

# FOCUS on Global Resources

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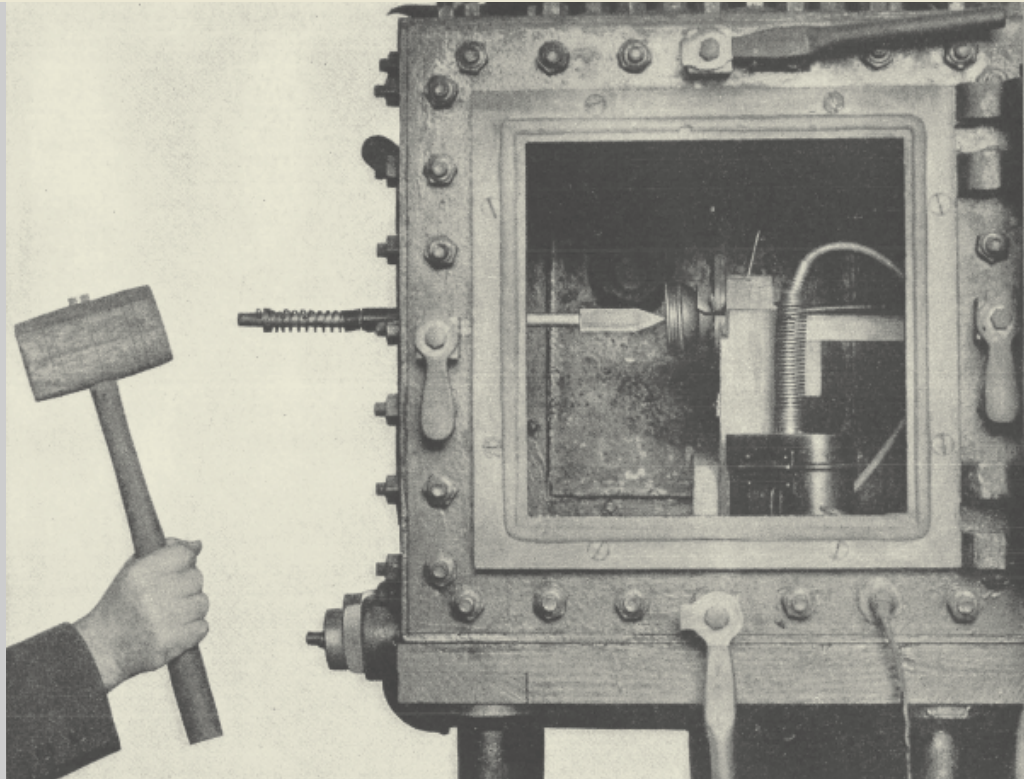
## GOVERNMENT TECHNICAL REPORTS

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"Equipment for testing safety devices of electric miner's lamp in explosive mixture of gas and air." From *U.S. Department of Commerce Bureau of Mines Bulletin 131: Approved Electrical Lamps for Miners* by H. H. Clark and L. C. Isley (Washington, D.C.: U.S. Government Printing Office, 1917). From TRAIL collections.



### *Technology's Memory*

This issue of *Focus on Global Resources* highlights the Technical Report Archive and Image Library (TRAIL), a new CRL Global Resources program that is preserving the vast technical literature produced by U.S. federal government agencies, and making that literature available openly accessible on the Web. The program was conceived and initiated by a multi-university team of dedicated librarians and engineering specialists led by Maliaca Oxnam of the University of Arizona. TRAIL has now scanned more than 1.9 million pages of public domain technical reports in engineering, nuclear science, health and safety, and other scientific and technical fields.

Related to the technical literature digitized by TRAIL are the important collections of crucial technical documents held by CRL. As Gwen Ihnat's article shows, these collections not only document the history of government-funded achievements in science and engineering, but provide a window to the monitoring of those activities by U.S. and British intelligence agencies.

Scholars and researchers, who will be mining these materials for years, owe a debt of thanks to the TRAIL librarians and others in the CRL community.

—Bernard F. Reilly, Jr.  
President

## Capturing America's Scientific History through Technical Report Literature



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*Associate Librarian, Science-Engineering  
Library*

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Cover of *Environmental Contamination from Weapon Tests* report (New York: Health and Safety Laboratory, United States Atomic Energy Commission, 1958). From TRAIL collections.

To many, the explicit record of the technical details and progress of scientific experiments may seem overwhelming; to scientists and historians, that detail is essential. Technical reports have long been recognized as a means of documenting scientific progress to specialized audiences of researchers. Contributing to the continued development and growth of science and technology, technical reports are often distributed by industry, research organizations, and the federal government. Reports range from several pages to several hundred pages and may contain maps, blueprints, schematics, data recordings, and descriptive text.

When polled, those who are familiar with technical reports often tend to think of publications from the Department of Energy (DOE), the Department of Defense (DOD), the National Aeronautics and Space Administration (NASA), and the Environmental Protection Agency (EPA). With the Internet and decreasing costs of scanning technology, these agencies have done much to increase access to their more recent publications and are striving to digitize and make their older literature more available in digital format. Other preceding agencies and government-funded laboratories have less stewardship and remembrance for these scientific technical reports.

Hundreds of millions of dollars of federal research and development money have been invested in the development of this science. Scientists, engineers, and historians depend on these reports that document scientific history. Improved access to the legacy report literature allows researchers to connect to past research relevant to their current projects, and in some cases eliminates the need to recreate the original research.

### **The Technical Report Archive & Image Library (TRAIL)**

Most large research libraries have sizeable amounts of federally funded technical research report literature in their collections, often housed in their science and engineering libraries, their government document collections, or some combination of both. However, researchers and librarians still find reports in these collections difficult to identify and locate for several reasons:

- Dissemination to libraries has occurred through a variety of agencies and organizations over many years, often based on institution profiles, creating incomplete sets of reports.
- Science, technology, and medicine indexing sources contain limited bibliographic access and control; often more than one index must be consulted to retrieve essential information about a report.
- Collections are usually available in some combination of print and microfiche, which may differ between institutions, and are difficult to access without known

citations and mediation to navigate through the various collections and specific institutional organization strategies.

- Depending on institutional preferences and availability, some collections of reports were produced and distributed using poor quality media, resulting in disintegrating and unusable pieces of collections.
- Most library catalogs and bibliographic utilities include only access points at a broad series level and even fewer records for individual technical reports in their online cataloging systems, making it difficult for users to determine the availability of reports at a title level in local library collections.
- Most legacy reports are not accessible in electronic format and are difficult to acquire via interlibrary loan.

With these challenges in mind and awareness that researchers today want access to materials in digital form from common discovery points such as Google, many librarians from universities and research institutions from around the country have avidly responded with interest in improving user access to these legacy research report collections.

The Technical Report Archive & Image Library (TRAIL) aims to:

1. Acquire, digitize, archive, and provide unrestricted, persistent access to the technical report literature published by research institutions and government agencies as a requirement of federally funded research. Preference is given to report series where there is no direct agency stewardship and/or no plans for digitization.
2. Assemble and validate a complete set of physical materials to be held at an institution(s), serving as an archive, in case of problems with the digital version.

TRAIL achieves the following direct benefits:

1. Researchers, nationally and internationally, will have open access to important information resources previously only available through mediated assistance in localized collections throughout the country—a trial-and-error method.
2. The national initiative will maximize investment returns from federal funding and research efforts and ensure that an archival collection of technical reports documenting research results achieved over the past 100 years is maintained.
3. University libraries may choose to remove incomplete sets and difficult-to-use groups of legacy reports from their collections, freeing up valuable space for collection growth and development of learning environments.

## The Origins of TRAIL

In fall 2006, the Greater Western Library Alliance (GWLA), in partnership with the Center for Research Libraries, formed TRAIL to explore the feasibility of acquiring, digitizing, and providing access to early technical report literature. For any one institution to tackle a comprehensive digitization and preservation project of the technical report literature would be resource-intensive to say the least, so a collaborative effort with libraries, agencies, and societies all contributing to the development and growth of the digital collection was needed. The following timeline outlines key milestones in the development of TRAIL:

- **2006**—TRAIL taskforce formed by GWLA and CRL; initial project feasibility assessed.

- **2007**—TRAIL released a pilot collection hosted by the University of Hawaii (see <http://digicoll.manoa.hawaii.edu/techreports/index.php>). A partnership with the University of Michigan increased the scanning capacity for digital conversion of technical reports, and allowed subsequent deposit of digital items with the University of Michigan and later HathiTrust.
- **2008**—TRAIL working groups revised process workflows to accommodate increased scanning capacity through partnerships.
- **2009**—Secured partnership with the University of North Texas as a digital archive for materials requiring special handling or materials and series unique in nature.
- **2010**—TRAIL formally becomes part of the Global Resources Network at the Center for Research Libraries; University of Washington develops new TRAIL federated search interface (expected release in October 2010), allowing users to search across reports deposited with the University of Michigan (and HathiTrust) and the University of North Texas, further increasing access to the technical report series acquired and processed to date.

To learn about specific series and viewing inventories for items cataloged and processed to date by TRAIL, a list by series name is available at <http://traildb.library.arizona.edu/collections>.

## To Get Involved with TRAIL

TRAIL is a multiyear collaborative effort with libraries, agencies, and societies all contributing resources and efforts to develop an openly accessible collection of digital copies of technical reports. This collection will allow users to easily search and access historical reports previously available only in print and microform formats. In addition, member institutions collect complete sets of hard copy (paper or microform, as appropriate) technical reports and place them in archival storage.

A digitization and preservation project of this magnitude needs strong coordination and oversight. The TRAIL Steering Committee of elected representatives convenes bi-weekly to discuss project management, sustainability, and issues across four primary areas: 1) Content Selection, 2) Content Cataloging & Digitization, 3) Content Discovery & Delivery, and 4) Reference & Communications. A working group oversees each area:

### Project Management & Sustainability

*Overseen by: TRAIL Steering Committee*

*Key Work Areas:*

- Considers and formulates the policies and procedures governing TRAIL in accordance with the recommendations of the membership
- Conducts the business of TRAIL
- Approves and enacts project activities
- Discusses and recommends future policy or changes in policy to be adopted by the membership
- Makes budgetary decisions for TRAIL
- Approaches funding agencies
- Conducts periodic membership drives
- Maintains communication with scholarly and professional associations, government agencies, and other cooperative projects

### Content Selection:

*Overseen by: TRAIL Central Processing Working Group*



## ***TRAIL's Next Step***

Currently TRAIL has collections of technical reports stored in multiple digital locations, in disparate systems, with similar, but not identical, metadata fields associated with the reports in each location. To streamline access to its collections, TRAIL is building a user interface that will offer both simple and advanced search options so that users will be able to search across those multiple locations and return a single results set.

Information technology staff at the University of Washington Libraries is designing the interface. The simple search option will allow a user to enter a single or multi-word search argument and retrieve a results set that can then be further refined if desired. Through the advanced search, users can do field-specific searching (title, author, report number, document type, date, and issuing agency) and combine terms using standard Boolean operators.

Once a result set is received, the user then can use facets (date, author, subject) to choose selected terms from a list to further narrow a search. The reverse is also true: if a searcher uses a facet to narrow a search and the results set is too small or specific, a facet can easily be removed to expand the results set.

Selecting a specific item will give the user a brief catalog record, displaying the title, author, place of publication, date of publication, subject terms, and a link to the digital copy of the work, regardless of its location.

Look for the TRAIL interface update in October at [www.technicalreports.org](http://www.technicalreports.org).

### **Key Work Areas:**

- Responsible for all aspects of the project related to the identification, selection, and acquisition of report series for scanning and placement in the print archive
- Assesses inventory holdings and formats of technical reports at interested institutions holding major print collections of technical reports
- Determines content digitization strategy (which collections are digitized and in what priority)
- Manages commitments for contributing documents for digitization and archival storage
- Oversees inventory of processed collections; note and seek missing reports
- Validation of completed sets of report series

### **Content Cataloging & Digitization:**

*Overseen by: TRAIL Collections Working Group*

#### **Key Work Areas:**

- Manages and records receipt of all physical items for digital conversion and cataloging
- Manages digital conversion processes for all items
- Determines digitization requirements (in collaboration with the Technology Working Group)
- Catalogs all items included in TRAIL
- Manages physical shipments to digitization partners
- Oversees quality control processes
- Ensures delivery of digital items to digital preservation partners

### **Content Discovery & Delivery:**

*Overseen by: TRAIL Technology Working Group*

#### **Key Work Areas:**

- Determines digitization requirements (in collaboration with the Central Processing Working Group)
- Identifies metadata requirements for system functionalities
- Manages search interface for TRAIL collections
- Manages digital repository structures for TRAIL materials

### **Reference & Communications:**

*Overseen by: TRAIL Reference & Communications Working Group*

#### **Key Work Areas:**

- Responds to all requests for assistance from TRAIL users
- Coordinates all communications on behalf of TRAIL
- Manages content on TRAIL Web pages and TRAIL search interface
- Manages all orientations for new project participants
- Develops and provides training on materials in TRAIL

It is important to note that institutions do not need to contribute physical collections to the project in order to participate. There are many opportunities for librarians to contribute intellectual input and advisement to the project through the working groups noted above. For more information on the project and joining TRAIL, visit <http://www.crl.edu/grn/trail/about-trail>. ❖



View of the mouth of a coal mine and surroundings after a fire. From *U.S. Department of Commerce Bureau of Mines Bulletin 229: Fifty-nine Coal-Mine Fires: How They Were Fought and What They Teach* by G. S. Rice, J. W. Paul, and M. W. von Bernerwitz (Washington, D.C.: U.S. Government Printing Office, 1927). From TRAIL collections.

Within the last three years, the TRAIL project has received feedback from all over the country and around the world affirming the value of the newly available materials:

In reference to NBS Monograph 93, *Spot Diagrams for the Prediction of Lens Performance from Design Data* (1965), a Massachusetts resident commented,

“The 25 year old copy of the monograph that I have was destroyed by water . . . finding it online makes me very happy! Please pass on my great appreciation to all those who have put together this very valuable service.”

A researcher from Washington state referenced the U.S. Bureau of Mines Bulletin 188, *Lessons from the Granite Mountain Shaft Fire, Butte* (1922):

“Thanks for providing this old bulletin online! I know that many people are interested in USBM documents, including my researchers, and usually the preference is for digital copies. You might get quite a few hits on these old docs.”

The president of Old Forge Coal Mine Inc. wrote:

“I can’t begin to express the gratitude and research potential your site has provided to us.

I am the president of the Old Forge Coal Mine Inc., an all volunteer non-profit educational and historical archive for the coal mining history, heritage, and industries that supported coal mining for the town of Old Forge, Pennsylvania.

Thanks to TRAIL, I am able to find and download Bureau of Mine Bulletins pertaining to my area that the Bureau of Mines and Office of Surface Mining in Pa. don’t even have in their libraries at Pottsville and Wilkes-Barre.

Your site has made my research efforts a lot easier, saving weeks of time and travel expenses.”

The president of a business in South Africa referenced USBM 406, *Contributions to the Data on Theoretical Metallurgy: VII. The Thermodynamic Properties of Sulfur and Its Inorganic Compounds* (1937):

“I am working towards the commercialization of a modification of the original thioigen process from 1917. The full report will be invaluable to my work. We have already incorporated some aspects of the original citrate process, also in your database, in our gypsum-to-sulphur pilot plant currently in construction.”

An engineering professor from Cambridge wrote:

“I was delighted to find NBS memorandum number 122 (*The Mechanics of Pneumatic Tires* [1971]) available in digital form.”

From an engineer in France:

“First of all, I want to congratulate the TRAIL team for the job you are doing. Making all those old reports easily available will certainly make life easier for many people. In my case, as I live in Europe, it is hard to find even paper copies of the USBM publications. Ordering them from GPO takes a couple of weeks, probably because of shipment.

I found the TRAIL Web site while I was Googling for USBM bulletin no. 672, *The Thermodynamic Properties of Elements and Oxides* (1982). Thank you again for the great job you are doing.”

# The Impact of Historical Federal Technical Reports

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and

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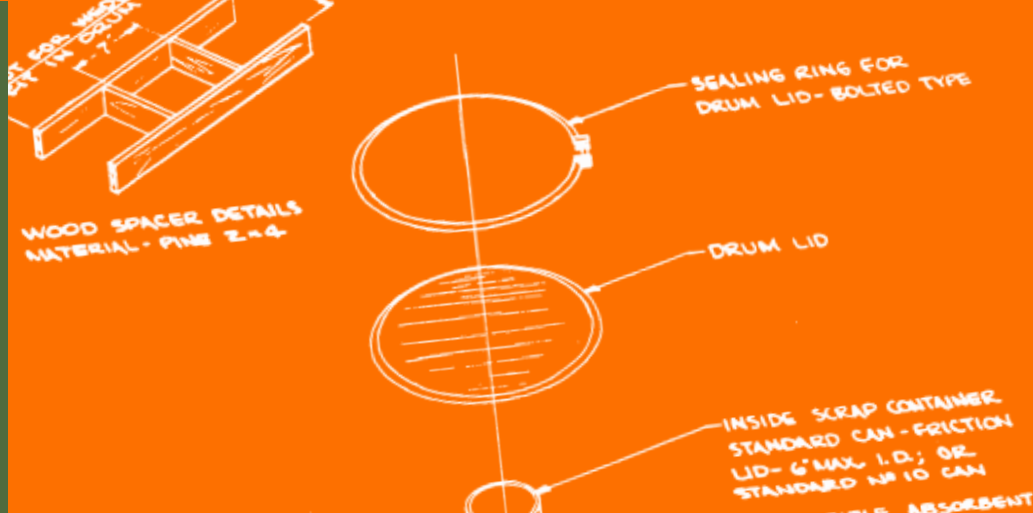


Diagram of a uranium scrap drum shipping container. From *Nuclear Safety in Manufacturing Plants* by James E. McLaughlin (New York: Health and Safety Laboratory, United States Atomic Energy Commission, 1959). From TRAIL collections.

What may look like long-forgotten, dusty government documents found in the recesses of most major libraries are actually relevant technical reports still invaluable to researchers around the world. Many libraries hold technical reports as part of government documents collections the Government Printing Office distributed to their depository libraries. This program, known as the Federal Depository Library Program (FDLP), requires retention of materials in accordance with federal law and regional procedural guidelines.

With space at a premium and facing current economic realities, many libraries feel the burden of housing and maintaining the large volume of depository materials. These libraries might not retain older technical reports, already difficult to identify and locate, in the future. A number of libraries, including two regional depositories, tasked with retaining all items received through the FDLP, have given up depository status in recent years. The Technical Report Image and Archive Library (TRAIL) project provides an advantageous situation for all concerned parties. Researchers do not lose access to needed technical reports; library administrators can begin to reclaim space for other uses; and librarians can provide improved and permanent access at little or no cost. Most importantly, these legacy technical reports will continue to impact the work of researchers for untold years to come.

TRAIL is diligently finding, collecting, cataloging, and digitizing pre-1975 federal technical reports on the verge of disappearing. By polling science and government documents librarians, reviewing “Appendix B: Federal Executive Agencies Terminated, Transferred, or Changed in Name Subsequent to March 4, 1933” from the *United States Government Manual*, and using tools such as the *Guide to U.S. Government Publications*, TRAIL identifies technical report series as candidates for digitization.

TRAIL contacts current agencies to make certain that efforts do not duplicate any digitization plans. Many agencies have digitization projects or plans, and TRAIL reviews many factors before including a series in the project. To date, TRAIL is collecting and digitizing technical report series from the following federal agencies: Atomic Energy Commission, Coast and Geodetic Survey, Department of Commerce, Energy Research and Development Administration, Environmental Protection Agency, Environmental Science Services Administration, Federal Energy Administration, Fish and Wildlife, National Aeronautics and Space Administration, National Bureau of Standards, National Science Foundation, Nuclear Regulatory Commission, Office of Saline Waters, and the United States Bureau of Mines. The Web page [Series in Process](#) allows researchers to see what series are being considered for digitization and the processing status of different series.



Image of National Bureau of Standards (NBS) Electronic Automatic Computer by the National Institute of Standards and Technology, 1950. From TRAIL collections.

*“The rarity and sometimes historical significance of the digitized reports make TRAIL unique.”*

The rarity and sometimes historical significance of the digitized reports make TRAIL unique. For example, the Manhattan Engineering District issued the Manhattan District Declassified Code (MDDC) documents in association with work on the Manhattan Project, the secret atomic bomb project in the 1940s. Some of these documents, such as *Element 94 in Nature*, were once secret reports mailed from Berkeley, California, to the “Uranium Committee” in Washington, D.C., in 1942. *The Effects of Radiation on Hemopoiesis* discusses the effects of chronic radiation exposure. The Manhattan District Declassified Code technical report series is one of many series from the Atomic Energy Commission being digitized. Both academic and public libraries are contributing their copies of these documents to TRAIL for digitization and permanent access.

TRAIL is also digitizing the vast body of technical reports produced by the National Bureau of Standards (NBS), which includes a variety of topics including energy-efficient heat pumps, the time signal, and the metric system. The agency explored research into energy alternatives including electric and solar energy, a topic of increasing current interest. In the 1920s, NBS began continuously broadcasting the time signal via radio station WWV, a service continued today by WWVB, operated by NBS successor the National Institute of Standards and Technology (NIST). The NBS adopted the metric system as its standard in 1964, preceding the effort to convert the United States to the system in the 1970s.<sup>1</sup> By digitizing these reports, the TRAIL project has made certain that the work of this interesting agency remains available and accessible to the public.

The digitized reports found in TRAIL have affected researchers around the world. For example, the U.S. Bureau of Mines Bulletins series have provided researchers with information still useful today. *USBM Bulletin 133: The Wet Thiogen Process for Recovering Sulphur from Sulphur Dioxide in Smelter Gases: A Critical Study* has been used for current mine operations, and *USBM Bulletin 627: Flammability Characteristics of Combustible Gases and Vapors* provided relevant information on the flammability of gases.

These digitized technical reports also have practical aspects for researchers. The on-line accessibility eliminates the weeks of wait time it takes to order and receive print copies. For one researcher, print copies were no longer available from the issuing agency. Others have noted that the TRAIL site eases research efforts, saving time and travel expenses.

The TRAIL government documents and engineering librarians continue to search for pre-1975, federal technical report series to add to this well-received legacy project. They welcome any suggestions from colleagues and the scientific community on other report series to review for digitization or an agency to review for potential technical reports. Please contact [TRAIL](#) for suggestions or comments. ❖

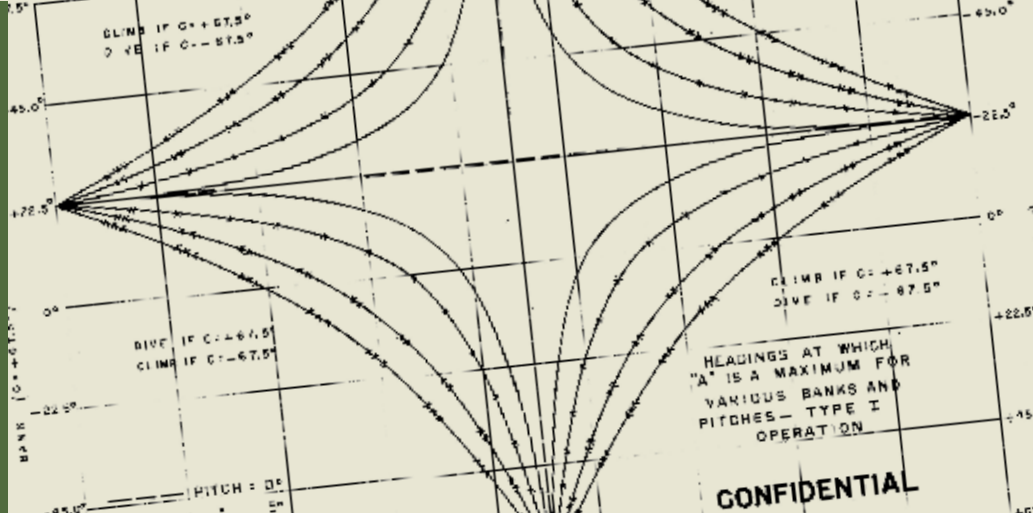
<sup>1</sup> U.S. Metric Association, *A Chronology of the Metric System* (<http://amar.colostate.edu/~hillger/dates.htm>)



## Technical Documents in CRL Collections

Gwen Ihnat

Communications Specialist  
Center for Research Libraries



Graph from *Analysis of Operation of the Universal Magnetometer Head* by M. S. Richardson and A. C. Weld, OSRD report no. 1776 (Mineola, N.Y.: Airborne Instruments Laboratory, 1943). From CRL collections.

Besides acting as a major partner with TRAIL, the Center for Research Libraries also houses some significant collections of technical reports:

### U.S. Office of Scientific Research and Development Reports

On June 28, 1941, President Franklin D. Roosevelt signed Executive Order 8807, which created the Office of Scientific Research and Development (OSRD). Its purpose was to assure “adequate provision for research on scientific and medical problems relating to national defense.”<sup>1</sup> Essentially, this U.S. federal government agency coordinated scientific research for military purposes during World War II. Scientist and engineer Dr. Vannevar Bush, reporting directly to President Roosevelt, ran the agency, which superseded the National Defense Research Committee (NDRC) and received almost unlimited access to funding and resources until it was discontinued at the end of 1947. Dr. Bush described the agency as “the medium through which scientists were joined in effective partnership with military men.”<sup>2</sup>

Although the agency had a short lifespan, it developed a vast array of projects (especially during World War II), including research on more accurate bombs, reliable detonators, work on the proximity fuze, radar and early-warning systems, lighter and more accurate hand weapons, more effective medical treatments, more versatile vehicles, and most famously, the “S-1 Section”, the precursor to the Manhattan Project, which developed the first nuclear weapons. At the agency’s close, Congress said of the OSRD, “The contribution it has made to the winning of the war is inestimable. Without such contribution, it is safe to say that victory would still await achievement.”<sup>3</sup>

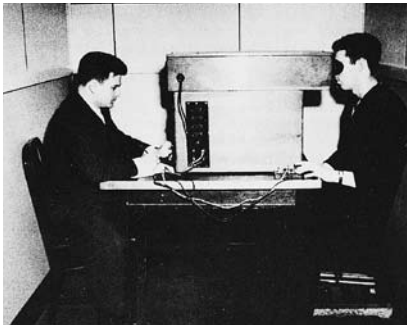
OSRD also used conscientious objectors from Civilian Public Service as subjects for research of malaria, altitude pressure, life raft rations, high altitude, frost bite, psycho-acoustics, poison gas, ingestion of and exposure to sea water, temperature extremes, climate, physiological hygiene, thiamine, bed rest, and aero medicine.

CRL’s collection contains technical reports of research OSRD conducted during World War II on warfare (for example, ballistics, fire control, radar, optics) and on medical topics. The reports were declassified and distributed to libraries beginning in 1946; CRL’s collection resulted from deposits by member libraries and is not complete but is extensive. The reports are arranged on the shelf by OSRD number or, if the report was not assigned a number, by the division under whose administration the report was produced. Two bibliographies are useful in identifying and verifying citations to reports:

<sup>1</sup> Irvin Stewart, *Organizing Scientific Research for War; the Administrative History of the Office of Scientific Research and Development* (Boston: Little, Brown, 1948), 36.

<sup>2</sup> *Ibid.*, ix.

<sup>3</sup> Report 1125 of the Committee in Appropriations of the House of Representatives, October 17, 1945.



To screen candidates for its WWII Submarine School, the U.S. Navy conducted “shock-fusion test” trials, which investigated the effects of emotional stress on reaction time. From *A Report of Research on Selection Tests at the U.S. Submarine Base*, OSRD report no. 1770 (Providence, R.I.: Brown University, 1943). From CRL collections.

Detail, cover of *General Review of Projects and Symposium on Optical Plastics*, OSRD report no. 1786 (Washington, D.C.: National Defense Research Committee, Office of Scientific Research and Development, 1943). From CRL collections.

- Library of Congress. Navy Research Section/Technical Information Division. A catalog of OSRD reports. Z1223.S35 (This work covers only divisions 1–8 of the 23 administrative divisions.)
- U. S. Department of Commerce. OSRD reports; a bibliography and index. (This work covers only reports with assigned OSRD numbers and only those declassified at the date of publication: June 1947.)

CRL also offers an [online guide](#) of OSRD reports, featuring declassified technical reports from World War II. These reports offer information on the aforementioned studies that the OSRD performed on contentious objectors during the war years, including such scientific subjects as the physiological effects of altitude, antimalarial drugs, sickness resulting from decompression, and the effects of bed rest.

## German and Axis Technology Reports

This rare collection includes reports on technology, engineering, and industries, chiefly in Germany. Allied forces such as the Combined Intelligence Objectives Subcommittee, the British Intelligence Objectives Sub-committee, and the Field Information Agency, Technical captured and collected these reports during and immediately following World War II. Titles include *Instrumentation and Control in the German Chemical Industry* and *A Survey of German Electro-plating Methods*, as well as subjects such as chlorine plants, pharmaceuticals, viscose rayon plants, radar, and the German clock and watch industry. The reporting agencies and CRL’s holdings include:

- Allied Forces. Supreme Headquarters. *Report [of the] Combined Intelligence Objectives Sub-committee (C.I.O.S.) file*, no. 1–33 [incomplete]. (Includes about 500 reports)
- Germany (Territory under Allied Occupation, 1945—U.S. Zone). Field Information Agency, Technical. *F.I.A.T. Final Report*, no. 46–1313 [incomplete]. (Includes about 500 reports)
- Great Britain. British Intelligence Objectives Sub-committee. *B.I.O.S. Final Report*, no. 1–1874 [incomplete]. (Includes about 1,500 reports)
- U.S. Joint Intelligence Objectives Agency. *J.I.O.A. [report]*, no. 1–174 [incomplete]. (Includes about 75 reports)
- U.S. Joint Intelligence Objectives Agency. *J.I.O.A. final report*, nos. 68 and 80 only.

In addition to these major sources, CRL maintains a selection of domestic and international technical reports. Foreign sources include government-sponsored reports from Australia, India, Japan, Pakistan, Russia, Yugoslavia, and other countries. For more information on CRL resources, consult CRL’s [online catalog](#). ❖



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