

# Ecology, Environment, and 'Big Science': An Annotated Bibliography of Sources on Environmental Research at Argonne National Laboratory, 1955-1985

---

prepared by  
Office of the Director  
Argonne National Laboratory



---

Argonne National Laboratory is managed by  
The University of Chicago for the U. S. Department of Energy

---

**About Argonne National Laboratory**

Argonne is managed by The University of Chicago for the U.S. Department of Energy under contract W-31-109-Eng-38. The Laboratory's main facility is outside Chicago, at 9700 South Cass Avenue, Argonne, Illinois 60439. For information about Argonne and its pioneering science and technology programs, see [www.anl.gov](http://www.anl.gov).

**Availability of This Report**

This report is available, at no cost, at <http://www.osti.gov/bridge>. It is also available on paper to U.S. Department of Energy and its contractors, for a processing fee, from:

U.S. Department of Energy  
Office of Scientific and Technical Information  
P.O. Box 62  
Oak Ridge, TN 37831-0062  
phone (865) 576-8401  
fax (865) 576-5728  
[reports@adonis.osti.gov](mailto:reports@adonis.osti.gov)

**Disclaimer**

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor The University of Chicago, nor any of their employees or officers, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of document authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof, Argonne National Laboratory, or The University of Chicago.

# Ecology, Environment, and 'Big Science': An Annotated Bibliography of Sources on Environmental Research at Argonne National Laboratory, 1955-1985

---

by

Judith Johns Schloegel

Office of the Director, Argonne National Laboratory

Karen A. Rader

Sarah Lawrence College

September 2005



THE UNIVERSITY OF  
**CHICAGO**



Argonne National Laboratory is managed by  
The University of Chicago for the U.S. Department of Energy

## *Table of Contents*

I.	<u>Introduction: Historiographical Overview and Acknowledgements</u> .....	2
II.	<u>Guide to Relevant Archival Collections</u>	
	Overview of ANL Collections .....	11
	<i>Materials at Argonne National Laboratory</i>	
	<u>Division Annual Reports</u> .....	11
	<u>Office of the Director Files</u> .....	19
	<u>Argonne News</u> .....	33
	<u>Argonne Oral Histories</u> .....	35
	Overview of Argonne Universities Association Collections.....	37
	<i>Materials at University of Illinois-Urbana: AUA Archive</i> .....	37
	<i>Materials at University of Texas-Houston: Felix Haas Papers</i> .....	48
	Overview of AEC/DOE Collections.....	50
	<i>Materials at Department of Energy, Office of History and Heritage</i>	
	<i>Resources: AEC Secretariat Records</i> .....	51
III.	<u>Published Works Consulted</u> .....	55
IV.	<u>APPENDICES</u>	
	#1 – Alphabetical List of Key People and Acronyms.....	58
	#2 -- Organization Chart: Argonne National Laboratory Research Divisions Involved in Environmental Research.....	60
	#3 – About the Authors.....	61

## I. Introduction: Historiographic Overview and Acknowledgements

Most broadly conceived, the United States National Laboratories are a system of research facilities controlled by the federal government for the purpose of advancing basic science and aiding in American economic and defensive national interests.<sup>1</sup> Funded by the Department of Energy [DOE], this national research infrastructure has grown substantially over the last five decades to become the most comprehensive of its kind, supporting (according the DOE Office of Science website) “10 world-class laboratories” and “fundamental research programs in basic energy sciences, biological and environmental sciences, and computational science.”<sup>2</sup> The largest amount of contemporary national laboratory money (in 2004, more than forty percent of the total) goes towards the physical sciences. In the U.S., DOE is the principal federal funding agency for work in high-energy physics, as well as nuclear physics and fusion energy sciences.

Perhaps because of this trend, as well as the high profile contribution of DOE facilities such as Oak Ridge and Los Alamos to World War Two’s atomic bomb development, historical investigations of the national labs thus far have drawn primarily on case studies from physics. Although, as Peter Westwick writes, national labs have “exemplified the large-scale, capital-intensive, multidisciplinary approach of what has come to be known as ‘big science,’ and propagated the notion of the fruitfulness of interdisciplinary research,”<sup>3</sup> the existing historiography suggests that this process has been driven primarily by the political, disciplinary, and institutional dynamics

---

<sup>1</sup> For a comprehensive treatment of the national labs, and their ‘systematicity,’ see Westwick, 2003.

<sup>2</sup> Department of Energy Office of Science, 2005.

<sup>3</sup> Westwick, 2003: p. 3.

surrounding the 'big machines' of post-war physical sciences (especially, cyclotrons and accelerators).<sup>4</sup>

Beginning in the early 1990s, when then-Secretary of Energy Hazel O'Leary announced an "openness initiative" to promote greater access to nuclear-related information,<sup>5</sup> historians have gathered a much greater range of documentation on DOE-sponsored research. As a result, a more complex picture of institutional growth and disciplinary diversification at the national labs has started to emerge. At the center of this historiographical shift has been work in history of the life sciences. Contemporary biological research at the national labs is well-known: its results have contributed to such major milestones as the decoding of the human genome and the discovery of the genetic blueprint for breast cancer.<sup>6</sup> Such developments appear to fulfill the predictions, made in the 1980s, that "Oppenheimer's statement 'I am become death, Destroyer of Worlds' [would] give way to the National Laboratories are become the ultimate advocate for understanding life."<sup>7</sup> But these institutional configurations and their scientific achievements draw strength and momentum from much deeper historical currents.

"Radiobiology," as a distinct research discipline, dates back to the 1920s, when investigators including Alexander Hollander and H.J. Muller began to explore the effects of phenomena like ultraviolet and X-ray radiation on life. The DOE, through its predecessor agency, the Atomic Energy Commission [AEC], funded experimental life

---

<sup>4</sup> Cf. Forman, 1987 and Kevles, 1990. Catherine Westfall makes the point that this also works in reverse: "the recorded history of large U.S. accelerators . . . is really little more than a history of high-energy physics," in Westfall, 2003b: p. 31.

<sup>5</sup> Weeks, 1998.

<sup>6</sup> Cf. Cook-Deegan, 1994 and Nonet et. al., 2001.

<sup>7</sup> Physician Mark Bitensky to DOE's Charles DeLisi, December 1984, as quoted in Cook-Deegan, 1994: p. 97.

science work on nuclear radiation in university laboratories through the Manhattan Project in the 1940s, and began expanding these commitments in the immediate post-war years.<sup>8</sup> John Beatty and M. Susan Lindee have detailed the government-sponsored work of the Atomic Bomb Casualty Commission, which undertook studies of the long-term genetic and health effects of radiation on Japanese atomic bomb survivors.<sup>9</sup>

An on-going desire to reassure the public, as well as to manage the effects of agency-made radiation in fields like nuclear energy, fueled a continued expansion of basic and applied biological research at the national labs in the 1950s and 60s. By the mid-1960s, for example, Oak Ridge National Laboratory [ORNL] had established well-respected programs in mammalian genetics, radioactive isotope production and distribution, health physics, and radioecology.<sup>10</sup> The late 1960s brought yet another wave of increased support for biology at the national labs—a trend driven by public concerns about test-bomb fallout and radioactive contamination, highlighted in the United States by the rise of the environmental movement.<sup>11</sup>

Biological research, then, was always central to the post-war fate of U.S. national laboratories and its incorporation into their historiography is critical for understanding both post-war biology and the evolution of the national laboratory system. Angela Creager and Maria Santesmases argue that such a historiography will “point to a greater range of resources and a more far-reaching set of policies than we usually associate with

---

<sup>8</sup> For pre-war background on radiobiology, see Rader, 2005 and Creager and Santesmases, 2005. On biological research as part of the Manhattan project, see Lindee, 1994, p. 105, which notes that AEC sponsorship was especially important in the field of genetics; on biological research in the immediate post-war years at Argonne, see Holl, 1997: pp. 74-75.

<sup>9</sup> Beatty, 1991: pp. 284-324; Lindee, 1994.

<sup>10</sup> Rader, 2004: Chapter 6; Creager, 2005; Bocking, 1995; Lenoir and Hays, 2000.

<sup>11</sup> Young, 2005; Bocking, 2004; Bruno, 2003; cf. Balogh, 1993.

atomic energy.”<sup>12</sup> But more than that, it will also allow a richer set of inter-institutional comparisons to be made about national laboratory programs and policies. This is particularly important with regard to questions about how each national lab developed multidisciplinary ventures that shaped (rather than just being shaped by) their unique research culture, as well as trends in life science research more broadly.

This bibliography represents a first step in those directions for the case of Argonne National Laboratory. Founded in 1946 from the University of Chicago’s Metallurgical Laboratory—the site of the first controlled nuclear chain reaction—Argonne’s initial mission was largely defined by its designation as the nation’s center for reactor development. By the 1950s, in the face of Eisenhower’s under-funded domestic mandates in nuclear power, Argonne re-tooled, placing a new emphasis on the construction of accelerators; as home to the Zero-Gradient Synchrotron, it “quickly regained a reputation as one of the nation’s foremost research institutions for high-energy physics.”<sup>13</sup> In the 1960s Argonne reactor research and development made a small comeback, but the national labs more broadly suffered from growing political pressures, as well as from AEC micromanagement. Searching for a new mission, Argonne’s leadership tapped the momentum of U.S. environmentalism to develop programmatic research in environmental studies of nuclear radiation.

Although typically not named as such, environmental research at Argonne had been going on since the lab’s founding—in the form of extensive meteorological and ecological measurements of laboratory-related radiation and meteorological studies associated with nuclear reactor development. In the mid-1950s, however,

---

<sup>12</sup> Creager and Santesmases, 2005: p. 6.

<sup>13</sup> Holl, 1997: p. xi. Cf. Paris, 2003.

environmental research began to coalesce as a series of small-scale internal collaborations between radiological physicists and meteorologists; these were in part a response to an AEC-sponsored program on radioactive fallout from nuclear weapons tests. Such “fallout studies” coalesced, along with other related work (e.g. in chemical engineering) into a program in the mid-1960s when the AEC formally approved the lab’s expansion as a ‘multi-purpose laboratory.’ In 1967, Congress passed the Clean Air Act, setting the stage for an expansion of Argonne’s existing regional Chicago Air Pollution Systems Analysis Program into a broader range of environmental studies projects. This development catalyzed Argonne management to work more closely on environmental projects with the Argonne Universities Association [AUA], the non-profit group formed by thirty midwestern universities to promote greater inter-institutional collaboration and to develop the lab’s research policies and programs. The culmination of these collective efforts and political contingencies was the 1969 conference, “Universities, National Laboratories, and Man’s Environment,” held at Chicago’s O’Hare airport and attended by a roster of environmental advocacy and research luminaries, including microbiologist René Dubos, Audobon Society President Elvis Stahr, and RAND president Henry Rowan.<sup>14</sup>

The so-called ‘O’Hare conference,’ along with the passage of other key environmental legislation, the founding of the Environmental Protection Agency [EPA] in 1970, and federally mandated environmental impact statements for all nuclear sources<sup>15</sup>, all combined to insure the expansion of environmental programs at Argonne.

---

<sup>14</sup> Holl, 1997: pp. 252-253. On the AUA see Greenbaum, 1971: pp. xvi –xvii. On efforts to mount civilian nuclear power research at ANL during this same period, see Westfall, 2003a.

<sup>15</sup> Additional legislation included the Clean Water Act (1967) and the National Environmental Policy Act (1969); for background, see Hays, 2000.

The decade of the 1970s was a 'golden age' for environmental work at ANL, which saw a gradual, across-the-board expansion of existing programs in both basic and applied research. But difficult political problems soon intervened: the U.S. energy crisis made policy makers impatient with existing EPA-supported work and in 1981 the new Reagan administration cut budgets dramatically. By the mid-1980s, some basic environmental research remained, but morale among researchers was low in the face of greater and greater emphasis on applied work.

As even this brief chronological narrative suggests, one major analytic problem facing historians who seek to document environmental studies at Argonne is to determine what exactly defined 'environmental studies' at any given historical moment, for any given group of actors. Furthermore, since many groups of actors were involved, another related problem is to discern carefully the flow of organizations, institutions, and people in this process. Finally, because Argonne was a national laboratory as well as a regional center for environment research and meteorological data collection, the on-going relationship between local and federal forces at work in shaping the lab's research policies and commitments must be given special attention.

For purposes of encouraging the development of further scholarly work, we aim to approach these three problems pragmatically: what kinds of sources exist to help historians of science and of the U.S. national labs tell the story of how Argonne came to be one of the premier research institutions in American environmental science? This bibliography represents a partial answer to that question, focusing in particular on our assessment of the vast range of archival materials that exist on the subject.<sup>16</sup> We have

---

<sup>16</sup>Reflecting the on-going nature of this project, we have excluded from this discussion two other known archival collections that we are still researching. These are the National Archives and Records

tracked down documents and attempted to give an informative, but also analytic, appraisal of what each set contributes to Argonne's more than five-decade long history of environmental studies work. We have organized this synthesis by record location, for easy consultation by researchers, but within the discussion of each collection, we have also indicated some specific themes and questions the papers will prove most useful for addressing.

The exercise of compiling these sources has helped us refine our questions about Argonne's environmental research history, as well as suggested new ones. In particular, we have become interested in how environmental studies at ANL developed vis-à-vis the development of environmental studies at other national labs, especially ORNL: what institutional, social, and policy dynamics contributed to each program's respective strengths and weaknesses and distinctive trajectories? Secondly, we aim to apply our insights on the history of environmental studies at ANL to develop a broader understanding of its diverse research initiatives. This leads us to consider more carefully Argonne's own history, as well as its proper role in the broader historiography of 'Big Science:' what new insights can be gained about the nature of 'Big Science,' national laboratory research, and federal technoscience policy by examining the development of environmental work at Argonne?<sup>17</sup> Finally, documentation suggests that policy-level questions can be addressed, such as: what importance did the AEC/DOE attribute to life science research and other affiliated research activities such

---

Administration in College Park, Maryland (**NARA-CP**), containing AEC documentation of Argonne environmental research programming, and the National Archives and Records Administration-Great Lakes Region in Chicago, Illinois (**NARA-GL**), containing Argonne National Laboratory records not housed at Argonne. Information about these collections can be found at <http://www.archives.gov/research/guide-fed-records/groups/326.html> and <http://www.archives.gov/research/guide-fed-records/groups/434.html>.

<sup>17</sup> Cf. Capshew and Rader, 1992.

as meteorology and systems analysis research in environmental studies at ANL? How and why did these perceptions evolve—and what effect did this have on the work itself?

We are currently developing research papers that focus on these questions and on the broader developments that led to the shaping of environmental studies at ANL and how it functioned in its institutional contexts. But there are still other questions about the role played by ANL environmental studies in broader institutional, policy, and social developments that go beyond the boundaries of these research projects yet also deserve scholarly attention. These include: How did the development of environmental studies at the national laboratories, and ANL in particular, affect the development of related research and programs in U.S. universities? What professional and academic coalitions (formal—such as societies—or informal—such as research groups) developed and transformed in response to the ‘golden age’ of environmental studies, and what role did ANL and national lab researchers play in these developments? And finally, what was the public perception and response to environmental studies conducted at ANL and in the national labs—and what impact did environmental research at ANL have on environment-related public policy? We hope that our work in progress encourages others to take up these questions suggested by our research as well as others we have not anticipated.

Thus far, we have had the chance to work with many talented and generous scholars, administrators, librarians, and archivists whose on-going engagement with our work has made it possible. First and foremost, we want to acknowledge the other two members of the ‘project team.’ Argonne Historian Catherine Westfall provided leadership and support at many levels, from gaining financial wherewithal to giving

scholarly feedback to doing administrative troubleshooting. Her rich knowledge of the history of national labs in general, and of Argonne in particular, made her an invaluable resource. Also, Ioanna Semendeferi worked alongside us on a Short-Term Appointment for the last six months, mining archives and contributing useful analytic and research suggestions. Her research brief on the AUA archives forms the primary basis of their annotation in this ANL report.

On the ground at Argonne, Physics Division Director Donald Geesaman offered his assistance whenever needed; we especially appreciate his passionate belief in the ongoing importance of all the Argonne history efforts. Members of the Steering Committee for the Laboratory History Group, especially Shannon Savage and Rich Valentin, gave generously of their time and talents whenever we needed them. Janet Anderson (ANL Records Coordinator) exceeded her reputation as 'a real ace' at locating and accessing Argonne OTD records and NARA-Great Lakes materials, and Sue Pepalis (Technical Librarian) proved similarly talented at sorting through and locating annual reports.

Off-site, we relied on the help and insights of skilled archivists to guide our research plans, especially Glen Longacre (NARA-GL), Marjorie Ciarlante (NARA-CP), and Jennifer Johnson (DOE-Germantown). The AUA materials at Urbana have one of the most comprehensive finding guides we have ever seen, and we thank its anonymous author(s). Finally, while all this was going on, we were encouraged and better informed because of our conversations with other scholars working on related projects, especially Angela Creager, Terry Fehrer, and Chris Young.

## II. Guide to Relevant Archival Collections

### Overview of ANL Collections

Archival materials originating from Argonne National Laboratory are disparately located. A large collection of records maintained by the laboratory director's office (Office of the Director files, described below) that were previously stored at the Great Lakes Federal Records Center in Chicago are now stored commercially by ANL and are accessible through the Technical Information Services section of the laboratory. It is expected that some or all of these records will be transferred to the National Archives and Records Administration-Great Lakes Region (NARA-GL) in Chicago in the future. Furthermore, some ANL archival materials have already been transferred to NARA-GL. These include a limited amount of Office the Director files, and a sizeable collection of division-level records that date primarily from the early period of the laboratory's history. In addition, it should be noted that a considerable portion of division-, group-, and project-level records remain in the possession of individual divisions, group leaders, and project leaders, as well as project participants and individual researchers.

Primary sources in the form of division-level annual reports, as described below, as well as technical reports can be accessed through ANL Library Services.

### *Materials at Argonne National Laboratory*

#### Division Annual Reports

Work in environmental studies at Argonne in the early period from 1955 to 1965 is remarkably diffuse and defies easy characterization. In part, this is because it did not

stem from a pre-defined academic discipline (like biology or physics) with affiliated university departments, professors, and professional societies. Rather, environmental studies emerged through loosely-organized sets of collaborations and research synergies that were both dependent on particular personalities (scientists and administrative leaders) and responsive to ever-changing political contingencies in Argonne's relationship with the AEC, with the University of Chicago and local Midwest universities, and with the broader American public it existed to serve.

It is for these reasons that environmental studies were situated in several divisions at Argonne, each of which underwent multiple transformations during the 'golden era' of environmental research at the laboratory, approximately 1965 to 1975. The earliest manifestations of environmental research at Argonne, dating to the mid-1950s, occurred in the Biology and Medicine (**BIM**) and Radiological Physics (**RP**) Divisions. By 1968, this research was consolidated in RP, which consequently was renamed the Radiological and Environmental Research (**RER**) Division shortly later. From that point on, BIM no longer played a role in environmental research. During the same period, in 1969, the Center for Environmental Studies (**CES**) was established. Whereas RER, like BIM, was a more research-oriented division that built on its strengths in ecology and meteorology, the CES excelled in large-scale data collection and systems analysis work, worked with a wider range of funding agencies, and was entrepreneurial and project-based in nature. The CES was transformed into the Energy and Environmental Systems (**EES**) Division in 1974. It was also during the same period, in 1971, that the Environmental Statement Project was established, later institutionalized as the Environmental Impact Studies (**EIS**) Division. Unlike the case for BIM and RP/RER,

no annual reports have been located for CES or the ESP/EIS. The discussion that follows subsequently focuses only on BIM and RP/RER.

*Biology and Medicine [BIM] Division [1950-1968]*

Up until 1950, all research in biology, medicine, and radiological physics at Argonne was grouped in the Division of Biological and Medical Research [**BIM**], directed by Austin Brues. Research groups in BIM were extremely wide-ranging, working on topics ranging from cell biology and physiological chemistry to field studies. Comprehensively, BIM included (with their group leaders):

- a. Biochemistry (E. S. G. Barron)
- b. Biophysics (L. D. Marinelli)—members of RP Division
- c. Chronic External Radiations (E. Lorenz)
- d. Clinical Investigation (R. J. Hasterlik)—members of Health Services Division
- e. Experimental Cytology (A. M. Brues)
- f. Experimental Pathology (M. P. Finkel)
- g. Experimental Surgery (J. G. Allen)
- h. Hematology (L. O. Jacobson)
- i. Histopathology (F. Wassermann)
- j. Invertebrate Zoology (T. N. Tahmisian)
- k. Microbiology (E. L. Powers)
- l. Neutron Radiobiology (R. E. Zirkle)
- m. Organic Chemistry (J. Pomeroy)
- n. Physical Chemistry (J. Schubert)
- o. Physiological Chemistry (D. L. Buchanan)
- p. Physiology (H. M. Patt)
- q. Phytobiology (S. A. Gordon)
- r. Plant Physiology (N. J. Scully)
- s. Radiochemistry (W. P. Norris); which consists primarily of the Radium Toxicity Program (which was moved from BIM to RP c. 1955). This work appears to consist of many similar research activities to those carried out in the later Center for Human Radiobiology (established in 1969).
- t. Special Problems (A. M. Brues)
- u. Theoretical Biology (G. A. Sacher)

In 1950, BIM was reorganized and a Program Committee was created to serve in an advisory capacity regarding Argonne's research and program objectives in biology,

radiological physics, and medicine. This group, BIM annual reports note, was also intended to encourage liaisons between Argonne's Toxicity Lab, the Institute of Radiobiology and Biophysics at University of Chicago, and other groups doing research of interest to the AEC.

Starting in 1951, the fate of environmental research in BIM changed, in part because of the reorganization but also because of the work of a young physicist, **Philip Gustafson**. Gustafson began work at Argonne in 1949 as a research technician in the Radium Toxicity Program. He served as assistant to **Leo Marinelli**, also a physicist, who possessed a joint appointment in both BIM and RP. Although Gustafson's own appointment was solely in BIM, Marinelli's position and the generally close relationship between the two divisions contributed to an atmosphere of inter-division collaboration in which Gustafson readily participated. From the beginning, BIM annual reports show that Gustafson's research involved collaborations with researchers in RP on broader problems of environmental radiation. In 1951, for example, he participated in a research project with Marinelli on the rate of elimination of  $\text{RaSO}_4$  dust from human lungs.

Throughout the 1950s, Gustafson's research gradually shifted from a focus on radiation effects in humans to the measurement and distribution of man-made and natural radiation in the environment. In July 1952 Gustafson was promoted to junior scientist and had developed broad research expertise in measurement, specifically: measuring and reducing environmental background radiation in the gamma-ray counting room; calibration of the scintillation counting set-up; and mathematical analysis of human radium retention following radium exposure.<sup>18</sup> By 1955, in

---

<sup>18</sup> Note that the content and structure of information offered in the Argonne Annual Reports changes over time. For example, the April 1954 volume marks the end of the inclusion of an "Editorial" section where

collaboration with Marinelli, Gustafson focused on developing new methods of both measuring radium retention and counting radioactive materials. This work was applied narrowly, in October 1955, when he reported on an estimation of body burden following an ANL accident involving Th<sup>227</sup>. But Gustafson was also interested in broader uses for radiation measurement: from July-December 1957, he carried out new research on radiation in food, including research on the question of whether irradiation is a safe method for food sterilization. In early 1958, Gustafson carried out research on uptake of radioactivity in grass, and in 1961, he reported on gamma-ray spectroscopy in the upper atmosphere using weather balloons, the detectors of which indicated fission debris associated with Soviet nuclear weapons testing.

1964 saw a new reporting structure as well as a new organization for environmental work in BIM. This year represents the first annual report for BIM, compared to the earlier practice of quarterly and semi-annual reporting. With the introduction of annual reports, research is once again grouped under research section heading after a cessation of this practice in 1954, with Gustafson's small research group formally identified by the title "Environmental Radiation Studies" [ERS]. As Gustafson himself wrote in the 1964 annual report, the focus of his group was local—"to investigate the levels of fission product and natural radioactivity present in the Chicago environment" (ANL-6971, p. 83)—but their work covered a broad range of topics, e.g. studies of radioactivity in air, precipitation, soil and vegetation at Argonne, and in foodstuffs and biological samples in the Chicago area. By the late 1960s, the ERS group had become a steady presence at Argonne (in 1965 there were nine individuals listed as

---

staff changes, promotions, etc. were noted. From July 1954-July 1955, BIM and RP publish their reports together in one volume, with BIM reporting quarterly, and RP reporting semi-annually.

engaging in research with the group); it was moved from BIM to RP in 1968 when Gustafson was named Associate Division Director of RP by his longstanding colleague in the division, Robert Rowland. What stimulated the formalization of ERS as a section in BIM in 1964, before any known relevant policy events of the later 1960s, is unknown and not revealed in these annual reports.

*Radiological Physics [RP]/Radiation and Environmental Research [RER]  
Division/Environmental Research [ER] [1954 to 1983]*

Created at the inception of Argonne National Laboratory, the Radiological Physics [**RPY** and **RP**] Division was renamed the Radiation and Environmental Research Division [**RER**] in 1970, and the Environmental Research Division [**ER**] in 1983, and was the locus of the majority of environmental research at Argonne. Semi-annual reports for the division first appear in 1954; they are published jointly with BIM quarterly reports for the next two years, and are issued independently beginning in 1956. In 1963, the RP division began issuing annual reports. Environmental research in the RER divisions was carried out in two research sections that, by 1971, had been named the "Ecology" and "Atmospheric Physics" [**AP**] sections. Annual reports show that research conducted by the Ecology and AP sections of RER was very strongly affected by federal policy changes during the period between 1967 and 1981. From **1967 through 1969**, environmental research began to blossom, as suggested by the wide range of research supported, including: the Chicago Air Pollution Meteorological Studies, a large-scale data collection and analysis project; the Great Lakes Research Program, which incorporated both ecological and meteorological studies, including thermal plume analysis from nuclear power plants and measurements of radioactive and non-

radioactive pollutants in lake water and fish; studies of the cycling of radioactive fallout in aquatic and terrestrial environments; and high altitude measurements of radioactivity. But from **1971 through 1973**, the federal mandate for environmental impact statements for all nuclear sources had the short-term effect of moving Argonne scientific personnel towards these bureaucratic tasks, which delayed basic environmental research. By the mid-1970s, new hiring for the so-called Environmental Statements Project [**ESP**] made return to the division's research priorities possible. Furthermore, the ESP appears to have significantly stimulated the RER division to perceive the need for new areas of investigation.

The replacement of the AEC by the Energy Research and Development Administration [**ERDA**] in 1975 and the simultaneous deepening of the U.S. energy crisis resulted in a further-broadened research focus in pollution studies at Argonne. "Pollution" was a word that became much more widely used in reports from 1975 onward, and reports show a more extensive focus on phenomena such as acid rain and sulfur dioxide. From **1975 through 1980**, both the Ecology and AP research programs flourished in this new political environment and contributed to the creation of new programs, extensive collaborations, and the pursuit of new sources of funding (especially from the new EPA.) In **1978**, the EPA took funding responsibility for many important environmental research programs at Argonne, but by 1981, a severe budget cut from this same government agency (brought on by a shift in presidential administrations) had extensive consequences for RER's Ecology section. Several Argonne programs were terminated and others experienced a considerable loss of staff. AP fared much better, due to far greater reliance on DOE funding, but annual reports

suggest the decline in morale was sharp for those who remained doing environmental work in this resource-scarce era.

The RER/RP annual reports that are most relevant to the development of a formal program in environmental research at Argonne begin in the early 1960s. For the time period from 1962-69, these are in the form of a single volume report. Prior to the July 1966-June 1967 volume, there is no breakdown of research categories or foci.

Beginning with the July 1966-June 1967 volume, the following themes are used to organize the reports within the single volume:

- Radiological and Health Physics
- Toxicity of Radioelements (research corresponding to what was previously the Radium Toxicity Program in BIM and is later carried out at the Center for Human Radiobiology, founded in 1969)
- Meteorological Studies (research corresponding to the later AP section)

Prior to this volume however, these categories are perceptible in the on-going research reported, and the reports are grouped and ordered according to these principles, although not labeled as such. In the July 1968-June 1969 volume, the new category "Bio-environmental Studies" is added, with one paper co-authored by Gustafson listed. This section is renamed "Environmental Studies" for the July 1969-June 1970 volume, "Environmental Research" for the January-December 1971 volume, and ultimately "Ecology," beginning in the January-December 1972 volume. Contributions to this section expanded rapidly, and during this same period, the July 1969-June 1970 volume appeared as the first annual report separated into multiple parts according to research sections.

### Office of the Director Files

The Office of the Director Files are a large and rich collection of documents that were either sent or received by the Laboratory Director or other staff in his office, including the Laboratory Deputy Director of Research. Correspondence folders include considerable division- and project-level correspondence that was provided as copies for informational purposes to the laboratory director's office. The collection also includes ALD correspondence, specifically, that of the ALD for Biomedical and Environmental Research [**BER**]. The collection is particularly strong for the period covering the late 1960s through the 1980s.

#### **Box 9704228: Folder 1.58, "Organization Charts," Vol. 1 (12/67-11/84)**

Materials here well document movement within and between Argonne research divisions that were engaged in environmental research. In 1969 the Center for Environmental Studies [**CES**] was founded as a freestanding center that was directed by **Leonard Link**, who reported directly to the Laboratory Director's office. In 1972 **E. J. Croke** became director of the CES, and the Center began to move away from strictly environmental projects; CES moved organizationally to report to the ALD of "Energy and Environment" [**EE**], which also oversaw the Chemical Engineering and Coal Programs. This suggests an immediate alignment of the CES with applied energy research in the wake of the U.S. national energy crisis. By contrast, Gustafson, now the head of the Environmental Statement Project [**ESP**], reported directly to Laboratory Deputy Director of Research, **M. V. Nevitt**.

In 1974, Argonne environmental studies underwent another extensive reorganization, with a large number of new energy-related programs grouped under the EE ALDship. These included the Systems Analysis Programs (headed by **J. J. Roberts**), and the Environmental Control Programs (with **E. G. Pewitt**, as acting director). The ESP moved to the BER ALDship headed by **W. K. Sinclair**, along with BIM and RER. CES significantly refocused its efforts on energy, and was transformed into a division titled “Energy and Environmental Systems” [**EES**]. Likewise reflecting its growing prominence on the Argonne institutional landscape, in 1975 the ESP also became its own division: Environmental Impact Studies [**EIS**]. Meanwhile, BER developed its own unique environmental programs, through its newly formed Office of Environmental Policy Analysis [**OEPA**]. OEPA Programs (with their program leaders) included:

- Environmental Control Technology (N. F. Sather) [relocated from the EE ALDship]
- Land Reclamation (R. P. Carter) [relocated from EES in the EE ALDship]
- Regional Studies (L. J. Hoover)

By 1978, the EE ALDship was officially renamed “Energy and Environmental Technology” [**EET**], to stress the applied (rather than basic) research nature of its work. Organizationally, environmental programs at Argonne during the early 1980s were characterized largely by stasis as they struggled to weather the changed political and fiscal environment of the period. Change was limited primarily to the naming of new leadership—with Robert Rowland serving as acting ALD of BER from 1981 to 1983 following the retirement of Sinclair, and **Harvey Drucker** named to the ALDship in 1983. Only a few new programs were created during the period and many existing ones were cancelled.

**Box 9704204: Folder 22.11, "Ecology Program," Vol. 1**

This folder includes correspondence between the Argonne director and the AEC about the initiation of an ecology program at Argonne, which was spearheaded by the ANL Ecology Study Committee of the Associated Midwest Universities [AMU]. Initial proposals for this program are on file. In a letter from John Roberson of the AMU to John N. Wolfe, head of the Environmental Sciences Branch of the Division of Biology and Medicine [DBM] at the AEC on September 25, 1967, Roberson sketched several options for the organizational structure of the proposed program, namely, that it be:

- Part of a future "Environmental Division"
- Part of the Biology Division
- An "Ecology Center"

A related proposal dated August 29, 1967 also argues that Argonne was a uniquely suited site for environmental research: "The AMU-ANL Biology Committee in its first Bulletin noted the attractiveness of the ANL site for field ecological studies and the potential for such studies related to radiobiological and gerontological studies in progress at ANL." Other reasons cited include: that the ANL site is ecologically significant for its location in the "prairie-forest border region;" that "certain facilities, skills and programs now present at Argonne would enhance ecological studies and ecological research would complement some present and proposed programs;" that many faculty and students in ecological research are close to ANL; and finally, that "Argonne can contribute through radioisotope studies and other new techniques, for which it is particularly well equipped, to the understanding of ecosystem processes and the cycling of nutrients or pollutant materials in ecosystems." In January of 1968, the AEC DBM approved the conduct of a research program in terrestrial ecology at ANL

arising from the AMU ecology proposal. The Program was to be placed in the RP Division, and 95 acres of land would be made available for research so long as the AEC supported the Ecology program.

**Box 9705081: Folder 64.1, "Center for Environmental Studies (CES)," Vol. 3**

This folder consists mainly of correspondence from 1972 to 1975 regarding the administration and early work of the CES. A February 1972 letter from CES director E. J. Croke to R. M. Adams in the Laboratory Director's Office noted that this same year the center would have a \$1.262 million budget and would be "projectized," that is, engaged in comparatively short-term mission-oriented programs. But Croke also hinted that he understood the CES would need to have a uniquely entrepreneurial culture in order to survive: the Center's "income is almost totally dependent on its ability to develop and market environmental research programs," and therefore "proposal preparation effort is disproportionately large, compared to that of divisions which enjoy relatively stable long-term AEC support" (2 February 1972).

CES leadership demonstrated in this period a consistent attention to presenting what they called the Center's "capabilities" to potential funders, including federal science policy-makers. The first few months of 1972 Croke and his staff prepared an overview prospectus of CES work, explicitly "for use as a public relations and marketing device" (Croke to Nevitt, 30 May 1972). Subsequent correspondence shows that Croke pursued the EPA for funding, shortly after Argonne laboratory director **Robert Sachs** (1973-1978) announced in 1973 that ANL would be reorganized "in anticipation of the important role that we expect the Laboratory to play in the national energy research and development program" (ANL Announcement, 21 December 1973). This contributed to

the transformation of CES to the EES Division the following year. Still, while demand for the CES's services seems to have increased, staffing did not appropriately keep pace. By August 1974, Croke put a moratorium on all proposal preparation activities, and acceptance of new programs until "supply and demand for professional manpower are more nearly in balance" (Memorandum, Croke to All EES Staff Members, 2 August 1974).

**Box 9704204: Folder 22.7, "Meteorology Installation," Vol. 2**

This folder contains a small amount of records related to the Atmospheric Physics section of the RER division, especially regarding the effects of the 1972 budget cut that led to a reorganization of the group. In a letter to C. L. Osterberg at the AEC, Rowland complained about staffing shortages this would cause, and noted that, while the unit had done what they believed to be good service for the environmental studies program, they were frustrated that they would not be able to provide such good service in the future with reduced manpower.

**Box 9704213: Folder 14.26, "Pollution Research"**

This folder contains correspondence that sheds light on how Argonne environmental studies leadership thought about using the lab's non-nuclear-related environmental research for education and public relations purposes. In December 1969, CES director Leonard Link wrote to Tom Mayberry, a producer for Thorne Films, encouraging him to contact George Lindholm, who was in charge of filming operations at ANL and throughout many AEC operations.

At the same time, Link worried that publicizing Argonne's work might be a double-edged sword in cases where the public saw environmental problems that were not yet solved. In a hard-hitting memo to Harry Moses in December 1969, Link noted the very high Chicago air pollution levels recently reported, and encouraged him to take a hard look at what happened and how much, if any advantage had been taken of the prior two years of Argonne work on Chicago air pollution. Link wrote: "if we cannot respond positively either to the fact that we have made some accomplishments or that incidents should be used as a means of education, then I think we must be in the very serious position of reviewing our work as to whether or not it will achieve some results in the very near future or whether it should be dropped" (19 December 1969).

**Box 9704213: Folder 14.26a, "Proposal for the Salt Creek Project"**

**Box 9703974: Folder 54.14c, "Integrated Puff Atmosphere Dispersion Model"**

**" Folder 54.14k, "A Study of the Fate of Carbon Monoxide in the Atmosphere"**

These folders describe specific environmental research projects proposed or undertaken by the CES around the problem of pollution in the rapidly expanding and highly industrial Chicago metropolitan area. Most of this research seemed applied in nature, was targeted at specific, regional needs, and was funded by a combination of federal and local sources. The earliest of these was the Salt Creek Basin Project—proposed in 1968, which attracted considerable interest as a planned collaboration between Argonne and AUA researchers. The project was to be a case study in water resource planning and management in a rapidly urbanizing area (specifically, west suburban Chicago). Ultimately, funding could not be secured and, despite extensive planning, the project was not carried out. In 1971 funding was secured from the EPA for

an eight-month continuation of ongoing research on seasonal variation and distribution of carbon monoxide by Argonne staff. The ultimate end of this study—a direct response to the Clean Air Act—was public policy: the EPA sought to establish a federal limit for automobile-produced Carbon Monoxide. Also, during 1970-71, Donald Rote of the CES developed the “Integrated Puff Atmosphere Dispersion Model” from a large amount of data generated by Argonne’s Chicago Air Pollution Systems Analysis Program

**[CAPSAP]**. CAPSAP was funded jointly by the AEC, the National Air Pollution Control Administration of the U.S. Department of Health, Education, and Welfare, and the city of Chicago.

**Box 9705081: Folder 64.3, “Chicago Metro Air Quality Control Region”**

**Box 9704995: Folder 64.24, “Illinois Institute for Environmental Quality”**

**Box 9704996: Folder 68.4, “Systems Analysis Project”**

In 1970, in response to amendments made to the Clean Air Act, the larger-scale projects described in these folders show that the CES expanded its work both on local and national fronts over the next decade. For example, in 1970 the CES managed the “Illinois Statewide Implementation Planning Program,” which was the continuation of a state-funded project involving the development of computerized analysis techniques to design emission control regulations. The Applied Mathematics Division played a significant collaborative role and, at peak, the project involved eight engineers and scientists. Box 9705081/Folder 64.3 includes milestones, planning, and progress reports for this project. Drawing bigger lessons from this experience, ANL Lab Director **Robert Duffield** (1967-1972) wrote to Kenneth Dunbar of the Chicago AEC in April 1971 suggesting that he saw the CES’s pursuit of such non-AEC funded projects as advantageous, because such projects attracted far less competition from other AEC-

funded institutions: "Since the new proposal again builds on the old, the background for this development work exists only at Argonne National Laboratory. We view this as a situation which places Argonne in a non-competitive position" (22 April 1971).

Correspondence shows that this program was viewed as a significant success for Argonne's CES.

Throughout the 1970s the CES also handled evaluations for the Illinois Institute for Environmental Quality, the State's environmental research and policy planning agency. Box 9704995/Folder 64.24 contains correspondence between CES and the Institute, in which Institute leaders express great appreciation for the high quality of service provided by CES.

By the mid 1970s, Argonne leaders intended to develop a "Systems Analysis Project," described in an October 1974 memo (Box 9704996/Folder 68.4) as "a management-information system for planning and (to a lesser degree) auditing of large-scale, multi-project, multi-agency environmental research programs related to the national energy R&D effort" (17 October 1974). Such a program would have put Argonne at the center of efforts to evaluate the success or failure of all AEC environmental studies work—though it is unclear from the materials in this collection whether the proposal was submitted or approved.

**Box 9703983: Folder 3.82, "AEC Division of Environmental Affairs"**

**Box 9705084: Folder 3.30, "Division of Biomedical and Environmental Research (DBER) [AEC/ERDA]," Vol. 4**

In December 1971, the AEC reorganized environmental research under the new Division of Environmental Affairs [DEA], and the files regarding this shift at Argonne document this division's personnel and their history with the AEC. For example: Robert

J. Catlin, was named Director of the DEA in March 1972; Saul Levine acted as Assistant Director of Programs and Policy; Walter G. Belter served as Senior Environmental Engineer; and in May 1972 W. Herbert Pennington was named Assistant Director of Assessments and Coordination to oversee environmental impact programs.

Three years later AEC environmental work was re-organized again, when the AEC's Division of Biology and Medicine (originally established in early 1948 to direct and coordinate all AEC biomedical research activities), became in 1974 the Division of Biological and Environmental Research [**DBER**] in the new ERDA. As of 1975, \$12.3 million of Argonne's environmental research was funded by DBER. In July of that year, in an "Interim Summary of the Balanced Program Plan for the DBER," the ANL leadership offered detailed feedback on the scope and purpose of Argonne's environmental research in the AEC-sponsored ventures: "The purpose of the BPP is to ensure that the DBER program fully supports ERDA programs to develop and demonstrate various energy supply and energy conservation technologies " (p. iii).

This summary report goes on to contextualize and explain ERDA's policy mandate: "The energy crisis confronting this country has precipitated a national commitment to the development of new, domestic sources of energy and to the implementation of wide-scale conservation measures. The evolution of any new energy system, however, will be heavily influenced by environmental\* policies and considerations, for energy production will be required to exert minimal impact on the environment. In fact, in the National Plan for Energy RD&D submitted to Congress on June 30, 1975, the protection and improvement of the Nation's environmental quality is explicitly defined as one of the five national energy policy goals. Thus, the development

and evaluation of emerging energy technologies demand a concurrent examination of the potential environmental consequences. It is the objective of the Division of Biomedical and Environmental Research (DBER), Energy Resource and Development Administration (ERDA) to provide this examination—to determine, through scientific research and assessments, the adverse environmental effects of energy-related effluents and pollutants; to explore methods mitigating these effects; and to provide the basis for formulating and implementing policies to ensure the safe and socially acceptable development of energy technologies . . . \*Throughout this document, the term ‘environmental’ is used in a comprehensive sense. It denotes not only phenomena related to the natural environment but also the health and socioeconomic aspects” (Introduction, p. 1-1).

By late 1975, ERDA proposed expanding these types of programs even further, at Argonne and beyond. ERDA proposed to develop a network of “National Environmental Research Parks,” the centerpiece of which would be a “secure, limited-access outdoor laboratory where research may be carried out to achieve national environmental goals, as articulated by the National Environmental Policy Act and the Energy Reorganization Act.” These expansions were presented as a “logical outgrowth of the nations’ ‘environmental movement,’ and the National Environmental Policy Act of 1969” (“National Environmental Research Parks (Tentative charter),” 20 October 1975). The proposal defined ‘environmental’ research in broad terms, with a stated focus on interaction between “natural and developed systems,” where developed systems were those described as “structured and maintained by auxiliary energy inputs provided by man.” While it doesn’t seem to have developed further at Argonne, such

ambitious proposals offer a window on the increasing scope and systematicity of environmental research at national labs during this period.

**Box 9703994: Folder 3.62, "AEC Division of Radiological and Environmental Protection"**

In February 1971 Harold Price, AEC Director of Regulation, announced that the existing AEC Division of Radiation Protection Standards would become responsible for implementation of NEPA. These new responsibilities necessitated a change in the name of the division to Division of Radiological and Environmental Protection [DREP], whose broader policy mission would include administering regulations and implementing NEPA requirements, as well as developing radiation protection standards for AEC employees and the public. This environmental work was closely connected to work going on at Argonne's CES; the DREP division became a part of the AEC's regulatory staff and focused on environmental statement work and implementation of a standardized regulatory program. It was reorganized again in February 1972.

**Box 9704204: Folder 22.14, "RER Division Review by US AEC"**

This folder contains material related to the November 1973 onsite peer review of the ANL RER division initiated by AEC DBER director, James Liverman. Throughout the years, the ANL Policy Advisory Board, the AUA, and the AEC reviewed Argonne's life science divisions extensively. These reviews offer valuable insights about the perception of Argonne environmental studies programs by peer scientists and highlight an array of tensions, such as those between academic and program-based research, and AEC programmatic ideals and resource realities. The 1973 AEC RER review feedback regarding environmental research focused primarily on the "widely scattered

organizational nature of the environmental programs” at ANL and the perception that these divisions prevented productive collaborations and interactions at the laboratory (Liverman to Sachs, 14 June 1974). Argonne’s official response emphasized the importance of the construction of a new Environmental Evaluation Laboratory, which would provide the “much needed milieu for interdivisional collaboration” (Sinclair to Liverman, 15 October 1974).

**Box 970397: Folder 51.13, “The Institute of Ecology”**

The Institute of Ecology [TIE] was an international organization funded by the Ford Foundation that aimed to expand and enhance ecological research and communication. Founded in 1971 and directed by Arthur Hasler at the University of Wisconsin, this loose federation of institutions consisted of an extensive list of leading research institutions, including the Smithsonian Institution, Harvard University, Yale University, and the University of Michigan, to name just a few. This folder contains documentation that reveals tensions among the interests of various stakeholders in the development of environmental studies at ANL. Despite AEC Assistant General Manager for Research and Development, Spofford English, recommending that all national laboratories join TIE, and ORNL successfully doing so (with ORNL’s Stanley Auerbach sitting on TIE’s Board of Trustees), ANL researchers ran into considerable resistance from laboratory management about the idea of joining the institute. Appearing to be under considerable pressure from the University of Chicago, laboratory director Robert Duffield announced the decision not to join TIE to English in July 1972. Argonne’s Gustafson undertook new but ultimately unsuccessful efforts to push for

membership in 1973 and 1974, leaving Argonne researchers to build informal relations with the institute.

**Box 9703994: Folder 3.72G, "Thermal Pollution"**

This folder contains documentation and correspondence concerning the development of Argonne's Great Lakes Research Program [GLRP], which originally focused on the consequences of thermal pollution in the siting of nuclear power plants on the Great Lakes. The GLRP developed as a collaboration between RP and the CES, and was initiated by Gustafson and Link, respectively. Early documentation shows Gustafson and Link collaborating and traveling extensively in late 1968 and early 1969 to promote their "Proposal for Effects of Thermal Discharges into Great Lakes" with the U.S. Lake Survey, the Great Lakes Basin Commission, and the University of Michigan's Great Lakes Research Institute—all in Michigan, and before AEC leadership in Washington. The proposal was well received by the AEC, which by then had come under considerable pressure from critics about the environmental consequences of nuclear power. The project was funded beginning in January 1970 to be a "comprehensive" program employing physical, meteorological, and biological methods, yet "its main core objective" was "primarily biological" (Link to Lawroski, 30 June 1969; Gustafson to Totter, 13 August 1969).

Documentation shows that the AEC maintained close control over the program once it was established, both in the form of service requests and scrutiny. The GLRP came under considerable staffing pressure in early 1972 due to increasing demands on it by the AEC both directly and through the diversion of staff to the ESP during the same period. Once the program emerged from the staffing crunch over the next year, the

DBER of the AEC considered suspending the program in 1974, expressed concern that the physical and biological sciences were insufficiently integrated in the GLRP and, moreover, that “the physical studies are not sufficiently subordinated to the service of the biological program” (Memorandum, Croke to Pewitt and Sinclair, 29 May 1974). This correspondence offers insight into the political importance of environmental research—valued for its appearance as ‘biological’ research—to the AEC in the early 1970s. At the same time, however, it illustrates the challenge the laboratory faced integrating multi-disciplinary environmental programs into the “traditional DBER biological program” structure (Ibid).

**Box 9703739: Folder 13.4, “Correspondence-Misc. Biology, “ Vols. 2-5**

This material consists of correspondence of Argonne’s ALD for Biomedical and Environmental Research [**BER**], Warren Sinclair (1974-1981) and acting ALD Robert Rowland (1981-1983), during the periods of their respective tenures in the position. Correspondence is relatively high level, and concerns the BIM, RER, and EIS divisions. Standing out in this material is the response by Sinclair to DOE Office of Health and Environmental Research [**OHER**] Acting Director, C. W. Edington, in May 1981 to the sharp funding cuts made by the OHER in response to the FY 1982 Revised President’s Budget. In addition to termination of the GLRP by the EPA during this period, the OHER budget cuts were expected to result in the termination of the Land Reclamation Research program, and extensive layoffs of staff and reductions in research output throughout BER divisions.

### Argonne News

*Argonne News* was published by ANL starting in 1951, as a means of publicizing laboratory events, information, and research to the laboratory population. Examining issues from 1964 to 1980 gives a good overview of the environmental studies work at the lab and provides material for historical analysis at several levels:

- **High-level support/impetus:** *Argonne News* closely reported speeches and initiatives undertaken by laboratory and governmental leadership on the role of national laboratories and Argonne in the environmental crisis. Among these were speeches and efforts on pollution and waste control undertaken by ANL Director **A. V. Crewe** (March 1967; August 1967), and AEC Chairman **Glenn Seaborg's** speech, "The Environment—and What To Do About It." The latter was delivered in a non-environmental context before the Solid State Science Panel in conjunction with the dedication of the Solid State Science Building at Argonne in May 1969 (June 1969).
- **Conferences and Reports:** Several key Argonne conferences and publications in environmental studies were reported in *Argonne News*, namely, the AUA-sponsored conference "Universities, National Laboratories, and Man's Environment," referred to as the "O'Hare Conference," in July 1969 (September 1969); the ensuing "Cantlon Report" authored by the O'Hare ad hoc committee [see below] (January 1970); and the March 1970 report presented by the CES to the AUA (September 1970).
- **Ad hoc committees:** Throughout the 1960s the creation of several ad hoc committees important to the development of environmental studies at Argonne

was reported. These include: the Ad Hoc Ecology Committee established by the AMU Biology Committee in 1966 (March 1968); a committee named by Crewe in 1966 to determine how Argonne could contribute to the resolution of the pollution problem (December 1969); and an Ad Hoc committee formed by the AUA following the July 1969 O'Hare conference (September 1969).

- **Policy:** *Argonne News* is useful for tracking the role played by federal environmental policies in shaping Argonne's programs. Reports of environmental initiatives at Argonne were typically explained in terms of the AEC policy, federal law, or state regulation that mandated or permitted specific programs. This can be seen, for example, in the case of the April 1970 overview article "Subject of the Hour: The Attack on Environmental Problems." Another such example can be seen in the February-March 1972 article on Argonne's Environmental Statement Project, which detailed the July 1971 Federal Court of Appeals ruling known as the "Calvert Cliffs" decision. This hallmark ruling interpreted the 1969 National Environmental Policy Act [**NEPA**] to require that the AEC (and all federal agencies, more broadly), prepare an assessment of the environmental impact, costs, and benefits of any major project undertaken. In the case of the AEC, this ruling applied to the siting of all new nuclear power plants. Within a few months time, this decision resulted in the creation of the Environmental Statements Project [**ESP**] at Argonne, which was at the forefront among national laboratories in environmental assessment work.
- **Programs:** *Argonne News* well documents the creation of several important environmental studies programs at ANL, including the ANL Ecology program

(March 1968); the Great Lakes Research Program (April 1970; May 1972); the Chicago Air Pollution Systems Analysis Programs (April 1970); the Environmental Statement Project (September 1971; February-March 1972); and the Argonne Airport Pollution Program (January 1972).

### Argonne Oral Histories

Since its inception in 2001, one of the objectives of the Argonne History Program has been to carry out oral interviews for the purpose of assisting current research as well to serve as a resource for historians working on Argonne-related history in the future. To date, thirty-eight interviews have been deposited with the Technical Services Division of Argonne. The collection focuses on the Experimental Breeder Reactor-II, the Zero Gradient Synchrotron, Mössbauer spectroscopy, and will soon include interviews on radiological physics and environmental research at Argonne and interviews on the Intense Pulsed Neutron Source.

In this later category, six interviews have been conducted to date, collectively sketching a picture of the multiple loci from which environmental research emerged, as well as the various scientific and technical, institutional and political events that shaped the evolution of environmental studies at Argonne. Interviews with Richard Valentin and Edward Croke illuminate the events and priorities that led to a significant commitment of individuals and resources from the Reactor Engineering division to the development of environmental studies at Argonne, contributing especially to the creation of the CES. These interviews likewise elaborate the types of expertise introduced by members of the reactor research community—primarily engineers—to

environmental research at Argonne, and they illustrate the distinctive character of environmental projects executed by the CES and, later, the EES division.

Interviews with Mitio Inokuti and Robert Rowland shed light on the broader and longstanding involvement of the RP/RER division to environmental research at Argonne. As is pointed out in these and nearly all the interviews described here, environmental research—although often not labeled as such prior to the mid-1960s—was a part of the research mission of Argonne since the founding of the laboratory. In his capacity as researcher, division director of RP/RER, and later, acting ALD for BER, Rowland's interview sketches a division- and laboratory-level perspective on environmental research at Argonne. For example, it illuminates the circumstances that led to the transfer of the "Environmental Studies" program led by Gustafson from BIM to RP. These events culminated in the renaming of the Radiological Physics division to the Radiological and *Environmental* Research division in 1972.

Interviews with Paul Frenzen and Donald Nelson detail specific aspects of environmental research within RP/RER, and earlier, in BIM. As section head of Atmospheric Physics in RP/RER and later, as Associate Division Director, Frenzen's interview describes the nature and diversity of pollution-related meteorology programs carried out in the division and the important role played by atmospheric physics in Argonne's multi-divisional, multidisciplinary Great Lakes Research Program (GLRP). Nelson's interview offers insights into aspects of fallout studies research carried out by Gustafson's group in BIM in the early-mid 1960s, as well as the creation and execution of the GLRP. Nelson's discussion sketches the range of studies carried out in the Ecology

section of RER. Collectively, Frenzen and Nelson's interviews produce a vivid picture of the scientific and political trajectories of the GLRP.

### **Overview of Argonne Universities Association Collections**

Founded in 1965, the Argonne Universities Association [**AUA**] arose from a merger with the Associated Midwest Universities [**AMU**] (formed in 1958), which was a consortium of higher education organizations associated (administratively or through informal research agreements) with Argonne National Laboratory and the preexisting Policy Advisory Board.<sup>19</sup> Good secondary accounts have already been written on the history of these institutions,<sup>20</sup> so we focus here on sources that detail AMU and/or AUA's critical involvement with Argonne's various environmental studies programs.

The main archival material on the AUA is housed at the University of Illinois at Urbana University Archive Research Center (197 boxes, covering 1945-1982 inclusive). Another smaller collection of interest to historians of biology is in the Felix Haas Papers, located at the McGovern Library at the University of Texas at Houston (Manuscript Collection Number 27).

### ***Materials at the University of Illinois –Urbana: AUA Archives***

A comprehensive finding guide for these papers can be found at:

<http://web.library.uiuc.edu/ahx/uasfa/1110083.pdf> (accessed 21 September 2005).

Though we surveyed most papers of potential interest in this collection, the following only gives descriptions of those most important for establishing the relationship between the AMU/AUA and the on-going development of environmental research at

---

<sup>19</sup> For AUA founding documents, see Argonne National Lab 1984.

<sup>20</sup> Greenbaum 1971; Bohm 1982.

Argonne. In particular, this collection is useful for materials related to disciplinary advisory subcommittees—e.g. Biology and Ecology; such groups were influential to both the formal establishment of environmental research at Argonne (see subcommittee proposals and meeting minutes), and its on-going direction. Also Trustee minutes, formal institutional proposals, as well as correspondence between AUA leaders and Robert Duffield, Argonne's director during the height of ANL's 'golden age' of environmental research, offer insights into the inter-institutional struggles over how to best manage and guide this work as it grew.

**Box 16: Folder, "Biology-AMU-ANL Committee, Dec. 1966-June 1968," Vol. 3**

**" Folder, "Biology-AMU-ANL Committee, Feb. 1970-June 1971," Vol. 5**

**Box 17: Folder, "Biology Committee—Minutes, AUA-ANL: 1965-71," Vol. 1**

Just after the AMU merger with the newly formed AUA, the Biology committee convened to discuss the broader implications of the merger for the ongoing efforts to develop ecology at Argonne. These files contain meeting agendas and some minutes, which indicate frank discussions about the AUA's concern over where to locate ecology in environmental studies at Argonne. Some later AUA concerns were also related to the so-called 'perimeter land transfer,' and its impact on the ecology program at Argonne, as detailed in the relatively comprehensive set of AUA and AMU minutes of committee meetings. Box 17 also contains an important early report that helped establish Argonne as a preferred site of ecology research: "Report of the Ad Hoc Committee to Assess the Suitability of the Argonne National Laboratory Site for Ecological Research, 12 May 1966."

**Box 24: Folder, "Board of Trustee Meeting Minutes" (Dec 1981 to Jan 1982, inclusive)**

**Box 26: Folder, "Board of Trustees Meeting, Henry V. Bohm, July 14-15, 1980"**

These boxes contains comprehensive minutes and reports used for preparing for the AUA Board of Trustee meetings during the early 1980s—a very challenging period for ANL. Consequently, these documents reflect the frank communication and creative strategizing that went on between ANL director Walter E. Massey and the AUA Board, in order to preserve as much environmental and ecological work as possible in the face of budget cuts and an ensuing mission crisis. Notably, in July 1980, Warren Sinclair made a presentation regarding the direction of the BER ALDship to AUA Board of Trustees meeting. Earlier AUA Board of Trustees minutes are contained in **Box 30**, for the period from 1967-1972, but these provide a less interesting perspective on the AUA relationship with Argonne researchers and leadership than materials in other boxes (see below).

**Box 34: Folder, "Brochures, AUA and AMU" (1967-86, not inclusive)**

The materials contained in this box were intended as publicity and informational material regarding the AUA's leadership role at Argonne. As such, they offer insights into how the AUA Board was thinking about its role in shaping Argonne research, as well as the emergence of a broader vision of environmental research both in academia and at the national labs. For example, in an appendix on "Environmental Research at Argonne" to the 1972 brochure entitled "Major AUA Responsibilities and Tasks for 1972-1973," AUA Board President **Philip Powers** (Purdue University) wrote: "The environmental program at Argonne is growing in stature, but there is still little participation by the universities in planning, carrying out, or evaluating the variety of

projects under way. Whether or not AUA wishes to increase university participation is a matter which must be decided, as well as how it is to be done. The question of university collaboration, including the ways in which social scientists may contribute, needs further study. It is evident that there is a substantial university interest in environmental undertakings at Argonne, and it is AUA's responsibility to formulate policies relative to Argonne's role in environmental research."

In another appendix ("Basic Research") to the same 1972 brochure, Powers described tellingly how he understood biological research on the environment to be favored over other disciplines, because of the contemporary policy climate that stressed radiation's health hazards: "A major effect of the several external pressures on Argonne has been to make it more difficult to do basic research . . . It has become more difficult to obtain government funds in support of discipline-oriented research particularly in physics, chemistry, and their related physical and mathematical sciences. If the research being proposed appears to have a relation to a national need, then its chances are far better . . . The effects of the external pressures on research in the biological and medical sciences have been somewhat different. Its priority appears to be up, perhaps because of the closer relation which the public believes these fields to have to national needs. The public has become increasingly concerned with radiological hazards, and the environmental problems of an ecological nature, and it is likely that this is one of the factors in making increasing research funds available for biological and medical research."

**Box 55: Folder "Education Board Committee  
" Folder, "Ecology Group"**

Early in the history of the AMU, there was limited cooperation between academic life science researchers and Argonne National Laboratory. But in 1965, a group of biologists from AMU institutions decided to take the initiative and explore possible connections between local universities and ANL. This group eventually became the AMU-Biology Committee (and later, the AUA Advisory Subcommittee on Biology)—but as is documented in these materials, AUA leaders sought to grow the seed of their initial idea beyond the life sciences. In 1968 an ANL "Center for Educational Affairs" was proposed, figuring in the ongoing, broader discussion over what role the newly-named AUA would play in setting Argonne's research agenda and organization. As Powers described it: "The Center will have as a primary objective the encouragement of cooperation between ANL and the academic community in education and research. As proposed by the ad hoc committee [AUA-ANL Ad Hoc Committee under the leadership of R. Marshall—Dean of the University of Wisconsin], the Center will be an organizational unit different from existing Argonne divisions in that it has responsibility not only for the administration of the education program but also for stimulating interaction between staff members in research divisions of the Laboratory and faculty members and students" ("Draft AUA Newsletter," 8 August 1968, p. 1; Folder: "Education Board Committee, General, October 1966-December 1968"). That same year, the University of Chicago (which had managed ANL since its founding), the AUA, and the AEC entered into an official 'tripartite' contract to share management of the lab.

Even before this, however, a group of AUA ecology researchers, headed by Robert McIntosh, developed an Ecology group (initially, called the AMU Ecology Committee). Correspondence contained here suggests that, unlike the AMU-AUA Biology committee, the AUA Ecology group sought broad disciplinary alliances in environmental studies at Argonne that involved researchers in the physical and geological sciences. For example, in May 1967 McIntosh wrote a letter to Orlando Park (Northwestern University) that noted interest in the “potential relationship” of the meteorology program at Argonne with the Ecology Committee’s proposed projects; McIntosh saw particularly “excellent opportunities . . . in biometeorology” (See folders: “Ecology Proposal, 1967-1971” and “Ecology Group—October 1968-September 1969” (File 4)).

**Box 59: Folder, “ERDA Correspondence,” Vol. 1**

- “ Folder, “Environmental Proposals-ANL” (beginning January 1971)
- “ Folder, “Environmental Studies Board Committee” (1968-71, not inclusive)

This box is one of the two most important in this collection for discerning the role of the AUA in the establishment of environmental studies at Argonne. Some folders contain background materials used in the AUA’s **Environmental Studies Board Committee [ESBC]** meetings, headed by Frederick Rossini of Notre Dame University. Though the ESBC was not formed until 1968, documents such as “Some Events of Significance to Environmental Research at ANL and in Collaboration with Universities” (Folder: “Environmental Studies Board Committee, September 1969-April 1970”) contain useful timelines and overviews of the early history of environmental programs at Argonne, from approximately 1966 to 1970. Further, they suggest that the AUA’s encouragement of environmental studies at Argonne was directly tied, as Rossini put it

in 1969, to “growing national concern about the preservation of our natural environment” (“Report to the ad hoc Committee of Environmental Programs by Frederick D. Rossini, Chairman of the AUA Board Committee on Environmental Studies,” enclosure, Rossini to John H. Roberson, 29 October 1969; Folder: “Environmental Studies Board Committee, September 1969-April 1970”).

Other important materials include reports received by the ESBC from Argonne, such as the 1967 “Report of ANL Study Group on Environmental Pollution.” This report notes four research areas in pollution problems of interest to ANL scientists: “1. energy sources that minimize pollution; 2. analysis of origin, dispersion, disposition and effect of pollutants; 3. critical attack on pollution problems of the Midwest region using both ANL and AUA capability; 4. systems analysis, modeling, and computation for prediction and control of environmental pollution” (see Memorandum: “Report on activities of the ANL and AUA in the field of environmental pollution,” David White to Philip Powers, 7 April 1967, p. 1, Folder: “Environmental Studies Board Committee, General, December 1968-August 1969”). Accompanying correspondence and draft report documents suggest that the AUA believed its organization’s interests would be best served by collaborating not only with Argonne but also with Chicago leaders to address local pollution problems. That same year, however, the AMU Ecology Subcommittee began to question how big the ‘big science’ arrangement of environmental studies at Argonne could get and still be viable; in particular, the subcommittee was concerned about plans to found separate AEC-sponsored ecology and environmental studies programs.

Expansion continued in other areas at the end of 1967. In October the "Chicago Air Pollution System Model" (which modeled SO<sub>2</sub> concentrations in the city of Chicago) was funded. ANL "position documents" as well as correspondence suggest that there was more enthusiasm for such work in non-biological ANL divisions (i.e. Reactor Engineering, as well as Applied Mathematics, from which many of the contributors to the project originated) than among biologists. But minutes and reports show that AUA leadership (especially those on the ESBC) discussed how biology and social sciences were among Argonne's most urgent needs, which points to an on-going tension between ANL and the AUA about the preferred direction of environmental programs. Other documents establish that these debates came to a head in 1968, when the AUA and ANL clashed over leadership of the unrealized Salt Creek Basin Project (see discussion above in OTD records). As Powers wrote in September to members of his AUA Board Committee on Environmental Studies: "It seems to be necessary to assure [Salt Creek] participants from the university community that they are participating in a joint project under AUA policies rather than this being strictly a Laboratory project" (Philip Powers to Members of the AUA Board Committee on Environmental Studies," 18 September 1968, Folder: "Environmental Studies Board Committee, General, December 1968-August 1969").

These debates continued throughout 1969, especially over the AUA's proposal to fund a Socio-Technical Research Organization at Argonne as an umbrella organization for environmental studies. ANL physicists believed such a move would undercut the high-energy physics research mission, while AUA leaders argued that separating out the growing environmental programs in this way was necessary for preserving physics

research. In addition, there were concerns raised about the problem of direct competition for funding among ANL researchers and researchers from AUA institutions (minutes show these resurfaced periodically, throughout 1970).

By 1969, tensions between the AUA and ANL were beginning to take their toll. One AUA board member even suggested that separate conferences be held at AUA member institutions, rather than holding what eventually became the jointly AUA/ANL sponsored O'Hare Conference that same year. Likewise, in 1970, A. G. Norman, a University of Michigan biologist involved in advising ANL on environmental work since the 1950s, wrote of the lack of university collaborations indicated in a report written by ANL's Center for Environmental Studies (CES): "Everyone appears set to go down the old fatal road which leads to further alienation, instead of real cooperation" (A. G. Norman to P. Powers, 16 April 1970, p. 1, Folder: "Environmental Studies Board Committee, September 1969-April 1970").

**Box 60: Folder, "Environmental Studies Board Committee" (1971-72)**

Materials in this box continue documenting discussions within the AUA about Argonne collaborations (or the lack thereof) with AUA member institutions or faculty. In particular, there is greater detail regarding the AUA's role in the establishment of the Ecology program. Initially the AMU Ecology committee gave its approval of such a program at Argonne, and it was funded in 1968 by the AEC's Division of Biology and Medicine. But almost immediately there were clashes over the role of the AUA in the execution of the program and, in July 1969, AUA leadership ordered an "inventory [of] the environmental interests of AUA members" ("A Condensation of Dr. Rossini's Report to the Annual Meeting of AUA on October 12, 1970, Showing the Evolvement of AUA

Policy Relative to Environmental Research," p. 2). In May 1970, Board chairman Powers appointed an ad hoc Committee on the Organization of Environmental Studies to help overcome 'polarized' opinions on this issue, and in July, the AUA established an Office for Environmental Studies, which served to facilitate collaborations in environmental studies between the AUA and ANL. That same month, board minutes suggest that tensions had cooled somewhat: Leonard Link and Edward Croke, both of ANL, attended and reported on the activities of the CES. Later meeting minutes suggest that clashes over AUA involvement in the MRESP program periodically re-surfaced throughout 1972, especially regarding the participation of social science researchers who were well represented at AUA member institutions but were perceived by the AUA to be absent among ANL personnel.

**Box 86: Folder, "Members Meeting, Annual, October 13, 1969"**

This folder chronicles the programmatic basis of ANL's decision to found the CES in 1969. Communication from ANL director Duffield and AUA leadership shows that Argonne founded the CES in order to expand work in more applied directions. This decision was driven primarily by what Duffield characterized as "an increasing number of people expressing an interest in working on such problems," but Duffield took pains to note that it "in no sense implies disinterest in basic work . . . I believe that profitable basic work in the environmental science field should be carried out within Argonne's divisions such as Chemistry, Biological and Medical Research, Radiological Physics, and Physics. The attached list of programs demonstrate (sic) that such work is already underway" (Robert Duffield to Philip Powers, 30 September 1969, p. 1). The fact that the CES was presented to the AUA as a *fait d'accompli*, and in the form of an official

'transmittal letter' rather than a personal correspondence speaks volumes about relations between ANL and AUA over the fate of environmental studies at Argonne.

**Box 94: Folder, "Newsletter—AUA, 1964-1973"**

“ Folder, "AUA-ANL Life Sciences, 1970-1973"

One of the relevant folders in this box, "Newsletter—AUA, 1964-1973," contains a comprehensive run of newsletters from the AUA Board to the Presidents of the Members of AUA Organizations and the Delegates to the Annual Meeting of Members. These newsletters offer excellent descriptions, from the perspective of the AUA Board, of why it was important for members to get involved in environmental studies. In 1967 Philip Powers stated that ANL involvement in this field was 'complicated' by complex local versus federal funding structures and by competing disciplinary frameworks (above all, what AUA believed to be the necessary involvement of the social sciences). A September 1970 newsletter article entitled "Toward Living in Harmony with Nature" played on these tensions—by pointing to ways to resolve the lack of harmony between the AUA's and ANL's very different approaches to studying the environment and to institutional control over programmatic decision-making.

**Box 109: Folder, "Organizational Materials, AUA" (1966-82, not inclusive)**

In October 1972, after five years in existence, the AUA Board of Trustees initiated a formal study of the effectiveness of the AUA in policy-making at Argonne; this box contains mostly materials generated for and in response to this decision. In April of 1973 Trustee Armon Yanders produced an interim report from the effectiveness study, which contained a frank critique of the power struggles over environmental studies at Argonne. AUA Chair Philip Powers wrote a powerful response to Yanders's criticism

(11 April 1972), and this correspondence, in particular, is valuable for providing some longer-term perspective on the successes of the AUA –ANL collaboration in environmental studies. As Powers summarized: “the AUA has made much more progress in the past five years than had previously been made toward solving the long-standing problem of harmonizing relationships between the Laboratory, the University [of Chicago], and the Midwest Universities.”

*Materials at the University of Texas-Houston: Felix Haas Papers*

A comprehensive finding guide for this collection (as well as excellent biographical background on Haas) can be found at <http://mcgovern.library.tmc.edu/text/collect/Manuscript/Haas/HaasTOC.htm> (accessed 21 September 2005). Series VI of these papers is labeled “Argonne,” and contains three boxes of interest for the history of environmental research program there (Boxes 1, 2, and 3). In 1968, the University of Texas at Austin became an AUA member organization, and the planned merger between AMU and AUA called for the Biology Subcommittee to serve as one of several subject-area advisory committees. **Felix Haas**, who had formerly worked as a research scientist for the AEC and headed the M.D. Anderson Hospital and Tumor Institute’s Department of Biology (1956-1975) where he taught genetics and radiation biology, became a member of the Biology Committee that year.

Some documents in the Haas papers replicate those found in the Urbana-AUA archive, and some contain materials relevant to aspects of biology research at Argonne beyond environmental research (e.g., Box 3 has a folder describing “Argonne National Laboratories Summer Program in Radiobiology”). The strength of this collection,

however, is that it offers a view from the 'trenches' of the policy-making efforts of the AUA subcommittees, which concerned themselves greatly with environmental studies.

Minutes and background documents for meetings Haas attended reflect a more detailed sense of the evolving discussions about environmental work at Argonne—especially from the perspective of academic researchers. For example, in an official report on his December 1969 site visit to Argonne contained in the AUA archives (Box 16, Folder: "Biology-AUA-ANL-Committee, July 1968-January 1970"), Haas noted that the main agenda item of the Biology subcommittee was to increase communication between life science faculty at AUA institutions and BIM researchers at the national lab. But as shown in the Hass Papers, as early as 1968, the Biology subcommittee was aware of the multi-disciplinary work in environmental studies going on at Argonne (see "AUA-ANL Biology Committee: Annual Report," 1968, p. 2, in Box 2, Folder 9: "ANL Biology Representatives Management"). Further, Haas' correspondence with other committee members (Box 2, Folder 12), shows that throughout 1971 the Biology subcommittee closely followed ANL work in ecology and radiological physics, with an eye towards suggesting expansions that would best foster life science research. Such programmatic goals were also sanctioned in communications between the AUA and the federal government, such as in October 1970, when the AUA president reported to the AEC that his organization planned to "undertake a study of what the long-range objectives and programs of ANL might be in relation to the broad problem of environmental pollution" (Box 2, Folder 8: "ANL Biology Program and Environmental Biology," Felix Hass Papers).

### Overview of AEC/DOE Collections

The DOE Historical Research Center in Germantown, MD is managed by the DOE Office of History and Heritage Resources, which in turn manages the AEC Secretariat files. The office web site is: <http://ma.mbe.doe.gov/me70/history/index.htm> (accessed 27 September 2005). This collection is composed of files maintained for the five AEC commissioners, whose chair was Glenn Seaborg for the period 1961-1971. Thus it contains correspondence, memos, and other materials that circulated in the highest levels of the Commission. The Secretariat files for 1947 to 1958 are accessible at National Archives II in College Park, MD (**NARA-CP**). Files for 1959 to 1975 are available in Germantown.

For the period from 1951 to 1975, the Secretariat files are organized by subject, according to an elaborate, administratively constructed system of subject filing system categories; examples of categories relevant to environmental studies include "Organization and Management" and "Medicine, Health, and Welfare." Periodically, as the Secretariat files grew larger, archivists broke them into distinct, chronological collections. This occurred in 1951, 1958, 1966, 1968, 1970, 1972, and 1974.<sup>21</sup> The collection with the most information about Argonne Environmental Studies is in RG 326; entitled "AEC Secretariat Files, 1966 to 1972," it corresponds to the 'golden age' of research at ANL. In 1970, when the AEC founded an Office of Environmental Affairs

---

<sup>21</sup> Note, also, from the History Research Office web site: "a card catalog for the AEC Secretariat collection was put together by AEC record keepers. Organized by subject and staff paper number, the catalog covers the period from 1947 to 1975 and is applicable to Secretariat records at NARA as well as in the Historical Research Center. Although the 60,000-card catalog has gone through a declassification review, it still contains security-classified entries. A searchable redacted version will soon be available to the public." For the most updated information, see the DOE Historical Office's Web Site Guide for Research: [http://ma.mbe.doe.gov/me70/history/guide\\_for\\_research.htm](http://ma.mbe.doe.gov/me70/history/guide_for_research.htm) (accessed 27 September 2005).

(initially headed by Joseph DiNunno), Seaborg began keeping these records as part of his "Office Files"—and a small number of folders in this collection (Box 71, Folders 9-10) also contain materials of importance.

In addition to the early Secretariat files, NARA-CP houses other AEC files of interest, especially:

- the so-called "Central Files" of the AEC Division of Biomedical and Environmental Research (formerly the Division of Biology and Medicine) for the period from 1944 to 1975;
- the Division of Biology and Medicine's Technical Analysis Branch files, which include reports relating to biological and environmental effects of nuclear war for 1962-71; and lastly,
- the Division of Biology and Medicine files on fallout monitoring and other studies for 1946 to 1973, inclusive.

While these files are of great interest for the period from 1959 onward (especially regarding the AEC policies on fallout studies, and how they impacted Argonne and other labs doing environmental work), we have not (as of this writing) completed research with them.

***Materials at Department of Energy, Office of History and Heritage Resources: AEC Secretariat Records***

The "Records of the AEC Secretariat, 1966-72" represent a very rich collection for purposes of discerning high-level discussions and constraints in environmental studies policy-making across the AEC's many programmatic mandates. Relevant material

appears in the following filing categories (with Box and Folders indicated, as well as filing sub-categories, if available):

- “Medicine, Health and Safety - 11”:
  - Sub-category: “Environmental Studies”
    - Box 7717, Folders 3-6
    - Box 7718, Folders 1-4
    - Box 7763, Folders 1-5, 7, 9-12
    - Box 7764, Folders 1-3
    - Box 7821, Folders 11-12
    - Box 7822, Folders 1-3, 5
  - Sub-category: “Industrial Hygiene”
    - Box 7763, Folders 4-5
- “Organization and Management”
  - Subcategory: “Biology and Medicine”
    - Box 7718, Folders 5-6
    - Box 7722, Folder 6
    - Box 7827, Folder 9
    - Box 7828, Folder 7 [now, “Radiological and Environmental Protection”]
  - Subcategory: “Biology and Medicine Advisory Committee”
    - Box 7728, Folders 4-5
    - Box 7772, Folder 3
    - Box 7827, Folder 10
    - Box 7831, Folder 9
- “Plants, Laboratories, Buildings, and Land” **[PLBL]**: Box 7775, Folder 18

One remarkable feature of the policy landscape that can be discerned from an overview of these files is the degree to which the AEC understood and participated in shaping public opinions about U.S. environmental problems, especially in the period from 1961 through 1972. For example, these files are filled with letters from U.S. House Representatives and Senators to Glenn Seaborg regarding questions or critiques that their constituents have asked them about the environmental hazards of radiation or nuclear power. For the most part, the AEC took these requests very seriously as a part of their public relations: Seaborg had his staff prepare detailed replies, sent out to the original letter writer on AEC stationary and in his own name. Furthermore, the AEC

kept monthly lists of "Environmental Activities" such as lectures, news documentary reports, and 'teach-ins' taking place across the country in public venues, and they took pro-active measures to participate in and fund some of them (and various commissioners attended events then transcribed their impressions for the record). Later, Seaborg complained to McGeorge Bundy, who was at the time President of the Ford Foundation, that such AEC sponsorship was *a priori* perceived as "detract[ing] from [the] apparent objectivity" (Box 7764, Folder 2, 18 March 1970) of university and other such programs.

In the more official policy-making arenas, these Secretariat files also clearly show that the AEC was under extreme pressure from Congress during the height of its environmental legislative activism. Seaborg and his staff testified at many Congressional hearings on the various environmental bills passed in the late-1960s (transcripts of their speeches appear throughout the files). Along the same lines, the Secretariat responded to requests from Senators and Representatives eager to consolidate the federal research efforts in environmental biology and health, by preparing reports (also contained in the files) of various programmatic expenditures across the AEC and its national labs.

For internal policy-making purposes, as well as for use in on-going public relations efforts, Seaborg and his colleagues relied heavily on the national lab leaders to provide the AEC with good examples of scientific work being done to address what were perceived as the most important environmental problems. For example, Seaborg frequently (i.e. about once or twice a year) wrote letters to the lab directors, requesting examples of successful environmental research, on topics ranging from thermal

pollution, to nuclear effects on humans and other ecological systems, to the revision of radiation protection standards in the workplace.

With regard to inter-institutional comparisons between national labs, the Secretariat files suggest that some directors took better advantage of these moments than others to court the favor of the AEC for their own environmental research programs. For example, several lab directors—including ORNL's Alvin Weinberg and Brookhaven's Maurice Goldhaber—had repeated correspondence in late 1966 and early 1967 with AEC General Manager Robert Hollingsworth regarding 'areas of competence' that each national lab could bring to the problem of environmental pollution (Box 7717, Folders 3-4). Weinberg framed his argument for Oak Ridge's competence broadly, almost magisterially: "the large multidisciplinary labs of the AEC, and particularly ORNL with its bias toward chemistry, biology, biochemistry, and chemical engineering, and its long-standing concern with radioactive environmental pollutants, can make important contributions to the understanding and control of pollution and its effects on the quality of human life and living things" (Weinberg to Hollingsworth, 6 January 1967, Box 7717, Folder 3). By contrast, Argonne's A.V. Crewe wrote of only a "few points of contact" with ANL's efforts in Chemical Engineering (notably, neglecting to mention ongoing environmental work in BIM and RP/RER), and concluded that it was "inappropriate...to recommend any long-term program for the Laboratory" because his own directorship was nearing a close (Crewe to Seaborg, 9 December 1966, Box 7717, Folder 3).

### III. Published Works Consulted

Argonne National Laboratory. "Access to Argonne," (Argonne, IL: ANL, 1984).

Balogh, Brian. *Chain Reaction: Expert Debate and Public Participation in American Commercial Nuclear Power, 1945-1975* (Cambridge: Cambridge University Press, 1991).

Bohm, Henry V. "Argonne Universities Association," in Joseph C. Kiger, ed., *Research Institutions and Learned Societies* (Westport, CT: Greenwood Press, 1982), pp. 133-37.

Beatty, John. "Genetics in the Atomic Age: The Atomic Bomb Casualty Commission, 1947-1956," in Keith R. Benson, Jane Maienschein, and Ronald Ringer, eds., *The Expansion of American Biology* (New Brunswick: Rutgers University Press, 1991), pp. 284-324.

Bocking, Stephen. *Nature's Experts: Science, Politics, and the Environment* (New Brunswick: Rutgers University Press, 2004).

\_\_\_\_\_. *Ecologists and Environmental Politics: A History of Contemporary Ecology* (New Haven: Yale University Press, 1997).

\_\_\_\_\_. "Ecosystems, Ecologists, and the Atom: Environmental Research at Oak Ridge National Laboratory," *Journal of the History of Biology* 28 (1995): 1-47.

Bruno, Laura. "The Bequest of the Nuclear Battlefield: Science, Nature, and the Atom during the First Decade of the Cold War," *Historical Studies in the Physical and Biological Sciences* 33 (2003): 237-60.

Capshew, James H. and Karen A. Rader. "Big Science: Price to the Present," *Osiris* 7 (1992): pp. 3-25.

Cook-Deegan, Robert. *The Gene Wars: Science, Politics, and the Human Genome* (New York: Norton, 1994).

Creager, Angela N. H. "Nuclear Energy in the Service of Biomedicine: The U.S. Atomic Energy Commission's Radioisotope Program, 1946-1955," *Journal of the History of Biology*, submitted June 2005.

\_\_\_\_\_ and María Jesús Santesmases. "Radiobiology in the Atomic Age: Changing Research Practices and Policies in Comparative Perspective," Introduction to a Special Issue of the *Journal of the History of Biology*, submitted June 2005.

Department of Energy Office of Science. "About the Office of Science: Overview," on <http://www.science.doe.gov/sub/about/About-overview.htm> (accessed 11 September, 2005).

Forman, Paul. "Behind Quantum Electronics: National Security as Basis for Physical Research in the United States, 1940-1960," *Historical Studies in the Physical and Biological Sciences* 18 (1987): 149-229.

Greenbaum, Leonard. *A Special Interest: The Atomic Energy Commission, Argonne National Laboratory, and the Midwestern Universities* (Ann Arbor: University of Michigan University Press, 1971), pp. xvi -xvii.

Hagen, Joel. *An Entangled Bank: The Origins of Ecosystem Ecology* (New Brunswick: Rutgers University Press, 1992).

Holl, Jack M. with the assistance of Richard G. Hewlett and Ruth R. Harris. *Argonne National Laboratory, 1946-96* (Urbana: University of Illinois Press, 1997), p. xi.

Kevles, Daniel J. "Cold War and Hot Physics: Science, Security, and the American State, 1945-56," *Historical Studies in the Physical and Biological Sciences* 20 (1990): 239-264.

Kwa, Chunglin. "Radiation Ecology, Systems Ecology and the Management of the Environment," in Michael Shortland, ed., *Science and Nature: Essays in the History of the Environmental Sciences* (Stanford in the Vale: British Society for the History of Science, 1993), pp. 213-249.

Lenoir, Timothy and Marguerite Hays. "The Manhattan Project for Biomedicine," in Philip R. Sloan, ed., *Controlling Our Destinies: Historical, Philosophical, Ethical, and Theological Perspectives on the Human Genome Project* (Notre Dame, Indiana: University of Notre Dame Press, 2000), pp. 29-62.

Lindee, M. Susan. *Suffering Made Real: American Science and the Survivors of Hiroshima* (Chicago: University of Chicago Press, 1994).

Nonet, Genevieve H., Martha R. Stampfer, Koei Chin, Joe W. Gray, Colin C. Collins and Paul Yaswen. "The ZNF217 Gene Amplified in Breast Cancers Promotes Immortalization of Human Mammary Epithelial Cells" *Cancer Research* 61 (15 February 2001): 1250-1254.

Paris, Elizabeth. "'Do You Want to Build Such a Machine?'" Designing A High Energy Proton Accelerator for Argonne National Laboratory, ANL/HIST-2, produced by the Argonne National Laboratory, 2003.

Rader, Karen A. "Alexander Hollander's Vision for Biology at Oak Ridge," submitted to the *Journal of the History of Biology*, June 2005.

\_\_\_\_\_. *Making Mice: Standardizing Animals for American Biomedical Research, 1900-1955* (Princeton: Princeton University Press, 2004).

Weeks, Jennifer. "Will O'Leary Legacy Last?" *Bulletin of the Atomic Scientists* 54, no. 2 (March 1998): 11-14.

Westfall, Catherine. "Civilian Nuclear Power on the Drawing Board: The Development of the Experimental Breeder Reactor-II," ANL/HIST-1-03/6, produced by the Argonne National Laboratory, 2003a.

\_\_\_\_\_. "Rethinking Big Science: Modest, Mezzo, Grand Science and the Development of the Bevalac, 1971-93," *Isis* 94: 30-56 (2003b).

Westwick, Peter. *The National Labs: Science in An American System, 1947-1974* (Cambridge, MA: Harvard University Press, 2003).

Young, Christian C. *The Environment and Science: Social Impact and Interaction* (Santa Barbara, CA: ABC-Clio, 2005).

## Appendix #1: Alphabetical List of Key People and Acronyms Used

### Key People

<b>Crewe, A.W.</b>	ANL Laboratory Director (1961-67)
<b>Croke, E. J.</b>	ANL Director of CES (1971-74); Director of EES (1974-2002)
<b>Duffield, Robert</b>	ANL Laboratory Director (1967-72)
<b>Drucker, Harvey</b>	ANL ALD of EE (1983-2004)
<b>Gustafson, P. F.</b>	ANL Associate Division Director of RP (1968-72); manager of ESP (1972- 75) and Director of EIS (1975-80)
<b>Haas, Felix</b>	Member and Chairman, AUA Biology Committee (1968-71)
<b>Link, Leonard</b>	ANL First Director of CES (1969-71)
<b>Marinelli, Leo</b>	ANL Director of RP (1963-67)
<b>Massey, Walter</b>	ANL Laboratory Director (1979-84)
<b>Nevitt, M. V.</b>	ANL Laboratory Deputy Director of Research (1969-81)
<b>Powers, Phillip</b>	AUA Board President (1966-72), from Purdue University
<b>Pewitt, E. G.</b>	ANL ALD of EE (1973-79)
<b>Roberts, J. J.</b>	ANL ALD of EE (1979-83)
<b>Rowland, Robert</b>	ANL Director of RP (1967-80); Acting ALD of BER (1981-83)
<b>Sachs, Robert</b>	ANL Laboratory Director (1973-78)
<b>Seaborg, Glenn</b>	Chairman, Atomic Energy Commission (1961-71)
<b>Sinclair, Warren</b>	ANL ALD of BER (1974-81)

### Key Acronyms

<b>AEC</b>	Atomic Energy Commission
<b>ALD</b>	Assistant Laboratory Director
<b>AMU</b>	Association of Midwest Universities
<b>AP</b>	ANL Atmospheric Physics Division
<b>AUA</b>	Argonne Universities Association
<b>BER</b>	Biological and Environmental Research ALDship, which consisted of BIM, RER and EIS
<b>BIM</b>	ANL Biological and Medical Division
<b>CAPSAP</b>	Chicago Air Pollution Systems Analysis Program
<b>CES</b>	ANL Center for Environmental Studies (fnd. 1969)
<b>DEA</b>	AEC Division of Environmental Affairs
<b>DBER</b>	AEC Department of Biological and Environmental Research
<b>DBM</b>	AEC Division of Biology and Medicine
<b>DOE</b>	U.S. Department of Energy (fnd. 1976)
<b>DREP</b>	AEC Division of Radiological and Environmental Protection
<b>EE</b>	Energy and Environment ALDship (becomes EET in 1978)
<b>EES</b>	ANL Energy and Environmental Systems Division (fnd. 1974)
<b>EET</b>	ANL Energy and Environmental Technologies ALDship (EE prior to 1978)
<b>EIS</b>	ANL Environmental Impact Studies Division (fnd. 1975)

<b>EPA</b>	U.S. Environmental Protection Agency (fnd. 1970)
<b>ER</b>	Environmental Research Division (1983-present)
<b>ERDA</b>	AEC Energy Research and Development Administration
<b>ERS</b>	Environmental Radiation Studies, ANL research group
<b>ESBC</b>	AUA Environmental Studies Board Committee
<b>ESP</b>	ANL Environmental Statement Project (beginning 1971)
<b>GLRP</b>	ANL Great Lakes Research Program (1970-1981)
<b>MRESP</b>	Midwest Regional Environmental Systems Program
<b>NARA-CP</b>	National Archives & Records Administration, College Park (Archives II)
<b>NARA-GL</b>	National Archives & Records Administration, Great Lakes
<b>NEPA</b>	National Environmental Policy Act (1969)
<b>OHER</b>	DOE Office of Health and Environmental Research
<b>OEPA</b>	BER Office of Environmental Policy Analysis
<b>ORNL</b>	Oak Ridge National Laboratory
<b>RER</b>	ANL Radiological and Environmental Research Division (1970- 1982)
<b>RP</b>	ANL Radiological Physics Division (1946-1970)
<b>TIE</b>	The Institute of Ecology, international federation of institutions engaged in ecological research

Appendix #2 – Organization Chart for  
Argonne National Laboratory Divisions  
Involved in Environmental Research

Center for Environmental Studies ---> Energy and Environmental Studies  
CES – (1969) EES -- (1974)

Radiological Physics Div. Radiation & Environmental Rsch Div  
(RP), fnd. 1946 ---> (RER) fnd. 1970 --->

Biological & Environmental Research  
(BER) Associate Lab Directorship  
Environmental Rsch. Div.  
(ER), fnd. 1983

Biology and Medicine Division  
(BIM), fnd. 1946

Meteorology Group

Fallout Studies  
(In RP Division)

Radium Toxicity Group ---> Center for Human Radiobiology  
(CHR), fnd. 1969

**APPENDIX #3 – About the Authors**

**Karen A. Rader** teaches Science, Technology, and Society at Sarah Lawrence College in Bronxville, NY. She is the author of *Making Mice* (Princeton UP, 2004), and the recipient of an NSF CAREER (2002 to present) grant for a project entitled: “Biology on Display: Changing Mode of Exhibiting Life in American Science Museums, 1910-1985.”

**Judith Johns Schloegel** is a postdoctoral research fellow at Argonne National Laboratory in Argonne, Illinois. She earned a Ph. D. in History and Philosophy of Science at Indiana University in 2005, and has published several articles related to her dissertation: “Intimate Biology: Herbert Spencer Jennings, Tracy Sonneborn, and the Career of American Protozoan Genetics.”