** Chronological**VOLUME** 20 cubic feet

**DESCRIPTION** The series consists of periodic reports of activities of some Atomic Energy Commission headquarters organizations and of activities overseen by the agency's major operations offices. It also contains some General Manager's monthly reports of activities and some monthly reports to the agency's General Advisory Committee. Runs of these reports vary considerably in time periods covered. Many reports were compiled by the AEC's Division of Finance to help AEC commissioners trace construction activities and the implementation of policy decisions. The series includes reports of biomedical activities as well as of weapon, reactor development, and other activities. The series consists of monthly and weekly reports

arranged by organizational unit or chronologically. A folder title inventory is available. Collection number 1342.

**RESTRICTIONS** This series contains classified information.

**LOCATION OF RECORDS** DOE Germantown Building, Room FB036

19901 Germantown Road

Germantown, MD 20585

**SERIES TITLE** *Program Reports to Joint Committee on Atomic Energy*

**INCLUSIVE DATES** 1947-1973

**ARRANGEMENT** Chronological

**VOLUME** 1 cubic foot

**DESCRIPTION** The series contains a partial set of quarterly progress reports to the Joint Committee on Atomic Energy. In the reports, the AEC described agency progress and major activities in biomedical, basic research, reactor development, and other program areas. A few contain information on radiological warfare activities. The AEC placed material on agency progress and major activities in weapons and production programs into separate parts of the quarterly reports, which were stored and maintained separately. Some of these weapons and production sections are in this series. The series consists entirely of reports, which are arranged chronologically. A folder title inventory is available. Collection number 1172.

**RESTRICTIONS** This series is entirely classified.

**LOCATION OF RECORDS** DOE Germantown Building, Room FB036

19901 Germantown Road

Germantown, MD 20585

**SERIES TITLE** *Progress Reports to Joint Committee on Atomic Energy*

**INCLUSIVE DATES** 1953-1964

**ARRANGEMENT** Chronological

**VOLUME** 1 cubic foot

**DESCRIPTION** The series contains a partial set of quarterly

progress reports to the Joint Committee on Atomic Energy. In the reports the AEC described agency progress and major activities in biomedical, basic research, reactor development, and other programs. The AEC placed material on agency progress and major activities in weapons and production programs into separate parts of the quarterly reports, which were stored and maintained separately. None of the separate weapons and productions sections are included in this series. This series consists entirely of reports, which are arranged chronologically. A folder title inventory is available. Collection number 1378.

**RESTRICTIONS** This series is entirely classified.

**LOCATION OF RECORDS** DOE Germantown Building, Room FB036

19901 Germantown Road

Germantown, MD 20585

### **U.S. Energy Research and Development Administration**

**SERIES TITLE** *Administrator's Mail Facility  
Correspondence Files*

**INCLUSIVE DATES** 1975-1977

**ARRANGEMENT** ERDA Subject/Numeric Filing System

**VOLUME** 115 cubic feet

**DESCRIPTION** The series consists of files compiled to capture the official decisions, policies, actions, and activities of the agency's top official. The series contains a section on biomedical programs and policies which include materials on controversial matters as well as routine biomedical program activities. The series contains letters, memorandums, briefing charts, reports, and meeting notes. A folder title listing is available. Collection numbers 1216, 1217, 1218, 1220, 1221, 1223.

**RESTRICTIONS** This series contains a small amount of classified information.

**LOCATION OF RECORDS** Washington National Records Center

Suitland, MD 20409

**U.S. Department of Energy**

**SERIES TITLE** *Office of Health and Environmental Research, Research and Development Project Case Files*

**INCLUSIVE DATES** 1954-1990

**ARRANGEMENT** Contract

**VOLUME** 40 cubic feet

**DESCRIPTION** This series documents biomedical research performed under contract to DOE and DOE predecessor agencies. Some of the files were originally part of the AEC Division of Biology and Medicine files. The research was performed by individuals, such as Hymer Friedell and Lester Van Middlesworth, and institutions such as Vanderbilt University, Massachusetts General Hospital, and the Universities of Rochester, Cincinnati, and Washington. The series contains letter and other reports of research, contrasts, memorandums, and documentation related to conferences and symposia. A folder title listing is available. Collection numbers 3267716, 326801, 430848, 4308413, 434879, 4348746, 4348676, 434802, 4348778, 4348925, 4348959, 43490341, 43490207, 4348921, 4348932, 4349022, 43490346, 434805, 4308620, 430872, 4348638, 4348687, 434803, 434849, 4348446, 4348447, 4348448, 4348449, 4348450, 4348410, 4308619, 4308618, 3268624, 4348710, 4348711, 4348712, 4348747, 4348748, 4348749, 4348750, 4348751, 4348677, 4348178, 4348679, 4348926, 4348927, 4348960, 43490342, 43490208, 43490209, 4348922, 4348923, 4348933, 43490226, 43490267, 43490228, 43490341, 4348623, 4348624, 4348623, 4348626, 4348627, 434871, 434872, 434873, 434874, 434875, 434876, 430871, 4348669, 4348688, 4348689, 4348690.

**LOCATION OF RECORDS** Washington National Records Center  
Suitland, MD 20409

**SERIES TITLE** *Office of Health and Environmental Research, Research and Development Project Case Files*

**INCLUSIVE 1957-1979  
DATES**

**ARRANGEMENT** Contract

**VOLUME** 87 cubic feet

**DESCRIPTION** The series documents biomedical research performed under contract to DOE and DOE predecessor agencies. Most appear to have been on ecological or environmental topics, although some human subject research may be documented in the series. Some of the files were originally created by the AEC Division of Biology and Medicine. The series contains letter and other reports of research, contracts, memorandums, and documentation related to conferences and symposia. A folder title listing is available. Collection numbers 6115, 6187, 6203, 6246, 6655, 7155, 430851, 430854, 430853, 7358, 7507, 4348455, 4308412, 4348224, 326825, 4348680, 4348765, 4348766, 4348764, 93078G, 7724, 4348518, 4348519, 430847, 4348444, 4348445, 434804.

**LOCATION OF RECORDS** DOE Germantown Building, Room GB017

19901 Germantown Road

Germantown, MD 20585

## **Argonne National Laboratory**

### **The Site Today**

Argonne National Laboratory (ANL) is a multiprogram research laboratory near Chicago, IL. Argonne undertakes basic and applied research and conducts experimental and theoretical programs in the physical, life, and environmental sciences. The Laboratory also operates programs for advanced fission reactors and other technologies.

Argonne runs 25 major research facilities, among them four particle accelerators, a fossil-energy laboratory, and a national storage-battery test facility. In 1992, Argonne employed a staff of more than 4,600 and had an operating budget of more than \$390 million. The University of Chicago operates the Laboratory for the U.S. Department of Energy.

### **Site History**

Argonne evolved from the Metallurgical Laboratory, which the Office of Scientific Research and Development (predecessor to the Manhattan Engineer District) organized to support the atomic bomb project. Early in 1942, Arthur Holly Compton, the scientist-administrator responsible for the project's plutonium studies, decided to consolidate his Columbia and Princeton University research groups at the University of Chicago. Compton also moved Glenn Seaborg's plutonium chemistry research from the University of California to Chicago. This consolidation of scientific resources formed the Metallurgical Laboratory, or Met Lab as it became known.

The Met Lab's primary job was to design nuclear reactors and chemical processes for plutonium production. Met Lab scientists focused their initial work on achieving a self-sustaining nuclear chain reaction. Led by Enrico Fermi, this goal was achieved on December 2, 1942, when the world's first sustained nuclear chain reaction took place under Stagg Field in Chicago.

The laboratory subsequently built and operated small research reactors outside Chicago in the Argonne Forest Preserve. In 1943, the Met Lab worked with E. I. du Pont de Nemours Company to design a reactor pilot plant in Oak Ridge and in building the full-scale plutonium production reactors at Hanford, WA.

The Met Lab was organized around four groups: a nuclear physics division; a chemistry division; a plutonium separation division; and, after July 1942, a health division. The health division was established to study the unique occupational hazards associated with the project. The plutonium production reactors would produce unprecedented radiation, and there was a pressing need to devise protective measures for laboratory employees. These measures were tied to collecting radiation exposure data and conducting experiments into the metabolism and toxicology of radioactive substances.

Although Compton received directives from the Manhattan Project for laboratory program work, the Met Lab was an integral part of the University of Chicago. The laboratory was housed in university buildings on the campus, and Compton held a university appointment as dean of the Physical Sciences Department. Many other scientists on the Met Lab staff were likewise members of the university faculty. The university kept direct control of the facility's administrative matters, and the laboratory's administrative officer reported to the university's business manager, not to Compton. By the fall of 1943, crucial activity in the plutonium project had shifted from Chicago to Oak Ridge and Hanford. The Met Lab became a vital part of the du Pont team that was building the Oak Ridge pilot reactor and the full-scale Hanford production reactors.



***Met Lab scientists focused their initial work on achieving a self-sustaining nuclear chain reaction.***

The Manhattan District formed Argonne National Laboratory (ANL) in 1946. Argonne drew many of its staff and facilities from the Met Lab, and the University of Chicago continued as the laboratory operating contractor. The Laboratory moved its operations to the current DuPage County site during the early 1950s. Postwar activities focused on thermal reactor research, and later on design of a breeder reactor that would create new supplies of nuclear fuel while it operated.

Walter Zinn was the first ANL director. He organized the Laboratory into divisions of chemistry, biology, radiological physics, medicine, metallurgy, hazard evaluations, mass spectroscopy, instrument research, instrument fabrication, information, and patents. Three of these divisions had missions that touched on biomedical research. The biology division investigated the effect of radiation on plants and animals. A medical division provided routine health services to laboratory employees and conducted research into the toxic and radiological effects of heavy metals. The radiological physics division conducted routine monitoring programs, set general radiation safety standards for laboratory personnel, kept all personnel radiation exposure records, and worked on new radiation monitoring instruments.

Under Zinn, Argonne gained preeminence in reactor development, and the AEC briefly considered placing all agency reactor work at the laboratory. Zinn and other Argonne scientists played an important role in selecting a proving ground in Idaho to build the breeder and other experimental reactors. Argonne designed a pressurized water reactor as the prototype propulsion unit for the nation's first nuclear submarine. ANL also designed the heavy-water moderated and cooled reactors used as production units at the AEC Savannah River plant.

***Argonne National Laboratory and its predecessor, the Met Lab, participated in clinical human radiation experiments.***

During the 1960s Argonne hoped to lead in the development of commercial breeder reactors. In 1963, the AEC authorized Argonne to design a Fast Reactor Test Facility. In late 1965, however, the project was canceled, and by the late 1960s Argonne was exploring alternative energy sources and environmental science. As the Laboratory diversified, it reorganized units with duties related to biomedical research. During the late 1960s and early 1970s, the AEC built a Center for Human Radiobiology (CHR) at Argonne to study individuals exposed to internal radiation; most of the people followed were dial painters who had ingested radium before World War II. Laboratory administrators placed the CHR in the

Radiological and Environmental Research Division.

### **Site Human Radiation Experiments**

ANL and its predecessor, the Met Lab, participated in clinical human radiation experiments. The most noteworthy were the plutonium injections at the University of Chicago's Billings Hospital during 1945. The Met Lab also analyzed excretion data from subjects, and analyzed tissues taken at autopsies from subjects who died from preexisting ailments shortly after the injections.

Met Lab scientists took part in another experiment to learn how best to measure plutonium: in 1946, six Met Lab employees volunteered to drink a solution containing a small amount of plutonium. The gastrointestinal absorption and fecal excretion rates of the ingested plutonium were then measured.

The Laboratory appears to have conducted few other clinical experiments. Known experiments include late 1940s studies involving radioactive phosphorus tracers to study human metabolism and radioactive arsenic to treat cancer. During the 1950s, ANL administered radioactive sodium to subjects. In the early 1960s, laboratory scientists prepared tritiated thymidine for collaborating scientists who used it to inject hospitalized cancer patients. The Laboratory also worked with staff at the separate Argonne Cancer Research Hospital (as described later in the University of Chicago narrative).

The primary ANL human research project focused on the adverse health effects of radium deposited in the bodies of pre-war radium dial painters. This research involved medical, epidemiological, and dosimetric follow-up studies. These estimated the radiation doses received by the dial painters and linked these doses to adverse health effects, providing data crucial to the establishment of internal radiation occupational exposure limits.

#### ***Argonne has valuable records collections documenting activities pertinent to human radiation experiments.***

Argonne moved beyond the radium studies and became involved in follow-up examinations of the survivors of the plutonium injection experiments. When Patricia Durbin learned in the late 1960s that four of the subjects injected with plutonium were still alive, she urged the AEC to do follow-up examinations. The Center for Human Radiobiology was authorized by the AEC to initiate the follow-up studies in 1973. In accordance with instructions from AEC Headquarters, the subjects were not initially informed of the true reason for the examinations. These events are described more fully below in the discussion of the plutonium injections.

## Site Records Collections

Argonne has valuable records collections documenting activities pertinent to human radiation experiments. Although the laboratory has transferred one older collection of records to the National Archives and Records Administration, it retains many original records, some of which date from the Metallurgical Laboratory. The laboratory has some intellectual control over them, and users will have an easier time here than at some other sites. The Center for Human Radiobiology has the richest collections, containing detailed documentation on the effects of radiation on radium dial painters and other groups exposed to radiation outside the laboratory. These collections also document evolving biomedical knowledge about the health effects of radiation.

Researchers will find some Argonne records, including a large collection of laboratory notebooks, classified. Other restrictions may also apply. Many notebooks dating from the Met Lab, for example, are contaminated with radioactivity and must be copied before use. As noted, a collection of older, classified Argonne records has been transferred to the National Archives in College Park, MD. Researchers must await its declassification before these records are openly available.

### Argonne National Laboratory

**SERIES TITLE** *Laboratory Director's Files*

**INCLUSIVE DATES** ca. 1950-ca. 1990

**DATES**

**ARRANGEMENT** Subject

**VOLUME** 80 cubic feet

**DESCRIPTION** This series consists of records held in storage for the Office of the Director and documents the range of activities in which the Laboratory has been involved such as reactor development and high-energy physics research. The records include files related to human health research such as information on the development of an artificial kidney and files related to the Institutional Review Board. The series contains administrative records and correspondence files, reviews, and reports.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Argonne National Laboratory

**RECORDS**

Records Holding Center, Building 4

Argonne, IL 60439

Federal Records Center

7358 South Pulaski

Chicago, IL 60629

**SERIES TITLE** *Health Effects of Exposure to Internally Deposited Radioactivity*

**INCLUSIVE DATES** ca. 1915-ca. 1993

**ARRANGEMENT** Subject

**VOLUME** approximately 1,500 cubic feet

**DESCRIPTION** These records were created, identified, or collected by the staff of the Center for Human Radiobiology. They document efforts to locate persons with prior occupational, iatrogenic or experimental exposures to internally deposited radioactivity; the results of those efforts; and the results of dosimetric, medical, and epidemiological follow-up of the subjects over a period of years following first contact. The follow-up studies were focused primarily on radium, but included exposures to other radio elements and radioactive substances that emitted alpha particles. Among these were thorium, plutonium, americium, and thorostrast. This series is broken down into sub-series according to the type of radioactivity involved or to distinguish the follow-up of a clearly defined experimental exposure from the follow-up of other radium exposure. The subseries are: Austin Brues; Occupational and Iatrogenic Exposure to Radium; Elgin State Hospital Follow-up of Experimental Exposure to Radium; Occupational Exposure to Thorium; and Other Radioelements and Circumstances of Exposure.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Argonne National Laboratory

Environmental Research Division

Building 202, Room A354

Argonne, IL 60439

**SERIES TITLE** *Health Effects of Exposure to Internally Deposited Radioactivity: Austin Brues Subseries*

**INCLUSIVE DATES** 1943-1982

**ARRANGEMENT** Subject

**VOLUME** 3 cubic feet

**DESCRIPTION** This subseries contains materials assembled by Austin Brues during his tenure as director of the Argonne Biology Division and its successors, while he was a staff member of those divisions, as Medical Director of the Center for Human Radiobiology, and after his retirement. The subseries documents Brues's professional medical research interests and activities. It has material on the state of knowledge about the health effects of radiation and some material on the hazards of beryllium and plutonium. These records were maintained by Austin Brues and were incorporated into the collection of the Center for Human Radiobiology in the late 1980s and early 1990s because they document the activities of the early Argonne Laboratory and of the Center for Human Radiobiology. The subseries contains letters, memorandums, reports, professional papers, published articles, news clippings, graphics, and charts. It also includes correspondence with private physicians and with Manhattan Engineer District and Atomic Energy Commission officials. (See Miscellaneous Austin Brues Material.)

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Argonne National Laboratory

Environmental Research Division

Building 202, Room A354

Argonne, IL 60439

**SERIES TITLE** *Health Effects of Exposure to Internally Deposited Radioactivity: Occupational and Iatrogenic Exposure to Radium Subseries*

**INCLUSIVE DATES** 1915-1993

**ARRANGEMENT** Subject

Numerical (case files)

**VOLUME** approximately 1,470 cubic feet

**DESCRIPTION** These records were created or collected by the staff of the Center for Human Radiobiology. They document efforts to locate persons with prior occupational or iatrogenic exposure to radium including the study of the radium dial painters. They include records of these follow-up efforts including notes and correspondence; records of medical examinations of subjects conducted by physicians employed by the Center for Human Radiobiology; other medical records released by the subjects to the Center; records of medical tests carried out on the subjects (e.g., blood chemistry, diagnostic radiography, bone densitometry); records of the measurement of radioactivity in the bodies of the subjects; records of the measurement of radioactivity in tissues of the subjects (e.g., teeth supplied by the subjects, or if the subject was examined after death, of bone samples and soft tissue); records of the measurement of radioactivity in the urine or feces of subjects; records of request for the willing of the body for scientific study after death and of consent for those subjects who granted permission; records of request for exhumation of (long) dead subjects and of consent by next-of-kin who granted permission; records of consent of living subjects to participate in the study; budget proposals to DOE; materials prepared for presentation to review committees and comments received from them; published papers; records compiled by employers such as personnel records and workplace radiation surveys; x-ray films from diagnostic x-ray examination; raw data from analytical procedures; various schedules; and other pertinent information.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Argonne National Laboratory

Environmental Research Division

Building 202, Room A354

Argonne, IL 60439

**SERIES TITLE** *Health Effects of Exposure to Internally Deposited Radioactivity: Elgin State Hospital Subseries*

**INCLUSIVE DATES** ca. 1950-ca. 1983

**ARRANGEMENT** Subject/Numerical (case files)

Alphabetical (individual subject files)

**VOLUME** 2 cubic feet

**DESCRIPTION** The records were created or collected by the staff of the Center for Human Radiobiology. They document attempts to locate persons who had been injected with radium as an experimental therapy for mental disorders. The experiment was conducted in the early 1930s many years before the formation of the AEC or Argonne National Laboratory. The records contain information on the radium content of most of the subjects located, medical information relating to the subjects' admission to the state mental hospital, the results of periodic medical examinations, the cause of death for deceased subjects, and the death certificate. The files contain original records created at Argonne National Laboratory as well as copies of other records.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Argonne National Laboratory

Environmental Research Division

Building 202, Room A354

Argonne, IL 60439

**SERIES TITLE** *Health Effects of Exposure to Internally Deposited Radioactivity: Occupational Exposure to Thorium Subseries*

**INCLUSIVE DATES** ca. 1935-ca. 1985

**ARRANGEMENT** Subject

Numerical (case files)

**VOLUME** approximately 20 cubic feet

**DESCRIPTION** These records contain information on the follow-up study of thorium deposited in

humans where exposure was incidental to thorium refining and gas mantle manufacturing operations. This work was funded by the Nuclear Regulatory Commission under the title "Health Effects of Industrial Exposure to Thorium." The efforts of the Center for Human Radiobiology were similar to those described in the subseries Occupational and Iatrogenic Exposure to Radium and consequently the types of records are similar. Some specific differences were the absence of a full skeletal diagnostic x-ray examination, the absence of bone densitometry, and the addition of lung function testing. (See Health Effects of Exposure to Internal Radioactivity: Occupational and Iatrogenic Exposure to Radium Subseries)

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Argonne National Laboratory  
Environmental Research Division

Building 202, Room A354

Argonne, IL 60439

**SERIES TITLE** *Health Effects of Exposure to Internally Deposited Radioactivity: Other Radioelements and Circumstances of Exposure Subseries*

**INCLUSIVE DATES** ca. 1945-1985

**ARRANGEMENT** Subject

Numerical (case files)

**VOLUME** approximately 5 cubic feet

**DESCRIPTION** These records were created or collected by the staff of the Center for Human Radiobiology in the course of dosimetric work on persons exposed to a variety of radioactivity including incidental exposure, self employment, or medical procedures that involved use of a radiographic contrast medium called thorostrast. They include records of the measurement of radioactivity in the people and their excreta, plus any medical information that the subjects may have authorized for release to Argonne. Such



radioelements and substances as protactinium, thorotrast, plutonium, americium, and strontium were among those included in this work. They also include any past records pertinent to the subject matter (e.g., the radioactivity associated with thorotrast).

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Argonne National Laboratory

Environmental Research Division

Building 202, Room A354

Argonne, IL 60439

**SERIES TITLE** *Environmental Research Division Office Collection of Center for Human Radiobiology Administrative Records*

**INCLUSIVE DATES** ca. 1989-ca. 1993

**ARRANGEMENT** Subject

**VOLUME** 5 cubic feet

**DESCRIPTION** This series consists of administrative records from the closing years of the Center for Human Radiobiology and document the management and closeout of the project during this period. The records include material transmitted to the Environmental Research Division when responsibility for the Center was transferred to that Division from the Division of Biological and Medical Research in 1991, as well as records generated thereafter.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Argonne National Laboratory

Environmental Research Division

Building 203, ER Division Office

Argonne, IL 60439

**SERIES TITLE** *Center for Human Radiobiology Miscellaneous Records*

**INCLUSIVE DATES** ca. 1915-ca. 1993

**ARRANGEMENT** Subject

**VOLUME** 20 cubic feet

**DESCRIPTION** These are records stored in the Center for Human Radiobiology archives that are not covered by the other records series descriptions. They include miscellaneous administrative and scientific records: for example, two 1944 notebooks from the Metallurgical Laboratory provide log sheets of information on occupational radiation exposure and data on personnel measurements made such as blood samples drawn from the employees to monitor blood reactions to the radiation environment. The records also include extensive information on a study of lung cancer mortality in the state of Pennsylvania, carried out by the Center in the late 1980s for the Department of Energy.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Argonne National Laboratory

Environmental Research Division

Building 202, Room A354

Argonne, IL 60439

**SERIES TITLE** *Institutional Review Board Records*

**INCLUSIVE DATES** 1971-present

**ARRANGEMENT** Chronological (Legal Dept.)

Subject (Medical Dept.)

**VOLUME** approximately 3 cubic feet

**DESCRIPTION** This series consists of the records of the Argonne Institutional Review Board. Two sets of records are maintained, one by the Committee Secretary for the Legal Department and the other by the Committee Chairman for the Medical Department. The records contain minutes of meetings; correspondence between members; memos; letters confirming the appointment of the Chairman and members; materials submitted to the Committee for review; and a variety of other information considered pertinent to the interests or functioning of the Committee. The records include brief information on all research projects submitted to the IRB for

review. These projects have been funded by a variety of sources, including the Department of Energy and its predecessors, the National Institutes of Health, the Nuclear Regulatory Commission, the Veterans Administration, and the International Atomic Energy Agency.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Argonne National Laboratory

Legal Department, Building 201, Second Floor

Medical Department, Building 201, First Floor

Argonne, IL 60439

**SERIES TITLE** *Nuclear Medicine Research*

**INCLUSIVE DATES** ca. 1970-ca. 1992

**ARRANGEMENT** Subject

**VOLUME** approximately 0.3 cubic foot

**DESCRIPTION** Consist of administrative documents, progress reports, grant proposals, award recommendations, publication reprints, and miscellaneous research records of work carried out in the nuclear medicine program. The records have information that helps to define the scope of the nuclear medicine program and the significant collaborations with medical institutions who conducted human subject experiments with materials produced at Argonne.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Argonne National Laboratory

Chemistry Division

Office Building 200

Argonne, IL 60439

**SERIES TITLE** *Miscellaneous Austin Brues Materials*

**INCLUSIVE DATES** ca. 1892-ca. 1982

**ARRANGEMENT** Subject (correspondence files)

Author (reprints)

**VOLUME** 40 cubic feet

**DESCRIPTION** These are records created and collected by Austin Brues during his lifetime. Brues was the first director of the Argonne National Laboratory Biology Division and a member of the Metallurgical Laboratory staff. They are the residuum of a larger collection that was reviewed by members of the Center for Human Radiobiology in the late 1980s and early 1990s. The staff of the Center selected items for integration into its own collection and destroyed others that were considered irrelevant. This series includes correspondence files containing letters, memorandums, notes, trip reports, and lectures. The series also includes an extensive collection of journal article reprints related to Brues' professional interests in the health effects of radiation and biology, laboratory notebooks, slides, and photographs. A folder title listing is available to this series. (See Health Effects of Internally Deposited Radioactivity: Austin Brues Subseries.)

**LOCATION OF RECORDS** Argonne National Laboratory

Environmental Research Division

Building 202, Room A354

Argonne, IL 60439

**SERIES TITLE** *In Vivo Measurement of Lead*

**INCLUSIVE DATES** ca. 1985-ca. 1992

**DATES**

**ARRANGEMENT** Subject

**VOLUME** 6 cubic feet

**DESCRIPTION** This series contains information about the measurement of lead *in vivo* by an external irradiation method. The concentration of lead in bone of the tibia was measured in 51 military personnel by directing an external beam of x rays at the leg and measuring the scattered radiation. The work was part of a study to evaluate the effects of lead exposure among artillerymen when firing weapons, sponsored by the U.S. Army Research and Development Command. The study and its results are described more fully in a report entitled *Lead Exposures and Biological*

*Response Among U.S. Army Artillerymen*, released by the Army Medical Research and Development Command. Included in this series are administrative, research, data, analysis, and reporting records.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Argonne National Laboratory

Center for Mechanistic Biology and Biotechnology

Building 202, Room B273

Argonne, IL 60439

**SERIES TITLE** *Metabolism and Dosimetry of Radon*

**INCLUSIVE DATES** 1982

**ARRANGEMENT** Subject

**VOLUME** approximately 0.3 cubic foot

**DESCRIPTION** This series contains administrative and research records, including data, from a pilot study done by Argonne in response to growing awareness that radon contributed more to natural background radiation than had been recognized. There was speculation that radon daughters might contribute to the risk of certain illnesses but little was known about radon's distribution or retention in the body. Six employees of the Center for Human Radiobiology stayed overnight in the home of a coworker where mildly elevated levels of radon gas had been found. They were then measured for radon content and exhalation rate at Argonne.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Argonne National Laboratory

Environmental Research Division

Building 202, Room A354

Argonne, IL 60439

**SERIES TITLE** *Plutonium Ingestion Studies*

**INCLUSIVE DATES** 1946

**ARRANGEMENT** Alphabetical by name of employee

(radiation protection records)

Subject and chronological (committee files)

**VOLUME** approximately 0.3 cubic foot

**DESCRIPTION** These records consist of occupational radiation exposure data and a Metallurgical Laboratory internal memo describing the research and its context, and presenting results. The records provide information on a human radiation experiment involving the ingestion of a plutonium containing solution by six employees of the Metallurgical Laboratory on May 13, 1946.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Argonne National Laboratory  
Environment, Safety and Health  
Division, Building 201  
Argonne, IL 60439

Argonne National Laboratory  
Records Holding Center, Building 4  
Argonne, IL 60439

**SERIES TITLE** *Radiation Protection Records*

**INCLUSIVE DATES** ca. 1945-present

**DATES**

**ARRANGEMENT** (See subseries descriptions)

**VOLUME** approximately 155 cubic feet

**DESCRIPTION** The records in this series are from the radiation protection program of Argonne, and to some extent, of the Metallurgical Laboratory. The series consists of four subseries: Bioassay, Internal Dosimetry, Personnel Monitoring, and Administrative.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Argonne National Laboratory  
Argonne, IL 60439

**SERIES TITLE** *Radiation Protection Records: Bioassay Subseries*

**INCLUSIVE DATES** ca. 1945-ca. 1987

**DATES**

**ARRANGEMENT** Chronological (logbooks)

Alphabetical by name (cards)

**VOLUME** 20 cubic feet

**DESCRIPTION** These records consist of approximately 80 logbooks from the bioassay programs of the Metallurgical Laboratory and Argonne National Laboratory plus record cards which summarize the data in the logbooks. These records give the type and amount of radioactivity in biological samples from the employees and other persons for which sample analyses were requested, as part of the radiation protection or assay programs of the Met Lab, Argonne, or the requesting institution. The logbook entries identify the sample type; the person submitting it; the type of radioactivity, radioisotope, or radioelement for which the radiochemical analysis is being carried out; and raw data on the results of measurements made. There may be some brief explanatory information on the reason for the analysis, and codes were generally used to distinguish routine, special request, repeat samples, etc., from one another. Notebook Number 1, also marked as Metallurgical Laboratory Notebook 596C, contains the data for the plutonium ingestion experiment that was initiated May 13, 1946, at the Metallurgical Laboratory. The notebooks also contain information on exposures to employees that occurred through routine and accidental operations. It is unknown whether the notebooks provide analyses for samples, other than those already noted, that are from subjects in human experiments. The summary record cards provide duplicate information on the May 13, 1946, experiment and other samples.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Argonne National Laboratory

Records Holding Center, Building 4

Argonne, IL 60439

**SERIES TITLE** *Radiation Protection Records: Personnel Monitoring Subseries*

**INCLUSIVE DATES** ca. 1945-present

**ARRANGEMENT** Alphabetical by name

**VOLUME** 50 cubic feet

**DESCRIPTION** This series consists of exposure records for

employees who were issued personnel monitoring badges for the measurement of external radiation exposure.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Argonne National Laboratory

Environment, Safety and Health Division

Personnel Monitoring Group

Building 202, R Wing

Argonne, IL 60439

**SERIES TITLE** *Radiation Protection Records: Administrative Subseries*

**INCLUSIVE DATES** ca. 1950-ca. 1987

**ARRANGEMENT** Subject

**VOLUME** 60 cubic feet

**DESCRIPTION** These are administrative records of the radiation protection program at Argonne. They consist of routine reports, review documents, and correspondence. These records contain information about research activities that involved radiation, as seen from the perspective of the radiation protection staff who provided support through the issuance of personnel dosimetry badges, review of designs, follow-up on accidents that occurred, etc.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Argonne National Laboratory

Argonne Records Holding Center, Building 4

Argonne, IL 60439

**SERIES TITLE** *Radiation Protection Records: Internal Dosimetry Subseries*

**INCLUSIVE DATES** ca. 1950-present

**ARRANGEMENT** Chronological (correspondence and subject files)

Alphabetical (individual exposures)

**VOLUME** approximately 25 cubic feet



**DESCRIPTION** This series consists of records of the occupational internal dosimetry program at Argonne National Laboratory, excluding the bioassay records in the Bioassay Subseries. The records include computer listings of data, subject matter files on accidental radiation exposures, records of exposure for individual employees by name, correspondence, etc. The records include dose values for employees who were subjects in the National Cancer Institute supported study of dose interactions between passive smoke and radon gas. It is unknown whether the records contain information on other studies in which employees participated as subjects.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Argonne National Laboratory

Environment, Safety and Health Division

Dosimetry and Analytical Services Section

Building 200, F Wing

Argonne, IL 60439

**SERIES TITLE** *Radon and Passive Smoking*

**INCLUSIVE DATES** 1985-1990

**ARRANGEMENT** None

**VOLUME** approximately 5 cubic feet

**DESCRIPTION** This series consists of administrative and research records, including data, relating to the exposure of human subjects to radon daughter products in an exposure chamber. A proposal was made and funded by the National Cancer Institute to study the possible modification of radon daughter exposure at home from passive smoking. In order to interpret data collected by body counting in the field, it was necessary to establish a method for distinguishing between radon daughter products deposited in the lungs and those deposited on the skin and clothing. To do so, Argonne employees were exposed in a chamber containing radon gas and daughter products and then measured in a whole body counter to determine radon

daughter uptake. In some cases subjects breathed air free of radon and radon daughter products; in others they breathed air in the room. By combining different exposure regimes it was possible to gain understanding of the division of radon daughter product activity between the clothing, skin, and lungs.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Argonne National Laboratory

Environmental Research Division

Building 202, Room A354

Argonne, IL 60439

**SERIES TITLE** *ANL Technical Reports*

**INCLUSIVE DATES** 1946-present

**ARRANGEMENT** Alphanumeric by report number

**VOLUME** 208 cubic feet

**DESCRIPTION** This series consists of scientific and technical reports created by ANL employees and their subcontractors to fulfill contractual requirements. These records document research and development performed by or for ANL. They include topical, progress (quarterly, semiannual, and annual), final, administrative, and special-interest reports, and conference proceedings. Progress reports of divisions that conducted biomedical, human health, and environmental research are part of this series. Copies of most of these reports are also available from DOE's Office of Scientific and Technical Information (OSTI). These reports provide descriptions of work that was completed or in progress during the reporting period and include progress reports issued by the Center for Human Radiobiology on the follow-up of humans exposed to radioactivity. Some classified technical reports exist at the Laboratory and are maintained separately.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Argonne National Laboratory

Technical Information Services Department

Building 316, Room A136

Argonne, IL 60439

**SERIES TITLE** *ANL Technical Notebooks*

**INCLUSIVE DATES** 1943-present

**ARRANGEMENT** Alphanumeric

**VOLUME** 294 cubic feet

**DESCRIPTION** This series consists of technical notebooks issued by Argonne National Laboratory and its predecessor, the Metallurgical Laboratory, to employees and contractors to record experimental procedures and data; scientific and technical ideas and concepts; lecture and seminar notes; and other information. Also included are several logbooks which, in addition to use as finding aids for the technical notebooks, provide information on the history of the notebooks, (e.g., when issued, names of users, when returned, when declassified, and other information). The logbooks provide information on the organizational structure of the Metallurgical Laboratory. These records occasionally identify subjects or hospital patients. They were the working documents of the holders and therefore describe what projects they were working on, and what they thought important. For example, a notebook of R.S. Stone contains mention of the need to gain information on plutonium metabolism from humans, and seems to anticipate the plutonium injection experiments that were carried out at various locations during 1945-1947. Some classified laboratory notebooks exist and are maintained separately.

**RESTRICTIONS** This series contains privacy material; some notebooks have radioactive contamination.

**LOCATION OF RECORDS** Argonne National Laboratory

Technical Information Services Department

Information and Publishing Division

Building 316, Room A136

Argonne, IL 60439

**SERIES TITLE** *Argonne News*  
**INCLUSIVE DATES** 1951-present  
**ARRANGEMENT** Chronological  
**VOLUME** 5 cubic feet  
**DESCRIPTION** This series consists of a complete set of the Argonne News, a periodic news publication of Argonne National Laboratory. Argonne News prints articles on research conducted at the Laboratory, articles on Argonne history, and articles on general subjects of human interest. Some articles discuss the work of investigators known to have been engaged in human subjects research, such as an article describing a visit of Marshallese Islanders to Argonne for whole body counting.  
**LOCATION OF RECORDS** Argonne National Laboratory  
Office of Public Affairs  
Building 201, Second Floor  
Argonne, IL 60439

## **Brookhaven National Laboratory**

### **The Site Today**

Brookhaven National Laboratory (BNL) is a multiprogram research laboratory owned by DOE and located on 5,300 acres on Long Island near Upton, NY. The laboratory is managed and operated by a consortium of universities known as Associated Universities, Inc., (AUI) under contract with DOE. Approximately 3,300 employees work at BNL along with over 4,000 annual visiting researchers. With an annual budget of about \$400 million, the Laboratory conducts basic and applied research in the physical, biomedical, and environmental sciences, as well as in selected energy technologies.

***Brookhaven was unburdened with the secrecy restrictions placed on many facilities with wartime legacies.***

Brookhaven is the location of several "big machines." The Alternating Gradient Synchrotron is a particle accelerator used to probe the essential structure of matter. A High Flux Beam Reactor produces neutron beams for use in various research efforts. The National Synchrotron Light Source is the world's largest facility for scientific research using imaging x-ray, ultraviolet, and infrared

radiation. A Scanning Transmission Electron Microscope permits detailed study of atomic structures. A Relativistic Heavy Ion Collider, opening shortly, will accelerate ions to the speed necessary to simulate conditions involved in the creation of the universe.

### **Site History**

AUI proposed the creation of Brookhaven in 1946 as a laboratory to facilitate cooperation between universities and the Federal government in performing research in physics and nuclear science. Camp Upton, an Army training center and rehabilitation hospital, was selected as the site. In 1947, the AEC negotiated a contract with AUI to operate the Laboratory. Brookhaven was one of the first facilities dedicated to nuclear research in peacetime. As a result, it was unburdened with the secrecy restrictions placed on many facilities with wartime legacies.

Brookhaven's Graphite Research Reactor, which opened in 1950, was one of the world's first nuclear reactors available for nondefense research. Two years later, the Cosmotron began operation, eventually becoming the first particle accelerator to achieve one billion electron volts. A Tandem Van de Graaff electrostatic accelerator also was built and used to study the mechanics of nuclear reactions and the structural compounds of nuclei. The Alternating Gradient Synchrotron began operations in 1960 and strongly influenced research that led to three Nobel Prizes in high-energy physics.

Brookhaven researchers have also worked in various other fields. Laboratory chemists doing solar neutrino experiments during the 1960s prompted reconsideration of stellar evolution theories. The laboratory has studied energy production and conservation, including the use of natural thermal storage in building construction. Brookhaven also conducts special materials research and has played an important role in nuclear reactor safety research.

Health and biology activities have been a continuing element of the Laboratory's program. During the 1960s, Brookhaven physician George Cotzias used the drug L-dopa to successfully treat Parkinson's disease. The medical department has monitored the health of Marshall Islanders exposed to radioactive fallout from the 1954 Castle-Bravo nuclear weapons test on the Bikini Atoll. Since then, Brookhaven physicians and health physicists have made annual trips to the islands to monitor the health of exposed persons.

### **Site Human Radiation Experiments**

The Brookhaven Medical Department has performed much human

research. As at other sites, the department's initial role was to provide occupational medical services. A major clinical research program began at Brookhaven in 1948, when Congress appropriated funds to the AEC specifically for cancer research.

### **A major clinical research program began at Brookhaven in 1948.**

The first patients came to the Brookhaven hospital in 1949. From the outset, the Laboratory's Medical Department used the hospital for experimental diagnosis, treatment, and research.

One of the major experimental programs, begun in 1951, was boron neutron capture therapy (BNCT). Boron compounds were injected into patients with untreatable brain tumors, and the patients were positioned by a reactor port to receive neutron beams. Since boron attracts (or "captures" untreatable) neutrons, it was hoped that the technique would allow larger doses of radiation to be applied to tumors without damaging healthy tissue. The treatment was not successful and the clinical program ended in 1961 after treating 45 patients. Changes in technology have recently led to renewed interest in BNCT. In September 1994, a Brookhaven research facility closed to patients for over 2 decades was recommissioned and a modified version of the technique was used on one patient under an approved protocol.

Some of the first Brookhaven patients participated in studies involving the use of iodine-131. From 1949 through 1961, researchers used iodine-131 to treat cancer and Graves' Disease; in tracer doses for *in vivo* thyroid counting; and as a label for serum albumin to detect blood plasma turnover rates. Brookhaven researchers also used carbon-14 to study metabolic pathways and the interrelationships of carbohydrate and fat metabolism with glucose oxidation. Most of the laboratory's studies had a link to cancer research.

The Medical Department has also worked in areas other than cancer research. During the 1950s and 1960s, the department did diabetes research; other investigations focused upon the effect of radiation on humans, animals, and plants. Isotope tracers were given to Brookhaven hospital patients for metabolic studies. In the early 1950s, the department did experiments on children with a degenerative kidney disease by using sodium-24 and radioiodinated human gamma globulin. The experiments were performed to study the effect of these radioactive agents on the kidney and kidney functions. Brookhaven has also used radioactive thymidine, a constituent of DNA that carries the genes, to measure the life span of various kinds of cells. Individual site experiments are detailed in Chapter 3.

The Brookhaven hospital closed in 1974, as did the two other AEC cancer research hospitals. Nonclinical biomedical research has continued, and currently includes studies of cancer, bone disease, and the effects of exposure to radiation and other energy-related agents. Major studies of brain structure and the processes associated with cocaine and alcohol addiction are also in progress.

#### Site Records Collections

Brookhaven has good documentation for its role in human radiation experiments. Most of these files are in the custody of the BNL Clinical Research Center. They include periodic reports of the Medical Research Center, minutes and agendas for clinical oversight committees, and Proposal and Authorization for Research or Development Forms (Form 189). Also extant are various indexes and listings documenting hospital treatments and research activities. Perhaps the most significant record series are those that cover study protocols and human subjects research policies.

There are, however, some gaps in the documentation. Few programmatic records exist for the boron-neutron capture therapy treatments at the facility during the 1950s and 1960s. A complete picture of site practices and polices for patient selection, informed consent, and experiment authorization is lacking. Moreover, Brookhaven has yet to bring its records fully under intellectual control through an effective records program. The records that have been found to date remain in laboratory custody and there are some limitations on access.

**SERIES TITLE** *Minutes and Agendas for Clinical Oversight Committees*

**INCLUSIVE** 1952-1994

**DATES**

**ARRANGEMENT** Record type; chronologically thereunder

**VOLUME** 5 cubic feet

**DESCRIPTION** These are the minutes and agendas for clinical oversight committees, which include the Executive Committee, Governing Body, Medical Records Committee, Patient Care Committee, Infection Control Committee, Medical Staff Committee, and Medical Care Evaluation Committee. The Medical Records Committee spans the period between 1955 to 1968. The sections are divided by year and each year contains: memorandums of committee membership; committee meeting minutes; and BNL Hospital Clinical and Statistical Summary Sheets which have

sample forms, draft forms including one on Authorization for Release of Clinical Information, proposed rules and regulations, captions for isotope index cards, evaluation of patient laboratory forms, and samples of approved patient consent forms. The Governing Body records begin in 1957 and contain bylaws and minutes of the governing board of the medical research center hospital of BNL; memorandums; forms for initiation and review of the clinical investigative program; forms for administration of radioisotopes to humans; and draft medical records. The Medical Staff Committee operated from 1960 to 1974, and was superseded by the Executive Committee, which is documented by instructions for the operation of the hospital; bylaws, rules, and regulations for the medical staff; memorandums relating to compliance with the policies of accreditation associations, including the Federal regulations on health insurance for the aged. Medical Care Evaluation Committee records are from 1971 and contain information on patient care evaluations.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Brookhaven National Laboratory

Clinical Research Center

Building 490

Upton, NY 11973

**SERIES TITLE** *James Robertson Files*

**INCLUSIVE DATES** ca. 1950-ca. 1974

**ARRANGEMENT** Record type

**VOLUME** 17 cubic feet

**DESCRIPTION** This material consists of records maintained by Dr. James Robertson during his tenure at BNL from 1950-1974. Robertson served as the head of the BNL Medical Division and, after leaving BNL, as head of the DOE Office of Health and Environmental Research in Washington, DC. Included are 10 boxes of Robertson's office chronological and subject files, as well as seven boxes of assorted



patient data. The office files discuss various aspects of Robertson's administrative duties as well as his professional activities. Topics discussed include acquisition and distribution of isotopes, operation of the BNL hospital, proposed and ongoing studies, and Robertson's involvement with other projects and programs such as the Armed Forces Special Weapons Project. The patient data references boron neutron capture therapy, Parkinson's disease patients, and growth hormone studies. The data is in the form of charts and observation logs and often contains quantitative measurements of dosages, vital signs, and other indicators.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Brookhaven National Laboratory

Clinical Research Center

Building 490

Upton, NY 11973

**SERIES TITLE** *Authorization for Isotope Administration to Patients*

**INCLUSIVE DATES** 1957-1962

**ARRANGEMENT** Alphabetical by patient

**VOLUME** 0.25 cubic foot

**DESCRIPTION** These forms pertain to patients receiving isotopes. There are a few handwritten memos dispersed throughout this series from physicians concerning the isotope administration forms. Each form contains personal information about the patient and other information including: diagnosis, expected longevity, reproductive status, BNL physician, and isotope to be administered. The forms also have an approval date and are signed by the chairman of the Medical Department. In addition, for some patients there are addenda to the request for authorization to use isotopes.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Brookhaven National Laboratory

Clinical Research Center

Building 490

Upton, NY 11973

**SERIES TITLE** *Bibliography of Medical Department  
Researchers*

**INCLUSIVE  
DATES** 1950-present

**ARRANGEMENT** Varies

**VOLUME** 0.25 cubic foot

**DESCRIPTION** This series is a list of all published articles by members of the Medical Department. There is a list of authors with corresponding BNL reprint numbers. Some of the pages give the journal name and the citation but most have only the title of the study, the researchers name and the BNL number. The BNL Clinical Research Center has all the articles corresponding to this list of publications. The list is an aid in locating particular published articles corresponding to any research activity conducted by BNL researchers, including experiments involving human subjects.

**LOCATION OF  
RECORDS** Brookhaven National Laboratory

Clinical Research Center

Building 490

Upton, NY 11973

**SERIES TITLE** *Human Medical Research Study Protocols*

**INCLUSIVE  
DATES** 1950-1994

**ARRANGEMENT** Chronological

**VOLUME** 10 cubic feet

**DESCRIPTION** This series contains protocols for approved human studies projects. Starting in January 1950, the protocols consist of brief memorandums from the BNL Committee on Use of Radioactive Isotopes in Human Subjects stating that the committee has granted approval for the use of a particular isotope in human subjects. There are also memorandums, from physicians to the committee, describing their study proposals. Other types of correspondence include letters

from the Isotope Division at Oak Ridge, TN, to BNL requesting further information on an application or stating that certain applications for proposed studies will be forwarded to the Subcommittee on Human Applications at Oak Ridge; and letters on BNL collaborative projects, written both by BNL researchers and by researchers at other institutions. Also included is an index of requests for use of isotopes in humans; and supplemental requests for projects. Each proposal to study radioactive isotopes in humans records the number of patients, purpose, isotope, dosage, and other physicians involved in the study. Each of these proposals is a separate experiment and several contain charts, graphs, photographs, and reprints of journal articles. From 1964 the forms change to Initiation of Review of Clinical Investigative Programs from physicians at BNL to the Committee and memorandums of approvals from the Committee on Clinical Investigations and Uses of Radioisotopes.

**LOCATION OF RECORDS** Brookhaven National Laboratory

Clinical Research Center

Building 490

Upton, NY 11973

**SERIES TITLE** *Human Subjects Research Policies*

**INCLUSIVE DATES** 1947-1963; 1970-1973

**DATES**

**ARRANGEMENT** Chronological

**VOLUME** 0.25 cubic foot

**DESCRIPTION** These records consist of two subgroups. The earlier group pertains to the implementation of human subjects research policies at the Brookhaven Medical Research Center. Included are minutes and agendas for medical staff meetings; AEC isotope circulars; correspondence with AEC program offices, including the Isotopes Branch and the Division of Biology and Medicine; and internal BNL memorandums. Subjects covered include policies regarding relations with local doctors, AEC policies for use of isotopes on human subjects; medical research

programs; and establishment and operation of the local isotopes committee. The primary subject pertains to establishment of the Brookhaven Clinical Investigation Radioisotope Committee in compliance with Department of Health, Education, and Welfare requirements for institutional review of proposed human studies.

**LOCATION OF RECORDS**

Brookhaven National Laboratory  
Clinical Research Center

Building 490

Upton, NY 11973

**SERIES TITLE** *Isotope Index Cards*

**INCLUSIVE DATES** 1950-1957

**DATES**

**ARRANGEMENT** Index type

**VOLUME** 0.25 cubic foot

**DESCRIPTION** This series consists of two indexes relating to BNL hospital patients. The first is a collection of 5- by 9-inch orange cards filed by isotope name (e.g., boron, carbon, iodine). Included is patient surname, unit number, sex, age, number of times administered, doctor, and general remarks. The second index is labeled "Log of Radioactive Administrations to Patients," and is filed chronologically by date of administration. Included is the name of patient, isotope, dose, and how administered (e.g., tracer, therapeutic, intraperitoneal, intravenous).

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS**

Brookhaven National Laboratory  
Clinical Research Center

Building 490

Upton, NY 11973

**SERIES TITLE** *Medical Research Center Forms*

**INCLUSIVE DATES** 1949-present

**DATES**

**ARRANGEMENT** None

**VOLUME** 0.25 cubic foot

**DESCRIPTION** This series contains a variety of Medical Research Center forms. Most of these are blank. The forms include: hospital forms, medical record forms, dietary forms, pharmacy forms, industrial medicine forms, research forms, clinical chemistry forms, and microbiology forms. Other documents include charts; forms for progress notes; x-ray exam requests and reports; occupational therapy requests; nurses admission reports and notes; supply forms; temperature and pulse charts; adverse drug reactions; nuclear medicine examination requests; release of clinical information; applications for participation in a clinical research program; history and physical examination forms; discharge summaries; isotope radiation summaries; consent on admission to hospital forms; internal isotope radiation summaries; and consent for procedure, study, or drug under clinical investigation.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Brookhaven National Laboratory

Clinical Research Center

Building 490

Upton, NY 11973

**SERIES TITLE** *Quarterly and Annual Reports of the Medical Research Center*

**INCLUSIVE DATES** 1948-1963

**ARRANGEMENT** Chronological

**VOLUME** 0.5 cubic foot

**DESCRIPTION** This series consists of three bound volumes of the quarterly and annual reports, which are medical, scientific and administrative progress reports of the Medical Research Center. Each report has a general introduction and then is divided into the divisions of the Medical Center. Divisions include Medical Practice, Division of Pathology, Hospital Division, Division of Bacteriology, Division of Biochemistry, Division of Physiology, Division of Industrial Medicine, Genetics, Division of Physiology, and the Division of Medical

Physics. Not all of these divisions are represented in each progress report. Some progress reports also have the activities of the Associated Universities, a list of officers and scientific staff, list of publications and papers presented. Some progress reports contain organizational charts, discussions of advisory committees and major facilities. Each of the sections contains information on research, medical, and scientific activities. The sections contain information on animal and human experimentation.

**LOCATION OF RECORDS**

Brookhaven National Laboratory  
Clinical Research Center

Building 490

Upton, NY 11973

**SERIES TITLE** *Patient Medical Records*

**INCLUSIVE DATES** 1949-1994

**ARRANGEMENT** Numeric

**VOLUME** approximately 370 cubic feet

**DESCRIPTION** Each patient treated at the Medical Research Center has a file containing medical records; there are about 13,000 individual files. The Medical Center treated a variety of cancers; mostly they specialized in brain tumors and thyroid carcinoma. The files contain personal information on the patient, the treating physician's notes, laboratory records, consent forms, medical follow-up notes, a list of the types of radiation the person was exposed to, hospital authorization forms, autopsy records, order forms, medication forms, photographs, charts, and graphs. Most files also contain a correspondence section that contains copies of letters between the medical staff and the patient, or, in the case of children, the patient's parents.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS**

Brookhaven National Laboratory  
Clinical Research Center

Building 490

Upton, NY 11973

**SERIES TITLE** *Physician Index Cards*

**INCLUSIVE DATES** 1949-1969

**DATES**

**ARRANGEMENT** Alphabetical by physician

**VOLUME** 0.25 cubic foot

**DESCRIPTION** Each card has the physician's name, the unit number, the patient's names, and treatment results. Posting to the cards was incomplete to 1/1/56, but from 1/1/56 to 12/31/65 posting occurred on a regular basis. From 1965 to 1967 indexing was incomplete. Five additional categories of cards are also present. These categories cover diseases and each contains a few cards with patient information. Categories are asthma, bronchitis, granulomatous, fiberglass, small airways, emphysema, and deformities. These cards contain names and other patient information.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Brookhaven National Laboratory

Clinical Research Center

Building 490

Upton, NY 11973

**SERIES TITLE** *Proposal and Authorization for Research or Development (Form 189) (Medical Division Copies)*

**INCLUSIVE DATES** 1950-ca. 1977

**DATES**

**ARRANGEMENT** Chronological

**VOLUME** 2 cubic feet

**DESCRIPTION** These forms were used by BNL (as well as other DOE contractors) to propose research projects and receive funding from AEC/DOE program offices. Included for each project is title, date, contractor/laboratory, location, contract number, budget number, classification, progress reporting method, person in charge, status, purpose/need/scope (narrative description), related projects, accomplishments (ongoing project), expected results, and anticipated problems. Multiple

forms for different years are present for ongoing projects.

**LOCATION OF RECORDS** Brookhaven National Laboratory

Clinical Research Center

Building 490

Upton, NY 11973

## **Hanford Sites**

### **The Sites Today**

The Hanford reservation occupies 560 square miles in southeastern Washington state. More than 18,000 people work at Hanford, and the site has an annual budget of more than \$1 billion. The DOE Richland Operations Office oversees several major contractors at Hanford: The Westinghouse Hanford Company provides operations and engineering services, the Hanford Environmental Health Foundation supplies occupational health services, and ICF Kaiser Hanford Company provides architect-engineer and construction services. Bechtel Hanford, Inc., is the site environmental remediation contractor. Waste management and environmental restoration are now the largest part of the site's activities.

Battelle Memorial Institute manages Pacific Northwest Laboratory (PNL), a DOE multiprogram National Laboratory. PNL employs more than 4,800 people, has an annual budget of over \$500 million, and supports energy, environmental, educational, and national security missions.

*Formerly a remote agricultural area, Hanford accommodated 50,000 people at the height of construction.*

### **Site History**

Manhattan Project officials selected the Hanford reservation in 1943 for the production of plutonium. This required the construction of nuclear reactors ("piles"), plutonium separation facilities ("canyons"), fuel fabrication plants, and many associated facilities, including those required to house thousands of war workers. The site offered abundant water from the Columbia River, electrical power, and isolation. Consistent with the Manhattan Project's practice of employing private industry to construct and operate the atomic bomb development complex, E.I. du Pont de Nemours and Company constructed and operated the facility. Building began in 1943 and within 2 years an enormous complex was in place. Formerly a remote agricultural area, Hanford



accommodated 50,000 people at the height of construction.

***Waste management and environmental restoration are now the largest part of the site's activities.***

Late in 1942, the MED viewed the reactor process as promising for production of fissionable material. In December, Enrico Fermi and his colleagues at the University of Chicago Metallurgical Laboratory achieved the first sustained nuclear chain reaction with a stacked pile of graphite and uranium. It was understood that large-scale production would generate extensive heat, radioactivity, and toxic chemical waste. In part because of these hazards, a pilot production reactor was built at Oak Ridge rather than the more populated Chicago site. Du Pont's construction of the pilot, known as the X-10 reactor, began in early 1943.

Even before construction began on the X-10 reactor, the Government decided to locate full-scale production at a place even more remote than Oak Ridge: Hanford. Pressing to meet tight deadlines, du Pont was directed to begin work on the full-scale production facilities, known as the Hanford Engineering Works. By the end of 1944, the first Hanford reactor, the B reactor, began operating. Chemical separation plants needed to extract plutonium from irradiated slugs were finished shortly afterward, and the site was operationally complete by early 1945. In a few months, Hanford had produced the plutonium for both the Alamogordo test device and the Nagasaki bomb.

During the war, du Pont established its own clinical and occupational medical programs, with the Manhattan Project Medical Section exercising only general supervision. In addition, du Pont conducted various kinds of research and development at Hanford. Substantial work went into programs to develop effective means of monitoring personnel for radiation exposure. This included the development of personnel dosimetry indicators (film badges, for example) and methods to interpret indicator data. Because operation of its facilities caused substantial radioactive emissions, Hanford also worked on stack and environmental monitoring programs. Environmental monitoring focused on the site environs, including the Columbia River.

***It was understood that large-scale plutonium production would generate extensive heat, radioactivity, and toxic chemical waste.***

After the war du Pont did not continue as prime Hanford contractor; General Electric acquired the managing and operating contract in 1946 and assumed responsibility for producing plutonium. The site also conducted a variety of research projects. Hanford Laboratories conducted research on the biological effects of radioactive material, using animals as experimental subjects. The

laboratories also studied the effects of radioiodine, which was emitted as a waste product from the chemical separation process.

In 1949, Hanford initiated a tissue sampling program to analyze the deposition of plutonium in humans. Bone, liver, and lung tissue were obtained during autopsies and studied to learn the amount, origin, and effect of resident plutonium. This sampling program grew into the current U.S. Transuranium Registry, now administered by Washington State University. The registry studies the distribution, concentration, and retention of transuranic elements (elements heavier than uranium) in deceased workers with occupational plutonium exposures; participation is voluntary. During the early 1950s, Hanford conducted innovative inhalation toxicology studies and was the first to demonstrate the production of a lung tumor by plutonium in animal studies.

***In December 1949, about 8,000 curies of radioactive iodine and about 20,000 curies of radioactive xenon were intentionally released from a separation plant stack.***

Nuclear weapons production releases and weapons testing raised biomedical questions and stimulated additional research at Hanford. In 1959, Hanford began feeding strontium-90 to miniature swine and pygmy goats to study biological effects. Other studies focused on fetal and juvenile mammal metabolism and the effects of tritium on biological systems. This and related work led to the establishment of a radiotoxicology center and an ecology group at Pacific Northwest Laboratory during the 1960s. Hanford also used these and related organizations to study the fate of radionuclides in the environment.

In December 1949, about 8,000 curies of radioactive iodine and about 20,000 curies of radioactive xenon were intentionally released from a separation plant stack. The rationale for the release, undertaken shortly after the first Soviet atomic bomb test and known as the Green Run for its use of highly radioactive "green" fuel, was to obtain information for monitoring Soviet nuclear activities. (For more on this event and other Hanford intentional releases, see the narrative on Environmental Releases of Radiation, later in this chapter). Apart from the Green Run, radioactivity was routinely released into the environment as a by-product of processing activities. Filters and other emission reduction devices were installed during the late 1940s and early 1950s, resulting in a marked decline in radioactive emissions from the site.

Hanford production facilities expanded from 1947 to 1953 to meet Cold War demands for more nuclear weapons. In the immediate postwar period, General Electric built five new production reactors at the site. Ultimately, nine production reactors were built along the Columbia River. During the 1960s, as the U.S. nuclear arsenal

grew to formidable levels and the atmospheric test-ban treaty limited weapons testing, six of the Hanford reactors were closed. To promote civilian nuclear power and to help meet plutonium production needs, the AEC built the Hanford N Reactor to produce both plutonium and electricity.

The AEC took other initiatives to promote diversification at Hanford. In 1964, hoping to establish an economic base less dependent on weapons-related activities, the agency committed to use multiple contractors at the site. Battelle Memorial Institute of Columbus, OH, was one of the first contractors selected. In 1965, Battelle contracted to run the Hanford Laboratories, newly designated as Pacific Northwest Laboratory. PNL soon began a design study for the Fast Flux Test Facility (FFTF) to test fuels and materials considered for use in fast breeder power reactors. Construction of the FFTF at Hanford began in 1970 and took 12 years to complete.

All of Hanford's production reactors and processing canyons have been shut down; today, most of the site's resources are devoted to managing the environmental legacy left by decades of plutonium production. The potential health consequences associated with the operation of the complex remains a serious concern among many who live, or have lived, near the site. As a result, Hanford is currently involved in several health-related activities, including:

- ***Hanford Environmental Dose Reconstruction Project (HEDR)***--The U.S. Centers for Disease Control and Prevention, National Center for Environmental Health (NCEH), manages this study. The goal is to estimate the radiation doses from Hanford emissions to offsite populations. An independent Technical Steering Panel of scientists and public representatives directs the objectives and methodology of this study.
- ***Hanford Thyroid Disease Study*** NCEH also manages this study, with the assistance of the Fred Hutchinson Cancer Research Center. The study's purpose is to determine the risk of thyroid disease among persons who were exposed to radioactive air emissions from the Hanford site between 1944 and 1957.
- ***Hanford Health Information Network***--Washington, Oregon, and Idaho state health agencies sponsor this project in collaboration with nine Indian nations. The Network distributes information about the known and potential health effects of exposure to radiation released from Hanford from 1944 to 1972. There are information and service centers in each state, a Tribal Service Program, and a resource center serving those who have moved from the region. The project operates a toll-free Hanford Health Information Line, connects people with referral resources, and is establishing a

Hanford Health Information Archives to gather and preserve individual health histories and experiences.

*All of Hanford's production reactors and processing canyons have been shut down; today, most of the site's resources are devoted to managing the environmental legacy left by decades of plutonium production.*

### **Site Human Radiation Experiments**

During the 1950s, human tritium absorption and radioiron studies were conducted at Hanford. The subjects of these experiments included site employees and medical patients. The controversy over nuclear fallout also stimulated work at Hanford, including studies of radionuclide metabolism and radiation health effects. Examples include research involving employee ingestion of iodine-131 in cow's milk. During the early 1960s, two employee volunteers were exposed to iodine-131 for measuring doses received through the air.

### **Site Records Collections**

The Hanford sites are complex and present a formidable records challenge. Diversification of operations has resulted in records in the custody of several different organizations. The Richland Operations Office has custody of many records kept by the site's Federal managers under the MED, AEC, ERDA, and DOE. In addition, the Operations Office has custody of du Pont, General Electric, and Hanford Environmental Health Foundation records.

The Operations Office now controls its records through a box-level electronic database (known as the Records Holding Area Management Information System, or MIS). While this system is potentially useful for research, it does not use the records series concept. Thus, in contrast to the situation at most DOE sites, identifying bodies of records associated with specific functions or organizations is difficult. Reconstructing records series by using MIS is possible, but the volume of material and the generality of the descriptions complicates this task. The series descriptions listed below represent an effort by OHRE staff to reconstruct collections of records with the most value for studying human radiation experiments. Researchers may wish to use these descriptions in conjunction with MIS. OHRE will continue working with the Operations Office to improve series-level control.

*The Hanford sites are complex and present a formidable records challenge.*

Pacific Northwest Laboratory has custody of its own records and

the records of its predecessor, General Electric. PNL has some intellectual control over its records, and identification of series is easier than for the Operations Office records.

Hanford organizations are not accustomed to providing archival reference services, and the records controls that are in place were designed to meet internal needs. Improving access to all site records, including those currently in Hanford custody, is a goal of this project.

### **Richland Operations Office**

**SERIES TITLE** *Chief Counsel Office, Classified Correspondence Files*

**INCLUSIVE DATES** 1947-1955; 1965-1971

**DATES**

**ARRANGEMENT** Subject

**VOLUME** 1 cubic foot

**DESCRIPTION** The series was compiled to document activities of the Office of Chief Counsel. It includes documents regarding patent declassification and application for classified subjects, reactor inspection records, contracts with special contractors, monthly reports of the Chief Counsel's Office activities, and a contract negotiation and procedure manual. It contains file of correspondence regarding special claims for injury from radiation exposure. The series consists of legal memorandums, contracts, memos, letters, reports, and applications. A box index is available. Box number 001772.

**RESTRICTIONS** This series is entirely classified.

**LOCATION OF RECORDS** Hanford Records Holding Area

715 Swift Blvd.

Richland, WA 99352

**SERIES TITLE** *Chief Counsel Office, Classified General Administrative Files*

**INCLUSIVE DATES** 1946-1963

**DATES**

**ARRANGEMENT** Subject

**VOLUME** 4 cubic feet

**DESCRIPTION** This series was compiled as part of a central filing system for basic reference materials. It includes files on contracts, monthly reports

of Office of Chief Counsel activities; reactor inspection reports; patent applications; special claims for injury; declassification procedures; photographs of the sites and facilities; Richland site selection criteria; and reports of activities at other sites. Box B00491 contains records of special claims made against Hanford for injury due to irradiation. The series includes reports, photos, negatives, memorandums, letters, press releases, manuals, and applications. A box index is available. Box numbers B00491, 041223, 008715, 002488.

**RESTRICTIONS** This series is entirely classified.

**LOCATION OF RECORDS** Hanford Records Holding Area

715 Swift Blvd.

Richland, WA 99352

**SERIES TITLE** *Chief Counsel Office, Litigation/Radiation Claims Files*

**INCLUSIVE DATES** 1957-1983

**ARRANGEMENT** Litigation subject

**VOLUME** 20 cubic feet

**DESCRIPTION** This series documents the litigation activities of the Office of Chief Counsel. It contains various litigation case files and materials on radiation claims against contractors, Workmen's Compensation cases, transcripts of public hearings, and investigative case reports. The series contains letters, memorandums, reports, legal documents, working papers, interrogatories, and charts. A box index is available. Box numbers 024757, 072689, 072709, 072909, 072943, 072910, 072945, 072949, 079007, 079307, 079308, 079403, 079405, 079406, 079440, 103076, 103077, 103080, 103081, 103082.

**LOCATION OF RECORDS** Hanford Records Holding Area

712 Swift Blvd.

Richland, WA 99352

**SERIES TITLE** *Chief Counsel Office, Unclassified Correspondence*

**INCLUSIVE** 1943-1973

**DATES****ARRANGEMENT** Subject**VOLUME** 9 cubic feet

**DESCRIPTION** This series documents the activities of legal counsel in advising Hanford Facility management on law, legal policy, and contract interpretation. It includes material on General Electric activities, patent matters, personnel clearance matters, the Manhattan District History, community management, the hospitals, leases, and land disposal. The series consists of graphs, charts, correspondence, court transcripts, hearing exhibits, trial preparation documents, police reports, and leases. A box index is available. Box numbers 001768, 002464, 002845, 002970, 003425, 007218, 029235, 030733, 079006.

**LOCATION OF** Hanford Records Holding Area**RECORDS**

715 Swift Blvd.

Richland, WA 99352

**SERIES TITLE** *General Electric, Contractor Research and Technical Notebooks***INCLUSIVE** 1952-1962**DATES****ARRANGEMENT** Chronological**VOLUME** 42 cubic feet

**DESCRIPTION** This series documents GE experiments and research initiatives. In particular the series contains information on animal research, plant study, radiological study, aquatic biology, chemistry, electrochemistry research on plutonium, environmental research, and other projects. The series contains laboratory notebooks used to record data, observations, and notes. A box index is available. Box numbers (G)67573, 67574, 67604, 67605, 68379, 84029, 84030, 84031, 84584, 84587, 84588, 84589, 84590, 84591, 84592, 84593, 84703, 84704, 85157, 85158, 85159, 85160, 85478, 85479, 85480, 85481, 85488, 85491, 85492, 85493, 85537, 85541, 85542, 85543, 85544, 85545, 85546, 85547, 85553, 85554, 85559, 85596.

**LOCATION OF** Records Holding Area

**RECORDS** 715 Swift Blvd.

Richland, WA 99352

**SERIES TITLE** *Hanford Engineer Works, Project Historical Files***INCLUSIVE** 1943-1947**DATES****ARRANGEMENT** Subject**VOLUME** 1 cubic foot**DESCRIPTION** The series documents the early history of the Manhattan District, particularly the Hanford Piles Project. It includes the diaries of Col. F. T. Matthias, the Manhattan District history book, and the Hanford Engineering Works project history. The Matthais diaries contain information related to meetings with D. Cooksey and Dr. Joseph Hamilton of the Lawrence Radiation Laboratory. The series consists of correspondence, manuscript drafts, descriptions of experiments, photographs, project completion reports, and military diaries of day to day operations. A box index is available. Box number C00309.**LOCATION OF** Records Holding Area**RECORDS**

715 Swift Blvd.

Richland, WA 99352

**SERIES TITLE** *Personnel Division, Classified General Administrative Files***INCLUSIVE** 1943-1976**DATES****ARRANGEMENT** Subject**VOLUME** 2 cubic feet**DESCRIPTION** This series documents the general administrative activities of the personnel division. It includes reference materials, annual reports, organizational charts for specific contractors and reactor operations, and studies of plant operations. It also contains reports on Richland diversification plans and summaries of plant operations. The series consist of organizational charts, studies, reports, graphs, letters, memorandums, and technical data. A box index is available. Box numbers 046073,



C00327.

**RESTRICTIONS** This series is entirely classified.

**LOCATION OF RECORDS** Records Holding Area

715 Swift Blvd.

Richland, WA 99352

**SERIES TITLE** *Plans & Budget Division, Classified Report Files*

**INCLUSIVE DATES** 1943-1961

**ARRANGEMENT** Chronological

**VOLUME** 11 cubic feet

**DESCRIPTION** The series documents the entire range of operations office activities. It includes Construction Engineering Operation monthly reports, Hanford Works monthly reports, manager's data books, du Pont monthly reports, and Hanford management books. Many reports include sections on medical division, health instruments, and biology division activities. The manager's data books include sections on personal injury claims, accidental and occupational fatalities, as well as organization charts. Box 003094 contains important histories of early Hanford medical programs. The series consists of formal reports and data books. A box index is available. Box numbers B00213, B00670, B00672, B00674, 001603, 002061, 002436, 002437, 002815, 003094, 001604.

**RESTRICTIONS** This series is entirely classified.

**LOCATION OF RECORDS** Records Holding Area

715 Swift Blvd.

Richland, WA 99352

**SERIES TITLE** *Procurement Division Files*

**INCLUSIVE DATES** 1965-1991

**ARRANGEMENT** Subject

**VOLUME** 22 cubic feet

**DESCRIPTION** This series documents oversight of contract negotiations and patent clearances at Hanford by the Contract Administration Division, earlier called the Contract and Procurement

Division. It includes information of the Westinghouse Hanford, Hanford Environmental Health Foundation, General Electric, University of Arkansas, University of Oregon, Flow Research Inc., Pacific Northwest Laboratories, and Battelle Northwest contracts, as well as, patent clearance requests. The series consists of memorandums, letters, and requests for patent clearances with supporting drawings and articles, contracts, authorization letters, policies and procedures, and technical reports. A box index is available. Box numbers 027205, 027252, 027254, 027255, 041242, 043046, 043051, 066889, 079080, 079446, 085597, 085599, 085600, 085651, 085731, 085859, 085862, 094630, 115477, 038169, 040963, 038170.

**LOCATION OF RECORDS** Records Holding Area

715 Swift Blvd.

Richland, WA 99352

**SERIES TITLE** *Procurement Division, Ronald E. Cone, Chief Acquisition & Financial Branch, Contracts & Correspondence Files*

**INCLUSIVE DATES** 1963-1969

**ARRANGEMENT** Subject

**VOLUME** 3 cubic feet

**DESCRIPTION** This series documents the functions and responsibilities for the contract manager branch. It includes contracts and correspondence pertaining to contracts, USGS Bureau of reclamation (Yakima) central warehouse upgrades, Bonneville Power Administration contracts, environmental studies, Richland audit reports, and AEC policies for operating contracts. The series consists of invoices, meeting notes, contracts, letters, memorandums, architectural drawings, floor plans, and published material. A box index is available. Box numbers 103205, 103209, 103214.

**LOCATION OF RECORDS** Records Holding Area

715 Swift Blvd.

Richland, WA 99352

**SERIES TITLE** *Production & Waste Management Division,  
Classified Correspondence Files*

**INCLUSIVE DATES** 1943-1973

**ARRANGEMENT** Subject

**VOLUME** 49 cubic feet

**DESCRIPTION** This series documents operations office oversight of production reactor operations. It includes documentation on reactor operating problems such as graphite expansion, cost of operations, plutonium production, reactor safety, reactor waste, chemical processing activities, and cost analyses of production reactor shutdown. It contains files on accidental exposure and cancer treatment, Columbia River pollution, Building 234 design, fallout data collection, heavy water production, and RaLa production at Richland and Los Alamos. The cancer treatment file is a Medicine Health and Safety (MH&S) 3-8 Special Case file that includes correspondence about the treatment of cancer patients using the Richland whole body counter. The series consists of letters, memorandums, reports, TWXs, charts, graphs, handwritten notes, and meeting minutes. The records are arranged according to several subject filing systems, one of which is the AEC numeric filing system. A box index is available. Box numbers A00601, A00739, B00125, C00361, 001418, 001607, 002421, 002461, 002876, 003085, 007532, 007541, 007545, 008748, 008751, 008784, 009920, 010478, 015200, 015202, 015203, 015204, 015227, 015237, 015270, 016211, 016250, 022746, 022749, 024721, 024722, 027216, 027256, 027260, 028732, 028766, 029363, 030750, 030751, 030755, 030758, 030760, 033273, 038287, 039230, 039231, 039270, 046093, 046220.

**RESTRICTIONS** This series contains classified information.

**LOCATION OF RECORDS** Records Holding Area

715 Swift Blvd.

Richland, WA 99352

**SERIES TITLE** *Production & Waste Management Division,  
Unclassified Correspondence Files*

**INCLUSIVE DATES** 1958-1973

**DATES**

**ARRANGEMENT** Subject

**VOLUME** 11 cubic feet

**DESCRIPTION** The series documents the activities of the Hanford Chemical Processing Department which produced various chemical and physical forms of plutonium, manufactured weapons components, and produced various isotopes. It includes materials on environmental impact statements, US AEC Material Status Reports, loan of materials to institutions, nuclear material transfers, leasing policies, waste management practices. Within the series there is a sub-series regarding grants and loans of plutonium which was overseen by P.A. Craig, Supply Coordinator. The series consists of letters, memorandums, reports, completed forms, and photographs. A box index is available. Box numbers 018776, 028710, 033286, 033287, 033297, 066594, 079168, 079169, 079172, 079401, 085618.

**LOCATION OF RECORDS** Records Holding Area

**RECORDS**

715 Swift Blvd.

Richland, WA 99352

**SERIES TITLE** *Research & Development Division,  
Classified Projects, Correspondence Files*

**INCLUSIVE DATES** 1958-1976

**DATES**

**ARRANGEMENT** Subject

**VOLUME** 3 cubic feet

**DESCRIPTION** This series documents various projects and studies of the Research and Development Division. It includes studies on the effects of the nuclear facilities on the Columbia River, waste disposal by the Federal Water Pollution Control Administration, earthquakes, and chemical discharges into the river. It also includes reports on isotope production, and studies on Hanford diversification. The series consists of letters, memorandums, reports, technical data,

meeting minutes, and technical reports. A box index is available. Box numbers 009042, 017264, 039235.

**RESTRICTIONS** This series is entirely classified.

**LOCATION OF RECORDS** Records Holding Area

715 Swift Blvd.

Richland, WA 99352

**SERIES TITLE** *Research & Development Division,  
Unclassified Correspondence Files*

**INCLUSIVE DATES** 1958-1982

**ARRANGEMENT** Subject

**VOLUME** 7.8 cubic feet

**DESCRIPTION** This series documents the division's major responsibilities and activities. Documentation was compiled as part of the division's investigation of site environmental problems. The series includes material on environmental research and activities, special research studies, and activities which the division oversaw, such as the transfer of control of activities among site contractors. It also contains documentation on thermal effects studies and of the effect of reactor operations on the Columbia River. The series contains memorandums, letters, directives, proposals, scientific data, technical notebooks, and reports. A box index is available. Box numbers 007400, 028738, 029361, 046088, 046111, 046116, 072771, 079392.

**LOCATION OF RECORDS** Records Holding Area

715 Swift Blvd.

Richland, WA 99352

**SERIES TITLE** *Research Prisoner Study Files*

**INCLUSIVE DATES** 1963-1976

**ARRANGEMENT** Project

**VOLUME** 1.5 cubic feet

**DESCRIPTION** This series documents the research project whereby prisoners in Oregon and Washington participated in testicular

irradiation studies. It is a medical research project case file reflecting the history of the project from initiation to completion. The series consists of contracts, letters, memorandums, annual reports, publications, renewal proposals, and consent forms. An electronic finding aid is available. Box number 046264.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Records Holding Area

**RECORDS**

715 Swift Blvd.

Richland, WA 99352

**SERIES TITLE** *Safety & Environmental Protection Division, Administrative Files*

**INCLUSIVE DATES** 1957-1981

**DATES**

**ARRANGEMENT** Subject

**VOLUME** 4 cubic feet

**DESCRIPTION** This series documents the division's activities and responsibilities. It includes material on radioactive contaminants discharged to ground; radioactive liquid wastes, radiation exposures (unintentional incidents, accidents, and occupational exposures); stack emissions; air pollutant emissions reporting; discharges into, and sampling of, the Columbia River; dosimetry management; employee safety and health complaints; health and safety inspections; and emergency preparedness. It does not seem to contain information on clinical experimentation but may have data on intentional releases. The series consists of reports, photographs, memorandums, letters, maps, charts, blueprints, phone conversation logs, stack emissions status reports, and environmental impact statements. A box index is available. Box numbers 024284, 066842, 094557, 103015.

**LOCATION OF RECORDS** Records Holding Area

**RECORDS**

715 Swift Blvd.

Richland, WA 99352

**Hanford Environmental Health Foundation****SERIES TITLE** *Administrative Correspondence Files***INCLUSIVE DATES** 1969-1992**DATES****ARRANGEMENT** Chronological**VOLUME** 1 cubic foot**DESCRIPTION** This series documents the administration of the foundation. It includes materials on organizational activities, security and safeguards directives, files related to the consent, use, and follow-up studies of diethylenetriamine penatacetic acid (DPT), United Nuclear Corporation employee files documenting training and welfare programs, and documentation on emergency medical services and emergency preparedness guidelines. The series consists of organizational reports, medical reports, letters, memorandums, graphs, and charts. Box number 099501.**LOCATION OF RECORDS** Hanford Records Holding Area

712 Swift Blvd.

Richland, WA 99352

**SERIES TITLE** *Policies and Procedures Correspondence***INCLUSIVE DATES** 1964-1971**DATES****ARRANGEMENT** Subject**VOLUME** 1 cubic foot**DESCRIPTION** This series documents foundation administration. It includes security appraisals and correspondence; contracts; industrial safety and fire protection functional appraisals; records management appraisals; occupational medicine appraisals; Environmental Health Science (EHS) appraisals; Richland Operations Office appraisals. It also contains a W. D. Norwood letter book, and medical director's office and personal correspondence. The series consists of letters, memorandums, reports, and notebooks. Box number 030247.**LOCATION OF RECORDS** Hanford Records Holding Area

712 Swift Blvd.

Richland, WA 99352

**Pacific Northwest Laboratory (PNL)**

**SERIES TITLE** *Director's Office Correspondence with  
AEC, ERDA, & DOE*

**INCLUSIVE  
DATES** 1965-present

**ARRANGEMENT** PNL Subject Filing System

**VOLUME** 6 cubic feet

**DESCRIPTION** The series documents the administration and management of the laboratory. It includes correspondence files between the PNL Director and the AEC, ERDA, and DOE Richland General Management. The series consists of contracts and related documentation, letters, memorandums, and reports. An electronic finding aid is available.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF  
RECORDS** Pacific Northwest Laboratory

Richland, WA 99352

**SERIES TITLE** *Biology Department Records*

**INCLUSIVE  
DATES** 1965-present

**ARRANGEMENT** PNL Subject Filing System

**VOLUME** 300 cubic feet

**DESCRIPTION** The series documents laboratory activities in the biological sciences. It includes some studies begun by du Pont and General Electric, animal studies, active and inactive administrative records, and project case files. The series consists of monthly, quarterly and annual reports, policies, procedures, letters, memorandums, publications, and formal reports. An electronic finding aid is available. Box numbers (primarily) 098638, 098639, 028000-028002, 028005, 040449, 040458, 040459, 048569, 048571-048577, 113283-113290.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF  
RECORDS** Pacific Northwest Laboratory

Richland, WA 99352



**SERIES TITLE** *Biology Department Records, du Pont and General Electric***INCLUSIVE DATES** 1944-1964**DATES****ARRANGEMENT** Subject**VOLUME** 100 cubic feet**DESCRIPTION** The series documents the biological and biomedical research activities of du Pont and General Electric. It includes records of the Health Instruments Division, material on the Green Run, and files on animal, fish, and vegetation studies. The series consists of monthly, quarterly, and annual reports; policies; procedures; letters; memorandums; Laboratory notebooks; publications; and formal reports. An electronic finding aid is available. Box numbers (primarily) 069551-069556, 080573, 107734-107742, 113295, 065548-065557.**RESTRICTIONS** This series contains privacy material.**LOCATION OF RECORDS** Pacific Northwest Laboratory**RECORDS**

Richland, WA 99352

**SERIES TITLE** *Health Risk Assessment Department Files***INCLUSIVE DATES** 1965-1994**DATES****ARRANGEMENT** PNL Subject Filing System**VOLUME** 100 cubic feet**DESCRIPTION** The series consists of administrative and project records received or generated by the department. The administrative records are maintained by organization and the research records as project case files. The research records are primarily "paper" studies of data collected by other organizations. The series consists of letters, memorandums, reports, computer printouts, and laboratory notebooks. An electronic finding aid is available. Box numbers (primarily) 119430, 126610, 129400-129404, 129456, 129457, 124714-124720.**RESTRICTIONS** This series contains privacy material.**LOCATION OF RECORDS** Pacific Northwest Laboratory**RECORDS**

Richland, WA 99352

**SERIES TITLE** *Human Subjects Committee*

**INCLUSIVE DATES** 1965-1994

**ARRANGEMENT** Subject

**VOLUME** 13 cubic feet

**DESCRIPTION** The series documents laboratory research involving human subjects and is composed of the human subject committee chairperson's administrative files. It includes studies identified by study number, documents on the approval process for each study, information regarding study funding, and copies of minutes of meetings of PNL's Human Subjects Committee. The series consists of letters, memorandums, reports, and meeting minutes. An electronic finding aid is available.

**LOCATION OF RECORDS** Pacific Northwest Laboratory

Richland, WA 99352

**SERIES TITLE** *Human Subjects Records Search, Retrieval Review and Release Project*

**INCLUSIVE DATES** 1993-present

**ARRANGEMENT** Project Case File

**VOLUME** 15 cubic feet

**DESCRIPTION** This series documents the Human Subjects Records Search, Retrieval, Review & Release Project. It includes master and redacted copies of documents pertinent to human radiation experiments, documentation about record searches, and DOE-PNL correspondence. It contains documentation on the following human radiation experiments: a tritium study, the Walla Walla prisoner study, a promethium study, and Hanford intentional releases of radiation. The series consists of notes, drafts, indexes, finding aids, reference material, reports, articles, oral histories, letters, and memorandums. An electronic finding aid is available.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Pacific Northwest Laboratory

Richland, WA 99352

**SERIES TITLE** *Dietary & Body Burden Data & Dose*

*Estimates for Local School Children & Teenagers*

**INCLUSIVE** 1965-1971

**DATES**

**ARRANGEMENT** By school and thereunder by name/number assigned to each person

**VOLUME** 27 cubic feet

**DESCRIPTION** The series was compiled to document a study of the influences of diet on radioactivity in people and was conducted at schools in the Richland area. It includes material on another study to analyze the amounts of certain foods consumed by local families and schoolchildren. The series contains analyses of significant pathways through drinking water, locally grown beef, river fish, and game birds, for radioactivity to reach the body. The series consists of diet charts, whole body counter results, printouts, and photos at local schools. A database is maintained of the documents in each box of records. Box numbers (primarily) 027860-027875, 050200-050213.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Pacific Northwest Laboratory  
Richland, WA 99352

**SERIES TITLE** *Hanford Environmental Dose Reconstruction (HEDR) Project, Administrative & Research Records, Tasks 0-12*

**INCLUSIVE** 1987-1994

**DATES**

**ARRANGEMENT** Project task

**VOLUME** 165 cubic feet

**DESCRIPTION** This series documents the projects' efforts to develop estimates of radiation doses that local populations received from nuclear operations at Hanford. It includes material on project scope, organization, and administration; the development of computer and other models for dose reconstruction; analyses of most hazardous radioisotopes and their transport through the environment into the body; site environmental monitoring, local food habits and life styles; and detailed information about types and amounts of

Hanford radiation releases. The series consists of computer software, memorandums, letters, notes, charts, graphs, preliminary drafts, final reports, database files, comments from the Technical Steering Panel in which panel members provided direction to the project, minutes of meetings, and comments received from the public concerning the research project. An electronic finding aid is available.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Pacific Northwest Laboratory  
Richland, WA 99352

**SERIES TITLE** *Hanford Intentional Atmospheric Releases*

**INCLUSIVE DATES** 1944-1963

**ARRANGEMENT** Document number

**VOLUME** 1 cubic foot

**DESCRIPTION** The series documents the intentional release of radiation to the environment at Hanford. It includes planning and other documentation from the site Health Division, materials on the Green Run, and documentation about the 1962 and 1963 intentional releases. These records were used by the Hanford Environmental Dose Reconstruction (HEDR) Project. The series consists of formal reports, quarterly reports, monthly reports, and prerelease planning documents. An electronic finding aid is available.

**LOCATION OF RECORDS** Pacific Northwest Laboratory  
Richland, WA 99352

**SERIES TITLE** *Records on the Irradiation Effects in the Human Testis*

**INCLUSIVE DATES** 1963-1970

**ARRANGEMENT** Subject

**VOLUME** 1 cubic foot

**DESCRIPTION** This series documents the Study of Irradiation Effects in the Human Testis (also known as the Walla Walla Prisoner Study). It contains documentation on General Electric's and PNL's technical assistance in the study which was conducted by the University of

Washington. The series consists of laboratory notebooks, drawings, sketches, letters, memorandums, photographs, reports, copies of journal articles, and blank consent forms. An electronic finding aid is available. Box number 094367.

**LOCATION OF RECORDS**

Pacific Northwest Laboratory  
Richland, WA 99352

**SERIES TITLE** *Transcripts/Reference Material for "Radioactivity & Health: A History" by Joseph Newell Stannard*

**INCLUSIVE DATES**

1944-1986

**ARRANGEMENT** Interviewee

Document title

Subject; and/or National Laboratory

**VOLUME** 22 cubic feet

**DESCRIPTION** The series was compiled by Stannard in the preparation of "Radioactivity and Health: A History," a work on the history of radioactivity from before World War II to the 1970s. It includes information on human subjects experiments and on animal studies at sites throughout the United States. The series consists of donated documents, reports, articles, tapes of oral history interviews, and transcripts of oral history interviews. An electronic index is available.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS**

Pacific Northwest Laboratory  
Richland, WA 99352

**SERIES TITLE** *Historical Collection of Hanford Documents*

**INCLUSIVE DATES**

1944-1965

**ARRANGEMENT** Document

Number

**VOLUME** 200 cubic feet

**DESCRIPTION** The series documents radiation protection, monitoring, and release activities at Hanford. It includes documents pertaining to research

projects, radiation protection, and radiation monitoring at the Hanford Site from the Manhattan Engineer District through 1965, the Green Run, and other intentional releases. The series consists of letters, memorandums, formal reports, internal reports, organizational charts, laboratory notebooks, and finding aids, such as handwritten document number issue books and a card catalogue for documents issued between 1944 and 1964. The majority of these documents have been reviewed for relevancy to the Hanford Environmental Dose Reconstruction Project and applicable documents were declassified (or declassified with deletions) for use by that project.

**RESTRICTIONS** This series contains privacy material and a small amount of classified information.

**LOCATION OF RECORDS** Pacific Northwest Laboratory

Richland, WA 99352

**SERIES TITLE** *Classified Laboratory Record Books*

**INCLUSIVE DATES** 1965-1994

**ARRANGEMENT** Numerical

**VOLUME** 50 cubic feet

**DESCRIPTION** The series documents classified scientific and technical research of the Laboratory. The record books are used to record observations/data chronologically, describe (narrative or sketch) experimental apparatus, equipment, and any procedures, data sheets, etc., that are used. The series consists entirely of Laboratory record books. An electronic finding aid is available.

**RESTRICTIONS** This series contains classified information.

**LOCATION OF RECORDS** Pacific Northwest Laboratory

Richland, WA 99352

**SERIES TITLE** *Unclassified Laboratory Record Books*

**INCLUSIVE DATES** 1965-1994

**ARRANGEMENT** Numerical

**VOLUME** 450 cubic feet

**DESCRIPTION** The series documents biomedical, scientific, and other research of the Laboratory. The

record books are used to record observations/data chronologically, describe (narrative or sketch) experimental apparatus, equipment, and any procedures, data sheets, etc., that are used. The series consists entirely of Laboratory record books. An electronic finding aid is available.

**LOCATION OF RECORDS** Pacific Northwest Laboratory

Richland, WA 99352

## **Idaho Sites**

### **The Sites Today**

The Idaho sites consist of three major facilities on 890 square miles in southeastern Idaho, about 50 miles west of Idaho Falls. The Idaho National Engineering Laboratory (INEL) is a multiprogram laboratory whose mission focuses upon advanced energy and environment engineering technology. A Naval Reactors Facility functions as a proving ground for prototype naval propulsion reactors. The Argonne National Laboratory West Facility (ANL-W) is a test area for Argonne National Laboratory experimental reactors. With 11,000 employees and a \$1 billion annual budget, the facilities together represent Idaho's second-largest employer. The Atomic Energy Commission originally established the site as a nuclear reactor proving ground, and 52 reactors of many different design types have been built there. As of October 1994, seven reactors were operating or in standby condition.

***Fifty-two reactors of many different design types have been built at Idaho.***

Three DOE offices each manage a portion of the Idaho complex. The Idaho Operations Office oversees INEL activities, the Idaho Branch Office of Pittsburgh Naval Reactors directs the Naval Reactors Facility, and the Chicago Operations Office oversees ANL-W. DOE recently awarded a 5-year management contract to Lockheed Idaho Technologies Company to operate INEL. The Westinghouse Electric Corporation operates the Naval Reactors Facility, and the University of Chicago runs ANL-W. Site focus has shifted from reactor development to management of radioactive waste, storage of spent nuclear fuel, remediation activities, environmental restoration, technology transfer, and research and development activities.

### **Site History**

***The Idaho National Engineering Laboratory (INEL)***--In need of a

remote site to work with experimental civilian and military reactors, the AEC in 1949 created a National Reactor Testing Station at a former U.S. Navy gun testing range in Idaho. The first reactor built at the site was the Experimental Breeder Reactor (EBR-1). In 1951, EBR-1 became the first nuclear reactor to produce electricity from nuclear fission. The main purpose for the reactor, however, was to show the feasibility of "breeding," or creating additional nuclear fuel during routine reactor operation. The AEC then anticipated shortages of the uranium ore needed for reactor fuel. EBR-1 demonstrated the first breeding of nuclear fuel in June 1953. During the 1950s, the AEC built a series of experimental reactors at INEL, including five Boiling Water Reactor Experiment (BORAX) reactors. These reactors generated power by running a turbine on steam directly generated in the reactor. The BORAX-I reactor was built in 1953 to examine the behavior of boiling-water reactors during abnormal changes in power and temperature. During 1954, most of the fuel plates in the reactor core were melted during an experiment. Another BORAX reactor, BORAX-III, became the first reactor to light an American town when it provided electricity for Arco, Idaho in 1955. The BORAX reactors laid the groundwork for the commercialization of boiling-water power reactors.

As the AEC began to encourage the creation of a commercial nuclear power industry after 1955, it conducted reactor research programs to gather data to confirm its assumption that reactors could safely generate electricity. At the time, scientists were concerned that a runaway nuclear chain reaction (excursion) would be the most likely cause of a serious reactor accident. The AEC built four reactors at INEL to carry out the Special Power Excursion Reactor Tests (SPERT). The tests pushed reactors to extreme limits, including intentionally destructive tests in which planned nuclear excursions were allowed to damage reactor cores. These tests released limited amounts of radioactive materials to the environment. SPERT program data contributed to the development of procedures to prevent reactor excursions. The last SPERT reactor (SPERT IV) was shut down in 1970.

The longest-lived INEL reactor project was the Loss of Fluid Test Facility (LOFT). Started in the early 1960s, the LOFT project originally intended to force a fuel meltdown to test reactor core performance. In 1967, AEC changed the purpose of the project to test reactor emergency core-cooling systems. In conjunction with the revised LOFT project, INEL conducted the "semiscale" tests in 1970. The semiscale apparatus consisted of a small reactor mockup equipped with an emergency core-cooling system. Tests suggested that water in the emergency core-cooling system did not circulate as designed. Critics argued that the test proved that emergency cooling systems would not work and that commercial reactors were at risk of releasing catastrophic amounts of radioactivity to the



environment. The semiscale tests were a key event in the U.S. debate over the safety of commercial nuclear power plants. LOFT was shut down in 1986.

INEL also operated experimental military reactors. During the early 1950s, the U.S. Air Force tested nuclear propulsion systems. This effort was part of the Aircraft Nuclear Propulsion program, which aimed to develop a reactor small enough to be mounted in an airplane. Three reactor assemblies, designated as the Heat Transfer Reactor Experiments (HTRE), were used to evaluate reactor control systems, test advanced fuels and moderators, and assess the feasibility of a nuclear-powered aircraft. The aircraft reactor program was canceled in 1961.

***The Idaho Operations Office now manages the Radioactive Waste Management Complex, which examines, sorts, processes, and stores transuranic waste and low-level waste.***

The U.S. Army, too, built experimental reactors at INEL. One such reactor, the Stationary Low-Power Reactor No. 1 (SL-1), was a portable reactor for use in providing power in remote areas. The SL-1 suffered a catastrophic power excursion in 1961, killing three technicians.

The AEC built the Idaho Chemical Processing Plant (ICPP) at INEL to recover enriched uranium for use as nuclear fuel. The ICPP was originally designed in the early 1950s as a 5-year demonstration facility. It quickly became the principal facility for receiving, storing, reprocessing, and managing nuclear materials from reactors in the U.S. and other countries. The ICPP also operated facilities to manage high-level radioactive wastes. The waste calcining facilities have been used to convert liquid radioactive wastes into a solid granular form for storage. Since 1963, the ICPP has converted more than six million gallons of high-level radioactive liquid waste to granular solid form.

The Idaho Operations Office now manages the Radioactive Waste Management Complex, which examines, sorts, processes, and stores transuranic waste and low-level waste. The complex consists of a 97-acre subsurface disposal area and a 57-acre transuranic storage area.

***The Naval Reactors Facility***--Experimental reactors for the Navy were also built at the Idaho site, but the Naval Nuclear Propulsion Program, a joint AEC-Navy program, maintained its own oversight over the reactors and operated them with its own contractors. The Naval Reactors Facility was built in the early 1950s and has tested prototype reactors for submarines and surface ships. The first prototype Naval reactor was produced to help design the reactor for the first nuclear submarine, the U.S.S. *Nautilus*, which was

launched in 1955. In 1958 two prototype Naval reactors were constructed in designing the first nuclear-powered aircraft carrier, the U.S.S. *Enterprise*, which went to sea in 1961. In 1965, a third prototype facility, S5G, was built to study enhanced reactor safety and allow quieter submarine operation.

***The Argonne National Laboratory West facility***--The ANL-W opened in 1964. It is operated as an adjunct to Argonne National Laboratory. This facility houses several experimental reactors and other laboratory facilities. The chief focus has been liquid metal-cooled reactors, safety studies, and reactor core designs. Reactors built at the facility include the Experimental Breeder Reactor II and the Zero Power Plutonium Reactor.

### **Site Human Radiation Experiments**

Two human radiation experiments have been identified that were performed by the Idaho Operations Office Health and Safety Division (known originally as the Health Services Laboratory). Several other experiments involving intentional releases of radioactivity to the environment were also conducted at INEL. Various groups sponsored these tests, including the AEC and its contractors, and other Federal organizations.

***Two human radiation experiments have been identified that were performed by the Idaho Operations Office Health and Safety Division.***

The first human radiation experiment was the Controlled Environmental Radioiodine Tests (CERT), which were designed to develop models for predicting the movement of radioiodine through the milk-to-human food chain (Figure 26). During these tests, known amounts of iodine-131 were released into the environment on 23 occasions from 1963 to 1968. From 1963 to 1966, some human volunteers inhaled air and ingested milk containing radioiodine to obtain data on the transport of radioiodine to and through the body. The purpose of this program, which was part of the AEC's investigation of fallout effects, was to develop mathematical models for predicting the movement of radioiodine through the food chain to man.

The second human radiation experiment involved administration of radioactive material to subjects for testing and calibrating whole body radiation counters. These tests took place from 1965 to 1972 and involved about 18 AEC employees as subjects. The subjects swallowed plastic capsules containing radioactive material, or inhaled radioactive noble gases. Whole body counting equipment was then used to measure and trace the isotopes.

Experiments involving intentional radiation releases to the environment also included tests associated with reactor development and safety, burning of contaminated solvents, and diffusion of gases. These experiments took place from 1955 to 1977. None of these releases involved deliberate exposure of human subjects to radiation. Some tests did, however, result in movement of airborne radioactive material offsite. Individual site experiments are discussed in Chapter 3.

### **Site Records Collections**

INEL has custody of records dating from the beginning of the site in 1949. Many inactive records are stored at the Federal Records Center in Seattle but some are maintained onsite. Most inactive records onsite are kept at the Central Facilities Area. INEL has custody of the records created by the site managing contractors and by the Idaho Operations Office of the AEC, ERDA, and DOE. Some important records are in the custody of the Radiological and Environmental Sciences Laboratory of INEL. Records created by the Naval reactors program and by ANL-W are controlled by these respective organizations. Some records are stored at sites in Idaho Falls, at the Idaho Falls Center for Higher Education (University Place), and at the Willow Creek Building of Lockland Idaho Technologies Company.

INEL has records transfer sheets that contain some information about the contents of individual boxes of inactive records. This information is maintained in hard copy and on the computerized Automated Document System (ADOCS),

which has a limited search capability. Because records holding information is maintained on a box-by-box basis, similar to the system used at Hanford, records series have to be reconstructed. These series descriptions represent a joint effort by Idaho and OHRE to reconstruct and describe the most important collections.

#### ***Information in these series covers the full range of human experimentation done at Idaho.***

Information in these series covers the full range of human experimentation done at Idaho. There is also a small amount of material on environmental releases that were not designed to test the health effects of radiation or the effect of human exposure to radiation. While these releases are beyond the scope of the definition of human experimentation, they were identified during the search. Specifically included are some records associated with the INEL Historical Dose Evaluation which studied radiation dose levels associated with releases and accidents.

**Idaho National Engineering Laboratory (INEL)****SERIES TITLE** *Chief Counsel Office Subject Files***INCLUSIVE** 1949-present**DATES****ARRANGEMENT** Subject Filing Code

Alphabetical by subject (in parts)

**VOLUME** 60 cubic feet

**DESCRIPTION** This series documents the full range of legal activities carried out at the Idaho site. The records cover a variety of topics including, among others, grazing claims and land acquisition files; radiation claims; information on the hazards of low-level radiation; contractor proposals; AEC correspondence; and waste disposal. The records include memorandums, correspondence, reports, legal documents and exhibits, publications, and conference and symposium materials. Three boxes from this series have been transferred into the custody of the National Archives Branch in Seattle.

**LOCATION OF RECORDS** INEL, Central Facilities Area (CFA)

Building CFA-674 E

Idaho Falls, ID 83401

Federal Records Center and National Archives

Seattle, WA 98115

**SERIES TITLE** *Personnel Medical Records***INCLUSIVE** 1947-present**DATES****ARRANGEMENT** Alphabetical**VOLUME** 915 cubic feet

**DESCRIPTION** This series consists of the medical records of each past and present employee of the Idaho National Engineering Laboratory. The records have been microfilmed and the hard copies sent to the Federal Records Center in Seattle, Washington. The microfilmed records are maintained by the Idaho National Engineering Laboratory, Office of Occupational Medicine. This series includes

the records of volunteers who are known to have participated in human radiation experimentation.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Office of Occupational Medicine

Willow Creek Building

Idaho Falls, ID 83401

Federal Records Center

Seattle, WA 98115

**SERIES TITLE** *Occupational Dosimetry Records*

**INCLUSIVE DATES** 1947-present

**ARRANGEMENT** Alphabetical by subject

**VOLUME** 71.5 cubic feet

**DESCRIPTION** These records contain the results of whole body counts, urinalysis tests, and thyroid counts measuring personnel for exposure to ionizing radiation. They also contain a calibration history for the whole body counting equipment. The records include: occupational radiation records; bioassay records; whole body count records; individual personnel records; and record storage receipts dating back to the late 1940s. There are bound notebooks containing log entries of whole body counts, including personnel names, dates, and comments; raw spectra data; viewgraphs of whole body counts, etc. There are also logbooks containing entries that show the name of the subject, date, and a comments section for the whole body count which notes the experiment or study for which the count was performed. Raw spectra data of whole body counts are also noted. The majority of the records are on microfiche and have been sent to the Federal Records Center (FRC), Seattle. There are a few records from 1990 to the present retained onsite. Most of the records have been entered into an electronic database.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** INEL, Operational Dosimetry Unit Offices

Central Facilities, CFA-690

Room 205, Room 11, Room 115, and  
Records Storage Vault

INEL, Central Facilities Area, CFA 674-E

Federal Records Center

Seattle, WA 98115

**SERIES TITLE** *Office of Operational Safety, Radiological  
Section, J.R. Horan Correspondence and  
Reading Files*

**INCLUSIVE DATES** 1958-1972

**ARRANGEMENT** Numerical filing system

**VOLUME** 5 cubic feet

**DESCRIPTION** These files, also known as "J.R. Horan Letter Files," are subject-based files which contain correspondence, reports, reprints, news clippings, interview transcripts, and raw data. Horan was the director for many years of the Health and Safety Division. Subjects include radium, film dosimetry, accidents, radiological assistance, water quality, structural studies, contamination and decontamination, radiation exposure, and contamination control. There is one file on John Gofman and Arthur Tamplin regarding their criticism of the Atomic Energy Commission in the 1970s.

**LOCATION OF RECORDS** Federal Records Center

Seattle, WA 98115

**SERIES TITLE** *Radiological and Environmental Sciences  
Laboratory, Environmental Sciences  
Branch: Subject Files and INEL Historical  
Dose Evaluation Project Files Collected by  
Eddie Chew*

**INCLUSIVE DATES** 1952-1991

**ARRANGEMENT** Subject

**VOLUME** 11 cubic feet

**DESCRIPTION** These records contain information used in the INEL Historical Dose Evaluation (IHDE) Project, along with related subject files of information collected during the normal

course of business. The Historical Dose Evaluation Project studied radiation dose levels associated with releases and accidents; it produced a final report in two volumes. The IHDE files contain project reports, task group meeting minutes, and correspondence. Also included are records documenting operational and episodic releases and the SL-1 accident. The subject files contain correspondence, contracts, and reports and are filed according to an AEC filing system. These files concern subjects which include: CERT, Experimental Cloud Exposure Study, SL-1, SNAPTRAN, CONVAIR Test, SPERT, and LOFT Release.

**LOCATION OF RECORDS** INEL, Central Facilities Area (CFA)

Building CFA-690 RESL, Room 191

Idaho Falls, ID 83401

Federal Records Center

Seattle, WA 98115

**SERIES TITLE Radiological and Environmental Sciences Laboratory:**

**Files of Doug Carlson, Director**

**INCLUSIVE DATES** 1958-1994

**ARRANGEMENT** Chronological

Subject

**VOLUME** approximately 7 cubic feet

**DESCRIPTION** These records include reading files of monthly reports, correspondence from 1992, and files containing collected information concerning human experiments. They contain information on: CERT tests, CERTLE tests, van calibration experiments, human nuclide studies, capsule experiments, the SL-1 accident, and an experiment apparently

conducted on a University of Arkansas graduate student at that facility who later became an INEL employee. The document types include: monthly activity reports, AEC Reports, journal articles, correspondence, and notes and reports summarizing experiments. Important information in this series includes: lists of experiment participants, summaries of experiments, CERT progress reports, information on CERT funding, and experiment logbooks containing consent forms.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** INEL, Central Facilities Area (CFA)

Office of the Director

Building RESL CFA-690

Idaho Falls, ID 83401

Federal Records Center

Seattle, WA 98115

**SERIES TITLE** *Radiological and Environmental Sciences Laboratory: Whole Body Counting Records Collected by Dale G. Olsen*

**INCLUSIVE DATES** 1961-1994

**ARRANGEMENT** Chronological

Subject

**VOLUME** approximately 4 cubic feet

**DESCRIPTION** These records include the journal articles, dectapes and dectape logs, reports on bioassay techniques, and whole body counting logbooks kept in the office of the Branch Chief of the Laboratory Accreditation Program. The logbooks record whole body counts conducted by Dale Olsen and others. One logbook entitled "Human Ingestion Capsule" contains information on body counts of people who voluntarily swallowed capsules containing radioisotopes. This log includes 10 signed consent forms.

**RESTRICTIONS** This series contains privacy material.



**LOCATION OF INEL, Central Facilities Area (CFA)  
RECORDS**

Building RESL CFA-690, Room 115

Idaho Falls, ID 83401

Federal Records Center

Seattle, WA 98115

(cabinet DOELAP, drawer #4 and adjacent  
bookcase)

**SERIES TITLE *Papers, Speeches, and Publications Files of  
Claude W. Sill*****INCLUSIVE** 1955-1980**DATES****ARRANGEMENT** Chronological**VOLUME** 5 cubic feet

**DESCRIPTION** This series contains the records of Claude Sill, who was chief of the Analytical Chemistry Branch at Idaho, part of the Health and Safety Division, for approximately 27 years. He worked for DOE from 1951 to 1980 and is currently employed by Lockheed Idaho Technologies Co., as a principal scientist. His branch provided analytic bioassay services for all contractors at Idaho and he was responsible for the whole body counters. He and his staff actively published and participated in professional meetings and these records include speeches at health physics and bioassay meetings and publications in a variety of journals and proceedings. He also has some logbooks and loose paper files. His records include accounts of his involvement in the Controlled Environmental Radioiodine Test (CERT) and use of humans for the calibration of analytical equipment. He also has in his collection an article on considerations when using human volunteers in experiments with radioisotopes.

**RESTRICTIONS** This series contains privacy material.**LOCATION OF INEL, Test Reactor Area  
RECORDS**

Building TRA 604, Alpha Wing,

Rooms 111, 118

Idaho Falls, ID 83401

Federal Records Center

Seattle, WA 98115

**SERIES TITLE** *Site Contractor General Managers  
Correspondence and Reports Files*

**INCLUSIVE DATES** 1975-1986

**ARRANGEMENT** (Multiple filing systems)

**VOLUME** 25 cubic feet

**DESCRIPTION** This series is composed of the records of the general managers of site contractors for the Idaho National Engineering Laboratory and some of their employees. There are two contractors included here who managed the site. The first is Aerojet Nuclear Company (ANC) which managed the site from 1971 until 1976, and the second is EG&G which managed the site from 1976 until 1994. The records consist of incoming and outgoing correspondence with the U.S. Atomic Energy Commission and with its successor, the U.S. Energy Research and Development Administration. Also included are internal memorandums, annual reports, project descriptions, engineering design papers and proposals, operating procedures, operating reports, procedural guidelines, and minutes of weekly managers meetings. A few subject files deal with issues of safety and risk assessment and the Accident Investigation Committee. The general managers whose records comprise the bulk of the material are C. K. Leeper, who was general manager for ANC, and J.O. Zane, who worked for both ANC and EG&G. Zane's files include some created before he became general manager. Also included are the records of Gary Marx, who was the manager of the Department of Planning and Budgets for EG&G. His records include copies of correspondence and reports, arranged by department, and his budget presentations. There is one box of correspondence of J.R. Dubay of Material, Plant Services, and Engineering. General

manager files for an earlier period have not been located and may have been destroyed.

**LOCATION OF RECORDS**

Federal Records Center  
Seattle, WA 98115

**SERIES TITLE** *Site Managing Contractor Health and Safety Division, and EG&G Safety and Environmental Programs Division Correspondence Logs and Report Copy Files*

**INCLUSIVE DATES** 1969-1985

**ARRANGEMENT** Chronological

Author

**VOLUME** 13 cubic feet

**DESCRIPTION** This series consists of office copies of correspondence and reports generated by and collected by their authors. The individuals who kept these files worked in the Health and Safety Division, and its successor divisions, over a long period of time. Their files record the various changes in contractors and organizational structure within an office that performed essentially the same function over this period. The contractor health and safety offices were concerned primarily with health safety and security issues that arose out of the day-to-day hazards of work on the site. Types of documents in this series include: memos, letters, route slips, weekly and monthly reports, safety anomaly reports, photographs, safety manuals, maps, plans, organization charts, and log books. They cover many safety related subjects including: bus accidents, pest control, decontamination, safety reviews, dosimetry, whole body counting, radiation protection, LOFT, and budgets. At least two letters discuss the planned human iodine-131 skin absorption experiment. The individuals whose files are collected in this series include: J. W. McCaslin, J. L. Clark, Lamar J. Johnson, Richard B. O'Brien, D. P. Halls, and Bryce L. Rich.

**LOCATION OF RECORDS**

Federal Records Center  
Seattle, WA 98115

**SERIES TITLE** *Contractor Medical and Bioassay Records*  
**INCLUSIVE DATES** 1951-1989  
**ARRANGEMENT** Alphabetical (medical records)  
Chronological (bioassay records)  
**VOLUME** 11 cubic feet  
**DESCRIPTION** This series contains bioassay and medical records from the Science and Technology Branch's Operational Dosimetry Organizations and the Quality Assurance, Safety, and Security--Industrial Safety--Medical Departments of the Idaho National Engineering Laboratory. The medical records were kept for personnel working under various DOE contractors during this period, including ENICO, AS&S, Industrial Safety, Allied Chemical Corporation, Aerojet, and Idaho Nuclear Corporation. Document types included in the series are bioassays and medical records of individuals from 1951 to 1989. Bioassay records are kept by analysis number which are roughly chronological. Medical records include physical examinations of employees, medical tests, and other medical information and are kept alphabetically by employee last name.  
**RESTRICTIONS** These records contain privacy material.  
**LOCATION OF RECORDS** Federal Records Center  
Seattle, WA 98115

**SERIES TITLE** *INEL Safety Branch Correspondence and Report Files*  
**INCLUSIVE DATES** 1962-1981  
**ARRANGEMENT** Document type and date  
**VOLUME** 7 cubic feet  
**DESCRIPTION** These records document the safety monitoring by the following safety branches of the Idaho National Engineering Laboratory from 1960 to 1974: Idaho Nuclear Company Health and Safety, Directors Office of Health and Safety; EG&G Idaho, Safety Division; EG&G Idaho, Technical Safety Support Division; EG&G Idaho, Safety Support; EG&G Idaho, System Safety Development Center, Safety and Environmental Programs;

and related safety branches of Aerojet Nuclear Company. The types of documents in this series include logbooks of instrument calibrations; Aerojet Nuclear Company correspondence of W.D. Hanson, P.B. Anderson, and others; industrial hygiene and safety correspondence (log of letters, subjects include safety issues, hazardous material disposal and spills, and equipment safety monitoring); health and safety equipment assessments; Governor's Committee on Radiation Directives and related correspondence; annual safety surveys and appraisals; D.P. Hall's, T. Stickley's, and J.W. McCaslin's letters; and EG&G Idaho Interoffice Correspondence, letter logs, and document review forms. A rough box content listing is available.

**LOCATION OF RECORDS**

Federal Record Center  
Seattle, WA 98115

**SERIES TITLE** *Auto-radiograph Plates of Fallout and Stack Gas Filters by Analytical Chemistry Branch, Environmental Safety Division, Aerojet Nuclear Company*

**INCLUSIVE DATES** 1974-1976

**ARRANGEMENT** Chronological

**VOLUME** 1 cubic foot

**DESCRIPTION** This series contains auto-radiographs of fallout collection plates of the Idaho National Engineering Laboratory gas stacks and soil samples. The series includes request forms from E.B. Tycz of the Environmental Safety Division for analysis by the Analytical Chemistry Branch of the Aerojet Nuclear Company, together with the plates of gas fallout from the stacks and deposition samples from the soil. Exposure time and date are marked on each plate as well as a tracking number generated by the Spectroscopy Section. The request forms indicate that the results were reported to D. Boyer and are in chronological order. The series also includes photographs of the radiographs. Isotopes include Rubidium-106, Sb-125,

and Cs-137 soil samples. Titles of plates include "Stack Gas Filter" and "Fallout Plate." Plates from 1959 to 1974 have been destroyed; thus records documenting intentional releases as part of the Controlled Environmental Release Tests (CERT) 1963 through 1968 are not included.

**LOCATION OF RECORDS**

Federal Records Center  
Seattle, WA 98115

**SERIES TITLE** *Phillips Petroleum Company Health Physics and Reactor Background Radiation Logs and Reports*

**INCLUSIVE DATES**

1951-1964

**ARRANGEMENT**

Within the logs, chronological; otherwise none

**VOLUME**

5 cubic feet

**DESCRIPTION** The bulk of these records are logs kept by the Materials Test Reactor, Health Physics Section. Since 1951, a continuous survey of background radiation was kept at the Idaho National Engineering Laboratory by the Health Physics section or the Health and Safety Division of the Phillips Petroleum Company. The survey was maintained in these logbooks. Start-up logs appear to be the first logs kept of a reactor. The logs record the background radiation day by day. Information includes the location, date, time of day the reading was taken, the background radiation count, and narrative comments. Health Physics logs were also recorded by date and shift, and include the work done by employees, and the names of employees in each area of the reactor. They also include records of isotopes acquired. There is some mention of System for Nuclear Auxiliary Power (SNAP) tests. Also included are Radioactivity Incident Reports which include the supervisor's name, the names of personnel involved, the date and time of the incident, the material involved, narratives of the incidents, graphs, records of medical examinations conducted, and tissue or excreta samples collected and examined. These reports include thyroid exposure data for the

iodine exposure incident in 1958. There are also logbooks of hot-waste-water storage tank samples and safe work permits.

**LOCATION OF RECORDS**

Federal Records Center  
Seattle, WA 98115

**SERIES TITLE** *Phillips Petroleum Company, Operations Office, Radioactive Waste and Release Files*

**INCLUSIVE DATES** 1951-1977

**ARRANGEMENT** Roughly chronological

**VOLUME** 3 cubic feet

**DESCRIPTION** This series contains records related to the Phillips Petroleum Company radiation exposures, radioactive waste, and litigation. Types of documents include the following: Operations Office notes (1975); Boaz folder containing information on Boaz v. Phillips Petroleum Co. litigation; Special Badge Pulls for all Idaho Chemical Processing Plant (CPP) visitors (1973); Phillips Petroleum Company correspondence (1951-1959) discussing radiation exposure and release incidents including write-ups for safety and a facility map; RaLa iodine release, including reference to thyroid counter during RaLa run; 1957 correspondence of A.L. Ayers, Assistant CPP Production Superintendent, Atomic Energy Division; Radioactive Waste Report (monthly from 1965 to 1971); radioactive waste from 1953 to 1971 including stack monitor data sheets; Waste Calcining Facility Off-Gas Samples (1-1-68); Onsite Radioactive Materials Shipment Records (1974); Stack Monitoring Notes 1960-1961; Radioactive Waste Forms (1977); and Stack Sample Analytical Data. A folder in box 24474 entitled "Boaz-Impressions from the Witness Chair" discusses the suit charging Phillip Petroleum Co., (Boaz v. Phillips Petroleum Company) with release of radioactivity and radiation causing leukemia, as well as the need to keep good logbooks at facilities. This folder includes depositions of John Horan, Charles M. Boaz, and Denzel K. Jenson in this case. A rough box contents listing is available for the three boxes.

**LOCATION OF** Federal Records Center

**RECORDS** Seattle, WA 98115**SERIES TITLE** *Technical Library Reports File***INCLUSIVE** 1950-present**DATES****ARRANGEMENT** Report type; thereunder by report number**VOLUME** approximately 300 cubic feet

**DESCRIPTION** This series consists of a collection of reports and publications maintained in the INEL Technical Library. There are approximately 800,000 reports on film and 200,000 in hard copy. INEL staff members are allowed to check out these reports for their personal use so some may be missing at any given time. Included are DOE Idaho numbered reports, Health and Safety Division annual reports, and the Radiological and Scientific Laboratory (RESL) annual reports.

**LOCATION OF** University Place**RECORDS**

Idaho Falls, ID 83401

**Lawrence Berkeley Laboratory****The Site Today**

Lawrence Berkeley Laboratory (LBL) is a multiprogram research facility in Berkeley, CA. The University of California (UC) operates the Laboratory under a managing and operating contract with DOE. The Laboratory employs about 3,500 people and has an annual budget of about \$250 million. Research at LBL focuses on energy technology and biological sciences. The Laboratory operates unique national scientific facilities, including the Advanced Light Source and the National Tritium Labeling Facility. LBL trains scientists and engineers and is involved in advanced technology transfer. LBL is also now expanding work in health sciences, environmental restoration, waste management, and energy efficiency.

**Site History**

The Laboratory has played an important role in the development of modern science and technology. Current ideas about using large teams to run complex equipment and explore interdisciplinary scientific issues originated at Berkeley. Many prominent scientists have worked at the Laboratory, nine of whom have won the Nobel Prize.



***Current ideas about using large teams to run complex equipment and explore interdisciplinary scientific issues originated at Berkeley.***

The origin of the Laboratory is traced to the arrival of Ernest O. Lawrence at UC Berkeley in 1928. Lawrence was a pioneer in nuclear physics: he built the world's first cyclotron at Berkeley in 1930. This machine accelerated nuclear particles in a predictable path by means of magnetic and oscillating electrical fields. The resulting beam of high-speed particles could disintegrate atomic nuclei and produce radioactive isotopes. The cyclotron opened new research opportunities in physics, chemistry, biology, and medicine. An adept entrepreneur, Lawrence met with steady success in convincing funding institutions of the scientific and practical benefits of his ideas. He won formal establishment of a UC Radiation Laboratory in 1936.

Lawrence, who served as Laboratory Director until his death in 1958, established a method of research known as "big science." Before establishment of the Radiation Laboratory, individual scientists had conducted research using simple equipment that they operated and built themselves. The cyclotron, however, was a large and complex machine that required the steady attention of many skilled people. The multiple uses to which a cyclotron could be put also led to the use of interdisciplinary research teams. This collaboration spawned significant technological developments, including powerful x-ray machines, new radioactive isotopes, and improved understanding of atomic and biological processes

The Radiation Laboratory continued to grow with cyclotron advancement. Development ran from the 37-inch and 60-inch cyclotrons during the 1930s, the 184-inch cyclotron during the 1940s, and the various specialized accelerators and other machines such as the Super-Hilac, the Bevatron, and the Advanced Light Source during the decades after the Second World War. Upon Lawrence's death, the facility was renamed Lawrence Radiation Laboratory. The University assigned the present title, Lawrence Berkeley Laboratory, in 1971.

Lawrence and his Laboratory were deeply involved in the war effort. Lawrence himself was one of the first scientists to believe that atomic weapons were feasible. His advocacy contributed to the creation of the Manhattan Engineer District, which assumed responsibility for the Laboratory's research in 1943. During this period, the Laboratory focused on developing a process for electromagnetic separation of a fissionable uranium isotope (uranium-235) for use in an atomic bomb. Using cyclotron technology and chemical processing techniques, the Laboratory produced the first samples of uranium-235. Berkeley participated in the design and construction of the electromagnetic separation plant

(Y-12) in Oak Ridge, TN. When the plant became operational, Lawrence and his staff devoted considerable time to resolving practical engineering issues and training the hundreds of people needed to operate the equipment.

***Lawrence and his Laboratory were deeply involved in the war effort.***

The Laboratory's scientific infrastructure supported important work in nuclear chemistry, including the discovery of many new transuranic elements. Laboratory researchers had discovered the first such element, neptunium, in 1940. Glenn T. Seaborg continued this work with the discovery of plutonium and played a key role in the discovery of over half a dozen new elements through the 1950s.

Work at the Laboratory also gradually expanded into other areas. A materials science center, established in 1961, studied the fundamental nature of materials at the molecular and atomic levels. By the 1970s, a major chemical biodynamics program was exploring green-plant photosynthesis and the chemical events that preceded the origin of life on Earth. The energy crises of the 1970s led to work on fusion, geothermal, and solar energy technologies.

**Site Human Radiation Experiments**

The Laboratory has a long history of biomedical research involving radiation. Ernest Lawrence quickly realized the potential of radiobiology both for advancing science and for obtaining funding. Soon after creation of the Laboratory, he formed a Medical Physics Section. During the war, he established the Donner Laboratory specifically for this work. Early practitioners of radiation experiments at the Laboratory included John Lawrence, Paul Aebersold, Robert Stone, and Joseph Hamilton; all these individuals became major figures in radiobiology research.

Starting in the 1930s, biomedical researchers used the Laboratory's new equipment (such as particle beam accelerators and more powerful x-ray tubes) and substances (radioactive isotopes) to do experimental work on animals and people. The work on people centered on trial therapies for various medical conditions, especially cancer. Much of this medical treatment took place under the auspices of the UC hospital and medical school in San Francisco, and advanced the understanding of polycythemia rubra vera, leukemia, thyroid disorders, and other diseases. While this work was important from a scientific perspective, the practices surrounding patient consent and selection are unclear. Stone and Hamilton initiated these studies during the 1930s, and both played key roles in controversial wartime human experiments with plutonium and other radioactive substances.

During the war, the Laboratory curtailed its experimental treatment of disease and centered its biomedical research on issues associated with production of fissionable materials. While such materials were known to be harmful, production for the atomic bomb required hundreds of workers to labor with and possibly receive high exposure from them. Critical areas of concern were the effects of radioactive substances when they were inhaled, ingested, or entered the bloodstream through the skin.

***During the war, the Laboratory centered its biomedical research on issues associated with production of fissionable materials.***

While health protection was an overarching concern, other factors were apparent as well. Stafford Warren, head of the MED Health Section, noted that health and safety measures were needed to keep workers healthy and on the production lines. Security considerations also played a role in the desire to limit occupational illnesses and offsite radiation releases.

Working under the Health Section of the University of Chicago's Metallurgical Laboratory, the Radiation Laboratory was uniquely positioned to help the Manhattan Project. During the 1930s, Joseph Hamilton had established the Nation's first systematic radiation health and safety program at the Laboratory, and Warren applied Hamilton's ideas throughout the Manhattan Project.

Hamilton and some colleagues were also experienced in conducting experimental procedures involving radiation and radioactive substances. Berkeley medical staff injected three people with plutonium and one with americium at the UC hospital as part of the controversial human plutonium experiments.

Beyond the plutonium studies, Stone, Hamilton, and other laboratory researchers such as Cornelias Tobias, Bertram Low-Beer, and John Gofman conducted experiments with fission products and other radioactive substances during the war and immediately thereafter. There was also interest in the metabolism of thorium, protactinium, uranium, and yttrium. Most of this research involved the use of animals, although Hamilton conducted studies involving the inhalation of zirconium oxides by human subjects.

***Limited consent documentation is available for these early human studies. The therapeutic intent of this work is also unclear.***

Other human studies involved the therapeutic and experimental use of radioactive potassium, tritium, iron, astatine, and carbon. Particle beams and other external radiation sources were also used.

These studies had multiple, sometimes overlapping, purposes. They were conducted to treat disease, to understand biological processes, and to refine radiation dose/response information. As noted earlier, limited consent documentation is available for these early human studies. The therapeutic intent of this work is also unclear. While there was interest in treating cancer, for example, there was also strong interest in learning more about the body and how it was affected by radiation.

Other Laboratory biomedical research projects from the 1950s through to the present day include genetic mapping and sequencing, structural and molecular biology, biology of human disease, and biomolecular design. Researchers have had success in learning about cancer, arteriosclerosis, and blood disorders. The laboratory has in recent decades developed sophisticated medical imaging equipment, including Positron Emission Tomography and Computed Tomograph diagnostic scanners. While currently verified site experiments are detailed in Chapter 3, DOE expects to identify and describe additional Berkeley-related experiments in the near future.

### **Site Records Collections**

Of all DOE facilities, LBL has done the best work in placing its records under intellectual control. The key to this success is a comprehensive inventory the laboratory has prepared for its active and inactive records. This inventory covers records of potential value for human radiation experiments, as well as all other laboratory records. Space does not permit inclusion of the total inventory here. In addition, LBL archivists and records managers are working to identify and describe records relating to human radiation experiments at other sites including University of California facilities in San Francisco and

Los Angeles. DOE will make the results of this work available when it is completed. Researchers should contact OHRE or LBL for further information and assistance.

***Of all Department of Energy facilities, Lawrence Berkeley Laboratory has done the best work in placing its records under intellectual control.***

There is much documentation at LBL of human radiation experimentation from the 1930s to the present. Records detailing the work of Joseph Hamilton, Cornelius Tobias, E.O. and John Lawrence, John Gofman, Patricia Durbin, and other scientists are available. Experiments and other activities are discussed in files of the Crocker Laboratory, Donner Laboratory, and LBL Biology and Medicine Division. Topics covered include development of human use protocols, and specific isotope tracer and total body irradiation

studies. Nearly all Laboratory records are unclassified or have been declassified. The location, content, and availability of especially pertinent records series are described below.

### **Lawrence Berkeley Laboratory (LBL)**

**SERIES TITLE** *LBL Business Manager/Research and Development Administrative Files*

**INCLUSIVE DATES** 1946-1988

**DATES**

**ARRANGEMENT** Subject, thereunder chronologically

**VOLUME** 281 cubic feet

**DESCRIPTION** This series contains administrative documents, including materials relating to patents and inventions, purchasing operations, security, foreign visitors and building maintenance, construction, furnishings and equipment, materials pertaining to various accelerators, weapons tests, computers, miscellaneous personnel files, and files pertaining to finances. There are also files concerned with industrial hygiene and accidental exposure to radiation of staff members. The files include correspondence, reports, photographs, blueprints, and handbooks. The files were created during the administrations of multiple Lab directors.

**LOCATION OF RECORDS** Lawrence Berkeley Laboratory

Archives and Records Office

Berkeley, CA 94720

Federal Records Center

1000 Commodore Drive

San Bruno, CA 94066

**SERIES TITLE** *Life Sciences Division--Administrative Files of Baird Whaley, Administrator*

**INCLUSIVE DATES** 1947-1988

**DATES**

**ARRANGEMENT** None

**VOLUME** 137 cubic feet

**DESCRIPTION** This series documents administrative activities of the Life Sciences Division.

Documents include project correspondence, program proposals, human use information, budget information, annual reports, and building and equipment additions/maintenance. Subjects include NASA, LRL, and Atomic Energy Commission proposals; human use protocol development and specific program protocols; Bevalac planning, space allocation, and funding; Electron Linac and 184-inch Cyclotron administrative and project development information; fiscal year funding, budget, and recharge documentation; and Donner Laboratory historical administrative information, including Human Use Committee (of LBL) and Committee for the Protection of Human Subjects (of UCB) correspondence and protocol development with the Department of Health, Education, and Welfare and the National Institutes of Health. The records also contain correspondence documenting the establishment of biomedical research units at hospitals in Thailand and India.

**LOCATION OF RECORDS** Lawrence Berkeley Laboratory  
Archives and Records Office  
Berkeley, CA 94720

Federal Records Center  
1000 Commodore Drive  
San Bruno, CA 94066

**SERIES TITLE** *Administrative Files of Administrative Assistants to the Directors of the Biology and Medicine Division and Donner Laboratory*

**INCLUSIVE DATES** 1946-1987

**ARRANGEMENT** Reverse chronological order

Subject

**VOLUME** 38 cubic feet

**DESCRIPTION** This series consists of administrative records created by various Administrative Assistants (among them: Igor Blake, R.A. San Souci, and Baird Whaley) in the course of their work for various Directors of the Biology and Medicine Division and Donner Laboratory (among them: John Lawrence, and James

Born). Records include historic documents chronicling the planning, building, and funding of Donner Laboratory, Donner Annex, and Donner Pavilion; Director's Funds Research Proposals; correspondence; account ledgers; manuals; news clippings; blueprints and floor plans; animal care expenditures and inventories; Lab population lists; reprints of journal articles; Field Task Proposals; grant files; photographs; newsletters; organizational charts; purchase orders; and invoices. Correspondence sometimes contains descriptions of human experiments conducted or planned, including isotopes used and patient/subject selection.

**LOCATION OF RECORDS** Lawrence Berkeley Laboratory

Archives and Records Office

Berkeley, CA 94720

Federal Records Center

1000 Commodore Drive

San Bruno, CA 94066

**SERIES TITLE** *Donner Clinic and Donner Pavilion Patients/Subjects Index Card Master File*

**INCLUSIVE DATES** 1938-75

**ARRANGEMENT** Alphabetical by patient name

**VOLUME** 3.75 cubic feet

**DESCRIPTION** This series documents patients and subjects treated at the Donner Pavilion and Donner Clinic between 1938 and 1975. The index was created to keep track of and assist in locating medical charts for patients and subjects treated at the two Donner facilities. This is a semiactive records series maintained at Donner Pavilion, Life Sciences Division. These records contain: clinic number; patient, address, referring physician, referral diagnosis, date first seen, birth date, and death date. On some of the cards, the Patient Identification Number has been handwritten on the card.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Lawrence Berkeley Laboratory

Archives and Records Office

Berkeley, CA 94720

Federal Records Center

1000 Commodore Drive

San Bruno, CA 94066

**SERIES TITLE** *Donner Laboratory Clinical Logs and Notebooks***INCLUSIVE DATES** ca. 1946-1977**ARRANGEMENT** Record type**VOLUME** 10 cubic feet

**DESCRIPTION** This series is comprised of patient appointment books, blood and bone marrow data, iron studies data, and miscellaneous clinical information pertaining to platelets, hematocrits, electrophoresis, and osmotic fragility. The majority of the information in this series is kept in small, bound logs or notebooks. Appointment books contain patient name, procedures, and physician name. Blood counts and bone marrow data include patient name, date of count, raw data, and occasional notes. Iron studies include patient name, weight, date, diagnosis and radioactivity injected, plus graphs and data relating to iron--59 injections. Several binders labeled "Blood Volumes" contain sheets listing patient name, weight, height, references to iodine-131 and date, time, and volume of injection. There are 13 sheets here that include the notation "San Quentin" after the patient name. These "San Quentin" sheets date from February and March of 1950. Miscellaneous clinical entries include patient name, date, and raw data.

**RESTRICTIONS** This series contains privacy material.**LOCATION OF RECORDS** Lawrence Berkeley Laboratory

Archives and Records Office

Berkeley, CA 94720



Federal Records Center

1000 Commodore Drive

San Bruno, CA 94066

**SERIES TITLE** *Donner Laboratory R&D Project Case Files--High-Altitude/Decompression Studies*

**INCLUSIVE DATES** 1940-1954

**DATES**

**ARRANGEMENT** Varies

**VOLUME** 17 cubic feet

**DESCRIPTION** This series documents the research and activities of the Donner Laboratory, Aviation Medicine and High Altitude Physiology staff during WWII. The aim of these studies was to determine the effects of decompression on the human body for flight personnel. The series includes records documenting the experimental procedures performed on Peruvian, Army, Navy, Air Force, ROTC, and civilian subjects, as well as animals, in the decompression chamber and during flights out of the San Diego Aviation field. Radioactive isotopes were used as tracers in many of these studies. The series contains Committee on Aviation Medicine (CAM) reports, experimental notes, procedures performed on individual subjects, correspondence, individual scientist's files and notes (Hardin Jones and John Lawrence), x rays of the knees and craniums of subjects, collected reference articles, photographs, graphs, charts, and original signed consent forms for underage subjects involved in these studies.

**RESTRICTIONS** This series contains a small amount of classified information.

**LOCATION OF RECORDS** Lawrence Berkeley Laboratory

Archives and Records Office

Berkeley, CA 94720

Federal Records Center

1000 Commodore Drive

San Bruno, CA 94066

**SERIES TITLE** *Patient Medical Records*

**INCLUSIVE** 1936-1983

**DATES**

**ARRANGEMENT** Disease name; thereunder alphabetical by patient name

**VOLUME** 149 cubic feet

**DESCRIPTION** This series documents treatment of patients at the Donner Laboratory. Records consist of information and patient history forms, blood counts, urinalyses, correspondence with referring doctors and with patients, photographs, graphs, electrocardiographs, tomographic scans, notes, isotope therapy records, daily observations, and lists of dosages; in some cases consent forms are also present. Diseases documented include Hodgkin's disease, lymphatic leukemia, multiple myeloma, polycythemia rubra vera, thyroid problems, and acromegaly. Most pre-1950s cases appear to have involved John H. Lawrence. Cases from 1950 and beyond involved other researchers at Donner Laboratory; Lawrence continued to oversee patient cases through the 1960s, when cases were seen by John A. Linfoot. Some records pertain to experimental work with radioactivity, and document treatment with x rays, radioactive phosphorus and strontium, iron, and radioactive yttrium for above-mentioned diseases. An index of diseases and cartons in which they are found is available.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Lawrence Berkeley Laboratory

Archives and Records Office

Berkeley, CA 94720

Federal Records Center

1000 Commodore Drive

San Bruno, CA 94066

**SERIES TITLE** *Research Medicine and Radiation Biophysics Historical Files*

**INCLUSIVE** 1957-1979

**DATES****ARRANGEMENT** Varies**VOLUME** 11 cubic feet

**DESCRIPTION** This series documents development of nuclear radiation techniques for medical research at Donner Laboratory. Included are slides of experiments, grant proposals (both funded and not funded from 1966 to 1974), and films of Donner research, for both public and medical audiences. The grant proposal folders contain UC Request for Report of Inventions, Notice of Grants Awarded by the Dept. of Health, Education and Welfare, detailed budget sheets, Application for Research Grant Continuation Support, Summary Progress Reports, Notice of Research Project, and Committee for the Protection of Human Subjects approval memos. It appears that human involvement in these studies is limited to blood plasma/lipoproteins studies, but the project descriptions are lacking in some of these folders. Photographs of Donner staff from the 1950s, funding source lists, and articles are also present.

**LOCATION OF RECORDS** Lawrence Berkeley Laboratory

Archives and Records Office

Berkeley, CA 94720

Federal Records Center

1000 Commodore Drive

San Bruno, CA 94066

**SERIES TITLE** *Statistical Summaries***INCLUSIVE DATES** 1937-1989**DATES****ARRANGEMENT** Varies**VOLUME** 1.2 cubic feet

**DESCRIPTION** These files consist of statistical summaries of patients/subjects treated at the Donner Pavilion and Donner Clinic and in the several programs in Research Medicine since 1975. The records are primarily typescript pages that are maintained in three-ring binders and

provide chronological statistical summaries of the treatment of patients/subjects at LBL by nuclear and radiological therapies. The format of the summary reports in each binder changes over time. These records were created and maintained for both their statistical summary function as well as a finding aid to be used in conjunction with the various card indexes for keeping track of biomedical charts for patients and subjects treated in the various Research Medicine Programs. Included are listings of all Donner patients/subjects; listings of new patients and deaths; survival lists of patients/subjects treated with alpha-particle irradiation organized by diagnosis, including but not limited to acromegaly, Nelson's Syndrome, Diabetic Retinopathy, Breast Cancer and prolactin-secreting pituitary adenoma; and lists of potential patients. A finding aid is available.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Lawrence Berkeley Laboratory

Archives and Records Office

Berkeley, CA 94720

Federal Records Center

1000 Commodore Drive

San Bruno, CA 94066

**SERIES TITLE** *Thomas Budinger Files*

**INCLUSIVE DATES** 1961-1983

**ARRANGEMENT** Varies

**VOLUME** 27 cubic feet

**DESCRIPTION** This series documents the research and activities of Budinger (Medical Director of Donner Laboratory from 1967 to 1978), from 1950 to 1984. Included are the following: original correspondence for Donner Medical Lab research; experimental/equipment development such as Positron Emission Tomography (PET), scanning techniques, and camera studies; patient files, including photographs of whole body, head, and hand

scans and procedures performed; correspondence about patients/research subjects; proposals to, and the protocol of, the Human Use Committee; Budinger's notes; copies of reference articles; conferences/workshops attended and organized; notes on student experimental activities; and copies of grant proposals to various organizations submitted to Budinger for review. The series contains records related to experiments on humans and animals using many radioactive isotopes. The series is composed primarily of paper records, but also includes Laboratory photographs of scans.

**LOCATION OF RECORDS** Lawrence Berkeley Laboratory

Archives and Records Office

Berkeley, CA 94720

Federal Records Center

1000 Commodore Drive

San Bruno, CA 94066

**SERIES TITLE** *Patricia Durbin Files*

**INCLUSIVE DATES** 1940-1994

**ARRANGEMENT** Chronological by project or topic

**VOLUME** 89 cubic feet

**DESCRIPTION** This series consists of correspondence, abstracts, project descriptions, progress reports, original and final drafts of papers, grant proposals, notebooks, animal protocols, visual records, research specimens, and reference files created and maintained by Durbin. The files dating from 1940 to 1957 are research records from the Crocker Laboratory that were inherited by Durbin and are maintained by her as part of this series; these particular files have been microfilmed. Crocker Laboratory files dating from 1940 to 1957 include some files created or maintained by Joseph Hamilton. There is some variation in the format of the paper records, particularly in the reference files, which contain index cards and complete sets

of animal progress reports of other biology groups in other national laboratories. Visual records (35mm slides, lantern slides, auto radiographs) total 2.75 feet and research specimens (microscope slides, bone blocks, bone bottles) total 5.25 feet.

**LOCATION OF RECORDS** Lawrence Berkeley Laboratory

Archives and Records Office

Berkeley, CA 94720

Federal Records Center

1000 Commodore Drive

San Bruno, CA 94066

**SERIES TITLE** *John W. Gofman Files*

**INCLUSIVE DATES** 1950-1959

**ARRANGEMENT** Varies

**VOLUME** 4 cubic feet

**DESCRIPTION** This series documents Gofman's research, which included thyroid studies, cancer and drug research, studies of lipoproteins and atherosclerosis, as well as his professional activities, such as University of California committee work. Records consist of correspondence, patient data, group progress reports, proposals, drafts, papers, questionnaires, follow-up forms, blood shipment lists, case report forms, and references. They are arranged loosely by study, so that most data pertaining to a particular experiment or study in a project is kept in one folder; blood sample information appears to be arranged by source (e.g., doctor providing the blood; other records, such as correspondence and reports, are not arranged systematically).

**LOCATION OF RECORDS** Lawrence Berkeley Laboratory

Archives and Records Office

Berkeley, CA 94720

Federal Records Center

1000 Commodore Drive

San Bruno, CA 94066

**SERIES TITLE** *Joseph G. Hamilton Records*

**INCLUSIVE DATES** 1943-1975

**DATES**

**ARRANGEMENT** Varies

**VOLUME** 12 microfilm reels

**DESCRIPTION** These records have been copied from various collections to form an artificial collection of records pertaining to Hamilton. Many of these records were created by Hamilton and transferred to the LBL Archives and Records Office in 1957. Patricia Durbin used the files for her follow-up study of the 1945-1947 plutonium injections. Attached to each reel are file folder listings, a biographical sketch of Joseph G. Hamilton, and a scope and content note. Some notable projects represented here include Dugway bomb tests, and Project Sunshine, a study of the effects of strontium-90. Other records from the 1950s seem to be more directly related to Durbin's research or to the research of other, newer members of the research group. They document Durbin's early work with radioactive materials in animals and in some cases with humans. Human studies include a study of astatine in patients with goiter or adenoma and a study of milk and baby food (tracing natural levels of strontium and other elements). Durbin's follow-up studies of people injected with plutonium or americium in the 1940s include some correspondence, notes, and data. A finding aid with reel and microfilm frame numbers is available.

**LOCATION OF RECORDS** Lawrence Berkeley Laboratory

Archives and Records Office

Berkeley, CA 94720

Federal Records Center

1000 Commodore Drive

San Bruno, CA 94066

**SERIES TITLE** *Joseph G. Hamilton Materials: Edwin M. McMillan Papers***INCLUSIVE DATES** 1938-1973**DATES****ARRANGEMENT** None**VOLUME** 0.2 cubic foot

**DESCRIPTION** This series contains correspondence, article reprints, reports, newspaper clippings, photographs, and transparencies pertaining to the work of Joseph G. Hamilton. The series documents use of human subjects in Hamilton's radiation experiments with photographs of human tissue and charts recording human metabolism of radioisotopes. While the photographs of human tissues do not reference particular experiments, they are consistent with other records that document human subject radiation research by Hamilton. The series was created during the directorships of Edwin McMillan and E.O. Lawrence, and has no particular arrangement.

**LOCATION OF RECORDS** Lawrence Berkeley Laboratory

Archives and Records Office

Berkeley, CA 94720

Federal Records Center

1000 Commodore Drive

San Bruno, CA 94066

**SERIES TITLE** *Hardin Jones Files***INCLUSIVE DATES** 1940-1978**DATES****ARRANGEMENT** Author name**VOLUME** 3 cubic feet

**DESCRIPTION** This series is composed primarily of article reprints from the files of Hardin Jones, but it also contains some correspondence, papers and reports. The articles come from a number of medical journals, mostly American, but European as well. They pertain to a variety of medical disciplines, but many are about experimental procedures and radiology. Topics include Laguna-Honda Hospital



human studies and Donner Clinic metabolic studies. Experiments located at Laguna-Honda include a I131 uptake study, and an electrolyte metabolism study in patients with malignancies using Na24 and K42. The hospital also studied leukemic children treated with radiation, use of tagged substances in the study of afferent arteries, and radiation to the pituitary in cancer patients. In addition to experiments with radiation, patients at Laguna-Honda Hospital were used for experimental drug and chemical therapies outlined in other funding proposals in this file.

**LOCATION OF RECORDS** Lawrence Berkeley Laboratory

Archives and Records Office

Berkeley, CA 94720

Federal Records Center

1000 Commodore Drive

San Bruno, CA 94066

**SERIES TITLE** *John Hundale Lawrence Files*

**INCLUSIVE DATES** 1932-1986

**DATES**

**ARRANGEMENT** Varies

**VOLUME** 65 cubic feet

**DESCRIPTION** This series chronicles the personal and professional life of Lawrence (1904-1991). Considered one of the pioneers in the field of nuclear medicine, Lawrence was the brother of LBL's first Director, Ernest O. Lawrence. John Lawrence served as Director of Donner Laboratory (1948-1970), Professor of Medical Physics at the University of California at Berkeley (1950-1970), Physician-in-Chief, Donner Pavilion (1954-1970), Associate Director, Lawrence Radiation Laboratory (1959-1970), and Regent of the University of California (1970 to early 1980s). The series contains correspondence; photographs; 35mm and lantern slides; preprints and reprints; newspaper clippings; negatives; charts; graphs; data; manuscripts; course materials;

curricula vitae; floor plans; protocols; records of invention; viewgraphs; speeches and talks; sound recordings; and travel plans. These records clearly depict the scientific and social milieu in which Lawrence operated. The correspondence documents the growth of Lawrence's international reputation in nuclear medicine; his personal, religious, and political beliefs; Lawrence family history; and the history of Donner Lab, Donner Pavilion, and the Metabolic Unit at Cowell Hospital.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF**

**RECORDS** Lawrence Berkeley Laboratory

Archives and Records Office

Berkeley, CA 94720

Federal Records Center

1000 Commodore Drive

San Bruno, CA 94066

**SERIES TITLE** *John Hundale Lawrence Research Subject Files*

**INCLUSIVE DATES** 1962-1975

**DATES**

**ARRANGEMENT** None

**VOLUME** 0.3 cubic foot

**DESCRIPTION** This series documents the research and administrative activities of Lawrence (1904-1991), brother of founder of LBL, Ernest O. Lawrence. In 1935 John Lawrence joined Ernest in Berkeley and became interested in the use of artificially produced radioisotopes and nuclear radiation in medicine. In 1936 Lawrence founded the Donner Laboratory within the Radiation Laboratory. Lawrence retired from Donner in 1969. He served as a University of California (UC) regent from 1970 to 1983 and was president of the Society of Nuclear Medicine in 1966-1967. This series is composed of two subseries: subject files in labeled file folders and a binder labeled Slides JHL.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Lawrence Berkeley Laboratory

Archives and Records Office

Berkeley, CA 94720

Federal Records Center

1000 Commodore Drive

San Bruno, CA 94066

**SERIES TITLE** *Thornton Sargent Administrative Files*

**INCLUSIVE DATES** 1961-1994

**ARRANGEMENT** Subject

**VOLUME** 11.5 cubic feet

**DESCRIPTION** Dr. Thornton Sargent is a biophysicist at Donner Laboratory whose research involves using radioisotopes in human and animal subjects to study physiologic processes. This series contains correspondence; grant proposals; personnel records, such as dosimetry, student assistant files by name; Donner staff committee meeting records; budget and funding information; safety data; radiation safety; administrative materials relating to whole body counter; pharmaceuticals; experimental proposals for projects that didn't get done; Donner administration materials; and travel. This series contains a file on human use protocols, filed by study name, and a file on consent forms and human use protocols that were in effect at the time human subject studies were approved.

**LOCATION OF RECORDS** Donner Laboratory

LBL Archives and Records Office

Berkeley, CA 94720

**SERIES TITLE** *Thornton Sargent Patient Medical Case Files*

**INCLUSIVE DATES** 1959-1994

**ARRANGEMENT** Study

Patient name

**VOLUME** 17 cubic feet

**DESCRIPTION** This series contains patient case files relating to Sargent's studies using radioisotopes in human subjects to study physiologic processes. The files include raw data measurements and medical evaluation of subjects for the following studies: studies of calcium/strontium metabolism in patients with acromegaly and bone cancer (1964-1969); cobalt studies of subjects with B12 deficiency v. normal subjects; chromium-51 studies of subjects with diabetes and hemochromatosis (1970s); iron studies of patients injected with thorotrast to compare iron absorption in normal v. iron deficient subjects; brain metabolism studies using iodine-122, filed by type of patient, e.g., depression, schizophrenia; brain imaging studies using bromine isotope for brain scanning on laboratory personnel, and zinc studies of mostly normal subjects (mid-1960s). Patient records note name, weight, height, date of birth, employee number, work location, phone, date and results of urine bioassay test, dates of whole body counts, calculation of actual exposure, spectra of detected activity in both tabular and graphic forms, list of isotopes with which employee regularly works, patient's uptake level (if known), and suspected location of exposure, and either referral letter from outside physician or from Environmental Health & Safety Division of LBL. There are also records for patients, referred by outside physicians, who may have been exposed to dangerous levels of radiation (e.g., as a result of Chernobyl nuclear reactor accident). Records of experimental exposures note isotope used, amount injected, daily counts, and final analysis.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF**

**RECORDS** Donner Laboratory

LBL Archives and Records Office

Berkeley, CA 94720

**SERIES TITLE** *Thornton Sargent Publication Working Files***INCLUSIVE** 1959-1994**DATES****ARRANGEMENT** Study name**VOLUME** 3 cubic feet

**DESCRIPTION** This series contains Sargent's studies of physiological processes in animal and human subjects using radioisotopes. Files in this series contain analyses of data, organized by study title, for studies including: subjects injected with thorotrast to evaluate difference in iron absorption in normal v. iron deficient subjects; bromine as brain imaging compound in studies involving lab personnel; cesium-137 and cesium-132 studies of subjects exposed to fallout; studies of calcium/strontium metabolism in patients with acromegaly and bone cancer (1964-1969); cobalt studies of subjects with B12 deficiency v. normal subjects; chromium-51 studies of subjects with diabetes and hemochromatosis (1970s); zinc studies (unpublished) of mostly normal subjects (mid-1960s); and positron emission tomography (PET) 280 fluorodeoxyglucose (FDG) studies of human subjects with schizophrenia. Titles in this series include: Iron Paper, FDG in Schizophrenia. These files provide a fairly complete overview of the types of studies done by Sargent during his years at LBL.

**LOCATION OF** Donner Laboratory**RECORDS**

LBL Archives and Records Office

Berkeley, CA 94720

**SERIES TITLE** *Kenneth Scott Oral History Transcript***INCLUSIVE** 1979**DATES****ARRANGEMENT** None**VOLUME** 0.2 cubic foot

**DESCRIPTION** This series consists of a single file that contains an incomplete, 70 page transcript of an oral history interview of Kenneth Scott conducted by Sally Hughs on December 17, 1979. References to humans treated or

experimented with radiation include treating leukemia patients with radioactive phosphorous in 1937; there are also references to the plutonium injection experiments.

**LOCATION OF RECORDS** Lawrence Berkeley Laboratory

Archives and Records Office

Berkeley, CA 94720

Federal Records Center

1000 Commodore Drive

San Bruno, CA 94066

**SERIES TITLE** William E. Siri Files

**INCLUSIVE DATES** 1945-1989

**ARRANGEMENT** Chronological

**VOLUME** 11.5 cubic feet

**DESCRIPTION** This series contains files relating to the research of William Siri who was a physicist at Donner Laboratory. Topics covered are human body composition, including studies of total body water, hydrogen exchange, acromegaly, and hypoxia. Files include LBL interoffice correspondence, and correspondence with outside colleagues; records relating to biophysics conferences and presentations; committees on which Siri served, such as Energy and Environment Division Council, and National Research Council; manuscripts and abstracts in draft, published form, grant applications and annual reports; drawings and plans for mass spectroscope, and altitude and low pressure chambers; and patient and human subject charts and graphs. Patient and human subject documentation includes raw data, cardiograms, notebooks for tritium studies, and studies using radioisotopes such as carbon-14, potassium-40, chromium-57, and iron-59. This series contains records of high altitude studies conducted in Peru in 1952, Bolivia in 1957, and relating to the American Mount Everest Expedition (AMEE) in 1963, using radioisotopes on human subjects. Files

are arranged chronologically by subject in three-ring binders and folders. This series contains videotapes of heart flow and monkey studies, and 21 rolls of numbered electrographs.

**LOCATION OF RECORDS** Federal Records Center

LBL Archives and Records Office

Berkeley, CA 94720

**SERIES TITLE** *Cornelius A. Tobias Files*

**INCLUSIVE DATES** 1937-1991

**ARRANGEMENT** Varies

**VOLUME** 105 cubic feet

**DESCRIPTION** This series documents Tobias= work as Professor of Medical Physics at the University of California at Berkeley, as well as his administration of the Radiation Biophysics Group at Donner Lab. Primary subseries include: subject and author literature searches; scientific journal reprints and preprints by both Tobias and others; correspondence; grant applications, research proposals and reports; instructional material; student theses and dissertations; recommendations for students, faculty and staff; experimental data; materials related to various Lawrence Berkeley Laboratory (LBL) organizations; LBL publications; documents related to Tobias= committee work on the Light Ion Biomedical Research Accelerator (LIBRA) and his Directorship at the Advanced Biomedical Science and Treatment Center (ABC); and Biology and Medicine Division staff files. This series also includes bibliographies, curricula vitae, journals, catalogs, technical reports and papers, patents, notebooks, experimental logbooks, and transcriptions of Sally Smith Hughs' oral history interviews of Tobias in 1979-1980.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Lawrence Berkeley Laboratory

Archives and Records Office

Berkeley, CA 94720

Federal Records Center

1000 Commodore Drive

San Bruno, CA 94066

**SERIES TITLE** *Cornelius A. Tobias Files (2)*

**INCLUSIVE DATES** 1943-1970

**DATES**

**ARRANGEMENT** Record type; alphabetical/chronological thereunder

**VOLUME** 38 cubic feet

**DESCRIPTION** This series documents Tobias= work as a Radiation Biophysicist at Donner Lab and LBL, as well as his professional association with various national and international committees, hospitals, and research facilities. Types of documents included are: drafts and final, scientific reports; AEC reports on experimentation with plutonium and I131 (Project 48A); scientific notes and correspondence related to radiation experimentation; slides, charts, and analysis of the uptake and desaturation curves of humans and animals used in radioactive tracer experiments; photographs of Donner personnel, scientific projects, and equipment; student information; curriculum vitae of physicists considered for jobs at LBL/Donner; Tobias' notes from classes taken as a graduate student, including copies of his thesis; publication correspondence; correspondence relating to applications for human use; correspondence with other facilities in a consultative capacity for cyclotrons and isotope techniques; blueprints for scientific equipment; patent files and applications; and copies of notes used for presentations and talks at seminars and conferences. The series also includes some of Tobias= personal correspondence and photographs. The series as a whole gives an overview of Tobias= career and his interaction with the international scientific community.

**LOCATION OF RECORDS** Lawrence Berkeley Laboratory



Archives and Records Office

Berkeley, CA 94720

Federal Records Center

1000 Commodore Drive

San Bruno, CA 94066

**SERIES TITLE** *Donald Van Dyke Files*

**INCLUSIVE DATES** 1957-1975

**DATES**

**ARRANGEMENT** Varies

**VOLUME** 10 cubic feet

**DESCRIPTION** This series documents Van Dyke's work on blood and bone marrow studies. Particular fields of research included studies of human erythropoietic activity in plasma, cardiac evaluation from radioisotope dynamics, and blood transport through bone marrow. Studies include both animal and human experimentation, chiefly for the advancement of research on forms of leukemia, myeloma, and anemia. Techniques included induced parabiosis in animals (fusion of two animals to study passage of solutes from one to the other); skin grafts; spinal cuts; exposure to light and dark, and in both humans and animals, fluorokinesis, assays using radioactive iron, use of alpha-corticotrophin, ACTH, EHDP, and synthetic calcitonin; and studies of iron involved femur injections. The series consists of notebooks, data, graphs, manuscripts, drafts, references, photographs, negatives, x rays, correspondence, magnetic tapes of data, and conference planning materials. Some subjects were prisoners and were recruited from the United States Public Health Service or San Francisco Public Health Service; work was also done on patients from San Francisco General Hospital. Human subjects included normal controls and patients, both adults and children. Correspondence and administrative records have gaps.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Lawrence Berkeley Laboratory

Archives and Records Office

Berkeley, CA 94720

Federal Records Center

1000 Commodore Drive

San Bruno, CA 94066

## **Lawrence Livermore National Laboratory**

### **The Site Today**

Historically, the primary mission of Lawrence Livermore National Laboratory has been nuclear weapons research and design. Livermore now supports other programs as well, including arms control and verification, fusion, lasers, materials research, and general energy research. The Laboratory is situated on 821 acres in Livermore, CA, about 50 miles east of San Francisco. In 1992, Livermore had an operating budget of over \$1 billion and employed approximately 8,000 people. It operates the National Energy Research Supercomputer Center, the National Genome Research Center, and other specialized facilities. Since Livermore's establishment in 1952, the University of California has run the Laboratory under a managing and operating contract with DOE.

### **Site History**

After the Soviet Union detonated a nuclear device in 1949, the United States launched a program to develop a hydrogen bomb. Lawrence Livermore National Laboratory grew out of debates within the atomic energy and defense communities about the adequacy of the resources devoted to the hydrogen bomb program. The AEC was initially reluctant to create another nuclear weapons laboratory in addition to Los Alamos. Pressure from the Joint Committee on Atomic Energy and the Department of Defense, as well as the advocacy of physicist Edward Teller, led the AEC to build a second weapons laboratory. The facility was placed at Livermore, which was then the site of an abortive effort to build a prototype particle accelerator to produce plutonium or tritium.

***Lawrence Livermore National Laboratory grew out of debates about the adequacy of resources devoted to the hydrogen bomb program.***

Initially, Livermore was a branch of Ernest O. Lawrence's Radiation Laboratory in Berkeley. When Livermore opened in 1952, it employed 123 people, many of them still working in

Berkeley. Broadly speaking, Livermore addressed aspects of designing and testing thermonuclear weapons and related research, notably controlled fusion research that became part of the AEC's Project Sherwood.

***The 1963 test ban treaty and technical difficulties derailed plans to use nuclear explosives to excavate a new Atlantic-Pacific canal through Central America.***

The first efforts of Livermore's bomb designers proved disappointing, although this did not slow laboratory growth. Weapons design breakthroughs came in 1955 during Operation Teapot and in 1956 during Operation Redwing. In 1955, Livermore received its first weapon development assignment, the warhead for the Navy's Regulus II cruise missile. Two years later the Navy commissioned Livermore to design and develop warheads for its new Polaris missiles. Two other large development projects also began in 1957: Project Pluto to develop nuclear ramjets and Project Plowshare to develop peaceful nuclear explosives.

From its inception, Livermore had supported research on magnetic fusion. Under the auspices of the AEC's Project Sherwood, several other laboratories were also looking for practical methods of confining a fusion reaction to produce useful energy. The laboratory also began its long involvement with high-powered computing in its early days; the first UNIVAC arrived in 1953 and was used for fusion and weapons research.

A moratorium on nuclear weapons testing went into effect in November 1958, lasting almost 3 years. Despite questions raised about the future of the laboratory--it was hardly certain that nuclear weapons testing would ever resume-- Livermore continued rapid growth. During the moratorium, Livermore scientists pursued some weapons design work using computers. Stimulated by their desire to understand the physics of nuclear explosions, weapons designers developed increasingly complex computer models. Livermore has become known for its efforts to understand many complex phenomena through computer modeling.

During the 1960s, the laboratory's nuclear weapons design program centered largely on requirements for strategic missile systems. The laboratory developed warheads for the second-generation Polaris and its successor, Poseidon. While the Air Force continued to rely heavily on Los Alamos to develop bombs and some missile warheads, it increasingly assigned warhead development for its intercontinental ballistic missiles, notably Minuteman, to Livermore. By the end of the decade, most of the warheads in the Nation's strategic nuclear weapons stockpile were Livermore designs. Livermore also designed several tactical weapons systems for the Army, among them short-range Lance missiles, ground-

launched cruise missiles, and nuclear artillery.

Initially focused on large-scale earthmoving, or nuclear excavation, the Plowshare project--the peaceful nuclear explosives program--became one of Livermore's major programs through the 1960s. The 1963 test ban treaty and technical difficulties, however, derailed plans to use nuclear explosives to excavate a new Atlantic-Pacific canal through Central America. A reoriented program focused on using nuclear explosives to free natural gas from rock formations, but ambiguous experimental results and the environmental legislation of the late 1960s spelled the end of Plowshare.

***Livermore has become known for its efforts to understand many complex phenomena through computer modeling.***

In June 1971, Livermore became independent from Berkeley. Responding in part to campus protest, the Lawrence Radiation Laboratory divided into the Lawrence Berkeley Laboratory and the Lawrence Livermore Laboratory, with Livermore continuing its nuclear weapons activity and Berkeley focusing on unclassified research. In 1980, Congress gave the laboratory a new name: Lawrence Livermore National Laboratory.

By the mid 1970s, Livermore had become a center for agency fusion research. The invention of the laser offered a potential avenue toward the goal of controlled fusion. For Livermore, laser fusion had an additional advantage: laser-generated thermonuclear microexplosions allowed access to new kinds of weapons physics study. Beginning in the early 1970s, the Laboratory developed a series of neodymium-glass lasers, each more powerful than its predecessor.

### **Site Human Radiation Experiments**

Livermore was the site of few known human radiation experiments. To date, three human experiments have been identified at this site. In 1963, a biomedical division was established at Livermore, headed by John Gofman, formerly of the Berkeley laboratory. This was consistent with the agency's decision to expand biomedical research activities into hazards of radioactive fallout. The AEC and the laboratory also wanted the Livermore unit to characterize the radioactive hazards that might arise from Project Plowshare. Livermore biomedical program personnel engaged in human radiation experiments during the early 1970s. Two of the Livermore human radiation experiments were designed to calibrate a biomedical research instrument, the whole body counter. The third involved the use of radioisotopes to study decompression sickness. Individual site experiments are detailed in Chapter 3.

## Site Records Collections

Livermore's known involvement in human experimentation is limited, as is the material thus far found. Many records collections that contain information pertinent to human radiation experiments have been consolidated into artificial groups. The series descriptions reflect Livermore's limited intellectual control over its records in contrast to the other laboratories run by the University of California. Although none of the series described here contain classified records, it should be noted that the facility itself is

classified; access is difficult and must always be arranged in advance. One important group, which did not conform to the descriptions standards of this project and is not included below, is a 2,200-cubic-foot collection of laboratory historical records in the custody of the Laboratory historian. Livermore does have an archival facility, but has not traditionally used it to provide extensive material to the public.

### Lawrence Livermore National Laboratory (LLNL)

**SERIES TITLE** *Director's Office Classified and Sensitive Program Administrative Files*

**INCLUSIVE DATES** 1979-present

**DATES**

**ARRANGEMENT** Alphabetical by subject

**VOLUME** 348 cubic feet

**DESCRIPTION** This record series functions as record of accomplishments, and provides background information as a basis for evaluating alternatives, as well as providing documentation of the actions taken by the Director's Office and the Laboratory. It is used for reference, documentation and tracking activities and consists of budget files, personnel awards, contracts, reviews, logs, correspondence, memorandums, photographs, travel files, and videos. Includes are mail logs, UC Contract 48, incoming and outgoing DOE and UC correspondence, and UC Regents Meeting Minutes.

**LOCATION OF RECORDS** Lawrence Livermore National Laboratory

Records Management Group

7000 East Avenue, L-511 (Vault)

Livermore, CA 94550

**SERIES TITLE** *Laboratory Counsel'L-511s Legal Subject Files*

**INCLUSIVE DATES** 1970-present

**ARRANGEMENT** Alphabetical by subject

**VOLUME** 75 cubic feet

**DESCRIPTION** This series documents the Laboratory Counsel's legal and administrative functions. The records delineate the role of the Laboratory Counsel in dealing with a wide range of issues having to do both with internal laboratory personnel, equipment, procedures and policies as well as with external institutions and individuals. These records consists of correspondence; memorandums; reports; policies and procedures; opinions; and research materials. Subjects in this record series include Safeguards and Security, Drug Testing files, Human Subject files, and Health Services files.

**LOCATION OF RECORDS** Lawrence Livermore National Laboratory

Building 253, Room 1717

Berkeley, CA 94720

**SERIES TITLE** *Institutional Review Board Meeting Minutes*

**INCLUSIVE DATES** 1975-1994

**ARRANGEMENT** Chronological

**VOLUME** 4 cubic feet

**DESCRIPTION** The series consists of the minutes which are the collected notes of the proceedings of the Institutional Review Board (IRB). The IRB is the LLNL entity that has the responsibility for reviewing and approving requests for the use of humans as subjects in experiments or research activities. Records for each protocol describe the involvement of human subjects and the risks, if any, to which they are exposed. The minutes include the meeting date; location; members present; matters considered, including old business, new business, and minutes approval; and the record of votes taken as to whether the

protocol being discussed should be approved. Related documents are attached to the minutes. The official copies of the minutes are maintained in hard copy by the Secretary to the Chairman of the IRB. A database of the minutes also provides summary information for the following categories: meeting date, IRB Project Number, title of project discussed at the IRB meeting, name of researcher, status of action, result (indicates whether or not the project was approved), and comments on whether or not the protocol was used subsequent to its approval. Three protocols involve experiments in which consenting human subjects were intentionally exposed to radiation.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF**

**RECORDS** Lawrence Livermore National Laboratory

Building 361, Room 1134, 1 c.f.; Room 1063, 3 c.f.

Berkeley, CA 94720

**SERIES TITLE** *Institutional Review Board Protocol Files*

**INCLUSIVE DATES** 1972-1994

**DATES**

**ARRANGEMENT** Active and inactive files; thereunder alphabetical by principal investigator

**VOLUME** 3 cubic feet

**DESCRIPTION** The series contains documentation of requests to use human subjects in scientific experiments which are submitted to the LLNL Institutional Review Board (IRB) in the form of protocols. Records for each protocol describe the involvement of human subjects and the risks, if any, to which they are exposed. The protocols are reviewed and discussed by the IRB and approved or rejected. The types of documents found in this collection include project summary sheets, consent forms, and correspondence and memorandums. The series contains one file folder entitled "Research on Human Subjects, 1972-1984," which contains University of California memorandums and correspondence.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Lawrence Livermore National Laboratory

Building 361, Room 1134 and 1063

Berkeley, CA 94720

**SERIES TITLE** *Project Administration Records for Human Subject Experiments*

**INCLUSIVE DATES** 1978-1990

**ARRANGEMENT** None

**VOLUME** approximately 1.5 cubic feet

**DESCRIPTION** Records in this series document the work of the Whole Body Counter (WBC) staff in conjunction with: three phantom validation studies using niobium-92m (Nb92m) to simulate inhaled plutonium; related studies using barium and strontium; and project administration records, including interaction with the LLNL Institutional Review Board (IRB). Subjects included in the collection are lung calibration/validation using the LLNL Humanoid lung, assistance with a British program to establish changes in lung counter calibration for Nb92m, the use of Ba133 and Sr 85 in tests conducted with a small number of human subjects, discussion of issues relating to use of human subjects, and request to Human Subjects Committee to allow participation of LLNL employees in the niobium inhalation study. Types of records in this series include memorandums, correspondence, journal articles, reports, raw scientific data, messages, handwritten notes, and photos. The series also includes a collective group of calibration data relating to the three validation studies, and the studies done with Ba133 and Sr85. For these same studies, raw scientific data is stored on magnetic disks, which is not readily accessible under current Whole Body Counter computer systems. The contents of this series are more fully described in the following subseries which are interfiled together: Subject Files for Inhalation Study Using 5-Micron-Diameter Niobium-92m; Subject Files for Inhalation Study Using 3.5-Micron-Diameter Niobium-92m; and Records



Relating to the Counting of Human Subjects Using Niobium-92m, Ba<sup>133</sup>, and Sr<sup>85</sup> (IRB No. 88-101).

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Lawrence Livermore National Laboratory

Building 253, Room 1719

Berkeley, CA 94720

(Raw data is on magnetic tape; and calibration records are stored in the Control Room.)

**SERIES TITLE** *Project Administration Records: Subject Files for Inhalation Study Using 5-Micron-Diameter Niobium-92m*

**INCLUSIVE DATES** 1979-1982

**ARRANGEMENT** Alphabetical by subject name

**VOLUME** approximately 0.5 cubic foot

**DESCRIPTION** This series contains files for human subjects who participated in a study by the Whole Body Counter staff. The phantom validation study involved eight male subjects, five British and three American, who inhaled 5-micron-diameter niobium-92m. The study was initiated by the United Kingdom to evaluate the Humanoid phantom as a calibration tool for measuring plutonium in the lungs and was approved by review boards in the U.K. and U.S. After inhalation, subjects visited several laboratories for "counting." Records for individual subjects are maintained in notebooks. Typical record types in the series include forms, raw data, photos, and lung clearance graphs. This series is interfiled with Project Administration records and records of the other two validation studies.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Lawrence Livermore National Laboratory

Building 253, Room 1719

Berkeley, CA 94720

(Raw data is on magnetic tape; calibration

records are stored in the Control Room.)

**SERIES TITLE** *Project Administration Records: Subject Files for Inhalation Study Using 3.5-Micron-Diameter Niobium-92m*

**INCLUSIVE DATES** 1983-1985

**ARRANGEMENT** Alphabetical by subject name

**VOLUME** approximately 0.5 cubic foot

**DESCRIPTION** This series contains files for human subjects who participated in a study by the Whole Body Counter staff. This series contains records of the second validation study, which involved 11 women who inhaled 3.5-micron-diameter niobium-92m-labeled microspheres to determine the suitability of the Humanoid phantom as a lung calibration medium for females. Subject files in this series were created by the Whole Body Counter staff in conjunction with their work on this study. The study was initiated by the United Kingdom to evaluate the Humanoid phantom as a calibration tool for measuring plutonium in the lungs and was approved by review boards in the U.K. and U.S. After inhalation, subjects visited several laboratories for "counting." Records for individual subjects are maintained in notebooks. The notebooks contain personal information about the subjects, biometric data and x-ray counts, and correspondence. Files contain records types such as photos, lung clearance graphs, raw data, handwritten notes, and charts. This series is interfiled with Project Administration records and records of the other two validation studies.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Lawrence Livermore National Laboratory

Building 253, Room 1719

Berkeley, CA 94720

(Raw data is on magnetic tape; calibration records are stored in the Control Room.)

**SERIES TITLE** **Project Administration Records: Records Relating to the Counting of Human Subjects Using Niobium-92m, Barium-133,**

**and Strontium-85**

**INCLUSIVE DATES** 1988-1990

**ARRANGEMENT** Alphabetical by subject name

**VOLUME** approximately 0.5 cubic foot

**DESCRIPTION** This series (IRB No. 88-01) contains records of a third validation study where five of the original eight male participants inhaled niobium and of studies where two subjects were injected with Ba133 and Sr85. The files for the niobium study pertain to subjects such as detector geometry, visits by foreign nationals, personal information on individual subjects, biometric data for the subject, and x-ray counts. Types of documents included are copies of the "Experimental Subject's Bill of Rights," signed consent forms, photos, tables, graphs, test results, and memorandums. The five British volunteers were also participants in the first study, so some folders for individual subjects may contain information from both the first and the third validation study. This series also contains subject file information for individual subjects who participate in studies relating to the use of Ba133 and Sr85. Two subjects received an injection of barium, and one of these subjects later received an additional administration of strontium. Some personal and medical information is available for subjects involved in these two studies. This series is interfiled with Project Administration records and records of the other two validation studies.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Lawrence Livermore National Laboratory

Building 253, Room 1719

Berkeley, CA 94720

(Raw data is on magnetic tape; calibration records are stored in the Control Room.)

**SERIES TITLE** *Records Relating to Interlaboratory Comparison of Human Subjects*

**INCLUSIVE DATES** 1972-1976

**ARRANGEMENT** None

**VOLUME** 1.5 cubic feet

**DESCRIPTION** This series contains information on the inter-laboratory comparison of three British subjects (all male) who inhaled palladium-103 (as a "mock" plutonium) and chromium-51. Subjects were counted by at least eight laboratories in the U.S., including LLNL. The overall purpose of this experiment was to improve methods of in vivo bioassay for accidentally inhaled long-lived isotopes. An additional purpose was to establish analyses capabilities on an international level. The experiment was especially notable as there had been a significant problem in conducting accurate external measuring of heavy elements, particularly plutonium, in the human lung. The series documents the experiments and the measurement of the human subjects, which took place 1972-1976. Most of the series is comprised of scientific data relating to measurements taken on the subjects at LLNL and to subsequent analyses. Type of records included in the series are calibration data, tables, graphs, charts, handwritten notes, correspondence, memorandums, reports, draft reports, and technical reference material. The correspondence, in part, represents a discussion with other laboratories about the importance and uniqueness of this experiment.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Lawrence Livermore National Laboratory

Building 253, Room 1717

Berkeley, CA 94720

**SERIES TITLE** *Records Relating to Proposed Technetium-99 Counting Program*

**INCLUSIVE DATES** 1975B1976

**ARRANGEMENT** None

**VOLUME** 0.3 cubic foot

**DESCRIPTION** The purpose of this proposed experiment was to study the use of technetium-99 to simulate inhaled plutonium-239 aerosol in the lungs.

The series contains information such as discussions between LLNL and LBL about the project, including the development of protocols for the experiment, a statement that all 15 adult volunteers would be from LLNL or LBL, and preparation of operating safety procedures that would incorporate protocols for the experiment. Types of records in the collection include raw data, correspondence, and memorandums. This experiment was never carried out.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Lawrence Livermore National Laboratory

Building 253, Room 1717

Berkeley, CA 94720

## **Los Alamos National Laboratory**

### **The Site Today**

Los Alamos National Laboratory (LANL) is a multiprogram facility whose original mission was nuclear weapons research, development, and testing. Current laboratory work includes nuclear weapons safety, nonproliferation and counterproliferation, and environmental restoration. Los Alamos also provides technical assistance and basic research including energy and environmental technologies. In addition, the Laboratory possesses extensive capabilities in high-performance computing and human genome studies.

Los Alamos operates 20 major research facilities, among them the Clinton P. Anderson Meson Physics Facility, the National Genetic Sequences Data Bank, the Ion Beam Materials laboratory, the Weapon Neutron Research Facility, and a Center for Human Genome Studies. The University of California manages the laboratory, which employs over 7,500 individuals and has a budget of about \$1 billion.

### **Site History**

The Manhattan Project established Los Alamos--originally known as Project Y--under the University of California in 1943 to design and build a fission bomb. Although staff and equipment were in place by the summer of 1943, production of fissionable material at Oak Ridge and Hanford proved slower than hoped, limiting Oppenheimer and his staff to work with small quantities. Only in

mid-1945 was enough fissionable material available to build the first two bombs, Fat Man and Little Boy.

Oppenheimer originally organized the laboratory into four technical divisions, each headed by a division leader: Theoretical Physics (T), Experimental Physics (P), Chemistry and Metallurgy (CM), and Engineering Ordnance (E). Each division contained several specialized groups, each group headed by a group leader. While individual scientists and group leaders had access to Oppenheimer, reporting was normally made to a division leader. These individuals, in turn, reported either to Oppenheimer or to committees created to monitor specific work, such as the "Cowpuncher Committee" created to "ride herd" on the implosion (Fat Man) design.

Oppenheimer also created an Administrative Division (A) for such activities as health, procurement, and patents. The first health group, A-6, was headed by Louis Hempelmann. Hempelmann, one of a few American physicians at the time with knowledge of radiation, came to Los Alamos from Washington University in St. Louis. He had worked with noted radiation biomedical scientists John Lawrence and Robert Stone and had served as a staff physician at the Malinckrodt Institute at Washington University.

***Only in mid-1945 was enough fissionable material available to build the first two bombs, Fat Man and Little Boy.***

The initial tasks of the Health Group were to define occupational health standards for special hazards and to monitor for radiation exposures. Although biological and physical research on health problems related to radioactive materials had been assigned elsewhere in the Manhattan Project, Hempelmann and Oppenheimer found that they could not always get the precise information they felt was needed. Consequently, Los Alamos undertook some health-related activities.

Since very little fissionable material was available during the first year of operations, the earliest work of the Health Group centered on the hazards related to accelerators and small sources of radioactive materials. In the spring of 1944, larger quantities of plutonium began arriving, generating increased health concerns. Hempelmann and his staff were entering new territory, since the only accepted standards for radiation exposure had been set in 1928 and were based on the health effects of radium. By August 1944, the Health Group were investigating biological methods for testing exposures to radioactive poisons.

Acting with the concurrence of Oppenheimer, Hempelmann urged the Manhattan Project to undertake human experiments to measure the excretion patterns of plutonium. Such experimentation became

feasible when a young chemist, Wright Langham (**Figure 30**), developed a method of measuring small amounts of plutonium in excreta. Subsequent studies by the Manhattan Project were undertaken to establish the excretion and retention rates of plutonium in the human body. Such information was needed to estimate internal uptake of plutonium in workers. Langham's method became the standard for making such measurements for the next two decades.

After the first Soviet nuclear detonation, President Truman ordered the AEC to develop a thermonuclear bomb. Los Alamos scientists produced the first workable design, which culminated as the 1952 Mike test at the Enewetak Atoll in the Pacific. By the 1960s, the U.S. possessed a large arsenal of nuclear weapons, including gravity bombs, missile warheads, artillery shells, atomic demolition devices, torpedo warheads, and antisubmarine missiles. Many nuclear components for these systems were designed at Los Alamos.

After the 1963 atmospheric test ban treaty, the Laboratory conducted nuclear underground weapons tests. In addition, the Laboratory designed systems for satellites that could detect nuclear tests conducted in violating the agreement. The test ban negotiations also led the Laboratory to undertake projects in areas outside nuclear weapons research. One of the first such projects, Rover, was aimed at the development of nuclear rocket engines. Laboratory-designed prototype rocket engines were tested in the Jackass Flats area of the Nevada Test Site.

Los Alamos scientists also designed and operated a facility at the laboratory to evaluate the use of molten plutonium as a reactor fuel. A small experimental reactor was built to test fuel that might be used in a commercial high-temperature, gas-cooled reactor. In addition, work was done on the design of small reactors that might be used to power satellites.

***Hempelmann and his staff were entering new territory, since the only accepted standards for radiation exposure had been set in 1928 and were based on the health effects of radium.***

Later, the Laboratory was selected as the site for an accelerator, subsequently called the Clinton P. Anderson Meson Physics Facility, which could be used for basic nuclear research. With the end of the Cold War, the Laboratory shifted its research emphasis to such areas as stockpile stewardship, high-performance computing, and environmental remediation. Los Alamos is also transferring technology to private industry.

### **Site Human Radiation Experiments**

In the autumn of 1945, changes were made to the Laboratory's organizational structure. In October 1945, Norris Bradbury became Director. In an effort to shape the Laboratory's structure to the postwar environment, Bradbury immediately altered the composition and charters of many divisions and groups. The health group and its functions remained intact. The group designation of A-6, however, was changed to A-10 in December 1945. The Group Leader continued to report directly to the Laboratory Director, the only group leader to do so. After Bradbury's organizational changes, the Laboratory's structure remained essentially the same for the rest of his Directorship, which lasted until 1970.

During 1945 and into 1946, Langham and others were deeply involved in analyzing samples obtained from the plutonium injection experiments. (See the Human Plutonium Injection Experiments narrative.)

***During the latter half of 1945 and into 1946, Langham and others were deeply involved in analyzing samples obtained from the plutonium injection experiments.***

Hempelmann relinquished his role as Health Group leader in 1946, to serve as a consultant to the Crossroads nuclear test in the Pacific. Shortly after these tests, the Manhattan Project passed its nuclear responsibilities on to the newly created AEC. The Interim Medical Committee of the AEC inherited the biomedical component of the Manhattan Project and saw a continuing need for clinical testing of radioactive materials with human subjects. Los Alamos was involved in these efforts.

In August 1945, the first of three fatal criticality accidents at the Laboratory occurred when a physicist dropped a tungsten carbide brick, causing an assembly experiment to become critical--that is, to begin a chain reaction. He died shortly afterward. The second accident occurred less than a year later. An individual received a lethal dose of ionizing radiation when his screwdriver slipped and two pieces of reflector came together. While they were not human experiment subjects, these individuals were carefully monitored after their exposures. The accidents provided some of the earliest data regarding high-dose radiation effects.

Group A-10 provided the basis for a new Health Division (H) in May 1947. The new division had responsibility for a much broader range of health activities, including radiological safety, health physics, and industrial health. The H division also monitored exposures and was responsible for safety for all weapons tests conducted by the Laboratory. The research functions of A-10 became the responsibility of a new group, H-4 (Radiobiology), under the direction of Wright Langham. During the late 1940s and early 1950s, research with human subjects at Los Alamos was



limited to tritium studies. The human subjects were researchers in Group H-4. In 1949, the group's name was changed from Radiobiology to Bio-Medical Research. Wright Langham headed this group from 1947 until his death in 1972. At the time of Langham's death, H-4 had grown to 70 staff members working in molecular radiobiology, cellular radiobiology, mammalian biology, biophysics, and veterinary biology, and pathology.

In 1956 the nature of human studies at Los Alamos changed dramatically when the first whole body radiation counter became operational. The sensitivity and noninvasiveness of this radiation counter made possible studies at levels 10 to 100 times below established limits of exposures. Using this new capability, tracer studies--research involving small amounts of radioactive substances that could be tracked in the body with instruments--were conducted at Los Alamos from 1956 through the 1960s. The subjects used in this research included Laboratory employees and their family members, as well as hospital patients. The patients were referred by attending physicians at the local hospital.

***Using this new capability, tracer studies--research involving small amounts of radioactive substances that could be tracked in the body with instruments--were conducted at Los Alamos from 1956 through the 1960s.***

A July 1956 memorandum from Health Division Leader Thomas Shipman enunciated "guiding principles and limiting rules" for human tracer studies. These rules, developed with guidance from the AEC Division of Biology and Medicine, stated that "[all] subjects will be bona fide volunteers who are fully informed as to the procedure to be carried out." The memo did not require that written consent be obtained from the subjects, but did call for written approval from the Health Division Leader, and to be based on a statement of the maximum dose to be administered. It further provided that all doses be given by a licensed physician. Among the tracer studies accomplished with the whole-body counter were iron absorption studies involving children and pregnant women. This study disproved the theory that intestinal absorption of iron is correlated with iron levels in the blood. Another of the tracer studies conducted in the late 1950s helped researchers assess the danger of fallout from open-air weapons testing. The ratio of radioactive iodine in eight children was measured to obtain accurate uptake and retention data as a benchmark for measuring thyroid doses from fallout. This study also improved counting methods for diagnostic uptake studies and provided data that enhanced knowledge about the thyroid gland. One of the last human studies conducted at Los Alamos took place in 1962 when cobalt tracers were used for diagnosing pernicious anemia. Site experiments are detailed in Chapter 3.

*In December 1958, a Laboratory technician received a lethal dose of radiation when a plutonium recovery process accidentally went critical.*

The last of the fatal criticality accidents at Los Alamos occurred in December 1958. A Laboratory technician received a lethal dose of radiation when a plutonium recovery process accidentally went critical. As in the previous cases, the course of the technician's condition was closely followed. His death also led to the establishment of the Los Alamos Human Tissue Analysis Project. Between 1959 and 1978, the Laboratory analyzed tissues of workers exposed to actinides (the group of radioactive chemicals between 89 and 103 on the table of elements), as well as tissues from the general population of the Nation. The successor to this program, now known as the Transuranium Registry, is currently run by Washington State University under a DOE grant.

After the National Institutes of Health adopted procedures for medical studies in 1966, the AEC began changing to a committee system for approval of medical research projects. The University of California also responded, calling for formalized procedures for such research. In 1971, Los Alamos established a Human Use Review Committee to oversee such research. By the mid 1970s, medical research at Los Alamos had entered an era where committees, not individuals, would shape research projects.

### **Site Records Collections**

Practically all Laboratory records remain on site. Of these, the inactive records are well organized, controlled, and stored. Most inactive records are maintained in the Laboratory's records center and archives building. Custody of the inactive files in the records center and archives is divided between records managers and archivists. Both staffs make documentation from collections available to researchers and maintain folder title listings to collections.

The Laboratory has maintained a records management program since 1943 and an archival program since 1982. The completeness of the Laboratory's inactive records and the degree of intellectual control over them reflect a significant investment of resources in preserving its older records. Consistent with the Laboratory's primary mission of nuclear weapon research, Laboratory records collections contain many classified documents. Some records are also closed because of Privacy Act restrictions. The Laboratory states that all its documents relating to human radiation experiments either are unclassified or have been declassified. These documents are maintained in a public reading room.

As noted, the series described below contain documentation

pertinent both to individual experiments themselves and to the site institutional milieu in which they took place. For the institutional framework, researchers will find the Laboratory Director's files especially useful. Researchers should note that the Laboratory Director's files on microfilm do not duplicate those on paper. Records about individual human radiation experiments can be found in most of the other series.

***Practically all Laboratory records remain onsite. Of these, the inactive records are well organized, controlled, and stored.***

In response to research interests of the Advisory Committee on Human Radiation Experiments, Los Alamos staff also reviewed and provided some documents residing in the records of the Los Alamos Test Division (J-Division). Some series descriptions are therefore included for those records, although the Laboratory states that these series do not contain material about human subject research.

### **Los Alamos National Laboratory (LANL)**

**SERIES TITLE** *Project Y (MED Era Director's Office & Lab Management) Records*

**INCLUSIVE DATES** 1942-1946

**DATES**

**ARRANGEMENT** War Department Dewey Decimal Filing System

**VOLUME** 33 cubic feet

**DESCRIPTION** These files document the founding of the Los Alamos National Laboratory and its subsequent work to develop fission bombs for use in WWII. These files contain some information on the biological effects of uranium-235 and plutonium-240, the earliest known references to the possibility of human experimentation by the Manhattan Engineer District, and the creation of RaLa Testing Program. These records were compiled by the Laboratory during WWII as the primary documentation of the Laboratories= wartime activities. As such they document technical, administrative, and policy decisions related to the development of the first nuclear bombs. The Project Y files consist of technical and administrative files of memorandums, letters, and reports. They are organized by major organizational units of the Laboratory. A folder title listing is

available. Collection number A-84-019.

**RESTRICTIONS** This series contains privacy material and classified information.

**LOCATION OF RECORDS** Los Alamos National Laboratory

Building 1001

PO Box 1663

Los Alamos, NM 87545

**SERIES TITLE** *Director's Office & Laboratory Management Files*

**INCLUSIVE DATES** 1945-1970

**ARRANGEMENT** War Department Dewey Decimal Filing System

**VOLUME** 260 cubic feet

**DESCRIPTION** These records document laboratory management, administration, and director's policy decisions. The series consists of the office files of the second Director of Los Alamos, Norris Bradbury. The Director's files contain staff papers, progress reports, correspondence, and meeting minutes of all major lab work conducted during this period. They contain documentation of all major laboratory programs including RaLa, Rover, and weapons tests. Moreover they include administrative correspondence regarding day to day operations, policy decision making, and other correspondence. They consist of correspondence files of memorandums, letters, reports, and data. A folder title listing is available. The collection is known as B-9.

**RESTRICTIONS** This series contains privacy material and classified information.

**LOCATION OF RECORDS** Los Alamos National Laboratory

Building 1001

PO Box 1663

Los Alamos, NM 87545

**SERIES TITLE** *Director's Office & Laboratory Management Files (microfilm)*

**INCLUSIVE DATES** 1945-1970

**DATES**

**ARRANGEMENT** War Department Dewey Decimal Filing System

**VOLUME** 10 cubic feet

**DESCRIPTION** The documents captured on microfilm do not duplicate the Director's office series of textual files. These records document laboratory, management, administration, and Director's policy decisions. These files were the office files of the second Director of Los Alamos, Norris Bradbury. The microfilm Director's files contain staff papers, progress reports, correspondence, and meeting minutes of all major laboratory work. They include documentation on Project Sunshine and RaLa tests. The series consists of technical and administrative files of memorandums, letters, reports, and data. A folder title listing is available. The collection is known as B-9 microfilm.

**RESTRICTIONS** This series contains privacy material and classified information.

**LOCATION OF RECORDS** Los Alamos National Laboratory

Building 1001

PO Box 1663

Los Alamos, NM 87545

**SERIES TITLE** *Robert Underhill Files*

**INCLUSIVE DATES** 1943-1978

**DATES**

**ARRANGEMENT** Subject

**VOLUME** 6 cubic feet

**DESCRIPTION** These files were kept by Robert Underhill, Secretary to the University of California Board of Regents, and contain information on the operation of Los Alamos, particularly its administration. The files are most useful for documenting the contractual relationship of the University of California to the Government for operating the laboratory. They include information on laboratory overtime pay, insurance matters, hazardous work, and other administrative matters. The Robert Underhill records consist of contracts, correspondence, memorandums, and reports.

A folder title listing is available. Collection number A-83-033.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Los Alamos National Laboratory

Building 1001

PO Box 1663

Los Alamos, NM 87545

**SERIES TITLE** *Records of CMB-DO (Chemistry-Metallurgy-Baker Division Offices)*

**INCLUSIVE DATES** 1956-1969

**ARRANGEMENT** Chronological

**VOLUME** 16 cubic feet

**DESCRIPTION** This series consists of the monthly progress reports of the CMB-DO. The reports document chemical and metallurgical research at Los Alamos, including the metallurgical research of plutonium. These reports also include abstracts of research initiatives and data. Progress reports for the 1950s contain information on fabricating RaLa sources. A folder title listing is available. Collection number A-89-068.

**RESTRICTIONS** This series is entirely classified.

**LOCATION OF RECORDS** Los Alamos National Laboratory

Building 1001

PO Box 1663

Los Alamos, NM 87545

**SERIES TITLE** *GMX-5 (Dynamic Weapons Testing Division), RaLa (Radiolanthanum) Groups Test Records*

**INCLUSIVE DATES** 1944-1963

**ARRANGEMENT** Topical subseries

**VOLUME** 2 cubic feet

**DESCRIPTION** These files document the work of the laboratory organization responsible for planning and carrying out the RaLa experiments at Bayo Canyon, near Los Alamos. The records in this series document

many of the RaLa experiments, including information on experimental design and data analysis. The series includes correspondence, reports, photographs, and meeting minutes. A folder title listing is available. Collection number A-84-018.

**RESTRICTIONS** This series contains classified information.

**LOCATION OF RECORDS** Los Alamos National Laboratory

Building 1001

PO Box 1663

Los Alamos, NM 87545

**SERIES TITLE** **Health Division Central Administrative Records**

**INCLUSIVE DATES** 1943-1979

**ARRANGEMENT** Subject

Chronological

**VOLUME** 100 cubic feet

**DESCRIPTION** This series contains the administrative files of the Laboratory's Health Division. These files were generated and kept as the division monitored the health and safety of laboratory workers. They also capture the division's involvement in decision making in matters concerning possible exposure to radioactive materials, health and safety aspects of the RaLa program, and biological work of Group H-4. The records of the Health Division consist of organizational charts, reports, contracts, questionnaires, correspondence, memorandums, and progress reports. A folder title listing is available. Collection numbers A-89-118, TR-6704, TR-1133.

**RESTRICTIONS** This series contains privacy material and classified information.

**LOCATION OF RECORDS** Los Alamos National Laboratory

Building 1001

PO Box 1663

Los Alamos, NM 87545

**SERIES TITLE** *H-4 (Bio-Medical Research Subdivision of*

***Health Division) Central Administrative  
Records***

**INCLUSIVE DATES** 1953-1955

**DATES**

**ARRANGEMENT** Subject

**VOLUME** 1.5 cubic feet

**DESCRIPTION** These files document the work of the biomedical research group at Los Alamos. As such, they are similar to the records in the Wright Langham Papers. These files include policy decisions and basic correspondence. They contain information on a criticality fatality, gamma radiation, iodine-131, beta radiation, and tracer studies. They consist of memorandums, correspondence, and reports. A folder title listing is available. Collection number A-92-096.

**RESTRICTIONS** This series contains privacy material and classified information.

**LOCATION OF RECORDS** Los Alamos National Laboratory

Building 1001

PO Box 1663

Los Alamos, NM 87545

**SERIES TITLE** *Bio-Medical Research Group, Wright Langham Papers*

**INCLUSIVE DATES** 1950-1971

**DATES**

**ARRANGEMENT** Subject

**VOLUME** 1.5 cubic feet

**DESCRIPTION** These records document the activities of Wright Langham and were created during his tenure as leader of the Biomedical Research Group. They contain documentation on the organization and technical work of the group, including animal studies and the Cecil Kelley accident. These files contain information related to Langham's research interest in gamma radiation and his leadership of a multidiscipline biomedical research group. However they are not as extensive as the H-4 subdivision records. The Wright Langham Papers consist of correspondence, memorandums, and reports on health research, particularly gamma radiation. A



folder title listing is available. Collection number A-92-095.

**RESTRICTIONS** This series contains privacy material and classified information.

**LOCATION OF RECORDS** Los Alamos National Laboratory

Building 1001

PO Box 1663

Los Alamos, NM 87545

**SERIES TITLE** *Records of J-Division (Weapons Testing), Central Administrative Files*

**INCLUSIVE DATES** 1946-1963

**ARRANGEMENT** Subject

**VOLUME** 57 cubic feet

**DESCRIPTION** These files contain the administrative and technical records of the Laboratory organization responsible for planning and carrying out nuclear weapons tests. The test division files contain extensive information on each weapons test from Operation Crossroads to Dominic and some information on the Geneva Conference on limiting nuclear weapons testing. The series may contain information on human testing done at nuclear weapons tests. The series contains planning papers, meeting minutes, correspondence, diagrams, and reports. A folder title listing is available. Collection number A-91-048.

**RESTRICTIONS** This series contains privacy material and classified information.

**LOCATION OF RECORDS** Los Alamos National Laboratory

Building 1001

PO Box 1663

Los Alamos, NM 87545

**SERIES TITLE** *Records of N-Division (Nuclear Rocket Propulsion Division), Rover Program Central Administrative Files*

**INCLUSIVE DATES** 1956-1975

**ARRANGEMENT** Subject**VOLUME** 40 cubic feet

**DESCRIPTION** This series documents the central administration of N-Division's Rover Program, including the policies, organization, and activities regarding the program. The records in it document work on the Kiwi reactor, the Nevada Test Site, space and nuclear propulsion, and the Laboratory Rover Committee. It also includes studies on the dispersion of radioactive particles that might occur if a nuclear rocket accidentally reentered the earth's atmosphere and disintegrated, and of the transit time of large radioactive particles through the human gastrointestinal tract. The series consists of reports, correspondence, memorandums, technical data, and meeting minutes. A folder title listing is available. Collection numbers A-86-017, A-88-007, A-89-083, A-93-003, A-93-070, A-94-020.

**RESTRICTIONS** This series contains classified information.

**LOCATION OF RECORDS** Los Alamos National Laboratory

Building 1001

PO Box 1663

Los Alamos, NM 87545

**SERIES TITLE** *Medium Energy Physics Division, Central File Records*

**INCLUSIVE DATES** 1965-1987

**ARRANGEMENT** Subject**VOLUME** 90 cubic feet

**DESCRIPTION** This series contains the technical and administrative records of the Medium Energy Physics Division, which conducted basic physics research in collaboration with universities throughout the world. Most of the collection deals with basic physics research, however, some information on biomedical research, particularly a pion therapy program is included. Pion therapy was a treatment at the Los Alamos Mason Physics Facility (LAMPF) using subatomic particles called pions to treat 225 cancer

patients between 1974-1981. The series contains project proposals, construction records, and biomedical research records. A folder title listing is available. Collection number A-91-011.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Los Alamos National Laboratory

Building 1001

PO Box 1663

Los Alamos, NM 87545

**SERIES TITLE** *Technical Information Group Files*

**INCLUSIVE DATES** 1945-1959

**DATES**

**ARRANGEMENT** Topical subseries

**VOLUME** 2 cubic feet

**DESCRIPTION** The series documents the dissemination of information to the public. It includes information on the 1958 criticality accident in which laboratory technician Cecil Kelley was killed. The series contains news releases, reference material, news clippings, and information on special projects. A folder title listing is available. Collection number A-83-005.

**LOCATION OF RECORDS** Los Alamos National Laboratory

Building 1001

PO Box 1663

Los Alamos, NM 87545

**SERIES TITLE** *Laboratory Progress Reports*

**INCLUSIVE DATES** 1945-1975

**DATES**

**ARRANGEMENT** Laboratory Organizational Units

**VOLUME** 100 cubic feet

**DESCRIPTION** The Laboratory Progress Reports consist of the formal reports written monthly by the laboratory's technical divisions and groups. They contain summary information and technical information on laboratory work such as that in physics, chemistry, and metallurgy. A listing is available. Collection

number A-86-016.

**RESTRICTIONS** This series contains privacy material and classified information.

**LOCATION OF RECORDS** Los Alamos National Laboratory

Building 1001

PO Box 1663

Los Alamos, NM 87545

**SERIES TITLE** *Reports Collection*

**INCLUSIVE DATES** 1943-1994

**ARRANGEMENT** Chronological, by report number

**VOLUME** 7,000 cubic feet

**DESCRIPTION** These reports document all of the technical work of the Laboratory. Within these reports, there is documentation of various experiments, (e.g., the plutonium injection experiments, tracer studies, releases, weapons testing). Since 1943, the Laboratory has maintained a central repository for technical reports. The series contains annual and quarterly progress reports as well as those on specific experiments. A listing is available.

**RESTRICTIONS** This series contains privacy material and classified information.

**LOCATION OF RECORDS** Los Alamos National Laboratory

Building 207

PO Box 1663

Los Alamos, NM 87545

**SERIES TITLE** *Laboratory Notebooks*

**INCLUSIVE DATES** 1942-1990

**ARRANGEMENT** Numeric

Sequential

**VOLUME** 1,500 cubic feet

**DESCRIPTION** The Laboratory Notebooks consist of hardbound notebooks used by the scientific staff to record experimental and technical data. Each notebook was assigned to an

individual scientist. The notebooks contain experimental data, calculations, and sketches of equipment and apparatus. They include experimental information including data related to early human plutonium studies, tracer studies, and RaLa research. A listing is available.

**RESTRICTIONS** This series contains privacy material and classified information.

**LOCATION OF RECORDS** Los Alamos National Laboratory

Building 1001

PO Box 1663

Los Alamos, NM 87545

**SERIES TITLE** *Litigation Support Database*

**INCLUSIVE DATES** 1943-1994

**ARRANGEMENT** Subject

**VOLUME** not applicable

**DESCRIPTION** The records in this series were originally collected from various Laboratory offices to support the laboratory's litigation efforts. Records collected document a wide range of Laboratory activities including human studies and exposures to ionizing radiation and toxic substances. The series consists of correspondence, memorandums, and reports collected throughout the Laboratory to support ongoing litigation. Indices can be generated on request.

**RESTRICTIONS** This series contains privacy material and attorney-client privileged information.

**LOCATION OF RECORDS** Los Alamos National Laboratory

Building 1001

PO Box 1663

Los Alamos, NM 87545

## **The Oak Ridge Sites**

### **The Sites Today**

The Oak Ridge complex consists of five major facilities located in

or near Oak Ridge, TN: the DOE Oak Ridge Operations Office, Oak Ridge Institute for Science and Education (ORISE), Oak Ridge National Laboratory (ORNL), K-25 site, and Y-12 plant.

The Operations Office provides DOE oversight for the other facilities, which are Government owned and contractor operated. Oak Ridge Associated Universities (ORAU) is the operating contractor for ORISE; Martin Marietta Energy Systems runs the remaining facilities. The Oak Ridge sites have a combined annual budget exceeding \$1 billion and employ more than 14,000 people.

ORISE conducts programs in science and engineering education, training and management, and medical sciences, including basic research in biochemistry and cytogenetics. ORISE also operates the Radiation Internal Dose Information Center, the Center for Epidemiological Research, the Radiation Emergency Assistance Center/Training Site, and the Center for Human Reliability Studies.

ORNL focuses on basic and applied research in energy technology and conducts research in the physical, chemical, materials, computational, biomedical, earth, environmental, and social sciences. The Laboratory also operates 20 major research facilities, including the Holifield Heavy Ion Research Facility, the Oak Ridge Linear Accelerator, and the High Flux Isotope Reactor.

The K-25 site, once a gaseous diffusion plant site for the production of uranium-235, now serves as headquarters for the Oak Ridge Environmental Restoration and Waste Management Office and for the High Temperatures Materials Laboratory. The Y-12 plant was originally built to produce uranium-235 through an electromagnetic process. Later the plant was converted to a nuclear weapons component manufacturing plant and now serves as a weapons disassembly site.

### **Site History**

***Oak Ridge Site selection***--Wartime atomic planners first looked to the Oak Ridge area during the spring of 1942. A site was needed to build industrial facilities for production of plutonium and uranium-235, the principal materials required for an atomic bomb. The only production process then known created minute amounts of fissionable materials in experimental laboratories. Scientists such as E.O. Lawrence of the University of California and Arthur H. Compton of the University of Chicago were confident, however, that experimental techniques could be translated into large-scale production facilities. This confidence, coupled with the Government's urgent desire to develop an atomic weapon, led the Manhattan Project to launch a crash production program.

***Residents of the sparsely populated area were paid for their property and ordered to leave within a few weeks.***

The program required large parcels of land to house sprawling plants, support facilities, and worker communities. Another requirement for industrial production of fissionable materials was relative isolation, both to ensure secrecy and to reduce danger to civilian populations. Abundant supplies of cooling water and electricity were also needed. The Manhattan Project determined that a 56,000-acre tract of land in eastern Tennessee met these requirements, and the Federal government moved to acquire what became known as the Oak Ridge reservation through eminent domain proceedings in September 1942. Residents of the sparsely populated area were paid for their property and ordered to leave within a few weeks.

General Leslie Groves and other Manhattan Project leaders identified four potential techniques for producing fissionable material at Oak Ridge. The reactor (or pile) process called for a controlled nuclear chain reaction to irradiate uranium, which could then be chemically processed to separate plutonium. Three processes were considered for producing the required quantities of weapons-grade uranium (uranium-235): *electromagnetic separation*, based on E.O. Lawrence's cyclotron research; *gaseous diffusion*, based on the research of Harold Urey of Columbia University; and *liquid thermal diffusion*, based on the ideas of Philip Abelson of the Naval Research Laboratory.

Since none of the methods had been proven on anything like the scale required, and there was no sure basis to choose among them, Groves pursued them all at once. This required construction of four separate and unique industrial plants, as well as the roads, housing, schools, and other infrastructure needed to support thousands of workers.

***The Y-12 Plant--***By 1942, work of Ernest Lawrence at the University of California in Berkeley suggested that the electromagnetic process was a feasible production method. The process was so inefficient, however, that it would require an enormous industrial plant to produce appreciable quantities of uranium-235. The Government contracted with Tennessee Eastman, a subsidiary of Eastman Kodak, to build and operate the Oak Ridge electromagnetic plant. Construction began on what was called Y-12 Plant in February 1943 on a site a few miles southwest of the town of Oak Ridge. Using 14,700 tons of silver borrowed from the U.S. Bullion Depository to substitute for scarce wartime copper, the plant was operating by early 1944. Yet the many new and complex machines caused electrical and mechanical problems to plague the facility. These problems, coupled with the success of the gaseous diffusion process, led to the discontinuance of the

electromagnetic process after the war.

***The K-25 Site***--As the Government moved to acquire the Oak Ridge site, atomic planners were confident that the gaseous diffusion production method would succeed. The Special Alloy Material Laboratories at Columbia University had proved the practical application of the technology in 1942.

Groves engaged the M.W. Kellogg Company, operating as the Kellogg Corporation, to design an industrial gaseous diffusion plant, which became known as K-25. The J.A. Jones Construction Company contracted to build the facility, and the Carbide and Carbon Corporation, a subsidiary of the Union Carbide and Carbon Corporation, was designated as the operator. Construction began around June 1943 at a site some 15 miles southwest of the town of Oak Ridge. Initial testing started during the spring of 1944, and productive operation began about a year later. A related plant, known as K-27, was built nearby to produce slightly enriched uranium used as feed material for the gaseous diffusion process.

Gaseous diffusion proved the best of the three production processes. The AEC turned to this technology when uranium-235 production capacity expanded to meet Cold War demands. More gaseous diffusion plants were built near K-25 and also in Paducah, KY and Portsmouth, OH. When the AEC moved to reduce production of fissionable material in 1964, the agency stopped operations at the K-25 and K-27 plants and gradually reduced operations at the remaining gaseous diffusion plants. Eventually the AEC used the plants to produce enriched uranium for commercial nuclear power plant fuel.

***The Oak Ridge National Laboratory***--The Manhattan Project originally intended to use the Tennessee site for all production work, but research at the Metallurgical Laboratory in Chicago showed that the pile process (the first nuclear reactor technology) would generate far more heat and radioactivity than scientists had previously believed. Consequently, the Project selected the Hanford site in eastern Washington, a much larger and even more isolated site than Oak Ridge, for plutonium production. A pile semiworks--a test plant that would move from the research stage to large scale production--was, however, built in Oak Ridge. The E.I. du Pont de Nemours Company built the test pile plant, designated X-10 (**Figure 34**). Construction of the X-10 reactor began at a site 10 miles southwest of Oak Ridge during March 1943. The reactor was ready for full-scale operations by January 1944. The University of Chicago, through its Met Lab, operated the plant.

A research facility designated as the Clinton Laboratories was built during the war to support X-10 reactor activities. By 1944, Clinton Laboratories had chemistry, health, and engineering divisions. In



1947, the entire Oak Ridge complex, including the Clinton Laboratories, passed from the Manhattan Engineer District to the newly formed Atomic Energy Commission. Scientists at Clinton, meanwhile, were engaged in transforming the laboratory from a war production facility to a nuclear research center. Clinton Laboratories pushed for a substantial role in building an experimental materials testing reactor. The AEC, however, assigned the project to Argonne National Laboratory outside Chicago, which likewise had hopes of serving as a reactor development center. Around the same time, the Monsanto Chemical Company announced its withdrawal as the operating contractor for the Oak Ridge Laboratory. That contract was transferred to the Union Carbide and Carbon Corporation, which already ran the gaseous diffusion plants. In January 1948, the AEC changed the name of Clinton Laboratories to Oak Ridge National Laboratory (ORNL). ORNL scientists set out to build a multiprogram research laboratory. They used the X-10 reactor to produce the radioisotopes that the AEC distributed to scientists and physicians worldwide. In the early postwar years, the isotope distribution program was the AEC's most visible and touted "atoms for peace" program. Researchers also conducted homogenous reactor experiments, and worked on a nuclear reactor to power long-range bombers. In 1946, the Laboratory divided its health division into divisions of biology, medicine, and health physics. Divisions of metallurgy, physics, solid-state materials, mathematics, engineering physics, and electronuclear projects were added shortly afterwards. ORNL also organized units for reactor development and fusion research.

In 1955, ORNL began to broaden its work beyond issues of interest to the AEC alone. By the 1960s ORNL was the most diversified of the AEC research laboratories. The Laboratory also continued to engage in a wide array of AEC research. The High Flux Isotope Reactor for the production of transuranic elements was sited at Oak Ridge. The Laboratory became the primary technical support organization for AEC nuclear desalting projects, directed toward the development of reactors to supply both electric power and desalinated sea water.

***In the early postwar years, the isotope distribution program was the Atomic Energy Commission's most visible and touted "atoms for peace" program.***

ORNL also undertook extensive reactor safety work, investigating fission product release from reactor fuel elements and heavy-metal fabrication processes used to create reactor pressure vessels. Fusion research work continued, and the Laboratory built an experimental fusion device, the Oak Ridge Tokamak, and other experimental fusion devices. The Laboratory also conducted some research for the liquid-metal fast breeder reactor program, and was chosen as

the site for the Clinch River Breeder Reactor, a project that was ultimately canceled.

***The S-50 Plant*** CThe Manhattan Project originally planned to construct only three Oak Ridge process plants. A fourth technology, liquid thermal diffusion, was initially considered but was rejected because of its apparent inefficiency. By June 1944, however, concerns about reaching needed production levels for uranium-235 led to a decision to construct a liquid thermal diffusion plant in Oak Ridge. The primary purpose of the plant was to enrich uranium feed material for the Y-12 electromagnetic facility. Using technology employed by a Navy pilot plant at Anacostia Station in Washington, DC, the H. K. Ferguson Company, operating as the Fercleve Corporation, quickly built the plant. Designated as S-50, the facility was near the K-25 gaseous diffusion plant. The S-50 plant operated for a year before it was shut down in September 1945.

***After the war, the U.S. Government was concerned that a shortage of trained nuclear scientists, physicians, and other specialists could imperil plans to expand nuclear programs.***

***The Oak Ridge Institute of Nuclear Studies (ORINS)***--After the war, the U.S. Government was concerned that a shortage of trained nuclear scientists, physicians, and other specialists could imperil plans to expand nuclear programs. Many universities were establishing instructional courses, but rigid security requirements limited the information that these institutions could distribute. At the same time, the Government was eager to train practitioners in what it viewed as the beneficial side of nuclear energy, particularly the use of radiation for biomedical research and treatment of disease. The Government concluded that it needed dedicated facilities for this purpose. The first such facility established was the Institute of Nuclear Studies at the University of Chicago.

Inspired by the Chicago institute, in 1946 the University of Tennessee and a consortium of southeastern universities persuaded the MED to establish the Oak Ridge Institute of Nuclear Studies (ORINS). Operating under a Manhattan Project (and later AEC) contract, ORINS was responsible for selecting both students and established scientists for fellowships and other temporary research assignments. The ORINS isotope training program, established in 1948, initially offered three 4-week summer courses covering radiation, instrumentation, tracer applications, and experimental procedures. These courses were immediately filled with scientists from diverse fields eager to use isotopes in their research. The AEC mandated such training before doctors or researchers could be licensed to use isotopes.

***The hospital operated until 1974, when it and the other Atomic***

### ***Energy Commission research hospitals were shut down.***

In 1948, the AEC asked ORINS to establish a clinical research facility as part of a national program to address public and scientific interest in using radiation to treat cancer. ORINS established a Medical Division to operate the hospital and conduct biomedical research. It was assigned space in the former Manhattan Project hospital at Oak Ridge. In 1950, ORINS began accepting patients referred by private physicians for experimental cancer therapy. A board of medical consultants from southern medical schools was assembled to oversee the clinical research program. The hospital operated until 1974, when it and the other AEC research hospitals were shut down. By that time, many private hospitals around the country were offering high-quality nuclear medicine facilities. ORINS medical personnel continued treating patients on an outpatient basis.

In 1966 ORINS became known by the name of its operating contractor, Oak Ridge Associated Universities. During the early 1990s the facility was renamed the Oak Ridge Institute for Science and Education (ORISE). ORAU currently remains the managing and operating contractor.

### **Site Human Radiation Experiments**

ORINS and ORNL performed all identified human radiation experiments at Oak Ridge except for one plutonium injection experiment: the first in the series done at various sites. A Manhattan Project physician administered the injection in April 1945 at the Oak Ridge hospital. Clinton Laboratories personnel also constructed mathematical models based on the excretion data from this and three other plutonium injection experiments.

The ORINS Medical Division conducted clinical experiments using radionuclide and total body irradiation therapies to develop cancer diagnosis and treatment. ORNL personnel performed a few clinical experiments and conducted three intentional radiation releases as part of radiological warfare field tests. Most human radiation studies undertaken at Oak Ridge were performed by ORINS Medical Division personnel through the cancer research hospital and a related biomedical research program. Individual clinical experiments are detailed in Chapter 3, while the ORNL environmental releases are discussed in the Environmental Radiation Releases narrative.

***Most human radiation studies undertaken at Oak Ridge were performed by ORINS Medical Division personnel through the cancer research hospital and a related biomedical research program.***

*ORINS radiation experiments*--ORINS human radiation experiments involved the use of radiation and radioisotopes in the study of cancer, specifically in cancer biology and treatment. The main areas of experimentation related to five concerns:

- total body irradiation in the treatment of leukemia, lymphoma, and polycythemia rubra vera (a condition in which too many red blood cells are formed);
- the development and evaluation of teletherapy (**Figure 36**);
- the effects of radiotherapy on the blood;
- the development of other uses of radiation and isotopes in cancer treatment; and
- the study of other therapy-related biologic effects.

Much time and effort was devoted to determining the biological, physiological, and clinical effects of total body irradiation.

Patients meeting predetermined disease criteria were accepted into the research hospital on the recommendation of the medical schools of ORINS member institutions. About 3,000 patients participated in the program from 1950 through 1974, when the hospital was closed. ORINS Medical Division personnel required patients to sign consent forms before undergoing treatment. Patients were provided with a booklet describing radiation generally, the nature of the program, and the nature of the experimental program in which they would participate. The Medical Division staff as a group reviewed proposed experimental treatments until 1967. That year, following the example of the National Institutes of Health and acting on AEC recommendations, ORINS formed an institutional review board that examined proposals for research using human subjects.

Total body irradiation had been employed for cancer treatment beginning in the 1930s, but until the late 1950s the instruments available did not provide uniform radiation fields. ORINS addressed this problem by designing and constructing a room to hold eight radiation sources that delivered a uniform dose at a moderate rate. The facility--called the Medium Exposure Total Body Irradiator, or METBI--went into use in 1960. In 1967, the Low Exposure Total Body Irradiator (LETBI) was built. Between 1960 and 1974, some 200 cancer patients received experimental treatment in these facilities.

The National Aeronautics and Space Administration (NASA) found LETBI patient data useful in assessing risks that astronauts might face from radiation in space or nuclear-powered spacecraft. Accordingly, in 1963, the AEC asked ORINS to assist NASA in assessing the health risks that astronauts might face from radiation in space. In response, ORINS conducted a retrospective study of acute radiation-induced effects among patients who had been

exposed to radiation previously in hospitals throughout the country. NASA also funded some LETBI work and data from patients receiving cancer treatment were used to address NASA questions.

**ORNL**--ORNL/Clinton Laboratories scientists conducted comparatively few human radiation experiments. Laboratory experimentation was episodic and determined by the research interests of individual scientists. Examples include two 1945 radiation skin absorption experiments, a 1963 experiment in which an investigator put radioactive silver on his own arm, and an early 1960s experiment in which five male subjects ingested radioiodine. The Laboratory helped with analyses of body fluids and autopsy materials of 11 patients injected with uranium at Massachusetts General Hospital during the early 1950s. In 1948, ORNL also conducted the three radiological warfare tests noted earlier. These tests apparently did not involve intentional human radiation exposures.

### **Site Records Collections**

Oak Ridge presents a challenge to the researcher. The site has many valuable records collections that document its history and the history of other MED and AEC sites. However, many of these collections are currently hard to use. The difficulties are illustrated by the inactive records of the DOE operations office. Nearly all these records--some 7,000 cubic feet encompassing everything from 1940s site construction plans to 1990s travel vouchers--are stored in a single records-holding area.

During the 1940s and 1950s, Oak Ridge served as a central records-collection point for other MED and AEC facilities. At one time, the records were carefully organized and indexed. But after years of inattention, there are today more than 1,000 boxes of fragmented and disorganized records dating from 1965 or before. Some important unclassified files were transferred to the custody of the National Archives and Records Administration (NARA). However, since NARA would not manage DOE classified records, classified segments were removed from many collections transferred to archival custody. These segments remain in the Oak Ridge holding area, separated from their parent series.

Starting in 1987, NARA and the DOE Oak Ridge Operations Office began working to characterize the records in the holding area and to transfer permanently valuable series to archival custody. Many significant files were transferred, but neither NARA nor DOE could provide adequate resources to finish the job. Listed below are records series that remain in Oak Ridge; it should be remembered, however, that these materials often represent fragments of larger series that either are at NARA or have been scattered, lost, or destroyed.

*The site has many valuable records collections that thoroughly document its history and the history of other MED and AEC sites. However, many of these collections are currently hard to use.*

Among the most potentially valuable of these records are more than 600 cubic feet of contract files dating to the early days of the MED. Considering that records retention guidelines call for such documents to be destroyed after only 6 years, the fact that this material survives at all is remarkable. Another important body of records is the Records Holding Task Group (RHTG) Files, which consists of nearly 300 boxes of classified documents removed from other collections. In archival terms, this is an *artificial collection* whose documents have lost all association with their original series.

The records situation for the Oak Ridge contractor sites is better. ORISE has many important records series documenting activities of the Medical Sciences Division, although the parent organization has only recently begun a systematic program to manage and control all its records. Of particular value are the ORISE medical files (for which personal privacy restrictions apply) and a full set of periodic reports from the

start of the facility. ORNL has a huge volume of records contained in the various elements of its designated central files, which include correspondence, reports, and laboratory notebooks. Both Y-12 and K-25 have a smaller volume of records. DOE plans to continue its efforts to identify records holding at all of these sites and to pursue avenues for archival preservation of permanently valuable series. For additional Oak Ridge records, see the series listed under the National Archives and Records Administration.

### **Oak Ridge Operations Office**

**SERIES TITLE** *AEC Manager's Meetings Files*

**INCLUSIVE DATES** 1957-1965

**DATES**

**ARRANGEMENT** Chronological

**VOLUME** 1 cubic foot

**DESCRIPTION** These records consist of Oak Ridge Operations Office Manager Sam Sapirie's files relating to annual Washington meetings of AEC field operations office managers. These meetings covered broad aspects of AEC policies and operations, including security, budgets, public relations, congressional legislation, and civil defense. Records for each meeting are filed together.

Included are agendas, minutes, reports, correspondence, directives, and other material relating to individual meetings. Also present are Sapirie's notes and correspondence relating to meeting activities.

**LOCATION OF RECORDS** Oak Ridge Operations Office

Building 2714J

200 Administration Road

Oak Ridge, TN 37831

**SERIES TITLE** *Classification Office Files*

**INCLUSIVE DATES** 1956-1971

**DATES**

**ARRANGEMENT** Subject

**VOLUME** 2 cubic feet

**DESCRIPTION** The series consists of documents compiled by the Classification Office showing classification policies and directives. It includes information on classification of nuclear weapons programs, nuclear production activities, and nuclear reactors. The series consists of letters, memorandums, and bulletins.

**LOCATION OF RECORDS** Oak Ridge Operations Office

Building 2714J

200 Administration Road

Oak Ridge, TN 37831

**SERIES TITLE** *Contract Division Insurance Files*

**INCLUSIVE DATES** 1948-1965

**DATES**

**ARRANGEMENT** Chronological

**VOLUME** 1 cubic foot

**DESCRIPTION** Contained in these records are insurance policy files for AEC contractors, including Mallinckrodt Chemical Works, H.K. Ferguson Co., and Oak Ridge Institute of Nuclear Science (ORINS). Policy files detail liability coverage and premiums for staff, facilities, and automobiles; information regarding workmen's compensation is also present. The ORINS file documents issues

such as medical malpractice and clinical activities, including patient treatment and autopsy. Correspondence is present to and from the Oak Ridge Division of Research, Oak Ridge Insurance Branch, AEC Insurance Section, and Office of the Comptroller in Washington, DC. Correspondence subjects include insurance coverage and premiums, public liability, workmen's compensation, and levels of needed coverage. These records appear to be fragments of a larger collection that existed at one time.

**LOCATION OF RECORDS** Oak Ridge Operations Office

Building 2714J

200 Administration Road

Oak Ridge, TN 37831

**SERIES TITLE** *Chief Counsel Office, Subject Files*

**INCLUSIVE DATES** 1949-1987

**ARRANGEMENT** AEC Subject/Numeric Filing System

**VOLUME** 28 cubic feet

**DESCRIPTION** The series was compiled by chief counsel staff to document litigation and other legal activities. It contains documentation on operations office legal matters and includes information on lawsuits, discrimination, procurement, and contract matters. These files contain letters, memos, reports, affidavits, depositions, and other legal documents. The series includes data on releases at the Portsmouth Plant.

**LOCATION OF RECORDS** Oak Ridge Operations Office

Building 2714J

200 Administration Road

Oak Ridge, TN 37831

**SERIES TITLE** *Decatur Area Office Files*

**INCLUSIVE DATES** 1944-1945

**ARRANGEMENT** Subject

**VOLUME** 1 cubic foot



**DESCRIPTION** The series consists of fragments of correspondence files pertaining to the manufacturing operation of the Houdaille Hershey Plant. The series consists of letters, memorandums, and reports that were maintained as an office subject file.

**RESTRICTIONS** This series contains a small amount of classified information.

**LOCATION OF RECORDS** Oak Ridge Operations Office

Building 2714J

200 Administration Road

Oak Ridge, TN 37831

**SERIES TITLE** *Feed Materials Division, Lockland Area Office, and Personnel Files*

**INCLUSIVE DATES** 1943-1962

**ARRANGEMENT** Subject

**VOLUME** 45 cubic feet

**DESCRIPTION** The series consists of correspondence files from three organizations. The Feed Materials division files (26 cu. ft.) cover uranium ore refining and assay activities at Oak Ridge and at the Mallinckrodt Chemical Works, Harshaw, Linde Air Products, and other plants. The Lockland Area office files (11 cu. ft.) cover attempts to develop nuclear reactors for the propulsion of aircraft. The personnel files (8 cu. ft.) contain organization charts, directives, and files on personnel. The series consists of letters, memorandums, reports, charts, and directives. The Feed Materials files are arranged according to a Dewey Decimal System; the Lockland files by the AEC Subject/Filing System; and the personnel files by subject. The personnel files contain early Oak Ridge organization charts and a file on medical activities for 1943-1946.

**LOCATION OF RECORDS** Oak Ridge Operations Office

Building 2714J

200 Administration Road

Oak Ridge, TN 37831

**SERIES TITLE** *Finance Division Files*

**INCLUSIVE DATES** 1944-1986

**DATES**

**ARRANGEMENT** Subject

**VOLUME** 11 cubic feet

**DESCRIPTION** This series was compiled by Oak Ridge personnel to capture data needed for financial oversight of contractors. The series contains documentation on financial policy implementation, contractor financial matters, audits, cost accounting methods, and uranium purchases. The series consists of letters, memorandums, reports, invoices, purchase orders, and cost accounting records. The series contains some files on the origins of the division.

**RESTRICTIONS** This series contains a small amount of classified information.

**LOCATION OF RECORDS** Oak Ridge Operations Office

**RECORDS**

Building 2714J

200 Administration Road

Oak Ridge, TN 37831

**SERIES TITLE** *Individual Injury Reports and Medical File-  
-Various MED Areas*

**INCLUSIVE DATES** 1943-1947

**DATES**

**ARRANGEMENT** Location

**VOLUME** 1 cubic foot

**DESCRIPTION** This grouping consists of compensation claim files and occupational injury records from locations such as Brookhaven, Chicago, Colorado, Columbia, Hanford, Madison Square, New York, Santa Fe Safety Branch, and the Division of Engineering and Production. Compensation files are arranged alphabetically by name of employee. Included is correspondence describing injuries written by the District Safety Engineer and area medical officials to the U.S. Employee Compensation Commission.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Oak Ridge Operations Office

**RECORDS** Building 2714J

200 Administration Road

Oak Ridge, TN 37831

**SERIES TITLE** *Industrial Personnel Relations Files***INCLUSIVE** 1957-1979**DATES****ARRANGEMENT** Site or work location**VOLUME** 11 cubic feet

**DESCRIPTION** The series consists of reports, contracts, and correspondence relating to employee salaries, strikes, retirement, grievances, insurance, and workmen's compensation. Also present is information about job descriptions, recruitment and regulatory programs, organizational structure, labor laws, compliance with the Davis-Bacon Act, and National Labor Relations Board Activities. Contractors covered include University of Puerto Rico, National Lead of Ohio, University of Tennessee, and Martin Marietta. Specified sites include the Portsmouth and Paducah gaseous diffusion plants. A file listing is available.

**LOCATION OF** Oak Ridge Operations Office**RECORDS**

Building 2714J

200 Administration Road

Oak Ridge, TN 37831

**SERIES TITLE** *Injury and Compensation Claim Files***INCLUSIVE** 1943-1950; 1961-1976**DATES****ARRANGEMENT** Record type**VOLUME** 12 cubic feet

**DESCRIPTION** These files document reports of employee job injuries and claims for compensation. Content, scope, and coverage vary within the files. Most of the files consist of individual employee injury reports created by the MED/AEC Oak Ridge Safety Branch. These reports include the name of the injured party, along with the type of injury, its severity, where it occurred, and if it occurred as a

result of unsafe practices or conditions. Statements of the injured party as well as their supervisors are included. Monthly summary reports of site injuries are present, mostly for Oak Ridge although some other sites are represented as well. Compensation claim files also include injury reports along with correspondence with claimants, doctors, and insurance representatives. Transmittal memos to the AEC Insurance Section are included. These records consist of file fragments, and gaps are apparent.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Oak Ridge Operations Office

Building 2714J

200 Administration Road

Oak Ridge, TN 37831

**SERIES TITLE** *Joseph A. Lenhard Reading File*

**INCLUSIVE DATES** 1957-1971

**DATES**

**ARRANGEMENT** Chronological

**VOLUME** 1 cubic foot

**DESCRIPTION** Records created and maintained by Joseph A. Lenhard, an AEC Oak Ridge employee. Lenhard was a health physicist who was employed by the Biology Branch of the Oak Ridge Operations Office Research Division. In 1967, Lenhard became Director of the Oak Ridge Safety Division, and later served as Director of the Safety and Environmental Control Division. The files document effluent and other pollution control, compliance with environmental protection laws, occupational health and safety, fire protection, waste disposal, isotopes handling and radiological safety, procedures for handling contaminated ORINS patients, and fallout reports. Much of the documentation consists of occupational correspondence with other AEC officials and with Oak Ridge contractors.

**LOCATION OF RECORDS** Oak Ridge Operations Office

Building 2714J

200 Administration Road

Oak Ridge, TN 37831

**SERIES TITLE** *K-25 Insurance Branch Files*

**INCLUSIVE DATES** 1944-1953

**DATES**

**ARRANGEMENT** AEC Subject/Numeric Filing System

**VOLUME** 0.5 cubic foot

**DESCRIPTION** The series contains seven files on the following subjects: insurance code classifications for some individual workers, a summary of health and accident reports for the site, and automobile accident reports at Oak Ridge. This series contains organization and personnel monthly status reports for the period June 1950 to October 1951. Several of these reports have short sections on insurance activities, which contain claims and pending litigation against Oak Ridge Operations Office for work-related disabilities.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Oak Ridge Operations Office

Building 27145

200 Administration Road

Oak Ridge, TN 37831

**SERIES TITLE** *New Brunswick Area Office Files*

**INCLUSIVE DATES** 1956-1958

**DATES**

**ARRANGEMENT** AEC Subject/Numeric Filing System

**VOLUME** 1 cubic foot

**DESCRIPTION** The series consists of fragments of correspondence files compiled to document the activities of the area office. They contain documentation pertinent to ore assay activities. The records include memorandums, letters, and reports organized into subject files.

**LOCATION OF RECORDS** Oak Ridge Operations Office

Building 2714J

200 Administration Road

Oak Ridge, TN 37831

**SERIES TITLE** *New York Operations Office Files*

**INCLUSIVE DATES** 1943-1944; 1951-1957; 1964-1972

**ARRANGEMENT** Subject

**VOLUME** 6 cubic feet

**DESCRIPTION** The series was compiled by New York Operations Office staff to assist in oversight of contractor operations. It contains documentation on plant operations, fuel element fabrication, Rochester worker badges, the Middlesex sampling plant, and the Fernald plant. The series contains letters, memorandums, reports, notebooks, handwritten notes, and badges.

**RESTRICTIONS** This series contains a small amount of classified information.

**LOCATION OF RECORDS** Oak Ridge Operations Office

Building 2714J

200 Administration Road

Oak Ridge, TN 37831

**SERIES TITLE** *New York Operations Office Contract Files*

**INCLUSIVE DATES** 1943-1950

**ARRANGEMENT** Record type

**VOLUME** 37 cubic feet

**DESCRIPTION** These records consist of documents related to contracts managed by the MED/AEC New York Operations Office. Contractors include private corporations such as Brush Beryllium, Electro Metallurgical, and Radium Chemical. Federal agencies, including the Navy Department, Bureau of Federal Supply, and War Assets Administration, are also represented by contracts in the files.

**LOCATION OF RECORDS** Oak Ridge Operations Office

Building 2714J

200 Administration Road

Oak Ridge, TN 37831

**SERIES TITLE** *Oak Ridge Contract Files*

**INCLUSIVE DATES** ca. 1943-ca. 1978

**DATES**

**ARRANGEMENT** Contract number

**VOLUME** approximately 650 cubic feet

**DESCRIPTION** This series consists of procurement files containing forms, reports, and correspondence associated with specific Oak Ridge-related contracts. The bulk of the files consist of routine financial and administrative materials relating to contract negotiation, awards, and financial accounting. The most substantive information is located in narrative statements included in project proposals, correspondence, and periodic reports, which are not always present in the files for each contract. The contracts relate to all areas of MED/AEC/DOE activities, including construction, manufacturing, administration, and research and development. Some human experimentation activities are detailed. The quantity and type of information varies among the files. For each contract file the volume of material ranges from a few pages to more than a cubic foot. There are significant gaps in the files, and it is not known where the missing files are located. An index to contractors is available.

**LOCATION OF RECORDS** Oak Ridge Operations Office

Building 2714J

200 Administration Road

Oak Ridge, TN 37831

**SERIES TITLE** *Oak Ridge Manager's Files*

**INCLUSIVE DATES** 1951-1953

**DATES**

**ARRANGEMENT** Subject

**VOLUME** 7 cubic feet

**DESCRIPTION** The records appear to be the official files created and maintained in the office of the AEC Oak Ridge Operations Office Manager. This series covers a broad range of subjects relating to Oak Ridge facilities. Topics include: budget, accounting, and finance;

community management; contracts; industrial research and application; information and publications; medicine, health and safety; organization and management; and research and development. While these files appear to be complete for the period covered, the location of similar material dating before and after is not known. A file listing is available.

**LOCATION OF RECORDS** Oak Ridge Operations Office

Building 2714J

200 Administration Road

Oak Ridge, TN 37831

**SERIES TITLE** *Public Information Office Files*

**INCLUSIVE DATES** 1971-1973

**ARRANGEMENT** Subject

**VOLUME** 21 cubic feet

**DESCRIPTION** These records are the central subject files for the Oak Ridge Public Information Office. A broad range of subjects are covered, including news releases, press interviews, radio and television stories, motion picture scripts, labor relations, procurement and contracts, and reactor development. Some information pertaining to medicine, health, and safety issues, including accidents, environment, and "special cases" of radiation exposure is present. Speeches of the Operations Office Manager are also included. While the files appear complete for the years covered, these records may be fragments of a larger collection that has yet to be located. A file folder listing is available for the 1971 records.

**LOCATION OF RECORDS** Oak Ridge Operations Office

Building 2714J

200 Administration Road

Oak Ridge, TN 37831

**SERIES TITLE** *Periodic Progress Reports (Oak Ridge Copy)*



**INCLUSIVE** 1948-1973  
**DATES**

**ARRANGEMENT** Report type; chronologically thereunder

**VOLUME** 8 cubic feet

**DESCRIPTION** The series consists of the Oak Ridge manager's office copy of the following formal reports: reports of the Oak Ridge operations office; monthly reports to the General Advisory Committee; quarterly progress reports to the Joint Committee on Atomic Energy; Hanford Operations Office reports; and Savannah River Operations Office reports. The series does not contain a complete set of any of these types of reports. Some reports contain information on AEC biomedical programs and activities.

**RESTRICTIONS** This series contains classified information.

**LOCATION OF RECORDS** Oak Ridge Operations Office

Building 2714J

200 Administration Road

Oak Ridge, TN 37831

**SERIES TITLE** *Personal Insurance Record Cards*

**INCLUSIVE** 1943-1944  
**DATES**

**ARRANGEMENT** Alphabetical by name

**VOLUME** 1 cubic foot

**DESCRIPTION** These records consist of four trays of 3- by 5-inch cards. The trays are labeled University of California, Clinton Laboratories, and University of Chicago. Each card contains the name of contractor, name of insured, date effected, premium amount, date canceled, and details regarding claims. Names are included under name of insured; these individuals were likely employees of the designated contractor. These cards likely are fragments of a larger collection of records that no longer exists.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Oak Ridge Operations Office

Building 2714J

200 Administration Road

Oak Ridge, TN 37831

**SERIES TITLE** **R.W. Cook Office Files**

**INCLUSIVE** 1947-1951

**DATES**

**ARRANGEMENT** Subject

**VOLUME** 1 cubic foot

**DESCRIPTION** The series was compiled by Cook's office to document his activities as manager of the operations office. It includes documentation on security, budget, and Clinton Laboratory matters. The series contains letters, memorandums, and reports arranged by subject.

**RESTRICTIONS** This series contains a small amount of classified information.

**LOCATION OF RECORDS** Oak Ridge Operations Office

Building 2714J

200 Administration Road

Oak Ridge, TN 37831

**SERIES TITLE** *Records Holding Task Group (RHTG) Files*

**INCLUSIVE** 1942-1980

**DATES**

**ARRANGEMENT** Sequential by assigned document number

**VOLUME** 290 cubic feet

**DESCRIPTION** The series consists entirely of classified documents removed from other files. This is an artificial collection created for classified document accountability purposes. The documents were produced by many parent Oak Ridge offices, including those concerned with MED biomedical programs. The files cover a variety of subjects from biomedical research to the production of special nuclear materials. File contents were assembled with classified documents removed from Oak Ridge records collections, some of which are now in the custody of the National Archives. An item index, which is itself classified, has been prepared as a listing of the documents in the collection.

**RESTRICTIONS** This series contains classified information.

**LOCATION OF RECORDS**Oak Ridge Operations Office  
Building 2714J

200 Administration Road

Oak Ridge, TN 37831

**SERIES TITLE** *Research and Development Division Files***INCLUSIVE DATES** 1943-1957; 1962-1967**ARRANGEMENT** None**VOLUME** 5 cubic feet**DESCRIPTION** The series was compiled by operations office staff to provide oversight of contractor operations. It includes materials on K-25 plant operations and medical reports and files similar to records found in Oak Ridge Operations Office collections in the National Archives field branch in East Point, GA. The series contains letters, proposals, blueprints, construction notebooks, memorandums, and reports.**RESTRICTIONS** This series contains classified information.**LOCATION OF RECORDS**Oak Ridge Operations Office  
Building 2714J

200 Administration Road

Oak Ridge, TN 37831

**SERIES TITLE** *Research and Medicine Division Files***INCLUSIVE DATES** 1944-1948**ARRANGEMENT** Subject**VOLUME** 3.5 cubic feet**DESCRIPTION** The series consists of letters, memorandums, and reports compiled by the office to administer MED/AEC biomedical programs. Included is documentation, much of it declassified, on MED and early AEC biomedical programs and policies. The series has material pertaining to the interim medical advisory committee, extensive material pertaining to radioisotope distribution, and other documentation pertinent to human radiation experimentation. The series is

closely related to the Oak Ridge Operations Office Research and Medicine Division files in the custody of the National Archives.

**LOCATION OF RECORDS** Oak Ridge Operations Office

Building 2714J

200 Administration Road

Oak Ridge, TN 37831

**SERIES TITLE** *St. Louis Area Office Files*

**INCLUSIVE DATES** 1946-1965

**ARRANGEMENT** Subject

**VOLUME** 2 cubic feet

**DESCRIPTION** The series consists of fragments of correspondence files compiled to document the activities of the area office. Included are personnel and security subject files; materials supply reports; plant and equipment diagrams; communications security files; and materials control files. The series consists of letters and memorandums organized into subject files.

**LOCATION OF RECORDS** Oak Ridge Operations Office

Building 2714J

200 Administration Road

Oak Ridge, TN 37831

**Oak Ridge Institute for Science and Education (ORISE)**

**SERIES TITLE** *DOE/ORISE DTPA Program and Registry*

**INCLUSIVE DATES** 1959-present

**ARRANGEMENT** Record type

**VOLUME** 12 cubic feet

**DESCRIPTION** The series consists of correspondence, reports, publications, and patient registries (electronic as well as hard copy) relating to efforts to reduce transuranic body burdens through chemical chelation. These burdens typically were acquired by nuclear workers who had inhaled or ingested materials such

as plutonium. Chelation is a process that attempts to speed excretion of materials such as plutonium and other transuranics through administration of chemical compounds. DTPA is approved by FDA as an Investigational New Drug (IND) for chelation of selected transuranic elements such as plutonium. Subjects covered include human use protocols, informed consent, and patient response, as well as general administration of the program. Also included are historical AEC business files for the DTPA program that document activities occurring prior to ORAU's involvement in 1978.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Oak Ridge Institute for Science and Education

Medical Sciences Division

150 East Road, Room A

Oak Ridge, TN 37830

**SERIES TITLE** *Human Radiation Studies Information*

**INCLUSIVE DATES** 1943-1986

**DATES**

**ARRANGEMENT** Record type

**VOLUME** 1 cubic foot

**DESCRIPTION** This is a reference file containing publications and other documents relevant to reports of human radiation experiments. Included are 1984 project summaries prepared by AEC in response to queries from Congressman R.L. Ottinger and ABC News, as well as the 1986 congressional report *American Nuclear Guinea Pigs: Three Decades of Radiation Experiments on Citizens*. Also present are several nuclear medicine publications that discuss aspects of ORINS/ORAU medical studies.

**LOCATION OF RECORDS** Oak Ridge Institute for Science and Education

Medical Sciences Division

140 East Vance Road, Room 202A

Oak Ridge, TN 37830

**SERIES TITLE** *Institutional Business Files and Reports*

**INCLUSIVE DATES** 1945-1954

**DATES**

**ARRANGEMENT** Chronological

**VOLUME** 1 cubic foot

**DESCRIPTION** This grouping consists of three bound volumes of original correspondence documenting the establishment and early operations of ORINS. Also included are photographs, press reports, and the original ORINS letter contract. The compilation was assembled along with detailed written commentary in observance of the tenth ORINS anniversary. Note: these are official ORAU records.

**LOCATION OF RECORDS** Oak Ridge Institute for Science and Education

Medical Sciences Division

140 East Vance Road, Room 202A

Oak Ridge, TN 37830

**SERIES TITLE** *Medical Correspondence and Committee Files*

**INCLUSIVE DATES** 1947-1993

**DATES**

**ARRANGEMENT** Record type

**VOLUME** 4 cubic feet

**DESCRIPTION** This collection consists of several small bodies of documents relating to ORINS/ORAU medical policies, including use of human subjects. The AEC Medical Division Correspondence (1947) pertains to clinical testing and legal responsibilities. Clinical conference announcements (1951-1957) document periodic hospital staff discussions relating to patients and pertinent study findings. Minutes of the Teletherapy Committee (1951-1960) discuss development of new instruments and techniques for medical use of external radiation. The Committee on Human Studies proposals (1967-1993) cover review of proposals to conduct studies involving human subjects at the facility. Medical Radionuclide

Committee/Committee on Human Studies proposals (1966-1981) cover review of proposals for the administration of radioactive materials to human subjects involved in research.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Oak Ridge Institute for Science and Education

Medical Sciences Division

140 East Vance Road, Room 202A

Oak Ridge, TN 37830

**SERIES TITLE** *Newsletters and Reports*

**INCLUSIVE DATES** 1947-present

**ARRANGEMENT** Record type

**VOLUME** 5 cubic feet

**DESCRIPTION** This collection consists of assorted ORINS/ORAU compilations and issuances intended for external use. Included are ORAU annual reports (1960-1991); Newsletters (1948-1974); Employee News and Notes (1965-1970); Medical Division monthly highlights (1959-1971); and bibliographies (1950-1992). These documents include information relevant to ORINS/ORAU clinical research program (1950-1986).

**LOCATION OF RECORDS** Oak Ridge Institute for Science and Education

Medical Sciences Division

140 East Vance Road, Room 202A

Oak Ridge, TN 37830

**SERIES TITLE** *Patient Medical Charts*

**INCLUSIVE DATES** 1950-1986

**ARRANGEMENT** Alphabetical by patient name

**VOLUME** 93 cubic feet

**DESCRIPTION** This series covers the central in and outpatient medical records (in original hard copy and/or microfiche forms) for the

ORINS/ORAU Hospital. Charts may contain admittance and agreement sheets, medical histories, medical reports, clinical laboratory results, diagnostic radiology reports, photographs, death certificates, autopsy reports, consent forms, discharge summaries, nurse/physician notes, physician's orders, reports, and correspondence, for visits to ORINS/ORAU clinical research program. Also included are treatment protocols, including application of internal or external radiation. All documents relating to an individual patient are compiled as one chart. Records dating from after the closure of the in-patient treatment facility in 1974 document ongoing or new outpatient visits.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Oak Ridge Institute for Science and

Education

Medical Sciences Division Collection

230 Warehouse Road

Records Holding Area Room 506,

Boxes 1-93

Oak Ridge, TN 37830

Oak Ridge Institute for Science and

Education

Medical Science Division

150 East Vance Road

Room A

Oak Ridge, TN 37830

**SERIES TITLE** *Patient and Radioisotope Logbooks*

**INCLUSIVE DATES** 1950-1986

**DATES**

**ARRANGEMENT** Record type

**VOLUME** 3 cubic feet



**DESCRIPTION** Included here are summaries of ORAU patient treatments as well as of ORAU receipt and/or use of radiation sources. Present is a set of patient registry logs that provide patient name, admission date, chart number, sex, age, address, and referring physician/university. For the ca. 1977-1986 period, the registries cover outpatients only. No information regarding medical condition or treatment is provided. Separate logs detail various uses of internal and external radiation. Included are logs for applications of gallium, carbon-11, valine, tryptophan, lanthanum, iodine-131, phosphorous-32, and other substances. These records generally include protocols and patient information such as name, date of admission and of procedure, diagnosis, dosage, and results. Logs for linear and other total body scans include similar information.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Oak Ridge Institute for Science and Education

Medical Sciences Division

140 East Vance Road, Room 202A

Oak Ridge, TN 37830

**SERIES TITLE** *Human Total Body Irradiation Program Information Reports*

**INCLUSIVE DATES** 1948-1974

**ARRANGEMENT** Record type

**VOLUME** 1 cubic foot

**DESCRIPTION** This is a collection of reports and other documents relating to operation and investigation of the ORAU total body irradiation (TBI) program. Present are fact sheets and technical documents (including reports associated with summary studies of TBI at 45 institutions), articles and tape recordings relating to the D. Sexton litigation, and reports and other documents pertaining to the 1981 congressional investigation of the TBI program (Gore hearings).

**LOCATION OF RECORDS** Oak Ridge Institute for Science and  
Education

Medical Sciences Division Collection

230 Warehouse Road

Records Holding Area, Room 506, Box 571

Oak Ridge, TN 37830

**Oak Ridge National Laboratory (ORNL)**

**SERIES TITLE** *Laboratory Director's Files*

**INCLUSIVE DATES** 1948-present

**DATES**

**ARRANGEMENT** Subject; thereunder chronological

**VOLUME** 150 cubic feet

**DESCRIPTION** These records consist of correspondence and other documents received and sent by ORNL directors and associate directors. Nearly all operations of the Laboratory are covered, including budgets, classification/declassification, accounting, health protection (including health physics), industrial relations, protection services, and research and development (including much reactor research). Records types include minutes, research proposals, budget analyses, data, and manuscripts.

**LOCATION OF RECORDS** Oak Ridge National Laboratory

ORNL Records Vault

Oak Ridge, TN 37831

**SERIES TITLE** *Laboratory Director Human Subject  
Research Reference Files*

**INCLUSIVE DATES** 1984-present

**DATES**

**ARRANGEMENT** Chronological

**VOLUME** 3 cubic feet

**DESCRIPTION** These records include project summaries of current DOE-sponsored research activities involving human subjects. Information in the file includes annual funding, principal investigators, collaborating institutions,

types of review, vulnerable population involvement, research type, and study objectives and methodology. "Protecting Human Subjects" forms are included.

**LOCATION OF RECORDS**

Oak Ridge National Laboratory

Building 4500-N, Room H-205 (Vault)

Oak Ridge, TN 37831

**SERIES TITLE** *Central Files: Central Report File*

**INCLUSIVE DATES** 1943-present

**ARRANGEMENT** Prefix; thereunder by number

**VOLUME** 1,200 cubic feet

**DESCRIPTION** Central files at ORNL consist of multiple series maintained at a single location in the Laboratory since its inception. This central filing unit has provided individual document control and currently serves as a report clearance mechanism. This series is a master file for ORNL reports in all areas of research and development. There are approximately 75 different prefixes for reports in this file; each relates to a specific topical area. ORNL prefixed reports, for example, are official institutional reports, while MON reports were generated by Monsanto Corporation when it operated the laboratory. Various indexes are available. The DOE Office of Scientific and Technical Information (OSTI) indexes the reports from 1974 forward.

**RESTRICTIONS** This series contains a small amount of classified information.

**LOCATION OF RECORDS**

Oak Ridge National Laboratory

Building 4500-N, Room H-205 (Vault)

Oak Ridge, TN 37831

**SERIES TITLE** *Central Files: CF-Prefixed Reports and Correspondence*

**INCLUSIVE DATES** 1943-present

**ARRANGEMENT** Chronological

**VOLUME** 400 cubic feet

**DESCRIPTION** Central files at ORNL consist of multiple series maintained at a single location in the

Laboratory since its inception. This CF (central files) prefixed series includes both correspondence and unpublished reports, and other internal unpublished material that has been collected and given a report number. After the 1970s correspondence is generally not included, but for the early period there is a considerable volume. There is a small amount of material relating to University of Chicago activities prior to establishment of the Oak Ridge site. Approximately 30 cubic feet of the central files are classified and are maintained separately. Handwritten chronological logs, including classified as well as unclassified entries, list the assigned report number and brief information about the document. These listings, verified against the documents, have been put into an unclassified computerized database that currently goes through 1949. The records document the full range of activities and interests of Laboratory personnel. Included are documents from the 1940s relating to Nuclear Energy for the Propulsion of Aircraft (NEPA); documents relating to field tests, using radioactive lanthanum, that were carried out in order to provide a basis for recommendations by the joint AEC-National Military Establishment Panel on Radiological Warfare; and documents relating to isotope production.

**RESTRICTIONS** This series contains a small amount of classified information.

**LOCATION OF RECORDS** Oak Ridge National Laboratory

Building 4500-N, Room H-205 (Vault)

Oak Ridge, TN 37831

**SERIES TITLE** **Central Files: Metallurgical Laboratory/Argonne National Laboratory Reports**

**INCLUSIVE DATES** 1943-present

**ARRANGEMENT** Numeric

**VOLUME** 29.5 cubic feet

**DESCRIPTION** Central files at ORNL consist of multiple series maintained at a single location in the Laboratory since its inception. This series

consists of reports published by the MED Metallurgical Laboratory, as well as reports issued by the lab's successor, Argonne National Laboratory. Some of these reports include data regarding human health and protection. These records constitute a complete set of reports published by the Metallurgical Laboratory. An index and brief history is available.

**LOCATION OF RECORDS** Oak Ridge National Laboratory

4500-N, H-205 (vault)

Oak Ridge, TN 37831

**SERIES TITLE** *ORNL Central Files: Technical Research Notebooks*

**INCLUSIVE DATES** 1943-present

**ARRANGEMENT** Numeric by notebook

**VOLUME** 420 cubic feet

**DESCRIPTION** Central files at ORNL consists of multiple subseries maintained at a single location in the Laboratory since its inception. Technical and research notebooks are used to record data on research and development work and for establishing patent or invention rights. They are also used to document the detailed information regarding and progress achieved on completed research. These are bound notebooks issued to researchers which are numbered sequentially.

**RESTRICTIONS** This series contains classified information.

**LOCATION OF RECORDS** Oak Ridge National Laboratory

ORNL Records Center

Building 4500-N, Room H-205 (vault)

Oak Ridge, TN 37831

**SERIES TITLE** *Health Physics Division Director's General Correspondence Files*

**INCLUSIVE DATES** 1943-1958

**ARRANGEMENT** None

**VOLUME** 12 cubic feet

**DESCRIPTION** This series consists of a broad range of

general correspondence files including housing and telephone allocations, incident reports, health physics reports, and meeting minutes.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Oak Ridge National Laboratory

Building 4500N, Room A224

Oak Ridge, TN 37831

**SERIES TITLE** *K.Z. Morgan Files*

**INCLUSIVE DATES** ca. 1943-1968

**ARRANGEMENT** Subject

**VOLUME** 20 cubic feet

**DESCRIPTION** These are the files of Karl Z. Morgan, past Director of the Laboratory Health Physics Division. Included are meeting minutes, publications, reports, official and professional correspondence, personnel exposure reports, instrument calibration information, and radiation surveys. Much information is also present regarding establishment of the health physics profession, as well as development of radiation exposure standards.

**LOCATION OF RECORDS** Oak Ridge National Laboratory

Building 4500-S, Attic

Oak Ridge, TN 37831

**SERIES TITLE** *Walter Snyder Files*

**INCLUSIVE DATES** ca. 1950-1985

**ARRANGEMENT** Subject

**VOLUME** 5 cubic feet

**DESCRIPTION** Walter Snyder was a section head and researcher in the Health Physics Division. These files include correspondence, publications, original experimentation data from tissue studies, meeting minutes, reports, and laboratory notes. Topics include use of isotopes, standard man studies, and Joseph Hamilton studies.

**LOCATION OF RECORDS** Oak Ridge National Laboratory

Building 4500-N

Oak Ridge, TN 37831

**SERIES TITLE** *J. H. Lum's Official Files*

**INCLUSIVE DATES** 1940-1948

**DATES**

**ARRANGEMENT** Subject

**VOLUME** 13 cubic feet

**DESCRIPTION** This series contains records of J.H. Lum who was the Deputy Director of Oak Ridge National Laboratory. It consists of administrative records which include information on staffing, housing, travel, budget, and similar topics.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Oak Ridge National Laboratory

Building 4500-N, Room A224

Oak Ridge, TN 37831

**SERIES TITLE** *Boston Oak Ridge Uranium Study Files*

**INCLUSIVE DATES** 1953-1958

**DATES**

**ARRANGEMENT** Numerical (patient records)

None (other files)

**VOLUME** 3 cubic feet

**DESCRIPTION** This series consists of records sent from Dr. Sweet at Massachusetts General Hospital, Boston, to the Health Physics Division at ORNL. They relate to a study in which eleven patients with inoperable brain tumors were injected with a uranium solution to determine its usefulness in therapeutic treatment. The injections took place at Massachusetts General Hospital and the uranium solution preparation and tissue analysis was done at ORNL. The series includes a correspondence file, medical notes on patients, and autopsy reports. There are logbooks for each patient that include analysis of data. Also included is data on animal experimentation with uranium.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** Oak Ridge National Laboratory

**RECORDS**

1060 Commerce Park, Room 253

Oak Ridge, TN 37831

**SERIES TITLE** *Biology Division Experiment/Research Progress Reports*

**INCLUSIVE DATES** 1948-present

**ARRANGEMENT** Chronological

**VOLUME** 2.2 cubic feet

**DESCRIPTION** This record series documents the research and experiment activities of the Biology Division at ORNL. The documents are periodic reports consisting of abstracts of research and experiments that were performed by scientists within the biology division. In addition to the abstract there are also bibliographic citations if publication resulted from the research. The reports also contain information on various animal experiments.

**LOCATION OF RECORDS** Y-12 Plant

Building 9207, Annex (Hall and Room 7-24)

Oak Ridge, TN 37831

#### **K-25 Site**

**SERIES TITLE** *Technical and Research Notebooks*

**INCLUSIVE DATES** 1944-present

**ARRANGEMENT** Numeric

**VOLUME** 307 cubic feet

**DESCRIPTION** These notebooks and logs record technical operations and research relating to both daily operations and to special research activities. Present are daily notes for checks of plant operations, as well as research progress. Notebooks are issued to specific individuals and are used for different purposes, including to record data for establishing patent or invention rights.

**RESTRICTIONS** This series contains a small amount of classified information.

**LOCATION OF RECORDS** K-25 Facility



Building 1034-A, Plant Records Vault

Oak Ridge, TN 37831

### Y-12 Plant

**SERIES TITLE** *Central Files: Reports*

**INCLUSIVE DATES** 1947-present

**DATES**

**ARRANGEMENT** Alphanumeric

**VOLUME** 523 cubic feet

**DESCRIPTION** This file contains classified and unclassified research and development, administrative, and progress reports related to the activities of this plant and other installations.

**RESTRICTIONS** This series contains classified information.

**LOCATION OF RECORDS** Y-12 Plant

**RECORDS**

Building 9711-5, Room 109 (Vault)

Oak Ridge, TN 37831

**SERIES TITLE** *Laboratory Technical Files*

**INCLUSIVE DATES** 1951-present

**DATES**

**ARRANGEMENT** Numeric by notebook number

**VOLUME** 142 cubic feet

**DESCRIPTION** The records in this series document the content and direction of research performed at the facility. Technical and research notebooks are used to record data on research and development work and for establishing patent and invention rights. They contain detailed information regarding progress achieved on completed research. The series consists of bound notebooks issued to researchers which are numbered sequentially.

**RESTRICTIONS** This series contains classified information.

**LOCATION OF RECORDS** Y-12 Plant

**RECORDS**

Building 9711-5, Room 109 (Vault)

Oak Ridge, TN 37831

### The University of Chicago

## **The Site Today**

The University of Chicago is a major academic and research institution. Founded in 1891 by John D. Rockefeller, the university includes an undergraduate college as well as ten graduate programs and schools. In addition, the university plays an active role in biomedical, physics, and nuclear-studies research through its contract with DOE to operate Argonne National Laboratory (ANL). More than 11,000 people are employed by the University through its schools and hospitals, and its annual budget is more than \$770 million.

## **Site History**

*The Metallurgical Laboratory*--During World War II the Federal government sponsored substantial scientific research at the University. The premier facility was the Metallurgical Laboratory (Met Lab), established on-campus in 1942. This laboratory was responsible for designing the first nuclear reactors to produce fissionable plutonium for the atomic bomb. In 1946, the Met Lab became Argonne National Laboratory, and the university continued to operate the facility under contract with the Government. ANL remains by far the largest and most significant Government nuclear facility associated with the university. (See the section on Argonne National Laboratory.) The university has, however, conducted other nuclear-related contractual work.

*The premier wartime facility was the Metallurgical Laboratory (Met Lab), established on-campus in 1942.*

*The Chicago Toxicity Laboratory*--Chicago ran a toxicity laboratory for the U.S. Army Chemical Corps during World War II to conduct chemical warfare research. From 1948 until 1951, the AEC used the facility for radiological warfare research. In 1948, the AEC worked with the Army and the university on a research program for the laboratory that focused on the poisonous effects of radiation exposure. Animal research was conducted on the local effects and general toxicity of radioisotopes considered for use as radiological warfare agents. Some coincidental work was also done with ANL on developing occupational safety practices for radiation handling. When interest in radiological warfare began to decrease in 1951, the AEC considered ending its association with the laboratory. Evidence suggests that the laboratory was under the control of the U.S. Air Force by 1952.

*Animal research was conducted on the local effects and general toxicity of radioisotopes considered for use as radiological warfare agents.*

***Project Sunshine***--Willard F. Libby, a Nobel laureate, held an appointment at the university's Enrico Fermi Institute for Nuclear Studies. In 1953, he began AEC-sponsored biomedical research for Project Sunshine, which studied the worldwide distribution and health hazards of fallout. The project examined movement of fallout through the atmosphere, its deposition on soil and vegetation, and its uptake into the human body. Researchers collected and measured radiation levels in soil, plant, and animal samples, and in samples of human tissues and bones, including some from the bodies of stillborn babies.

Project Sunshine research was initially conducted at the University of Chicago, the AEC Health and Safety Laboratory, and the Columbia University Lamont Geological Observatory. Fallout generated by 1954 AEC nuclear tests led to greatly increased funding for Project Sunshine. By 1957, nearly 50 institutions and Federal agencies were participating in the project. The project yielded important data that allowed the estimates for worldwide fallout levels. The AEC curtailed Project Sunshine work at the university in 1958.

***The Argonne Cancer Research Hospital***-- During the immediate postwar years, there was great interest in exploring the potential biomedical uses and effects of radiation. The Argonne Cancer Research Hospital was one of three clinical facilities created by the AEC in 1948. The hospital was originally intended to be part of Argonne National Laboratory, but the University of Chicago ultimately contracted to run it as a separate institution. While the AEC owned the hospital, the university medical school administered and staffed the facility. Construction began in 1950 and the hospital admitted its first patient in January 1953.

***Fallout led to greatly increased funding for Project Sunshine. By 1957, nearly 50 institutions and Federal agencies were participating in the project.***

The hospital was equipped with 58 patient beds and facilities for animal research. In addition, it had contemporary state-of-the-art therapeutic and diagnostic equipment for experimental cancer treatment and research using radioactive materials. Members of the medical school faculty, as well as physicians and scientists from Argonne National Laboratory and various other institutions, used the hospital for research (**Figure 37**). Patients were admitted on a selective basis, with doctors choosing persons whose condition best suited the hospital's research and treatment applications. In 1973, the university changed the name of the hospital to the Franklin McLean Memorial Research Institute. The AEC terminated its contract with the hospital in 1974.

### **Site Human Radiation Experiments**

The Argonne Cancer Research Hospital undertook many experiments focusing on the internal use of radioisotopes. Examples include use of carbon-13 labeled glycine to investigate multiple myeloma; application of yttrium-90 for intracavity therapy; and chromium-51 as a labeling technique to study red cells. In addition, the hospital conducted many tracer studies and studies of radioactively labeled compounds to determine metabolic rates. Individual site experiments are detailed in Chapter 3.

### **Site Records Collections**

The university provided helpful assistance for the DOE search, although records relating to the Manhattan Project and successor agencies are seemingly not abundant. The university has no central records-management program, and academic departments, institutes, and Argonne Cancer Research Hospital have preserved or destroyed records as they saw fit. As a result, many potentially useful records have been destroyed over the years.

The Joseph Regenstein Library has a few pertinent records collections. Except for two collections, these holdings present little documentation pertinent to this project. Those seeking to document the university's role in human radiation experiments will find only a small part of the story here.

*The Argonne Cancer Research Hospital undertook many experiments focusing on the internal use of radioisotopes.*

Researchers should know that two access policies are in place at the university. The Joseph Regenstein Library collections are easily accessible through routine archival procedures. Records in the General Counsel's Office, however, are not in archival custody and require advance permission for use. Use of records currently in the Public Affairs Office also require special permission.

### **University of Chicago**

**SERIES TITLE** *Reprints from the Argonne Cancer Research Hospital*

**INCLUSIVE DATES** 1954-1973

**ARRANGEMENT** Chronological

**VOLUME** 4 cubic feet

**DESCRIPTION** This series documents the medical, research and experimentation activities of the Argonne Cancer Research Hospital (ACRH). It includes articles on animal and human subject research at the ACRH as well as data

on radium watch dial painter studies. The series consists entirely of 16 volumes of published articles and abstracts. An index is available.

**LOCATION OF RECORDS**

The University of Chicago

Office of Legal Counsel

5801 Ellis Avenue

Chicago, Illinois 60637

**SERIES TITLE** *Semiannual Reports of the Argonne Cancer Research Hospital*

**INCLUSIVE DATES** 1954-1973

**DATES**

**ARRANGEMENT** Chronological

**VOLUME** 1 cubic foot

**DESCRIPTION** This series documents the medical, research and experimentation activities of the Argonne Cancer Research Hospital. It includes information on both animal and human radiation experiments carried out by the Argonne Cancer Research Hospital as well as its assistance in Argonne National Laboratory radium and other radiation studies. The series consists entirely of bound volumes of semiannual and annual reports. A brief index to the reports is available.

**LOCATION OF RECORDS**

The University of Chicago

Office of Legal Counsel

5801 Ellis Avenue

Chicago, IL 60637

**SERIES TITLE** *Public Affairs Office--Faculty Files*

**INCLUSIVE DATES** 1924-present

**DATES**

**ARRANGEMENT** Alphabetical

**VOLUME** 70 file drawers

**DESCRIPTION** This series documents the lives and careers of past and present University of Chicago faculty. It was created to serve as a resource of the Public Affairs Office. It includes

biographical, bibliographical, and professional information and contains files on Austin Brues, Arthur Compton, Lowell Coggeshall, Robert Hasterlik, Leon Jacobson, Robert Stone, Leo Szilard, and Raymond Zirkle. The series consists of resumes, obituaries, bibliographies, journal articles, speeches, press releases, news clippings, correspondence, and publicity materials created for special events. No index is available.

**LOCATION OF RECORDS** University of Chicago

Administration Building, Public Affairs Office

5801 Ellis Avenue

Chicago, IL 60637

**SERIES TITLE** *Public Affairs Reference Files*

**INCLUSIVE DATES** 1944-1993

**ARRANGEMENT** Subject

**VOLUME** 150 cubic feet

**DESCRIPTION** The series documents publicity given to University of Chicago projects and faculty. It includes files on biological sciences; hospitals and clinics; institutes; centers; nuclear energy; foundations; pharmacology and radiation; Fermi Memorial; inhalation therapy; Cancer Research Center; and Fermi National Accelerator Laboratory. It also contains issue papers and President's files, and a post-1987 collection of biographies and publications. The series consists primarily of press releases and news clippings. A finding aid is available.

**LOCATION OF RECORDS** University of Chicago

Administration Building, Public Affairs Office

5801 Ellis Avenue

Chicago, IL 60637

**SERIES TITLE** *University General Archival Files***INCLUSIVE** 1892-1988**DATES****ARRANGEMENT** Subject**VOLUME** Approximately 42 cubic feet

**DESCRIPTION** This series documents the activities of organizations, institutions, and committees associated with the University of Chicago. It includes information on AIDS Task Force; American Meat Institute Foundation; Argonne Universities Association; Argonne Cancer Research Hospital; Chicago Lying-in Hospital; Hospitals and Clinics; Coggeshall Report; Biological Sciences Division; Council on Medical and Biological Research; and Pharmacology Department. It does not appear to contain specific information on human radiation experiments. The series consists of reports, publications, press releases, and pamphlets. A finding aid is available.

**LOCATION OF RECORDS** The University of Chicago

Department of Special Collections

The Joseph Regenstein Library, Room  
JRLB130

1100 E. 57th Street

Chicago, IL 60637

**SERIES TITLE** *University Miscellaneous Archival Files***INCLUSIVE** 1939-1974**DATES****ARRANGEMENT** Alphabetical by name**VOLUME** Approximately 12 cubic feet

**DESCRIPTION** This series documents selected information concerning individuals of importance to the University of Chicago. It contains collections of papers, such as those of George V. LeRoy and Robert J. Hasterlik, as well as collections of publications and speeches. The series consists of articles, speeches, press releases, letters, and memorandums. An index is available.

**LOCATION OF** The University of Chicago

**RECORDS** Department of Special Collections

The Joseph Regenstein Library, Room  
JRLB130

1100 E. 57th Street

Chicago, IL 60637

**SERIES TITLE** *Physics Department Papers***INCLUSIVE** 1937-1947**DATES****ARRANGEMENT** Subject**VOLUME** 13 cubic feet

**DESCRIPTION** This series documents teaching and other activities of the Physics Department of the University of Chicago. It includes correspondence files, departmental records, reprints, textbook and course materials, the papers of A. E. Shaw, and documentation on the Cosmic Ray Study in Boxes 27B37. The series consists of letters, memorandums, reports, reprints, personnel and health charts, navigation logs, charts, graphs, magnetic observatory data tables, lecture notes, class records, and experimental results. A finding aid is available.

**LOCATION OF** The University of Chicago**RECORDS**

Department of Special Collections

The Joseph Regenstein Library, Room  
JRLB130

1100 E. 57th Street

Chicago, IL 60637

**SERIES TITLE** *Records of the Office of the Vice President,  
Special Projects***INCLUSIVE** 1940-1966**DATES****ARRANGEMENT** Subject

Chronological

**VOLUME** 27 cubic feet



**DESCRIPTION** This series documents the activities of the Office of the Vice President for Special Projects, which managed projects outside of the responsibilities of established schools and academic departments. It includes files on contracts with various Federal agencies, including the Departments of Agriculture, Health Education and Welfare, and Defense (Army, Air Force, and Navy), the Office of Scientific Research and Development, the Atomic Energy Commission, Argonne National Laboratory, the Clinton Laboratory, du Pont and Monsanto Chemical Companies, and various construction companies. It also contains two files on Project Sunshine. The series consists of letters, memorandums, and reports. A finding aid is available.

**LOCATION OF RECORDS** The University of Chicago

Department of Special Collections

The Joseph Regenstein Library, Room  
JRLB130

1100 E. 57th Street

Chicago, IL 60637

## **The University of Rochester**

### **The Site Today**

The University of Rochester is a private, independent institution on a 534-acre campus in Rochester, NY. Rochester has about 8,500 enrolled students and is among the top 25 American universities in Federal funding for research and development. Technical research centers include the Institute of Optics, the Laboratory for Laser Energetics, and the Strong Memorial Hospital. Other specialties include schools of music, management, medicine, and nursing.

### **Site History**

From 1850 through 1918, the institution was a liberal arts college. In 1918, it became a university and established professional schools and doctoral programs. The university invested in state-of-the-art scientific instruments, including a cyclotron and a million-volt x-ray machine. These developments brought several prominent scholars to Rochester, including Lee A. DuBridge in physics, W. Albert Noyes in chemistry, and Curt Stern in biology. In 1925,

Stafford L. Warren began his service at the University of Rochester School of Medicine and Dentistry, where he served as the Department of Radiology chief.

***The Manhattan Project looked to the university to provide extensive research and support for medical aspects of the bomb program.***

During World War II the university undertook several military research projects. A major client was the U.S. Office of Scientific Research and Development (OSRD), which contracted with Rochester for more than a hundred projects in chemistry, physics, biology, medicine, and psychology. The Manhattan Project, successor to the OSRD in supporting atomic research, looked to the university to provide extensive research and support for medical aspects of the bomb program. This program began in 1943 when Stafford Warren was appointed first as a consultant and later as Chief of the Manhattan Project Medical Section. Apart from Warren's expertise, Rochester was selected as a medical research center because of the extensive biological studies with cyclotron-produced radioactive isotopes conducted at the medical school. A contract established a formal Manhattan Project program at the university. This program grew rapidly, and by the end of the war the total staff size reached about 350.

The Rochester project supported two basic activities. The first consisted of technical services, including analysis of periodic medical examination reports for all personnel employed at Manhattan Project facilities. Rochester also advised these facilities on employee health protection issues and developed radiation measurement instruments, and staff traveled to various Manhattan Project sites to measure radiation and toxic dusts.

The second service Rochester provided to the Manhattan Project was biomedical research. Much of this work focused on biological studies of polonium, radium, and plutonium and was intended to establish occupational radiation exposure standards. Rats and other animals were used as subjects in many experiments designed principally to measure bodily distribution and excretion of these substances. Human beings were also used as experimental subjects. Most wartime activities at Rochester were secret and related documentation was classified.

***The second service Rochester provided to the Manhattan Project was biomedical research.***

After the war, Rochester received a substantial AEC contract to operate an Atomic Energy Project (AEP). The university created a Department of Radiation Biology at the medical school to administer this contract. With all of its former technical services

now performed by the AEC Health and Safety Laboratory in New York, Rochester focused on research and education activities related to the biomedical aspects of nuclear energy. Security eased to the point were nearly all AEP projects were unclassified by 1950. Most wartime research was also declassified and published in the open scientific literature.

Through the Atomic Energy Project, the university established a preeminent program in radiation biology. In 1950, Rochester offered the first doctorate degree in radiation biology, and many influential scientists passed through this program. During the 1950s, research emphasis shifted from acute radiation effects to molecular aspects of radiation damage in biological systems. Activities under the AEP also fostered extensive work involving nuclear materials in pharmacology and biochemistry.

Until the early 1960s, the AEC funded all activities of the university's Department of Radiation Biology through the Atomic Energy Project. Limitations on AEC funds led Rochester in 1963 to solicit funding from the National Institutes of Health and the National Science Foundation. Despite this shift, AEP research interests remained focused in areas that originated during the war or shortly thereafter: aerosols, cancer research, internal emitters, and basic radiobiology. AEC commitment to the program, however, declined and successor agencies also had limited interest in the AEP. During the 1980s DOE terminated the project and turned all facilities over to the university.

### **Site Human Radiation Experiments**

As noted, Rochester was a hub for Manhattan Project biomedical research. As part of this activity, the University also served as a major center of human radiation experiments. Documents suggest that Stafford Warren arranged a cooperative experimentation plan involving the Rochester and Los Alamos projects. This plan called for separate human metabolism studies with at least five different substances: plutonium, uranium, polonium, and radioactive lead, each with 10 subjects; and radium, with 5 subjects. Rochester selected the subjects, arranged for their stay at the university hospital, administered the substances, and collected samples of blood and excreta. Los Alamos analyzed the samples, determined concentrations of the administered substances, and determined rates of excretion. The stated purpose of these experiments was to gain knowledge about the behavior of the substances in the body so that researchers could establish standards for Manhattan Project workers.

***Rochester was a hub for Manhattan Project biomedical research and also served as a major center of human radiation experiments.***

Evidence suggests that studies involving at least three of these substances took place at Rochester from 1945 through 1947: Eleven people received plutonium injections; 5 received doses of polonium (four injections and one oral dose); and 6 received injections of uranium. Apparently these individuals were Strong Memorial Hospital patients who were selected on the basis of their medical condition. For the plutonium injections, documents show that Rochester personnel carefully selected each subject and prepared separate protocols for each injection. A 1974 AEC investigation of the plutonium injections was unable to find documentary evidence that the university obtained consent from these subjects.

After 1947, biomedical aspects of the Rochester Atomic Energy Project focused primarily on animal studies, although human subjects were used on occasion. Individual site experiments are detailed in Chapter 3.

### **Site Records Collections**

Documents have been found that shed light on Rochester's role in biomedical support for the MED or its successors, but these materials are primarily in files focusing on other topics. No body of records for the Rochester project have been found within DOE, although documents have been found in other files that discuss activities at the university during the war and afterwards. Of particular value are Rochester-related documents in the Plutonium Injection Investigation Files and the Ottinger/Markey Investigation Files (listed earlier under the headquarters series), which document aspects of the Rochester human radiation experiments occurring during and just after the war. Additional documents have been found in series at Oak Ridge, Lawrence Berkeley Laboratory, and the National Archives.

DOE has contacted Rochester to learn what records the university may have relevant to human radiation experiments. The university is

involved in litigation in this area and has shown caution in communicating the contents of its records holdings. Rochester states that it has not found a body of records relating to either wartime or Atomic Energy Project activities connected with human radiation experiments. The university also states that it has searched the potentially relevant files of its president, treasurer, and medical school dean. DOE did obtain one cubic foot of AEP periodic reports dating from about 1948 to about 1968 from the university.

A DOE staff member traveled to Rochester to discuss the university's search and to examine special collections holdings of

the Edward G. Miner Library. Two collections of personal papers were examined: the Joe W. Howland Papers and the Louis H. Hempelmann, Jr. Papers. Both individuals participated in the plutonium injection experiments and later joined the Rochester medical school staff. DOE intends to continue efforts to review Rochester's records holdings.

### **University of Rochester**

**SERIES TITLE** *Atomic Energy Project Reports*

**INCLUSIVE** 1948-1954

**DATES**

**ARRANGEMENT** Chronological

**VOLUME** 1 cubic foot

**DESCRIPTION** These records consist of periodic technical reports from the Rochester Atomic Energy Project (AEP) to the AEC. Topics cover most aspects of AEP activities, including biomedical studies of x rays, uranium, beryllium, thorium, fluoride, and fallout. Information is also present regarding chemical toxicity, health physics, and educational programs. Some gaps are apparent in the reports. The wartime origins and activities of the project are not covered extensively in this material; the location of reports from this era is unknown. Bibliographic listings and indexes are available.

**LOCATION OF** University of Rochester

**RECORDS**

School of Medicine and Dentistry

Rochester, NY 14642

**SERIES TITLE** *Louis H. Hempelmann, Jr., Papers*

**INCLUSIVE** 1948-1973

**DATES**

**ARRANGEMENT** Record type; chronological thereunder

**VOLUME** 1 cubic foot

**DESCRIPTION** These records consist of three subgroups: correspondence and research grants of the university medical school Division of Radiation Therapy; correspondence, research grants, and budgets of the Division of Diagnostic Radiology; and annual reports to the dean of the medical school. Hempelmann

was an instructor in Radiology at Washington University from 1942 to 1946, and served as Health Division Leader at Los Alamos from 1947 to 1948. He came to the Rochester medical school as a professor of experimental biology in 1950. He later served as Chairman of the Department of Radiology at Rochester. These papers contain no information pertaining to Hempelmann's activities prior to coming to Rochester in 1951, his involvement with the MED or AEC, or his research activities at Rochester. A finding aid is available for this collection.

**LOCATION OF RECORDS** University of Rochester

Edward G. Miner Library

School of Medicine and Dentistry

Rochester, NY 14642

**SERIES TITLE** *Joe W. Howland Papers*

**INCLUSIVE DATES** 1949-1973

**DATES**

**ARRANGEMENT** Record type; chronological thereunder

**VOLUME** 10 cubic feet

**DESCRIPTION** These records consist of four subgroups: the Atomic Energy Project (AEP); AEP Medical Division; Health and Safety; and Howland (personal papers). The materials document early research in radiation toxicity and also illustrate operation of the AEP, which was funded by the U.S. Atomic Energy Commission, at Rochester. Included are Proposals for Research and Development (Form 189s); copies of the AEP Quarterly Review; administrative records; research correspondence and reports; and educational materials. Documentation is also available concerning Howland's activities as a consultant on radiation exposure, occupational safety, and civil defense. Information pertaining to the use of isotopes at Rochester and the university's role in allocating isotopes to regional hospitals is also present. Howland worked at the Rochester School of Medicine and Dentistry from 1938 to 1965, ending as a professor of

radiation biology. He was on a leave of absence from 1944 to 1947 when he served in the medical organization of the MED. A finding aid is available for this collection.

**LOCATION OF RECORDS** University of Rochester

Edward G. Miner Library

School of Medicine and Dentistry

Rochester, NY 14642

## **National Archives and Records Administration**

The National Archives and Records Administration (NARA) is the Federal agency responsible for overseeing the creation, management, storage, and final disposition of the Federal government records. NARA provides two types of facilities and services for physical custody of records:

- ***records centers***--For inactive records (older records that usually receive minimal use), Federal agencies are permitted to use various NARA Federal Records Centers located around the country. Records in these centers remain under the legal custody and control of the agency that sent them. Most of these records are slated for eventual destruction according to terms of legally approved disposition authorities.
- ***permanent archives***--Separate archival repositories preserve and service records judged to warrant permanent retention for their historical value. Records in these repositories have been legally transferred to NARA ownership and control. NARA's job is to protect the records and make them available to individuals who wish to use them. NARA maintains archival repositories in Washington, DC, and College Park, MD, as well as in 12 regional repositories across the Nation.

***Most of the Department of Energy's historical records lie beyond NARA control.***

While some important files from DOE and its predecessors have been transferred to NARA archival custody, most of the agency's historical records lie beyond NARA control. This is due partially to classification issues, but the most substantial barrier to transfer is the poor intellectual control of DOE records. It should be noted, however, that this issue goes beyond DOE.

***There is a critical need to use innovative efforts to manage and***

*preserve Post-War Federal records. Failure to do so will mean the effective loss of the Cold War historical record.*

NARA has had limited success managing permanent records dating from the postwar period, particularly those relating to science and technology. The great volume of these materials, their technical complexity, and their disorder and decentralization have presented archival obstacles that the Federal government as a whole has yet to overcome. As the human radiation experiments project has proven, however, there is a critical need to use innovative efforts to manage and preserve these records. Failure to do so will mean the effective loss of the Cold War historical record.

### **National Archives Records Relating to the Manhattan Engineer District**

**SERIES TITLE** *Central Files*

**INCLUSIVE DATES** 1942-1947

**DATES**

**ARRANGEMENT** War Department Dewey Decimal Filing System

**VOLUME** 60 cubic feet

**DESCRIPTION** This series documents the work of the MED, which was headquartered in Oak Ridge, except for a short initial period in New York. It has information on the range of activities involved in the supervision of sites and contractors across the country, including the construction and operation of the Oak Ridge and Hanford facilities. A preliminary search revealed some references to the plutonium injection experiments and to the polonium work at Rochester. The records include extensive discussions of worker hazards and occupational health issues and discussions of the urgent need to set safe standards based on research with ionizing radiation and toxic chemicals. The series consists of correspondence files of reports, letters, memorandums, studies, meeting minutes, and telegrams. Classified documents have been removed from the files and retained in Oak Ridge Operations. Collection number 4NNB326B8505.

**LOCATION OF RECORDS** National Archives--Southeast Region

1557 St. Joseph Street



East Point, GA 30344

**National Archives Records Relating to the Atomic Energy  
Commission**

**SERIES TITLE** *Research Division Correspondence Files*

**INCLUSIVE** 1944-1962

**DATES**

**ARRANGEMENT** AEC Subject/Numeric Filing System  
(exceptions noted below)

**VOLUME** 66 cubic feet

**DESCRIPTION** The series documents agency and site biomedical and basic research programs. It is especially valuable for documenting biomedical policies (1944B1950), the interim medical advisory committee, and policies for the medical use of radioisotopes. It contains files on plant and animal studies, information related to human experimentation, and files on worker exposures and environmental emission monitoring. The series contains subsections devoted to University of Tennessee, Oak Ridge Institute of Nuclear Studies, and aircraft nuclear propulsion program biomedical activities. Also included are subsections of access permits (filed by permit number), directives (filed by directive number), and contracts (filed by contract number). A detailed folder title inventory to series is available. The series consists of correspondence files of memorandums, letters, meeting minutes, handwritten notes, TWXs, drawings, charts, and some photographs. Classified documents have been removed from the files and retained in Oak Ridge Operations Office RHTG (Records Holding Task Group) Files. Collection number 68A1096.

**LOCATION OF  
RECORDS** National Archives--Southeast Region

1557 Street Joseph Street

East Point, GA 30344

**SERIES TITLE** *Research and Development Division  
Correspondence Files*

**INCLUSIVE** 1947-1963

**DATES****ARRANGEMENT** AEC Subject/Numeric Filing System (Part)

Subject (Part)

**VOLUME** 44 cubic feet

**DESCRIPTION** The series was assembled by Oak Ridge officials of the division in implementing agency reactor development and other programs. It contains information on reactor programs, isotope production, aircraft nuclear propulsion programs, other developmental programs and some information on radiological warfare and RaLa programs. There may be data in environmental emissions in the series. Boxes 12 & 13 contain some biomedical program data for the 1944B1946 period. The series consists of correspondence files of memorandums, letters, meeting minutes, and handwritten notes. Classified documents have been removed from it and retained in the Oak Ridge Operations Office Records Holding Task Group (RHTG) Files. A folder title inventory to the series is available. Collection number 4NNB326B87B6.

**RESTRICTIONS** This series contains privacy material.**LOCATION OF RECORDS** National Archives--Southeast Region

1557 St. Joseph Street

East Point, GA 30344

**SERIES TITLE** *Research and Medicine Division  
Correspondence Files***INCLUSIVE DATES** ca.1944-1950**DATES****ARRANGEMENT** Alphabetical by subject (partially by AEC Subject/Numeric Filing System)**VOLUME** 20 cubic feet

**DESCRIPTION** The series documents the Oak Ridge administration of MED/AEC biology and medicine programs. It contains significant information relating to all aspects of MED/AEC biology and medical programs, including research activities, health effects of radioactive and other materials, animal studies, some experiments with human

subjects, worker exposures to radiation, isotopes distribution, and plant and environmental emission monitoring. The series includes correspondence, budget documents, reports, medical and other topical case files, directives, meeting agendas and minutes, and policy development documents. Classified documents have been removed from the files and retained in the Oak Ridge Operations Office RHTG (Records Holding Task Group) Files. A detailed file folder listing is available. Collection number 326B68A588.

**RESTRICTIONS** This series contains privacy material.

**LOCATION OF RECORDS** National Archives--Southeast Region

1557 St. Joseph Street

East Point, GA 30344

**SERIES TITLE** *Metallurgical Laboratory/Argonne National Laboratory, Classified Correspondence Files*

**INCLUSIVE DATES** 1942-1965

**ARRANGEMENT** Chronological

**VOLUME** 158 cubic feet

**DESCRIPTION** The series was compiled to document laboratory research and administration activities. It includes information on the design and construction of plutonium production reactors, health and safety problems associated with them, other laboratory reactor development activities, laboratory biomedical activities, research into fission products and their health hazards, and work on separating plutonium from waste fission products. It also includes information on radiological warfare activities, may contain information on clinical human radiation experiments, and contains a set of MED N and C series of technical reports. The series contains some Walter Zinn reader files from his tenure as laboratory director. The series consists of letters, memorandums, technical reports, charts, graphs, and handwritten notes. A general box index is available. Collection number EB74.

**RESTRICTIONS** This series contains classified information.

**LOCATION OF RECORDS** National Archives at College Park

8601 Adelphi Road

College Park, MD 20740

**SERIES TITLE** *Oak Ridge Diaries*

**INCLUSIVE DATES** 1943-1972

**DATES**

**ARRANGEMENT** Chronological

**VOLUME** 14 cubic feet

**DESCRIPTION** This series consists of the daily diaries of the managers of the MED/AEC Oak Ridge Operations Office. The diaries may contain brief references to radiological warfare or to human experimentation. The diaries consist of notebooks containing typewritten notes of telephone conversations, meetings, and significant events which took place during the course of the day. No index is available. Collection number EB81.

**RESTRICTIONS** This series is entirely classified.

**LOCATION OF RECORDS** National Archives at College Park

8601 Adelphi Road

College Park, MD 20740

**SERIES TITLE** *Office of the Secretary (Secretariat Records), Correspondence Files*

**INCLUSIVE DATES** 1946-1958

**DATES**

**ARRANGEMENT** Dewey Decimal Filing System (1946B1951 portion)

AEC Subject/Numeric Filing System  
(1951B1958 portion)

**VOLUME** 146 cubic feet

**DESCRIPTION** These files were compiled by the Secretary to the Atomic Energy Commission (AEC) to create the official record of agency policies, origins, structure, functions, missions, controversies, and activities at the highest level of the agency. These portions of the files document AEC operational activities.

They include agency policy formulation on budgets, contractor oversight, nuclear weapons programs, nuclear reactor programs, the hydrogen bomb program, special nuclear materials production programs, biomedical programs, Project Sunshine, the nuclear waste programs, contracts, and security matters. They contain information on agency policies and standards for human experimentation. They also include files on radiological warfare policy decisions and programs. The Secretary's files contain some meeting minutes and most letter reports of the Advisory Committee on Biology and Medicine. The 1946B1951 portion contains materials on the interim medical advisory committee. The series contains AEC information and decision staff papers, letters and memorandums showing implementation of policy decisions, and excerpts of minutes of Commission meetings. Collection numbers EB78 and EB79.

**RESTRICTIONS** This series contains classified information.

**LOCATION OF RECORDS** National Archives at College Park

8601 Adelphi Road

College Park, MD 20740

**SERIES TITLE** *Minutes of the Meetings of the AEC*

**INCLUSIVE DATES** 1946-1961

**ARRANGEMENT** Chronological

**VOLUME** 5 cubic feet

**DESCRIPTION** The series consists of minutes for Commission Meetings 1B1807 and for a few unofficial meetings, as well as indexes to the meeting minutes. Minutes contain summaries relating to general policy or other matters brought up for discussion; policy decisions are recorded. Subjects dealt with in minutes relate broadly to the AEC's origins, structure and administration, functions, and programs. More specifically, they concern such matters as budgetary planning, biomedical programs, the fallout controversy, Project Sunshine, research programs, reactor development, nuclear fuel production, military applications

of atomic energy, weapons testing, facility construction, security matters, and health and safety concerns. They were compiled by the Secretary to the Atomic Energy Commission to record policy decisions on virtually all subjects coming before the AEC commissioners. The series consists of meeting minutes arranged in chronological order by formal meeting number. Collection number EB19.

**RESTRICTIONS** This series contains classified information.

**LOCATION OF RECORDS** National Archives at College Park

8601 Adelphi Road

College Park, MD 20740

**SERIES TITLE** *Microfilm Copies of Transcripts of the Meetings of the AEC*

**INCLUSIVE DATES** 1954-1957

**ARRANGEMENT** Chronological

**VOLUME** 0.3 cubic foot

**DESCRIPTION** The series consists of verbatim transcripts of the proceedings of commission regular meetings, executive session meetings, and informal meetings. The series was compiled by the AEC Secretary to create a supplemental record of agency policy decisions. The series contains verbatim discussions of a wide range of subjects; for example, the J.R. Oppenheimer security clearance decision, the fallout controversy, biomedical programs, nuclear weapons programs, special nuclear materials production programs, basic research programs, civilian nuclear power programs, regulatory programs, and Atoms for Peace programs. The series consists entirely of transcripts arranged in chronological order.

**RESTRICTIONS** This series is entirely classified.

**LOCATION OF RECORDS** National Archives at College Park

8601 Adelphi Road

College Park, MD 20740

**SERIES TITLE** *Minutes and Reports of Meetings of the General Advisory Committee (GAC)*

**INCLUSIVE DATES** 1947B1974

**DATES**

**ARRANGEMENT** Chronological by date of meeting

Numerical sequence by meeting number

**VOLUME** 6 cubic feet

**DESCRIPTION** The series consists of summaries of GAC meetings prepared by the Committee Secretary. It contains minutes and related records that document the GAC's involvement in administrative and policy matters relating to basic research, reactor development, weapons development and testing, research performed by Atomic Energy Commission national and other laboratories, special nuclear materials production programs, test ban and disarmament negotiations, and the hydrogen bomb decision and program. Because the General Advisory Committee rarely considered biomedical topics, the series contains little, if anything, directly pertinent to human radiation experiments. The series contains meeting minutes, agendas, letter reports of meetings, and some special subcommittee reports. Collection number EB70.

**RESTRICTIONS** This series contains classified information.

**LOCATION OF RECORDS** National Archives at College Park

8601 Adelphi Road

College Park, MD 20740

**SERIES TITLE** *Records of the Division of Biology and Medicine Relating to Fallout Monitoring and Studies*

**INCLUSIVE DATES** 1946-1973

**DATES**

**ARRANGEMENT** Subject

**VOLUME** 22 cubic feet

**DESCRIPTION** The series consists of correspondence files and data files created by the fallout studies branch and other units of the Atomic Energy Commission's division of biology and

medicine. It contains extensive documentation on fallout controversy of the 1950s, including files on Project Sunshine, the investigation of sheep losses after the 1953 test series, and the controversy over Harold Knapp's analysis of iodine-131 doses to residents of St. George, Utah. The series is arranged into subject files, but they are not grouped according to a single filing system. The series contains technical reports, Project Sunshine bulletins, speeches, memorandums, letters, transcripts of interagency conferences, data files, handwritten notes, published articles, and photographs. Collection number EB73.

**RESTRICTIONS** This series contains classified information.

**LOCATION OF RECORDS** National Archives at College Park

8601 Adelphi Road

College Park, MD 20740

## Topical Areas

### Introduction

Three topical narratives dealing with areas of special interest are included here:

1. Radiation, Biomedical Science, and Distribution of Isotopes;
2. Plutonium Injection Experiments; and
3. Intentional Radiation Releases.

Because these topics cut across sites and other structural arrangements, records series for these narratives are not listed. Series that are pertinent to the topics are, however, listed under the site narratives.

Human radiation experiments encompass many additional topics beyond those presented here. Yet the three that are discussed are of particular relevance to DOE and sufficient information is available about them to tell a meaningful story. As with the other topical areas covered in this report, the broad outlines of what took place are provided with particular attention to organizational context.

### Radiation, Biomedical Science, and Isotope Distribution

#### Introduction



Government-sponsored human radiation experiments occurred in the broader context of biomedical science, which encompassed experimental research as well as medical diagnosis and treatment.

Biomedical use of radiation began before the Manhattan Project. This use, moreover, has grown into accepted practices of modern nuclear medicine that today take place with only limited Government involvement. The Manhattan Project and its successors (AEC and DOE) played a key role in advancing the scientific use of radiation. This role ran from developing critical research tools to supporting pioneering cancer therapy. The role also included questionable and controversial activities, such as wartime human experiments.

## **Background**

Before 1930, scientists were aware that multiple versions of some elements existed in nature. Such versions of a single element, known as isotopes, shared the same chemical properties. Some of these isotopes had unstable nuclei that gave off radiant energy--radioactivity--as they disintegrated.

Radioactive isotopes had value for biological research because a researcher could measure their movement through living organisms. In 1923, the first use of radioactivity in biological study took place when a radioactive isotope of lead was employed to study bean root absorption. Shortly afterward, radioactive isotopes of lead and bismuth were used in animal studies. During the late 1920s, Herman Blumgart of Harvard University extended this work by injecting isotopes into humans to study physiological processes.

Initially, the major limitation to research use of isotopes was the scarcity of naturally occurring radioactive elements. This stricture began to loosen in 1934, when IrPne Curie and Jean FrJdJric Joliot announced they had produced a new radioisotope by striking target metals with alpha radiation. During the same year, physicists working under Ernest O. Lawrence at the University of California in Berkeley announced they, too, had produced isotopes. The Berkeley group used Lawrence's cyclotron to bombard a variety of elements with atomic particles, which proved to be a highly effective method of producing various new isotopes.

***Radioactive isotopes had value for biological research because a researcher could measure their movement through living organisms.***

John Lawrence, Joseph Hamilton, and other Berkeley biomedical researchers working with E.O. Lawrence quickly grasped the value of radiation and radioactive materials for human

experiments. Hamilton used radioactive sodium to study blood circulation. John Lawrence used an isotope of phosphorous in experimental treatments for leukemia and polycythemia rubra vera. Robert Stone pioneered the use of external radiation sources for experimental treatment of human cancer patients. Other researchers at various institutions also used radioactive materials to make significant advances in scientific knowledge during the 1930s.

These developments led to optimism (and increased funding) for the biomedical use of radiation. Universities such as Harvard, Rochester, and the Massachusetts Institute of Technology acquired cyclotrons and x-ray equipment to pursue studies of plants, animals, and humans. Yet despite the cyclotron and other means of producing radioactive materials, the total amount available for research remained small. One consequence of this was limited knowledge of the potential harm from radiation. It was known that some industrial dial painters who inadvertently ingested radium during earlier decades had contracted bone cancers and other maladies; radiologists of the era were aware that too much x-ray radiation would cause damage. But the overall hazards of radiation, both immediate and long term, were not well understood.

### **World War II and the Manhattan Project**

Early in 1942, officials of the Manhattan Project realized they needed a special medical program associated with the secret project to build an atomic bomb. Work was underway to construct mammoth industrial facilities to produce plutonium and uranium-235, key bomb materials.

These materials existed in minute quantities to that point, but successful operation of the new plants would result in massive production. Many scientists and thousands of workers would be exposed to exotic new materials, some of which were extremely toxic. The health effects from such exposures were unknown. There were many reasons to worry about possible adverse health effects. There were humanitarian concerns for personnel safety, but two other issues also loomed large:

- If knowledgeable personnel were disabled or killed from exposures, keeping the project secret would be impossible, as would maintaining the bomb schedule.
- If excessive radioactivity spread from production facilities, it might be detected through adverse health effects. This detection, likewise, threatened to compromise secrecy.

To avert these risks, the MED in 1943 asked Stafford Warren, professor of radiology at the University of Rochester School of Medicine and Dentistry, to serve as Chief of the Manhattan Project Medical Section. Along with industrial safety and medical care, the

Medical Section was responsible for funding and coordinating university biomedical research programs. Most of these research programs were carried out in a select group of universities--particularly Berkeley, Rochester, and Chicago--that had been active before the war in radiation research.

Until the war, biomedical researchers at these universities had used radiation as a tool to study biological systems and disease. The Manhattan Project shifted this research to study the metabolism and health effects of radiation itself. For example, experiments at Rochester included studies of chronic low levels of radiation and development of improved detection instruments. At the Chicago Met Lab, a group headed by Robert Stone worked to define the mechanisms of radiation injury from internal and external exposure in the hope of detecting early damage and providing remedial treatment. The Berkeley group studied the effects of internal depositions of fission products and came to focus on the actinides, especially plutonium.

***Early in 1942, officials of the Manhattan Project realized they needed a special medical program associated with the secret project to build an atomic bomb.***

Inhalation, ingestion, and injection of radioactive materials were studied at all three universities under Manhattan Project contracts. Most of these studies involved animals, and their chief purpose was to determine where in the body these materials collected and at what rate the materials were excreted. This information was needed to judge the radiation dose from the material and the estimate corresponding hazard.

While the animal studies provided important data, MED researchers wanted precise human data to establish firm radiation exposure guidelines. As a result, human studies were authorized. Some researchers used themselves as subjects: six researchers at the Met Lab drank solutions of plutonium to study excretion rates. Other studies used hospital patients, and included injections of radioactive polonium and uranium in patients at Rochester's Strong Memorial Hospital. Plutonium was also injected into subjects in the Oak Ridge hospital, the University of Chicago Billings Hospital, the University of California Medical School, and Strong Memorial Hospital.

***The Manhattan Project shifted the focus of biomedical research to study the metabolism and health effects of radiation itself.***

Data from these human experiments and related research were used to set worker exposure standards. These standards, in turn, were used to analyze the various industrial processes to set needs for shielding, ventilation, and other worker-safety measures. The

principle behind these practices was to control exposures from external radiation, and from internal radioactive emitters entering the body from inhalation, ingestion, or wounds. Initially, these standards were implemented from headquarters in Oak Ridge or from the university research programs that developed them. But as the production facilities grew more familiar with the standards, responsibility for managing them became more localized. Inspection teams still visited the plants periodically, but the expectation was that each facility would operate health and safety programs based on established standards.

### **Postwar Research**

After the war, there was a great deal of interest in conducting further biomedical research with radiation. This interest correlated with a vastly enhanced knowledge of radioactive materials and the recently developed ability to produce large volumes of radioisotopes in nuclear reactors.

Scientists who had used radiation for metabolic studies or for medical diagnosis and treatment before the war now envisioned broad new avenues of radiation research. The U.S. Government shared this view, as did the public. Impressed with the remarkable success of the Manhattan Project and awed by the power of the atomic bomb, the nation was receptive to using radioactivity to solve problems. There was also a new willingness for Government to fund and support research. As a result, the Manhattan Project and later the AEC moved aggressively into civilian biomedical research while continuing defense-related applications.

Researchers used isotopes in many areas, including industrial, agricultural, and chemical research. By far the largest area of use was biomedical research. Isotopes were ideal tools for learning about basic functions, particularly the normal chemical activities--metabolism--of biological systems. Researchers wanted to know more about metabolism to understand the many complex mechanisms involved. This understanding would be of particular value for epidemiologists, immunologists, and others interested in learning about why and how disease interferes with the system.

***Scientists who had used radiation for metabolic studies or for medical diagnosis and treatment before the war now envisioned broad new avenues of radiation research.***

A disease of major interest to biomedical research was cancer. Cancer was a focal point because it was widespread and because radiation had shown early promise as a possible treatment and diagnostic tool. Some cancer tumors could be destroyed or greatly reduced by radiation; if effective doses could be delivered to a cancerous spot, patients could be helped. Iodine-131, for example,

was an effective treatment for some thyroid cancers because the isotope had a great affinity for locating in the thyroid gland. Isotopes were also useful in diagnosing system abnormalities associated with cancer.

Along with a rise in scientific interest in using radiation to battle cancer, there was also some related political interest during the postwar years. In 1948, for example, Congress earmarked \$5 million for AEC-sponsored cancer research. As a result, the AEC could provide research grants to various universities and was also able to establish its own cancer research hospitals at the University of Chicago, Oak Ridge Institute of Nuclear Studies, and Brookhaven National Laboratory.

***The years immediately after the war were characterized by optimism that radionuclides could combat diseases, particularly cancer.***

These special hospitals admitted patients through physician referrals. Most of these people had illnesses that had resisted conventional treatment, and the avowed concept was to use experimental treatments to help the patient and to gather information that might help other patients. Since knowledge about effective treatment doses from and specific physical reactions to isotopes was still limited, much experimental work went into developing methodologies and techniques. Many internal and external radiation applications were tested until the AEC closed the hospitals in 1974. This work laid the foundations for modern nuclear medicine.

J. Newell Stannard, in *Radiation and Health: A History*, describes two distinct periods in the history of nuclear medicine. He cites an "era of therapeutic intent" occurring from about 1948 to 1965. This was replaced by an "era of ever more scanning and ever shorter half-life radionuclides," which continues today. As noted above, the years immediately after the war were characterized by optimism that radionuclides could combat diseases, particularly cancer. The AEC, through its support for cancer research and its isotopes distribution program, played a critical role during this period. This role grew even larger with the initiation of the U.S. 'Atoms for Peace' program during the mid-1950s.

Atoms for Peace aimed to promote a wide range of nonmilitary nuclear applications, including civilian power generation; mining and excavating; and agricultural production. Interest in medical uses for radiation, already booming, grew still larger. Ambitious studies were underway using radioiodine and astatine for thyroid problems, gallium for bone tumors, and radioactively labeled antibodies for various tumors. Boron neutron capture therapy, a process involving localization of boron in brain tumors and

irradiation with reactor neutrons, was tried on more than 40 patients.

Many of these applications ultimately proved disappointing, and by the mid-1960s medical use of radionuclides was shifting away from therapy and toward diagnosis. Stannard notes that unlike the earlier era, AEC and Government laboratories have played a limited role in these later nuclear medicine applications. This is chiefly attributable to the proven success of modern nuclear medicine and its ability to support itself through patient medical fees. Much of this success came through first radioiodine, and later technetium, for diagnostic scanning of various organs and tissues.

### **Isotope Distribution Program**

A major reason for the postwar boom in isotope use was the establishment of an isotopes distribution program. In 1946, Paul Aebersold, formerly a scientist at the Berkeley Radiation Laboratory and at Los Alamos, came to Oak Ridge to establish an Isotopes Branch. Official announcement of the isotope distribution program was made in a June 1946 issue of *Science*; 100 available isotopes were listed. The Isotopes Branch received many applications. The first isotope recipient was the Bernard Free Skin and Cancer Hospital in St. Louis, which had requested carbon-14 for cancer research. Over the rest of the year, the branch received several hundred requests. Many of these initial applications were delayed, however, because the requesting facilities lacked personnel with radiation training.

Officials were not surprised by the need for radiation training. While Manhattan Project staff had received extensive instruction, no similar teaching was available elsewhere. Eager to train practitioners in the use of radiation, the Manhattan Project established the Oak Ridge Institute of Nuclear Science (ORINS) in 1946. Initially, the facility focused on establishing resident fellowship programs for work at the Oak Ridge Laboratory. In 1948, ORINS began a nonresident isotope training program. Many physicians and scientists eager to use isotopes attended these courses. The training consisted of lectures and laboratory work focusing on various aspects of physics, instrumentation, tracer applications, and experimental procedures. These and related offerings have proved of enduring popularity.

Initial development and oversight of the isotope distribution program fell to an Interim Advisory Committee on Isotope Distribution Policy. This committee worked with the Clinton Laboratories (predecessor to the Oak Ridge National Laboratory) to set up production and distribution schedules. The committee also recommended that the MED take four steps:

1. Appoint a Subcommittee on Allocation and Distribution of Isotopes to judge the merits of each request,
2. Appoint a Subcommittee on Human Applications to review requests for use of isotopes on humans,
3. Make isotopes available only through qualified institutions, and
4. Establish priorities for allocation, to be based on perceived value for publishable research and human therapeutic uses.

These recommendations were accepted by the Manhattan Project and its successor, the AEC. Meeting later in 1946, the Subcommittee on Human Applications affirmed that its primary responsibility would be to review and approve isotope requests involving human research. The group also decreed that it would steer production efforts to emphasize isotopes needed for human therapeutic and diagnostic applications, with an emphasis on cancer. In addition, the subcommittee endorsed the following policies:

- Create an official list of medical schools, hospitals, and clinics prepared to receive isotopes.
- Appoint a local committee at each listed facility to review all isotopes requests.
- Direct requests to the Isotopes Division from these local committees for all proposed human uses.
- Appoint knowledgeable physicians and radiologists to the local committees.

The AEC issued policies for the use of isotopes in human studies. A primary control involved the requirement that each requesting institution set up a local isotope committee to evaluate all proposals for use of isotopes on humans. These committees were to include physicians trained in internal medicine and hematology, and someone experienced in protecting personnel against ionizing radiation. Qualified physicists and therapeutic radiologists were to be members of such committees or available in a consulting capacity. Only after approval by its local committee could a requesting organization apply to the Isotopes Division for an allocation.

In completing Form AECB313, "Application for Radioisotope Procurement," applicants had to provide the name of the institution and the name of the individual who would use or directly supervise the material. Details regarding the proposed use were also required, including:

- approval of the local isotopes committee,
- the types of cases for which materials would be administered,
- the number of patients receiving materials,
- the frequency of treatment per patient,

- the nature of samples to be taken for measurement, and
- radiation instruments and health protection facilities.

***The AEC required that each institution requesting isotopes have a local isotope committee to evaluate all proposals for use of isotopes on humans.***

Under the original policy, the Isotopes Division would submit all applications involving the use of humans to the Subcommittee on Human Applications for review. But in 1948, the AEC Advisory Committee on Biology and Medicine concluded that the subcommittee would only review applications for the first human use of a particular isotope. If the first use was approved, future uses of the isotope would not require subcommittee review.

How much success the AEC had in implementing and enforcing policies for application of isotopes to humans is unclear. Records indicate that some local isotope committees functioned according to AEC guidelines. In addition, the Isotopes Division produced detailed published accounts of its operations regarding isotope authorizations and their intended purpose, including human use. (For an example, see *Isotopes: An Eight Year Summary of Distribution and Utilization*, U.S. AEC, 1955.) The agency also placed a heavy emphasis on training practitioners in isotope use and safety practices.

On the other hand, no files documenting AEC audits of isotope recipients have been found. There is evidence that the AEC had reason to enforce its rules. In a 1949 letter to all agency National Laboratories, Shields Warren, Director of the AEC Division of Biology and Medicine, reminded managers that "the same clearances for the use of isotopes should be obtained from [the Subcommittee on Human Applications] as would be required by the work to be done in an institution not connected with an atomic energy installation."

Aebersold followed up with a memorandum to the AEC New York Operations Office Manager noting that full application, including Subcommittee approval, was needed in all proposed human uses, even in cases where the isotope was made in the laboratory where it was to be used. Noting that "this procedure has not been uniformly followed in the past," he enclosed application forms and instructions.

### **Other Aspects of Biomedical Research**

The major pursuit in radiation biomedical research during and after World War II focused on health effects in the interest of basic science and therapeutic medical applications. The MED and its



successors also had related interests, including radioecology, radiological warfare, civil defense, nuclear fallout, and special technologies such as nuclear-powered aircraft. Occasionally, biomedical topics were studied in conjunction with other activities. For example, the agency studied radioecology--how radiation affects and moves through the environment--with nuclear weapons tests. On other occasions, officials ordered separate studies, such as radiological warfare tests or "Project Sunshine" fallout tissue research.

In some cases, however, the connection between mainstream activities such as cancer research and the various other government re-search interests was less clear. Knowledge gained from therapeutic trials of a radionuclides, for example, might have application to civil defense planning. Similarly, results noted from clinical treatments with external radiation might be useful in designing shielding for a nuclear aircraft engine.

Extensive radiation-related biomedical research occurred from 1946 onward in both public and private organizations. This is reflected partly in isotope distribution statistics. Five years after the start of distribution in 1946, the AEC had issued more than 13,000 procurement authorizations to more than 600 institutions. By the end of 1954, the number of authorizations exceeded 37,000, and the institutions that received them numbered over 2,400. By 1966, the AEC had sent more than 200,000 isotope shipments to a host of national and international entities. The Manhattan Project and its successors played a key role in developing and supporting biomedical research, much as other Government agencies stimulated various other scientific research during the same era.

## **Human Plutonium Injection Experiments**

### **The Manhattan Project and Plutonium Health Hazards**

Discovered in 1941 by Glenn Seaborg and others at Berkeley, plutonium supported nuclear fission, a process that split atoms and released tremendous energy. Plutonium became an urgently needed material for one variety of atomic bomb; uranium-235, the fissionable isotope of natural uranium, was used in the other bomb type.

The first appreciable quantities of plutonium became available by January 1944. At that time, Seaborg warned of its potential health hazards and suggested immediate studies to learn its biological behavior. This was a critical issue: the longer the material stayed in the body, the more damage it could do. Hundreds of workers would soon be exposed to plutonium, and exposure standards were necessary. Overexposure would not only hurt workers; it could

compromise secrecy and disrupt production schedules.

***Sentiment grew among project medical staff to administer known amounts of plutonium to humans to derive precise excretion data.***

About 10 percent of the plutonium supply was allocated for animal studies in January 1944. By the summer of that year, those studies provided enough information about plutonium retention to justify removal of several Los Alamos workers with high previous exposures from further work with the material. Los Alamos had already had several accidental human exposures to plutonium, and the imminent prospect of working with far larger quantities increased the desire for even more metabolic information.

The early animal studies showed that different species excreted known amounts of plutonium at different rates. This meant that there was no accurate way to correlate animal excretion data to humans. As a result, sentiment grew among project medical staff to administer known amounts of plutonium to humans to derive precise excretion data. However, it was not until the winter of 1944 that Los Alamos Health Group personnel developed methods to detect tracer-level concentrations of plutonium in excreta. In February 1945, this group, headed by Louis Hempelmann and supervised by Wright Langham, used the procedure to monitor workers for accidental plutonium uptake.

***The Manhattan Project was asked to consider "that a hospital patient at either Rochester or Chicago be chosen for injection from 1 to 10 micrograms of material [plutonium]."***

With a proven method to detect small amounts of plutonium in excreta, Los Alamos personnel met on March 23, 1945, with Robert Oppenheimer and Colonel Hymer Friedell of the Manhattan Engineer District (MED) to discuss "the medical problems of this project and their relationship to the Medical Research Program of the Manhattan District." In a memorandum written three days after the meeting, Louis Hempelmann stated that the Manhattan Project was asked to consider "that a hospital patient at either Rochester or Chicago be chosen for injection from 1 to 10 micrograms of material [plutonium] and that the excreta be sent to this laboratory for analysis." The Manhattan District was also asked to help make arrangements for this "human tracer experiment." Such arrangements were made, and an MED medical officer administered the first human plutonium injection on April 10, 1945, at the Oak Ridge Hospital.

**The Experiments, Part 1**

How all the injections were coordinated--or even if they were

coordinated--is unclear. Following the Oak Ridge test, injections were given at the Billings Hospital at the University of Chicago on April 26, 1945, and at the University of California Hospital in San Francisco on May 14, 1945. By late June, Manhattan Project contractors at the University of Rochester's Strong Memorial Hospital developed a detailed plan for "rapid (1 year) Completion of Human Tracer Studies." These studies were to include plutonium, uranium, polonium, and radioactive lead.

Over the next several months this plan was revised, and on September 18, 1945, Wright Langham sent the most recent version to Colonel Stafford Warren, Chief of the Manhattan District Medical Section, noting that "you and Col. Friedell, will of course, have final say as to whether or not the experiment goes through in accordance with this plan."

The Rochester plutonium experiment protocol called for 10 subjects to be admitted to the Strong Memorial Hospital metabolism ward in groups of four per month for the first two months and two for the third month. After injection, samples of blood, urine, and feces were to be shipped to Langham at Los Alamos for analysis. Documents show that, from October 1945 to July 1946, Rochester injected 11 patients. One of the later patients (designated as HPB11) died of pneumonia and other preexisting ailments 6 days after his February 20 injection. Samuel Bassett at Rochester described this as an "acute experiment" that did not involve collection of excreta, but that did yield organs and other autopsy material that was sent to Los Alamos for study.

When notified of HPB11, Langham told Bassett, "If you should decide to do another terminal case, I suggest you use 50 micrograms [of plutonium] instead of 5. This would permit the analysis of much smaller samples and make my work considerably easier." Langham also stated, "I have just received word that Chicago is performing two terminal experiments using 95 micrograms each. I feel reasonably certain there would be no harm in using larger amounts of material if you are sure the case is a terminal one."

***Langham told Bassett, "If you should decide to do another terminal case, I suggest you use 50 micrograms [of plutonium] instead of 5. This would permit the analysis of much smaller samples and make my work considerably easier."***

The two Chicago experiments took place at Billings Hospital on December 27, 1945. Both subjects died of preexisting ailments shortly after injections of 94.91 micrograms of plutonium.

Experimental protocols exist for the Rochester studies. Langham and others who directed the research also described in broad terms

how subjects were to be selected. Generally, the choice fell on older individuals (13 of whom were 45 or older) with limited life expectancy. (Ten of the 16 who were tracked died within 10 years.) Four subjects did, however, live more than 20 years after the experiments.

Although several research reports by others appeared earlier, Langham and several colleagues at Los Alamos compiled the most substantial account of the plutonium injection experiments. They based their conclusions chiefly on the Rochester study. Issued as Los Alamos report LAB1151 in September 1950, *Distribution and Excretion of Plutonium Administered Intravenously to Man* described the experiments, tabulated the data on plutonium metabolism, and derived an empirical formula for calculating retained plutonium from urinalysis. Although LAB1151 itself remained restricted until 1980, information about the plutonium studies made its way into the scientific literature shortly after the injections took place.

*Efforts to find and study surviving patients from the experiments of the 1940s ultimately triggered controversy.*

### **The Experiments, Part 2**

During the early 1970s, Patricia W. Durbin, a biophysicist at the Lawrence Radiation Laboratory, reevaluated Langham's plutonium excretion data. One reason Durbin could improve on Langham's results was the unexpected availability of data from long-term survivors. During her research, she learned that one subject had lived for 20 years after being injected. Painstaking detective work revealed that four other subjects were also still alive in the early 1970s. With the AEC's approval, support from the Center for Human Radiobiology at Argonne National Laboratory, and cooperation from the University of Rochester's Strong Memorial Hospital, three of the four survivors were reexamined in 1973. Researchers gathered and promptly published new data on long-term patterns of plutonium retention and excretion.

Efforts to find and study these surviving subjects ultimately triggered controversy. In the time since the work had been done, the Government had adopted requirements mandating that subjects give informed consent as a condition of research. Questions arose whether the plutonium subjects provided consent for the original experiments or for the 1973 follow-up examinations. The ensuing investigation resulted in two internal AEC reports issued in August 1974. Both concluded that only one subject may have provided any kind of consent. The other 17 participated with little verifiable knowledge of the experiment or its risks. Moreover, the reports found that the 1973 follow-up studies were also not done with informed consent from the subjects. The three subjects were not

told they had been injected with plutonium for experimental purposes, nor why they had been asked to return to the hospital.

Although the AEC did not publicly release these reports, the agency's successor, the Energy Research and Development Administration, issued a fact sheet on the matter in 1976. This issuance provided details on the experiments and briefly discussed results from the 1974 AEC inquiry on informed consent.

### **The Plutonium Experiments and the Public**

Publications based on the plutonium studies began to appear in the medical literature as early as 1948. In several articles during the 1950s and early 1960s, Langham explained the technique for measuring excreted plutonium and referred to the validating research on plutonium metabolism in humans. Some information, however, remained classified for a number of years afterward.

*What the scientific literature and other information about the experiments did not provide was the names of the subjects or their personal stories.*

The public first learned about experiments in 1976, after ERDA issued the fact sheet noted above. Several newspapers carried stories emphasizing the absence of informed consent and raising questions about medical ethics, but the issue seemed to arouse little public concern. Ten years later, a congressional committee issued a report that criticized the plutonium injections and about 30 other Federal human radiation experiments. Commonly known as the Markey report after subcommittee chairman Edward J. Markey (D-Mass.), this document again stimulated only limited media attention at the time.

What the scientific literature and other information about the experiments did not provide was the names of the subjects or their personal stories. This approach was pursued by Eileen Welsome of the *Albuquerque Tribune*, who in November 1993, published a series on the experiments and its subjects. The author had hunted through government reports, scientific journals, and newspaper files to piece together facts about the experiments, including the names and other personal details of several subjects.

At a December 1993 press conference, Secretary of Energy Hazel R. O'Leary discussed the plutonium experiments in conjunction with releasing much formerly classified information on a variety of subjects. As part of a new policy of openness, she also committed the Department to revealing the full scope and details of human radiation experiments done by the agency and its predecessors. The story of the experiments received extensive national attention and

led to public demands that the Federal government make full disclosure on the topics.

One year after the Secretary's commitment, the Department has found, declassified, and made available much documentation relating to the plutonium injections and other human radiation experiments. Now under investigation by the Advisory Committee on Human Radiation Experiments and others, this information will provide the basis for a comprehensive ethical analysis of these studies.

## **Environmental Releases of Radiation**

### **Introduction**

Generally speaking, these releases do not fit the definition of human experimentation, in that they were not undertaken with the intent of testing the effects of radiation in humans or designed to measure human exposure.

The scope of Doe's document search has encompassed numerous environmental radiation releases. In looking for pertinent records, it has become apparent that such releases were typically conducted as site projects, meaning that pertinent records often still reside at the sites. Record series for releases are therefore found under the section dealing with the site where they were conducted. For example, the Green Run series are described in the Hanford section. This narrative outlines the history of the pertinent DOE and predecessor agency environmental radiation releases, including radiological warfare activities.

*Some of these events fit the definition of a human radiation experiment, while others do not. Some are ambiguous.*

In November 1993, the U.S. General Accounting Office (GAO) released a Fact Sheet entitled "Examples of Post World War II Radiation Releases at U.S. Nuclear Sites." The report focused on three occurrences:

- the 1949 Green Run test at Hanford,
- radiation warfare tests at Oak Ridge and the Dugway Proving Grounds from 1948 to 1952, and
- the 1950 atmospheric radiation-tracking tests at Los Alamos.

Section 2(b) of the January 15, 1994, Executive Order establishing the Advisory Committee on Human Radiation Experiments directed the committee to evaluate the radiation releases outlined in the GAO Fact Sheet, and A[a]ny other similar experiment that may later be identified."

A subsequent memorandum from the Secretary of the Cabinet directed several agencies, including DOE, to find and inventory records related to human radiation experiments, including those related to intentional environmental releases, defined in Paragraph 2(a)(1) as

[e]xperiments involving intentional environmental releases of radiation that (A) were designed to test human health effects of ionizing radiation; or (B) were designed to test the extent of human exposure to ionizing radiation.

The environmental releases described below are grouped into two main categories:

- *Releases associated with military purposes*--this category includes radiological warfare, nuclear-powered aircraft, the Green Run, and the Los Alamos Bayo Canyon tests.
- *Nonmilitary programs*, including various reactor-related tests.

Many of these releases are now under study by entities other than DOE to arrive at independent conclusions regarding potential health effects.

Some of these events fit the definition of a human radiation experiment, while others do not. Some are ambiguous. Yet rather than choose among these releases, DOE has taken an inclusive approach. The releases described below, therefore, include events where individuals were purposefully exposed to radiation, events where such exposures were inadvertent or incidental, and events with no known human exposures. Please note, however, that this listing is by no means a full accounting of all agency environmental radiation releases.

### **Radiation Releases for Military Purposes**

The first National nuclear undertaking-- development of the atomic bomb--focused exclusively on military objectives. The Atomic Energy Act of 1946 called for the development of an atomic energy program "subject at all times to the paramount objective of assuring the common defense and security." Through the mid-1950s, AEC activities continued to focus on atomic energy for weapons development and for other military purposes. Early AEC intentional releases of radioactivity included testing for radiological warfare and for other purposes; all but a handful of these tests were originally secret. Known intentional releases for military purposes are described below.

***Radiological warfare: An overview***--The Manhattan Project and its

successors investigated various aspects of radiological warfare, which would use radioactive sources to contaminate a targeted area. Nuclear explosions would not be involved. Rather, radioactive material would be placed in a casing for battlefield dispersal. Among the purposes envisioned for these weapons were to injure enemy soldiers, block troop advances, and contaminate enemy cities. Radiological warfare weapons also were conceived as a tool to instill fear in adversaries and to serve as a deterrent to their use against America.

Ideas about radiological warfare surfaced even before the U.S. began its atomic bomb program. Key atomic scientists Ernest O. Lawrence and Arthur Holly Compton proposed a top priority program to develop radioactive weapons in 1941. An atomic bomb program was actually given a lower priority at that point, in part because it was far more complex than producing fission products for use on a battlefield or an enemy city. While most attention soon shifted to the bomb program, anxieties persisted that Germany might develop radiological weapons for use against American or English cities. The Manhattan Project even sent radiation detection instruments to Washington, New York, Chicago, and other cities to prepare for such an attack.

Serious consideration was given to radiological warfare after the war. There was concern that a foreign power, frustrated in its attempt to develop an atomic bomb, might instead turn to radiological warfare. In 1947, the Armed Forces Special Weapons Project of the Department of Defense (DOD) asked the AEC to form a committee to study the subject. A year later, following the recommendations of its General Advisory Committee and the Advisory Committee on Biology and Medicine, the AEC committed to further investigations. Areas of study included laboratory research on radiological agents, field toxicology studies on animals and vegetation, and methods of producing and dispersing radiological agents.

In 1948, AEC and DOD formed a special panel to study defensive and offensive radiological warfare. This panel became known by the name of its chairman, W.A. Noyes, Jr. Defensive aspects included assessment of potential radiological agents, including delivery systems and biological effects. Methods of medical treatment and public education were also considered. Offensive aspects focused on the potential use of radioisotopes to deny an enemy the use of an area for a period of time. The Noyes panel was set up to help define the AEC radiological warfare program, particularly the production of radioactive sources and the study of biomedical effects. Within the military, the Army Chemical Corps assumed responsibility for dissemination methods and protection measures, including design, selection, and testing of tactical weapons.



***Anxieties persisted that Germany might develop radiological weapons for use against American or English cities.***

Also in 1948, a study panel chaired by Franklin McLean of the University of Chicago was established. This panel differed from the Noyes group in that it focused solely on biological and medical aspects of radiological warfare. The Chicago Toxicity Laboratory, an Army Chemical Corps contractor, helped in reviewing literature and in suggesting the necessary experimental work. Using animals, the laboratory studied the toxicity of radioactive zirconium, tantalum, columbium, and lanthanum following inhalation, bloodstream absorption, and ingestion. Plans were made to coordinate this research with work at other AEC facilities, such as the research in diagnosis and treatment of radiation sickness and deposition of radioactive materials in tissue.

The Noyes panel functioned until November 1950, when it voted to disband. The committee recommended a low priority for radiological warfare, citing the need for bomb production and the limited success in producing waste fission products in amounts that could be useful for radiological warfare. The panel saw some limited cases where radiological warfare offered potential advantages over the atomic bomb, such as for use against targets where it might be desired to preclude human presence for some time while avoiding permanent destruction. The panel also recommended consolidation of radiological warfare and atomic bomb civil defense programs. AEC continued some research and production of potential radiological agents until all such work was ended in 1954. Army Chemical Corps radiological research and development ended in 1953.

***Oak Ridge radiological warfare releases***--In 1948, Oak Ridge National Laboratory (ORNL) conducted three field experiments to support the Noyes panel. ORNL was responsible for testing radioactive lanthanum (RaLa) and radioactive tantalum, and also for working with Hanford to develop potential agents such as tantalum, zirconium, and columbium. For the RaLa tests, a strip was cleared in a field near the XB10 reactor area. Sources were placed and measurements taken at varying distances. The first test used three sources of approximately 1280, 100, and 20 curies each. The second test used only the 1280 curie source. Upon completion of the tests, the sources were removed.

A test involving radioactive tantalum was conducted shortly afterward. The experiment was conducted in a rectangular plot near the KB25 gaseous diffusion plant and involved over 250 tantalum wires placed in a grid pattern. ORNL took measurements of radiation intensities at various points and removed the wires. None of these tests were designed to yield biomedical information.

***Radiological warfare releases at Dugway Proving Ground--***The AEC worked with the Army Chemical Corps and the Air Force to develop munitions for radioactive warfare products. Munitions field testing took place at the Dugway Proving Ground in Utah, which was established by the Army in 1942 for biological and chemical warfare tests. Between 1949 and 1952, there were at least 14 radiological tests at Dugway. Dispersal tests measured the rate and extent of the spread of radioactive material following a release. Contamination tests focused on the effect of radioactivity on land and structures. Decontamination tests evaluated the effectiveness of cleansing methods. Documentation uncovered in DOE's search does not show a biomedical research component of AEC participation in these tests.

The tests usually involved an air release of radioactive material followed by analysis of the test area. Data from measuring devices placed at various heights and distances were collected to evaluate weapons strategy and tactics. Precautions were taken against off-site contamination, including scheduling tests when wind conditions were most favorable.

***The documents found by DOE do not show that human experimentation was involved in the Dugway tests.***

The Dugway test series began late in 1949. The purpose of the first tests was to study ballistic dispersal from an air-dropped device. Particles of tantalum-132 were prepared for the tests by Oak Ridge National Laboratory and loaded into cluster devices. The Air Force dropped the devices, which dispersed material within a square mile. Additional testing continued from 1950 through 1952 to evaluate explosives used to disperse radioactive agents, primarily tantalum. Decontamination studies were also conducted. AEC's primary responsibilities for these tests continued to be the provision of nuclear materials. By late 1950, tantalum was scarce and was replaced by zirconium-niobium as the primary radiological testing agent. The documents found by DOE do not show that human experimentation was involved in the Dugway tests. The only known evidence of human exposure reviewed involves a crane operator accidentally exposed during a tantalum test.

***The Green Run--***The Air Force and the AEC conducted a test at Hanford in December 1949 to test a methodology for monitoring the emerging Soviet nuclear program. Known as the Green Run, the test aimed to learn if nuclear materials could be detected at long distances from their source. There was a strong desire to answer this question because the Soviets had tested their first atomic bomb in August 1949 and the government wished to gather data about Soviet capabilities.

The term "Green Run" refers to the use of "green" irradiated reactor

fuel cooled (allowed to become less radioactive through atomic decay) for only sixteen days--instead of the usual ninety to one hundred days--before processing. The fuel was dissolved in nitric acid and the solution processed to separate plutonium. Dissolution of this "green" fuel resulted in the discharge of much larger quantities of radioactive iodine and xenon than would result from the processing of a like amount of older fuel. The plant's off-gas scrubbers, which in normal operations substantially reduced the release of radioactive iodine from the stacks, were intentionally shut down.

The official test account issued in May 1950 reports that about 7,800 curies of iodine and 20,000 curies of xenon were released into the atmosphere in Southeast Washington and Oregon. This iodine release was almost twice the pre-test projection. Weather conditions at the time of the test were unfavorable, and radioactive gases were dispersed over populated areas. Radioactive iodine was detected on the ground, vegetation, and water. Although the amount of the release was not deemed unsafe at the time, the Health Instruments Division stated in a 1950 report that "the resultant activity came close enough to significant levels, and its distribution differed enough from simple meteorological predictions that [we] would resist a proposed repetition of the test." Radioactivity released during the Green Run was, however, dwarfed by the amount of radioactive materials released during routine production activities at Hanford in the 1944B1948 period, before the installation of emission reduction equipment.

***Weather conditions at the time of the Green Run test were unfavorable, and radioactive gases were dispersed over populated areas.***

DOE has declassified all technical data associated with the test and DOD conducted a declassification review in 1994 that released additional information. Only a few details remain classified by DOD. The December 1993 GAO Fact Sheet noted that GAO had reviewed the classified material and believed that it contained no documentation showing that "the test was intended to be a radiation warfare experiment or a field test of radiobiological effects on humans." Both OHRE and the Advisory Committee on Human Radiation Experiments staff with security clearances have also reviewed the classified material. The test did result in the exposure of populated areas near the site. These exposures, and exposures resulting from other Hanford emissions, have been estimated through work of the Hanford Environmental Dose Reconstruction Project, a multi-year undertaking managed by the U.S. Centers for Disease Control and Prevention.

***Los Alamos Bayo Canyon RaLa tests***--From 1944 to 1962, Los Alamos conducted 254 open-air implosion physics tests in Bayo

Canyon. The purpose of the program was to test weapons designs using conventional high explosives and radioactive lanthanum (RaLa), a short-lived but intense radioactive source. Tests were performed specifically to diagnose material motion and compression through high-speed x-ray photographs of the earliest moments of the implosion. The sources involved contained from around a hundred to several thousand curies of lanthanum-140; some strontium-90 impurities were also present.

Design details of the RaLa test device and the implosion process remain classified because the information is judged to be of potential use to a nuclear proliferator. Data on how much RaLa was used in each test is, however, unclassified and has been made public. While the highest concentration of radioactivity after a test was around the site of detonation, offsite contamination was periodically detected. Los Alamos National Laboratory has an effort underway to estimate the offsite doses resulting from the Bayo Canyon tests.

***Los Alamos Atmospheric Tracking Tests***--The 1993 GAO report listed four tracking tests conducted at Los Alamos in 1950. The report stated that the tests were conducted by Los Alamos and the U.S. Air Force to track radioactive clouds using an experimental aircraft instrument. Two of these tests were conducted during RaLa implosion tests. The Air Force Cambridge Research Laboratories used an aircraft to evaluate an experimental instrument for measuring atmospheric electrical conductivity in an attempt to measure airborne radioactivity. These tests took place during March and April of 1950. A third detection study was scheduled during a RaLa test, but was canceled when the test cloud drifted over restricted airspace.

The fourth event, conducted by the Air Force in July 1950, also focused on measuring atmospheric electrical conductivity. This test used a lanthanum-140 source to test air conductivity in a static known radiation field. The test involved no explosives or release of radioactive material. At the completion of the experiment the source was removed.

***The Aircraft Nuclear Propulsion Program (ANP)***--General Electric ran the aircraft nuclear propulsion program (ANP) for the U.S. Air Force. Its goal was to design a nuclear reactor suitable for use in aircraft. The program was a follow-on to the unsuccessful Nuclear Engine for the Propulsion of Aircraft (NEPA) program of the late 1940s and early 1950s. Safety concerns and engineering problems led to the cancellation of this program as well in the early 1960s.

Three major test series at the AEC National Reactor Testing Station in Idaho were conducted for the ANP program. The first were the Initial Engine Tests (IET), designed to test reactor assemblies. At

least 26 of these tests were conducted from 1955 to 1961, most of which involved some release of radioactivity into the environment. There were, however, no known biomedical aspects of these tests. The most significant releases took place during Initial Engine Test #3. During this test, damage to the fuel elements resulted in the release of about 300 curies of iodine-131.

***General Electric ran the aircraft nuclear propulsion program (ANP) for the U.S. Air Force.***

The second series was the Fuel Element Burn Tests A and B, conducted in March 1957. Nuclear fuel assemblies were heated to determine fission product release in the case of aircraft crash and resulting fire. The tests were not classified and may have resulted in some off site exposures. The third test series, the Fission Product Field Release Tests (FPFRT), took place from July through September 1958. Nine tests were undertaken to measure fission product release, diffusion of radioactivity in the air, deposition of radioactivity on vegetation and the ground, and uptake by animals and plants, including possible biological effects. All of the experiments were done with extensive field monitoring to verify predicted test behavior. The tests included a biological component run by the University of Rochester, which used dogs, rabbits and rats. No intentional exposure of human subjects to radiation is suggested in the documents reviewed.

Additional fission product field release tests took place at the Dugway Proving Grounds in Utah. The tests were conducted in essentially the same manner as those done in Idaho and involved some intentional environmental release of radiation. These tests are separate from the radiological warfare experiments described above that took place at Dugway in the early 1950s.

**Radiation Releases for Nonmilitary Purposes**

In 1954, the Atomic Energy Act was amended and the AEC given authority to declassify certain areas of nuclear technology to promote commercial nuclear power and international peaceful atomic energy activities. Concurrent with the development of these applications, public concern about the hazards of fallout from atmospheric nuclear weapons testing was increasing. The releases discussed below are closely tied to these concerns and include analysis of fallout effects, reactor safety testing, nuclear rocket and aircraft tests, and plant safety testing. With one exception, these experiments were not classified.

***In 1962 and 1963, Hanford intentionally released small amounts iodine-131 to study the dispersion of radioactive iodine into the air and soil.***

***Hanford: 1962 and 1963 releases***--In 1962 and 1963, Hanford intentionally released small amounts of iodine-131 to study the dispersion of radioactive iodine into the air and soil. These tests were related to AEC biomedical studies of fallout. The 1962 release involved 8.3 curies of iodine-131 emitted from the Hanford Redox Plant, a plutonium processing facility. During the emission, the plume trajectories were plotted from meteorological data and samples were collected across the predicted plume trajectories at several altitudes and at distances up to 50 miles from the plant.

Following the emission, sets of vegetation and milk samples were collected. Designed to study the spread and behavior of iodine-131 released to the atmosphere, the 1963 test provided data to estimate the hazards potentially associated with weapons testing or nuclear accidents. The test released 120 millicuries of iodine-131. Two human volunteers, Hanford employees, stood in the path of the release to obtain data on inhalation uptake. Air, soil and plant data were collected and dogs were also used to measure inhalation.

***The Controlled Environmental Release Tests involved intentional releases to measure released radionuclides in the air, vegetation, cows, and milk.***

***Idaho National Engineering Laboratory (INEL): Controlled Environmental Radioiodine Tests (CERT)***--The CERT activities involved intentional releases of radioiodine to the environment and were intended to evaluate the health hazards of reactor accidents. Twenty-four tests undertaken from 1963 to 1968 were designed to develop models for predicting movement of radioiodine through the air-vegetation-cow-milk-human food chain. CERT tests 1, 2, 7, 10, and 11 involved human volunteers breathing air or drinking milk containing small amounts of radioiodine. In the first test, seven people had their thyroids measured after drinking milk from cows that had grazed in a pasture with radioiodine deposits. In the remaining four tests, individuals were exposed during radioiodine release over the pasture and their inhalation uptake was measured. The experimental design for the other CERT tests apparently did not involve exposure of human subjects.

***INEL: Controlled Environmental Release Tests (CERT)***--This test series, also known as CERT, involved intentional releases with isotopes other than radioiodine and, like those described above, were designed to measure released radionuclides in the air, vegetation, cows, and milk. The radionuclides released in this series, running from 1968 through 1977, included sulphur-35, chromium-51, potassium-42, cesium-134, and cerium-141. The experimental design involved no intentional exposure of humans radiation.

***INEL: Special Power Excursion Reactor Tests (SPERT)***"When

the AEC began to promote commercial nuclear power during the mid-1950s, it initiated reactor safety research programs at INEL. Initial concerns focused on the hazards of a nuclear excursion, or runaway chain reaction. The Special Power Excursion Reactor Tests (SPERT) at Idaho included destructive tests in which reactor cores were intentionally damaged by nuclear excursions. These tests resulted in limited releases of radioactive materials into the environment. The SPERT-I testing program consisted of three series of tests done in 1962 through 1964 to evaluate the factors involved in two actual test reactor accidents. Exposure to humans was not planned and no exposure is suggested in documents collected.

***INEL: Loss of Fluid Test (LOFT)***--The LOFT series involved eight power reactor safety-related tests conducted under the direction of the Organization for Economic Cooperation and Development, an international group. The final testing simulated a small-break, loss-of-coolant accident in a commercial reactor similar to the 1979 Three Mile Island accident. The test resulted in fuel meltdown and release of fission products to the primary coolant system. Following the test, leakage from the fission product monitoring system and the primary coolant system allowed some fission products into the reactor building and subsequently was released through a monitored pathway to environment.

***The Loss of Fluid Test resulted in fuel meltdown and release of fission products to the primary coolant system.***

***INEL: Systems for Nuclear Auxiliary Power (SNAP) program***--The SNAP program was designed to develop small, lightweight nuclear power sources for satellites, spacecraft, Antarctic weather stations, and navigation buoys. The SNAP 10A transient (SNAPTRAN) Test series was conducted to evaluate radiation safety problems of small space reactors. A test version of the reactor was destroyed during SNAPTRANB3 in 1964 to determine the radiological consequences of immersion of a SNAP reactor in water or wet earth. The test was conducted with extensive radiological and meteorological support, surveillance and controls; small amounts of radioactive material were released. SNAPTRANB2, conducted in 1966, provided data on the dynamic response, fuel behavior, and inherent shutdown mechanisms of the reactors in the open air. The experiment did not involve intentional exposure of people to radiation.

***INEL: Diffusion tests with the National Oceanic and Atmospheric Administration (NOAA)***CNOAA conducted a meteorological research program with the AEC to improve the characterization of the transport and diffusion of pollutants in the atmosphere. These studies focused on determining the differences in urban and rural diffusion patterns. NOAA conducted four

Relative Diffusion Tests (RDT) from 1967 through 1969 using small amounts of radioactive tracers.

The Long Distance Diffusion Tests (LDDT) were jointly conducted by the National Oceanic and Atmospheric Administration and the AEC Health Services Laboratory. Taking place in 1971 and 1972, these tests involved measurements of controlled releases. Known quantities of radioactive and non-radioactive tracers were released from the INEL Chemical Processing Plant under monitored meteorological conditions. Air concentrations were measured at distances up to 80 kilometers from the release point.

***INEL: Other tests***--The Organic Moderated Solvent Burning Experiment (OMRE) tested the feasibility of open-air incineration of contaminated solvents. Conducted in 1960, the test burned about 400 gallons of diesel oil, xylene, methylchlor, and water. Small amounts of radiation were released. The Experimental Cloud Exposure Study (EXCES) was conducted from 1968 to 1970 and involved release of xenon-133 and sodium-24 with the subsequent measurement of exposure rates at several downwind distances.

***Nevada Test Site: Kiwi tests***--Kiwi was the name given to the reactors designed and tested by Los Alamos for the space program known as Rover. Rover began in 1955, and reactor testing took place at the Nevada Test Site between 1959 and 1966. The Kiwi tests included plume sampling done by the Air Force to measure radioactive reactor effluent. During a Kiwi test, aircraft crews participated in tests to measure thermal neutrons. Prior to the test, some crew members swallowed gamma measuring film capsules. During the test, crews wore different types of gamma film badges and flew in planes equipped with various measuring devices. After the test, the measuring films were analyzed and some crew were given whole body counts.

***The Kiwi Transient Nuclear Test simulated a worst case accident occurring during the launch of a nuclear-powered spacecraft.***

The Kiwi Transient Nuclear Test (TNT), conducted in 1965, simulated a worst case accident occurring during the launch of a nuclear-powered spacecraft. The test involved a controlled nuclear excursion resulting in partial vaporization of the reactor core. This created a radioactive plume that, while low in radioactivity, was detectable far off-site. Los Alamos collected environmental data from the test point to approximately 50 miles downwind. The U.S. Public Health Service monitored the cloud to beyond 200 miles downwind, which extended to Los Angeles and the Pacific Ocean.

***Paducah, KY, Gaseous Diffusion Plant: uranium hexafluoride tests***--Four deliberate releases of uranium hexafluoride (UF<sub>6</sub>) were made to the atmosphere at the Paducah Gaseous Diffusion Plant.



Two occurred in 1955; the other two took place in 1974. The tests were conducted to study the airborne behavior of UF<sub>6</sub>. There is no record of human experimentation associated with these tests.

***Oak Ridge KB25 Plant: UF<sub>6</sub> outleakage tests***--During 1976, fifty-seven tests were conducted at the Oak Ridge KB25 plant, resulting in the release of uranium hexafluoride into the environment. The purpose was to evaluate the plant detectors in conjunction with a plant operation upgrade. The releases were considered small in comparison to routine production releases at the facility.

***Oak Ridge environmental research areas***--The Oak Ridge Health Physics Division established various environmental research areas to evaluate the behavior of radionuclides in the environment. These areas functioned in conjunction with a radioecology program begun in 1954. Laboratory and field studies used 18 different radionuclides to study the uptake, accumulation, and movement of isotopes in terrestrial and aquatic food chains; rates of translocation in plants; consumption of food and turnover of isotopes by terrestrial and aquatic insects and other invertebrates, fish and mammals; and reentry of isotopes into the soil through fungi, bacteria, and soil animals.

Thirty-eight different environmental research areas have been identified at Oak Ridge. Various types of trees were inoculated and sprayed with cesium isotopes to simulate fallout, and the material tracked through the leaves and roots to the soil and to foliage-feeding insects. Radiocesium was also applied to grass and agricultural plants, such as soybeans, sorghum, and peanuts for transport evaluation. Rodents and arthropods were also studied in this manner.

In addition, a field study of stream flow generation using natural and injected tracers was conducted with the Massachusetts Institute of Technology. The study focused on two forested watersheds, the Bickford Watershed in central Massachusetts and the West Fork of the Walker Branch Watershed in eastern Tennessee. A major objective of the study was the development of a methodology to use naturally occurring radon-222 as a tracer. "