1 of 2

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CEDR

*U.S. Department of Energy
Assistant Secretary for Environment, Safety and Health
Washington, D.C. 20585*

COMPREHENSIVE EPIDEMIOLOGIC DATA RESOURCE

Office of Epidemiology and Health Surveillance

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prepared by:

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MASTER

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Foreword

CEDR, the Comprehensive Epidemiologic Data Resource, is a paradigm for the cultural change in the Department of Energy. Indeed, its initiation heralded the change, and its development demonstrated the appropriateness of a new way of thinking in the Department. CEDR has incorporated stakeholder involvement, teamwork, and openness as it has evolved to meet changing priorities with limited resources. CEDR is a dynamic system, and the bounds for its usefulness have hardly been explored. This catalog is one way by which we hope to facilitate that exploration and foster new discovery and understanding.

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Acknowledgements

The Department of Energy (DOE) wishes to acknowledge the efforts of the organizations and staff who have provided data to CEDR. They have worked closely with DOE to provide the data, to provide accurate and complete structured documentation, and to verify that the resulting entry into CEDR reflects their submissions. The staff at Lawrence Berkeley Laboratory developed and operate the CEDR computer information system and have been instrumental in designing the system and ensuring the accuracy and availability of data. DOE also wishes to thank all the states for making their data available to CEDR and, therefore, helping the CEDR Program accomplish its mission.

Introduction to the DOE CEDR Program

Mission of the DOE CEDR Program:

To enhance DOE's epidemiologic research by facilitating independent research to validate and supplement DOE research on health effects associated with working at or living near facilities involved with DOE or other energy production activities.

The Department of Energy (DOE) and its predecessor agencies have a long history of epidemiologic research programs. The main focus of these programs has been the Health and Mortality Study of the DOE work force. This epidemiologic study began in 1964 with a feasibility study of workers at the Hanford facility. Subsequently, epidemiologic studies were undertaken at many DOE facilities to determine the health consequences of working in these facilities. Studies of other populations exposed to radiation have also been supported, including the classic epidemiologic study of radium dial painters and studies of atomic bomb survivors. From a scientific perspective, these epidemiologic research programs have been productive, highly credible, and formed the bases for many radiological protection standards.

Recently, there has been concern that, although research results were available, the data on which these results were based were not easily obtained by interested investigators outside DOE. Therefore, as part of an effort to integrate and broaden access to its epidemiologic information, the DOE has developed the Comprehensive Epidemiologic Data Resource (CEDR) Program. Included in this effort is the development of a computer information system for accessing the collection of CEDR data and its related descriptive information.

The epidemiologic data currently available through the CEDR Program consist of analytic data sets, working data sets, and their associated documentation files. Detailed definitions of these data sets and files are provided in Section 2. In general, data sets are the result of epidemiologic studies that have been conducted on various groups of workers at different DOE facilities during the past 30 years.

CEDR Program Goals:

- ❖ **To provide data from the DOE epidemiologic studies program to all interested parties**
- ❖ **To provide opportunities for new scientific understandings**
- ❖ **To identify and incorporate other data potentially useful for health studies**
- ❖ **To create a central repository of data related to epidemiologic and health concerns**

As these studies are updated and new studies are performed, additional data sets will become available.

As the CEDR Program matures, other types of data useful for epidemiologic and health surveillance activities will be added. Data on the atomic bomb survivors, provided by the Radiation Effects Research Foundation in Japan, will be added shortly. Data from Lawrence Berkeley Laboratory's (LBL's) Socio-Economic Environmental Demographic Information System (SEEDIS), such as census data, geographic base map files, mortality and cancer incidence data, and ecologic summary data will also be added. These are examples of possible future data and are not intended to be an exhaustive list.

Not only is the volume of data expected to increase but also the methods of disseminating and providing access to CEDR data will continue to grow and evolve. Therefore, comments and suggestions for helping the CEDR Program achieve its goals are always welcome and should be directed to the CEDR Program Manager (address and phone number are provided on the next page).

Purpose of This Catalog

This catalog is intended for use by any individual interested in obtaining information about, or access to, CEDR data. It serves as a starting point for current or potential users by providing an introduction to the DOE CEDR Program and to the types of data available through CEDR. This catalog should provide sufficient information for users to identify and request data sets of potential use.

Section 2 of this catalog discusses the specific types of data available. Section 3 describes the process for becoming an authorized CEDR

Additional Reading:

DOE supports research on human health effects resulting from the operation of DOE facilities and generation and use of energy. Publications resulting from this research are collected in a bibliography, *DOE Epidemiologic Research Program - Selected Bibliography*, published by the Office of Health. It provides a guide to health-effects research supported by DOE. Single copies are available from the Office of Health.

data user, and Section 4 outlines the methods for obtaining CEDR data and access to CEDR's computer information system. A description of each analytic data set and working data set available in the CEDR computer information system, as of the date of this catalog, is presented in Sections 5 and 6, respectively. A glossary of CEDR-specific and computer terms is provided as well as appendixes containing facility descriptions and CEDR data access forms.

References for Obtaining Additional Information

To obtain further information concerning the CEDR Program and access to CEDR data, please contact:

**Barbara G. Brooks
CEDR Program Manager
Office of Health, EH-421
U.S. Department of Energy
Washington, DC 20585
Phone: 301-903-4674
FAX: 301-903-4677**

To obtain further information concerning access to the CEDR computer information system, please contact:

**CEDR Project
Lawrence Berkeley Laboratory
1 Cyclotron Road, MS 50B-3238
Berkeley, CA 94720
Phone: 510-486-4136
FAX: 510-486-6363 or 510-486-4004
Internet: CEDR@lbl.gov**

Overview of CEDR Data

The CEDR Program provides a repository of DOE data that have been used to support epidemiologic studies. Most of these epidemiologic studies have been published in peer-reviewed journals; however, there are also data that have been used in student dissertations, presentations, and DOE technical reports.

The sources of the data contained in CEDR are various records and files that were generated by each facility to meet specific needs that usually were not related to epidemiologic studies. The data cover different time spans. The number, type, and format of variables included in studies vary considerably. The studies may represent entirely different groups of people or cohorts. For example, some data files will be limited to specific locations, some to specific exposures, some to certain groups of people, and some will contain only morbidity or mortality information.

Data in the CEDR files pertain to approximately 420,000 individuals employed at one or more of 50 DOE sites or facilities. The data support the analyses that have appeared in numerous articles and publications during the last 30 years. The data, approximately 100 megabytes in size, appear at the individual record level and are not aggregated. In order to protect individual privacy, some information has been replaced or is not available. Otherwise, any information, including demographic, socioeconomic, and exposure data, that was collected and placed into an electronic file by the researcher is provided in its entirety.

Data Definitions and Relationships

To help clarify the different types and groups of data in CEDR, a set of CEDR terminology has been defined. However, due to the diverse

Figure 2-1. CEDR Data Set Relationships

nature of the data in CEDR, the definitions are fairly broad. Some of the most commonly used CEDR terms are defined below. Other definitions can be found in Appendix A.

A *data set* is a collection of logically related files. There are two types of data sets defined for CEDR: working data sets and analytic data sets.

A *working data set* contains files of data—called *working files*—with which an investigator worked during the course of the study.

An *analytic data set* contains files—called *analytic files*—on which the analyses or results of a study are based. **Figure 2-1** shows the relationship between working and analytic data sets in CEDR.

Figure 2-2 shows the relationship of working and analytic data sets to their respective files.

**Figure 2-2. Data Set/
Data File Relationships**

Working files may be gathered from a variety of data sources, such as payroll, personnel, or dosimetry systems. Working files may contain an assortment of data, including demographic, work history, industrial hygiene, vital status, internal dosimetry, and/or external dosimetry data. Working files are typically dynamic, with new, updated, and corrected information continually being added to the files. Researchers select data from a number of potentially diverse working files to form their initial analytic data set. Because working files contain the least refined form of data in CEDR, the level of verification and validation applied to working data will vary. For continuing studies, working files are periodically replaced in CEDR with the most current version of the file; older versions are archived by CEDR.

Analytic files contain data upon which a researcher directly bases a study's reported findings. However, the files may also contain additional data that the researcher collected but did not use in the final analysis of the study. Analytic files are typically composites of data (derived from working files) formulated to meet specific cohort descriptions and study needs that represent the best data available at that time. To create analytic files, researchers may subset data to form a cohort, merge data from multiple working files, validate and edit the working data, and convert the data as necessary to conduct the analysis. Analytic files generally represent data that have been extensively reviewed, validated, and verified by a researcher. However, if the cohort for a study is a subset of an analytic file, not all variables or records in the file may have the same level of validation. Analytic files are static and are retained permanently in CEDR. If similar files with updated data are used for additional analyses, a new data set will be defined and stored in addition to the original analytic data set.

Structured documentation is information that describes CEDR data. CEDR maintains a large volume of documentation in structured data base files that provide an overview of the data sets, list citations, describe files, list variables, and contain much of the information normally found in a researcher's code book. The detailed descriptions of each data set presented in Sections 5 and 6 are taken from CEDR structured documentation supplied by the data providers.

How CEDR Data are Collected

As researchers near completion of their study, they compile their working files, analytic files, and structured documentation into data

Figure 2-3. CEDR Data Flow Diagram

Major Contributors:

DOE studies are coordinated primarily by three organizations:

- ◆ Los Alamos National Laboratory (LANL)
- ◆ Oak Ridge Institute for Science and Education (ORISE)
- ◆ Pacific Northwest Laboratory (PNL)

sets that are submitted to the CEDR Program Manager. Although the working and analytic files may differ considerably in content and format, the accompanying structured documentation must be submitted in a standard format. This standard format ensures that the structured documentation explains the data as consistently and completely as possible.

Quality assurance procedures have been implemented throughout CEDR processing to ensure proper validation and verification as the data are incorporated and made accessible. CEDR data are processed as shown in the data flow diagram provided in **Figure 2-3**. When CEDR data are received, the data files are examined and the structured documentation is reviewed for completeness. Data are not accepted until structured documentation requirements are satisfied. After acceptance, the working and analytic files are processed and the structured documentation is loaded into the CEDR system.

One step in validating CEDR data is the comparison of the information provided in the structured documentation files with the actual data in the working and analytic files. The results of data and structured documentation validation efforts are reviewed by the researcher providing the data for final verification and approval.

Caveats of CEDR Data

Data Format

Because the information collected and examined by various researchers was originally generated by DOE facilities, or other sources, for different purposes and needs, there is considerable variation in the format and content of data files. Terminology used to identify vari-

ables also varies considerably. There has been no attempt to standardize individual variables (field names) found throughout the CEDR data. Sections 5 and 6 list the variables, as received from the researchers, that are found in each of the named analytic and working data sets. Because no standardization exists among these variables, all of the following situations are possible:

- Different files may have variables that share the same name but have different meanings.
- Different files may have variables that share the same name and have the same meaning but use a different range of values.
- Different files may have variables that have different names but represent exactly the same information.

Confidentiality Protection

The CEDR Program receives data containing information directly related to specific individuals. To protect the privacy of these individuals, data truncation is performed according to the following guidelines:

- Identifying information, such as individual names, social security numbers, addresses, badge numbers, and similar information, have been replaced with a unique, impersonal number (a pseudo-identifier).
- The specification of race has been limited to white, black, and other.
- The dates of birth and death have been truncated to the year.
- Other personal dates, such as date of employment, are truncated to month and year.

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Becoming an Authorized CEDR Data User

Information about the CEDR Program and access to files of CEDR structured documentation are available to all interested parties. However, due to the nature of CEDR data, precautions must be taken to ensure that the privacy of the individuals in the studies is not violated. CEDR data are to be used only for research. No attempt is to be made to identify individuals.

All users who wish to receive CEDR data files (working or analytic) must complete the access request and confidentiality forms in Appendix B of this catalog. Approved users will receive a CEDR account and start-up information. These users may share CEDR data with approved secondary users helping with the research. As explained on the access request form, CEDR data may not be shared with unauthorized users and must be used according to the restrictions specified.

The authorization process usually takes a few weeks to complete because some states require special individual authorization or notification.

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Methods of Accessing CEDR Data

One of the goals of the CEDR Program is to provide easy access to DOE epidemiological data and to stimulate the use of these data by interested researchers. To facilitate the dissemination of CEDR information and to accommodate disparate user working environments, DOE provides a number of different methods—both traditional and electronic—for obtaining CEDR data and related news and information.

All requestors of CEDR data will be contacted by CEDR staff, and their requests will be filled as promptly as possible. The requestor will be provided with specified data files and the structured documentation associated with those files. The structured documentation includes names of individuals who may be contacted for additional information about the data set.

Traditional Methods (Phone or Mail)

Authorized users may request data sets or files of interest by completing the Data Request Form in Appendix C and then mailing or faxing the form to the CEDR Program Manager (see Section 1 for address and phone number). However, the CEDR catalog—this publication—may be viewed and used without prior authorization. Additional catalogs may be requested by phone, fax, or mail from the CEDR Program Manager.

Electronic Methods

Several electronic access mechanisms have been developed that allow users to establish contact with the CEDR information system

and to use software developed specifically for working with CEDR information and data. These access methods vary in complexity, ease of use, and required computer skill. They accommodate a wide range of user skills and equipment and allow the novice, as well as the sophisticated user, to satisfy their CEDR data inquiries. For example, users having a personal computer and modem may use commercially available communications software to dial in to the system for text-based interaction. Or, if they wish to interact in a graphical mode with the CEDR bulletin board system, they can use free software provided by the CEDR Program. Individuals having access to larger computers may use other communications capabilities, including Internet, to establish contact with the CEDR information system.

Figure 4-1 summarizes the three types of electronic access to CEDR that will be supported. Each method is described in more detail in the subsequent sections. Also, more information concerning any of the electronic methods may be obtained by contacting the CEDR Project at LBL (see Section 1 for the address and phone number).

CEDR OnLine Bulletin Board

Electronic bulletin boards are used to post information and exchange news much like traditional bulletin boards. *CEDR OnLine* is a customized electronic bulletin board system for CEDR users. It provides a mechanism for individuals to browse through current information provided by DOE as well as to pose questions or respond to comments posted by other CEDR users. Users may also post their own information or requests. *CEDR OnLine* will also:

- present the history and scope of the CEDR Program
- provide an explanation of how CEDR data are organized

ELECTRONIC ACCESS METHODS			
	CEDR-Specific Methods		Direct Software Access
	<i>CEDR OnLine</i>	CEDRtext	
Description	Customized electronic bulletin board; provides news and notes capabilities	CEDR custom software; allows viewing of data and structured documentation	Direct access to UNIX, Informix, and SAS commands; allows viewing of data and structured documentation
Authorization Required	No	Yes	Yes
Contact*	CEDR Program Manager (DOE) or CEDR Project (LBL)	CEDR Program Manager (DOE) or CEDR Project (LBL)	CEDR Project (LBL)
Equipment Needed	Any modem-equipped IBM compatible PC or Apple Macintosh, or Internet access	Any modem-equipped IBM compatible PC or Apple Macintosh, or Internet access	Any modem-equipped IBM compatible PC or Apple Macintosh, or Internet access
Comments	<ul style="list-style-type: none"> • May allow future access to CEDRtext • Free graphical-mode software available for PC and Macintosh. X-windows graphical software being developed for Internet users. 	<ul style="list-style-type: none"> • User Manual is under development • Requires 2-3 weeks for authorization 	<ul style="list-style-type: none"> • For experienced users • Work from UNIX prompt • Requires 2-3 weeks for authorization

*See Section 1 for names and addresses.

Figure 4-1. Electronic Access to CEDR

- provide an electronic forum (including an electronic mail capability) where CEDR users could interact about any aspect of CEDR or common data sets of interest
- critique the current system (these critiques will assist DOE in the evaluation and refinement of the CEDR Program and the CEDR computer information system)
- immediately list findings and comments about specific data sets
- list upcoming plans or activities
- record requests for data and structured documentation

CEDR OnLine bulletin board can be accessed in a number of ways depending on whether individuals have dial-in capability or Internet access. Users also have the choice of text or graphics modes of interaction. The following situations are possible:

- To access *CEDR OnLine* bulletin board in a text mode, users with terminals or terminal emulation software (for IBM PC, Macintosh, or other computers) can dial in with a modem.
- To create a simple, graphical, point-and-click interface for navigating the bulletin board, users can obtain a free access program. It is available for IBM PC/compatible and Apple Macintosh computers and can be obtained from the CEDR Program or downloaded directly from the bulletin board when in a text mode session.
- Users with Internet access can use UNIX telnet, rlogin, or xterm commands to interact with *CEDR OnLine* in text mode.
- In the future, users with Internet access and X-Windows servers can use *CEDR OnLine* in graphical mode.

CEDRtext Fact:

The CEDRtext application runs much faster when accessed through a TELNET session on the Internet because the speed of the network connections available to Internet users far exceeds those of telephone connections using the fastest modems.

CEDRtext Data and Structured Documentation Viewer

CEDRtext is a software tool that provides simple, direct access to CEDR data and structured documentation. It is menu-driven software having a variety of commands for exploration of selected data sets to determine their essential characteristics. Because CEDRtext provides direct access to CEDR data, all CEDRtext users must complete the appropriate confidentiality forms (see Section 3). Upon authorization, users will be provided with a CEDR account (no cost) and start-up information. The options available in CEDRtext include:

- listing all currently available data sets
- surveying overviews of each data set, including information on cohort size and properties, exposure types, and citations
- listing information about the files associated with each data set
- generating a list of the variables (fields) in each file, including variable formats and descriptions
- viewing codes used for each variable
- browsing through the actual data contained in each analytic or working file
- viewing help information screens

CEDRtext was designed to be accessible to as many users as possible. Using a modem, authorized users can access CEDRtext by dialing in to the UNIX host computer at LBL from any terminal or from any personal computer with terminal emulation software. Internet users can access CEDRtext via TELNET.

Other Electronic Access

CEDR data reside on a UNIX computer at LBL. The CEDR data are stored in a data base using the Informix relational data base management system. Authorized users familiar with Informix and the query tool ISQL will have direct, read-only access to CEDR data. Widely used statistical packages, S and SAS, are also available for purposes of data exploration. Users will also have access to basic UNIX commands and utilities that may also be useful in examining data, downloading information, or other functions.

The CEDR host computer at LBL is accessible through the Internet, which provides connections that are much faster than those available through dial-up connections. Internet utilities, such as the file transfer protocol (FTP), are also available to facilitate access to the data. Other Internet access techniques, such as Gopher and Wide Area Information System (WAIS), are under consideration.

CEDR Analytic Data Sets

Descriptions of the analytic data sets currently available are presented in this section. These descriptions identify the site or facility from which the data were collected, describe the files and data comprising the data set, and list pertinent citations. In addition, a table that

summarizes the causes of death in the data set is presented. This table uses categories of death derived from groupings of International Classification of Diseases (ICD) Codes as shown in

Figure 5-1. Subsequent pages list the variables found in each file of the data set. For additional information on each of the sites or facilities from which researchers collected data that are available in the CEDR analytic data sets, please see Appendix D.

Figure 5-2 presents a summary table that alphabetically lists the short name for each analytic data set and provides the name of the associated study and a brief description. This table also indicates the order in which the analytic data sets appear in this catalog.

Cause of Death	ICD Codes Included
Infectious & Parasitic Diseases	1 - 136
All Malignant Neoplasms	140 - 209
• Lip, Oral Cavity & Pharynx	140 - 149
• Digestive Organs & Peritoneum	150 - 159
• Respiratory System	160 - 163
• Bone & Connective Tissue	170 - 171
• Skin	172 - 173
• Breast	174 - 174
• Genitourinary System	180 - 189
• Brain/CNS	191 - 192
• Other & Unspecified Sites, Except Brain/CNS	190, 193 - 199
• Lymphatic/Hematopoietic	200 - 209
All Benign Neoplasms	210 - 228
All Neoplasms, Unspecified	230 - 239
Endocrine, Nutritional, Metabolic Diseases & Immunity Disorders	240 - 279
Diseases of Blood & Blood-Forming Organs	280 - 289
Mental Disorders	290 - 315
Diseases of Nervous System & Sense Organs	320 - 389
Diseases of Circulatory System	390 - 458
Diseases of Respiratory System	460 - 519
Diseases of Digestive System	520 - 577
Diseases of Genitourinary System	580 - 629
Complications of Pregnancy & Childbirth	630 - 678
Diseases of Skin & Subcutaneous Tissue	680 - 709
Diseases of Musculoskeletal System & Connective Tissue	710 - 738
Congenital Anomalies	740 - 759
Symptoms & Ill-Defined Conditions	780 - 796
Accidents, Poisoning & Violence (External Causes)	800 - 999

Figure 5-1. Groupings of ICD Codes Used in the Death Summary Table

Figure 5-2. CEDR Analytic Data Sets Currently Available

Data Set	Study Name	Brief Description*	Page
FRW83A01	Fernald (NLO) Cohort Study, 1983	Nonmalignant respiratory morbidity study of 4,101 Fernald uranium workers	23
HFC78A01	Hanford Cohort Study, 1989	Mortality study of 35,869 Hanford operations workers, 1945-1981	27
HFI89A01	Hanford Cohort Study, 1993	Mortality study of 37,012 Hanford operations workers, 1945-1986	31
HFS93A03	Hanford Cohort Study, 1993	Mortality study of 44,101 Hanford operations workers, 1944-1986	35
LAFEMA01	Los Alamos National Lab (LANL) Female Cohort Study, 1987	Mortality study of 5,234 white female workers at LANL research facility	39
LASUIA02	Los Alamos National Lab (LANL) Female Suicide Case Control Study, 1988	Case-control study of suicide among 136 female workers at LANL research facility	43
LND87A01	Linde Uranium Worker Cohort Study, 1987	Mortality study of 995 white male uranium workers	47
MDEXTA02	Mound Facility External Radiation Cohort Study, 1991	Mortality study of 4,182 workers at a research and production facility	51
MDPOLA03	Mound Facility Polonium Exposure Cohort Study, 1991	Mortality study of 4,402 white male workers at a research and production facility	55
MDSMRA01	Mound Facility Cohort Study-Preliminary SMRs, 1991	Mortality study of 4,697 white male workers at Mound	59
ORK25A01	Oak Ridge K-25 (ORGDP) Nickel Exposure Cohort Study, 1984	Mortality study of 8,366 white male workers at a uranium facility	63
ORMULA01	Oak Ridge Facilities Welders Study, 1981	Mortality study of 1,059 white male welders at uranium and research facilities	67

* The numbers of workers in the brief description represent the number of workers in the study cohort. Data in the files may pertain to a larger number of workers.

Figure 5-2. CEDR Analytic Data Sets Currently Available (cont.)

Data Set	Study Name	Brief Description*	Page
ORMULA02	Oak Ridge Facilities World War II Cohort Study, 1990	Mortality study of 28,008 white male workers at uranium and research facilities during WW II	71
ORMULA03	Oak Ridge Facilities Cohort Study—ill-defined Cause of Death, 1992	Mortality study of 1,216 uranium and research workers with ill-defined causes of death	75
ORX10A01	Oak Ridge National Laboratory (ORNL) Cohort Study, 1985	Mortality study of 8,375 white males at ORNL	79
ORX10A02	Oak Ridge National Laboratory (ORNL) Cohort—Follow-up Study, 1991 & 1993	Mortality update study on 8,318 white males at ORNL research facility	83
ORX10A03	Oak Ridge National Laboratory Cancer Case Control Study, 1983	Cancer mortality study of 1,785 male workers at ORNL research facility	87
ORY12A01	Oak Ridge Y-12 Plant Cohort Study, 1988	Mortality study of 6,781 white males workers at a research and development facility	91
ORY12A02	Oak Ridge Y-12 Plant Mercury Exposure Cohort Study, 1984	Mortality study of 5,663 white males at a research and development facility	95
ORY12A03	Oak Ridge TEC Cohort Study, 1981	Mortality study of 18,869 white male TEC workers at a uranium plant	99
ORY12A04	Oak Ridge TEC Phosgene Exposure Cohort Study, 1980 & 1985	Mortality study of 106 male TEC workers highly exposed to phosgene at a uranium plant	103
† PXSMRA01	Pantex Weapons Facility Cohort Study, 1985	Mortality study of 3,564 white male workers at the Pantex weapons facility	107
RFPLUA01	Rocky Flats Cohort Study, 1987	Mortality study of 5,413 white male workers at the Rocky Flats weapons facility	111
SRC88A01	Savannah River Plant Cohort Study, 1988	Mortality study of 9,860 white male workers at the Savannah River Site	115

† All analytic files pertaining to this data set may not be available until October 1993.

FERNALD

FRW83A01 Data Set

Description

This analytic data set consists of one file generated for a 1983 dissertation that involved a study of nonmalignant respiratory disease among white males at the Fernald Facility.

This cohort morbidity study investigated the relationship between exposure to uranium and the development of nonmalignant respiratory disease. Diagnosis was based upon physician diagnoses as recorded on medical insurance claims. An examination of these data, along with exposure associated with job title, suggested that exposure to uranium dust was the principal exposure at Fernald that contributed to the development of nonmalignant respiratory disease. No statistically significant association was demonstrated for non-radioactive chemical exposures.

The single analytic file (PRELIM09) in this data set contains 13,196 records, with one or more records for each person. Data in the file

include demographic, work history, radiation exposure (internal and external), and smoking history (on a 17 4% sample) data. A list of all chemicals used in the plant and indicators of exposure risk level also are provided. The study cohort was defined as 4,101 white males who were first hired at Fernald between January 1, 1952, and December 31, 1972, and who had at least 3 months of continued employment. Internal and external exposures were obtained through urine bioassay, film badges, and air sampling data. Smoking data were potentially available for workers employed on or after January 1, 1968.

The chemicals used in the processes at the facility, along with job title and plant area, were analyzed by plant experts to determine exposure risk classes. Four exposure risk classes ranging from none to heavy were developed. A similar scale that ranged from no exposure above background to regular exposure at low levels was developed for radiation exposures.

FERNALD

FRW83A01 Data Set

Citations

Wilson, J. 1983. "An epidemiologic investigation of nonmalignant respiratory disease among workers at a uranium mill." Ph.D. dissertation, University of North Carolina, Chapel Hill.

No. of Files: 1		
File Name	No. of Variables	Type of Data
PRELIM09	44	demographic; work history; radiation exposure index; smoking history

Summary Death Tables

Cause of Death	No. of Deaths	
	Male	Female [†]
Infectious & Parasitic Diseases	2	
All Malignant Neoplasms	116	
• Lip, Oral Cavity & Pharynx	1	
• Digestive Organs & Peritoneum	38	
• Respiratory System	40	
• Bone & Connective Tissue	1	
• Skin	1	
• Breast	0	
• Genitourinary System	7	
• Brain/CNS	6	
• Other & Unspecified Sites, Except Brain/CNS	7	
• Lymphatic/Hematopoietic	15	
All Benign Neoplasms	0	
All Neoplasms, Unspecified	0	
Endocrine, Nutritional, Metabolic Diseases & Immunity Disorders	3	
Diseases of Blood & Blood-Forming Organs	2	
Mental Disorders	2	
Diseases of Nervous System & Sense Organs	0	
Diseases of Circulatory System	174	
Diseases of Respiratory System	13	
Diseases of Digestive System	16	
Diseases of Genitourinary System	2	
Complications of Pregnancy & Childbirth	0	
Diseases of Skin & Subcutaneous Tissue	0	
Diseases of Musculoskeletal System & Connective Tissue	0	
Congenital Anomalies	2	
Symptoms & Ill-Defined Conditions	1	
Accidents, Poisoning & Violence (External Causes)	74	
Deaths, With ICD Code	407	
Deaths, No ICD Code	15	
Total Deaths, All Causes	422	

[†] No females were included in this study.

Analytic File Name

PRELIM09

1 CER-assigned ID number 2 observation number in Oak Ridge tape 3 date of first hire into this job 4 job title 5 number of days in this particular job 6 numerical job grouping code 7 radiation exposure code 8 trichloroethylene exposure code 9 tributyl phosphate exposure code 10 cutting fluid exposure code in this job 11 kerosene exposure code in this job 12 lime exposure code in this job 13 ammonia exposure code for this job 14 carbon exposure code in this job 15 nitric acid exposure code in this job 16 sodium hydroxide exposure code for job 17 total job days worked 18 date of first hire date at NLO 19 birth date of individual 20 age at first hire at Fernald 21 wage/salary code 22 department code and building number 23 physical location of workplace 24 date of final termination at Fernald	25 total number of respiratory events 26 total number of acute respiratory events 27 total number of chronic respiratory events 28 indicates if person was case or control 29 cumulative exposure index 30 age at first termination 31 year of first acute respiratory diagnosis 32 year of first diagnosis of chronic event 33 year of first respiratory event 34 age at first respiratory event 35 age at first acute respiratory event 36 age at first chronic respiratory event 37 vital status 38 4-character ICD cause of death 39 3-digit ICD code for cause of death 40 ICD code for cancer 41 last known date per vital status 42 code indicating error in vital status 43 smoking history code 44 sequence number

HANFORD

HFC78A01 Data Set

Description

This analytic data set consists of three files generated for the cohort mortality study, published in *Health Physics* in 1989, of operations workers at the Hanford Site.

The study evaluated the relationship of occupational radiation exposure and mortality from several specific causes. The study showed that Hanford workers exhibited a strong healthy worker effect, having death rates substantially below those of the general U.S. population. Comparisons by level of exposure within the Hanford worker population provided no evidence of a positive correlation between exposure and mortality from all cancers combined or between exposure and mortality from leukemia.

The three analytic files in the HFC78A01 data set pertain to 44,101 Hanford workers initially employed at Hanford between 1944 and 1978. The first file (CEDR78_1) contains demographic, work history, and vital status data and indicators of internal depositions. Mortality data are provided for deaths occurring outside the state of Washington between 1944 and 1981, as well as for deaths occurring in Washington between 1944 and 1985. Internal deposition data include the radionuclide symbol and the year of first plutonium deposition. There is one record per individual. The second file (CEDR78_2) contains annual external whole-body doses that were compiled from external monitoring data for operations workers. These data include doses received while the worker was employed at other sites but, unlike another Hanford data set (HFI89A01), they do not include doses received while performing construction work at Hanford. There is one record for each year of exposure data for each of the 35,869 workers who were monitored. The third file (CEDR78_3) contains additional data related to onsite exposure and cause of death. There is one record for each worker.

The discussions in the published paper focus on monitored workers of both sexes. Dose response analyses (internal comparison) included 35,869 workers who were monitored for external radiation. Vital status was ascertained through December 31, 1981, the study end date. There were 4,846 deaths identified, and death certificates were obtained for 4,797 (99.0%) of these deaths. Comparisons with the U.S. general population included 42,291 white workers. There were 7,249 deaths identified, and death certificates were obtained for 7,155 (98.7%) of these deaths. Internal exposures were also examined.

Workers at the Hanford Site were involved in a variety of activities that resulted in their exposure to radiation, including reactor operations, chemical separation of reactor fuel to obtain plutonium, treatment and storage of hazardous waste, and biological and engineering research. Personal dosimeters (film or thermoluminescent) have been used since 1944. Also, bioassay programs to detect exposures to internally deposited radionuclides, primarily transuranics, were initiated in 1944. Dose estimates resulting from these monitoring programs appear in this analytic data set. Annual whole-body doses to penetrating external radiation are presented in units of millisieverts. Quality factors of 10 for fast neutrons, 3 for slow neutrons, and 1 for photons and electrons were used in the conversion of exposure to dose. Internal exposure data were collected and evaluated for all individuals who worked in locations where there was a potential for exposure to radioactive material (transuranics).

HANFORD

HFC78A01 Data Set

Citations

Gilbert, E. S., G. R. Peterson, and J. A. Buchanan. 1989. "Mortality of workers at the Hanford Site: 1945-1981." *Health Physics* 56:11-25.

Additional References

Gilbert, E. S., J. A. Buchanan, and N. A. Holter. 1992. *Description of the process used to create 1992 Hanford Mortality Study data base*. PNL-8449.

No. of Files: 3		
File Name	No. of Variables	Type of Data
CEDR78_1	19	demographic; work history; vital status; internal deposition
CEDR78_2	7	annual external whole-body doses
CEDR78_3	15	onsite exposure; cause of death

Summary Death Tables

Cause of Death	No. of Deaths	
	Male	Female
Infectious & Parasitic Diseases	32	5
All Malignant Neoplasms	1437	318
• Lip, Oral Cavity & Pharynx	41	1
• Digestive Organs & Peritoneum	405	73
• Respiratory System	466	50
• Bone & Connective Tissue	8	5
• Skin	21	6
• Breast	3	79
• Genitourinary System	192	49
• Brain/CNS	42	9
• Other & Unspecified Sites, Except Brain/CNS	129	19
• Lymphatic/Hematopoietic	139	27
All Benign Neoplasms	5	2
All Neoplasms, Unspecified	7	1
Endocrine, Nutritional, Metabolic Diseases & Immunity Disorders	124	27
Diseases of Blood & Blood-Forming Organs	10	5
Mental Disorders	44	7
Diseases of Nervous System & Sense Organs	59	16
Diseases of Circulatory System	3497	367
Diseases of Respiratory System	440	52
Diseases of Digestive System	277	65
Diseases of Genitourinary System	74	7
Complications of Pregnancy & Childbirth	0	1
Diseases of Skin & Subcutaneous Tissue	1	1
Diseases of Musculoskeletal System & Connective Tissue	19	10
Congenital Anomalies	11	5
Symptoms & Ill-Defined Conditions	49	5
Accidents, Poisoning & Violence (External Causes)	685	115
Deaths, With ICD Code	6771	1009
Deaths, No ICD Code	335	68
Total Deaths, All Causes	7106	1077

Analytic File Name

CEDR78_1

- 1 CER-assigned ID number
- 2 sex of worker
- 3 date of birth (century, year, month, day)
- 4 ending date of study
- 5 date of last vital status
- 6 date of initial employment (year, month, day)
- 7 date of follow-up start
- 8 date of final employment (year, month, day)
- 9 year of first Pu deposition
- 10 year of first Pu monitoring
- 11 year of first U deposition
- 12 year of first U monitoring
- 13 other type of internal deposition
- 14 year of first other type of deposition
- 15 socioeconomic category
- 16 underlying cause of death
- 17 ICD revision number
- 18 number of external dosimetry readings
- 19 duplicate indicator

Analytic File Name

CEDR78_2

- 1 CER-assigned ID number
- 2 sex of worker
- 3 date of birth (century, year, month, day)
- 4 year of external dosimetry
- 5 facility
- 6 total whole-body penetrating radiation dose, mSv
- 7 duplicate indicator

Analytic File Name

CEDR78_3

- 1 CER-assigned ID number
- 2 sex of worker
- 3 date of birth (century, year, month, day)
- 4 race of worker
- 5 amount of plutonium deposition
- 6 state of death code
- 7 study overlap flag
- 8 first associated cancer cause of death
- 9 second associated cancer cause of death
- 10 third associated cancer cause of death
- 11 fourth associated cancer cause of death
- 12 fifth associated cancer cause of death
- 13 number of onsite external dosimetry readings
- 14 year of first onsite external dosimetry reading
- 15 duplicate indicator

HANFORD

HF189A01 Data Set

Description

This analytical data set consists of three files for the updated study, published in *Health Physics* in 1993, of operations workers at the Hanford Site.

This study continues to examine the relationship between occupational radiation exposure among Hanford workers and mortality from specific causes. The files used for this paper have been updated and refined since the 1989 publication. The study showed that both male and female workers continue to exhibit a strong healthy worker effect, with death rates from most causes substantially below those of the general U.S. population. Comparisons by level of radiation exposure within the Hanford worker population provided little evidence of a positive correlation between cumulative radiation exposure and mortality from leukemia or from all other cancers combined.

The three analytic files in the HF189A01 data set pertain to 44,156 Hanford operations workers initially employed at Hanford between 1944 and 1978. The first file (IARC89_1), with one record per individual, contains demographic, work history, vital status, and internal deposition data. Mortality data are provided for deaths occurring outside Washington State between 1944 and 1986, and deaths occurring in Washington between 1944 and 1989, inclusive. Internal deposition data include the radionuclide symbol and the year of first plutonium deposition. The second file (IARC89_2), contains external exposure data for the years 1944 through 1989. The dosimetry data include doses received while performing construction work at Hanford as well as occupational doses received offsite at other facilities. There is one record for each year of exposure data for each of the 37,012 monitored workers. The third file (IARC89_3) contains additional

data related to internal exposures, offsite exposures, and cause of death. There is one record for each worker.

Comparisons with the U.S. general population included a cohort of 42,070 white workers. There were 9,452 deaths identified, and death certificates were obtained for 9,285 (98.2%) of these deaths. Dose response analyses included 32,643 workers (24,672 males and 7,971 females) who were monitored for external radiation and employed for at least 6 months between 1944 and 1985. Vital status was ascertained through 1986, the study end date. There were 6,286 deaths identified, and death certificates were obtained for 6,200 (98.6%) of these deaths. Both types of analyses included deaths through December 31, 1986.

Workers at the Hanford Site were involved in a variety of activities that resulted in their exposure to radiation, including reactor operations, chemical separation of reactor fuel to obtain plutonium, treatment and storage of hazardous waste, and biological and engineering research. Personal dosimeters (film or thermoluminescent) have been used since 1944. Bioassay programs to detect exposures to internally deposited radionuclides, primarily transuranics, also were initiated in 1944. Dose estimates resulting from these monitoring programs appear in this data set. Annual whole-body doses to penetrating external radiation are presented in units of millisieverts. Quality factors of 10 for fast neutrons, 3 for slow neutrons, and 1 for photons and electrons were used in the conversion of exposure to dose. Internal exposure data were collected and evaluated for all individuals who worked in locations where there was a potential for intake of radioactive material (transuranics).

HANFORD

HFI89A01 Data Set

Citations

Gilbert, E. S., E. Omohundro, J. A. Buchanan, and N.A. Holter. 1993. "Mortality of workers at the Hanford Site: 1945-1986." *Health Physics* 64:6.

Additional References

Gilbert, E. S., J. A. Buchanan, and N. A. Holter. 1992. *Description of the process used to create 1992 Hanford Mortality Study data base*. PNL-8449.

No. of Files: 3		
File Name	No. of Variables	Type of Data
IARC89_1	18	demographic; work history; vital status; internal deposition date
IARC89_2	11	external exposure
IARC89_3	30	internal exposure; offsite exposure; cause of death

Summary Death Tables

Cause of Death	No. of Deaths	
	Male	Female
Infectious & Parasitic Diseases	42	8
All Malignant Neoplasms	1927	451
• Lip, Oral Cavity & Pharynx	48	4
• Digestive Organs & Peritoneum	515	92
• Respiratory System	637	80
• Bone & Connective Tissue	13	7
• Skin	33	6
• Breast	4	113
• Genitourinary System	264	67
• Brain/CNS	55	13
• Other & Unspecified Sites, Except Brain/CNS	156	26
• Lymphatic/Hematopoietic	202	43
All Benign Neoplasms	6	4
All Neoplasms, Unspecified	9	2
Endocrine, Nutritional, Metabolic Diseases & Immunity Disorders	165	32
Diseases of Blood & Blood-Forming Organs	13	5
Mental Disorders	53	10
Diseases of Nervous System & Sense Organs	88	21
Diseases of Circulatory System	4330	510
Diseases of Respiratory System	609	98
Diseases of Digestive System	331	82
Diseases of Genitourinary System	92	11
Complications of Pregnancy & Childbirth	0	1
Diseases of Skin & Subcutaneous Tissue	3	3
Diseases of Musculoskeletal System & Connective Tissue	22	12
Congenital Anomalies	11	5
Symptoms & Ill-Defined Conditions	62	10
Accidents, Poisoning & Violence (External Causes)	778	133
Deaths, With ICD Code	8541	1398
Deaths, No ICD Code	224	101
Total Deaths, All Causes	8765	1499

Analytic File Name

IARC89_1

- 1 CER-assigned ID number
- 2 sex of worker
- 3 date of birth (century, year, month, day)
- 4 ending date of study
- 5 date of last vital status
- 6 date of initial employment (year, month, day)
- 7 date of follow-up start
- 8 date of final employment (year, month, day)
- 9 year of first Pu deposition
- 10 year of first Pu monitoring
- 11 year of first U deposition
- 12 year of first U monitoring
- 13 type of internal deposition
- 14 year of first other type of deposition
- 15 longest general social class
- 16 underlying cause of death
- 17 ICD revision number
- 18 number of external dosimetry readings

Analytic File Name

IARC89_2

- 1 CER-assigned ID number
- 2 sex of worker
- 3 date of birth (century, year, month, day)
- 4 year of external dosimetry
- 5 facility
- 6 penetrating radiation dose, mSv
- 7 neutron radiation dose, mSv
- 8 tritium radiation dose, mSv
- 9 total whole-body penetrating radiation dose, mSv
- 10 x-ray dose, mSv
- 11 extremity dose, mSv

Analytic File Name

IARC89_3

- 1 CER-assigned ID number
- 2 sex of worker
- 3 date of birth (century, year, month, day)
- 4 race of worker
- 5 amount of plutonium deposition
- 6 amount of deposition other than Pu
- 7 strontium flag
- 8 state of death code
- 9 study overlap flag
- 10 first associated cancer cause of death
- 11 second associated cancer cause of death
- 12 third associated cancer cause of death
- 13 fourth associated cancer cause of death
- 14 fifth associated cancer cause of death
- 15 last social class
- 16 longest general social class
- 17 longest social class
- 18 length of employment
- 19 year of first offsite dose
- 20 amount of first offsite dose
- 21 year of second offsite dose
- 22 amount of second offsite dose
- 23 year of third offsite dose
- 24 amount of third offsite dose
- 25 year of fourth offsite dose
- 26 amount of fourth offsite dose

- 27 year of fifth offsite dose
- 28 amount of fifth offsite dose
- 29 year of sixth offsite dose
- 30 amount of sixth offsite dose

HANFORD

HFS93A03 Data Set

Description

This analytic data set consists of one file constructed for another analysis, published in the *American Journal of Industrial Medicine* in 1993, of operations workers at the Hanford Site. This study examines the relationship between low level occupational radiation doses among Hanford workers and mortality from specific causes. The approach taken in this study makes new use of standard epidemiologic procedures and reveals evidence of increased cancer risk at low dose levels.

The reanalysis does not indicate that radiation is more likely to cause leukemia than solid tumors or that there is a reduced cancer effectiveness of radiation at low dose levels. However, the estimated proportion of radiogenic cancers was much higher for the 175 nonfatal cancers than for the 1,732 fatal cases.

The analytic file consists of seven records per worker for a cohort of 44,101 workers. The cohort was restricted to individuals who worked at Hanford between 1944 and 1978. The follow-up period for this reanalysis runs from January 1944 through December 1986. The file contains demographic data, offsite doses, internal exposure data,

annual external doses, work history, and vital status data. Due to the many job titles at Hanford, six job categories were established: professional, managerial, clerical, crafts people, blue collar, other, and not specified. Data include the date on which a worker was first monitored (by urinalysis) for internal deposition as well as the dates on which the result was first greater than zero (i.e., measurable), the result was greater than the standard error, and the result was greater than twice the standard error. Results of in vivo counting include the years at which depositions of one, two, or three nuclides were detected. There were 9,443 deaths identified through the follow-up period of December 31, 1986.

Workers at Hanford were involved in a variety of activities resulting in exposure to radiation, including reactor operations, chemical separation processes, treatment and storage of hazardous waste, and biological and engineering research. Personal dosimeters were first used in 1944. The doses contained in the file are expressed in centirad. Internal exposure data were collected and evaluated for all individuals who worked in locations where there was a potential for intake of radioactive materials.

HANFORD

HFS93A03 Data Set

Citations

Kneale, G. W., and A. Stewart. 1993. "Reanalysis of Hanford Data: 1944-1986 Deaths." *American Journal of Industrial Medicine* 23:371-389.

No. of Files: 1		
File Name	No. of Variables	Type of Data
HAN_A2	106	demographic;; work history; vital status; external exposure

Summary Death Tables

Cause of Death	No. of Deaths	
	Male	Female
Infectious & Parasitic Diseases	42	8
All Malignant Neoplasms	1927	451
• Lip, Oral Cavity & Pharynx	48	4
• Digestive Organs & Peritoneum	515	92
• Respiratory System	637	80
• Bone & Connective Tissue	13	7
• Skin	33	6
• Breast	4	113
• Genitourinary System	264	67
• Brain/CNS	55	13
• Other & Unspecified Sites, Except Brain/CNS	156	26
• Lymphatic/Hematopoietic	202	43
All Benign Neoplasms	6	4
All Neoplasms, Unspecified	9	2
Endocrine, Nutritional, Metabolic Diseases & Immunity Disorders	165	32
Diseases of Blood & Blood-Forming Organs	13	5
Mental Disorders	53	10
Diseases of Nervous System & Sense Organs	88	21
Diseases of Circulatory System	4330	510
Diseases of Respiratory System	609	98
Diseases of Digestive System	331	82
Diseases of Genitourinary System	92	11
Complications of Pregnancy & Childbirth	0	1
Diseases of Skin & Subcutaneous Tissue	3	3
Diseases of Musculoskeletal System & Connective Tissue	22	12
Congenital Anomalies	11	5
Symptoms & Ill-Defined Conditions	62	10
Accidents, Poisoning & Violence (External Causes)	778	133
Deaths, With ICD Code	8541	1398
Deaths, No ICD Code	224	101
Total Deaths, All Causes	8765	1499

Analytic File Name

HAN_A2

- 1 CER-assigned ID number
- 2 sex
- 3 race
- 4 birth year
- 5 hire year
- 6 year of first offsite dose
- 7 first offsite dose
- 8 number of years of offsite doses
- 9 year of first plutonium deposition
- 10 plutonium deposition
- 11 death year
- 12 state of death
- 13 cause of death (underlying)
- 14 cause of death (contributory)
- 15 cause of death (second contributory)
- 16-50 external dose by year, 1944 - 1978
- 51-85 job code by year, 1944 - 1978
- 86 definite termination
- 87 bioassay level one
- 88 bioassay level two
- 89 bioassay level three
- 90 bioassay level four
- 91 bioassay level five
- 92 in vivo level one
- 93 in vivo level two
- 94 in vivo level three
- 95 in vivo level four
- 96 in vivo level five

- 97 in vivo level six
- 98 in vivo level seven
- 99 in vivo level eight
- 100 in vivo level nine
- 101 in vivo level ten
- 102 in vivo level eleven
- 103 in vivo level twelve
- 104 in vivo level thirteen
- 105 in vivo level fourteen
- 106 in vivo level fifteen

LANL

LAFEMA01 Data Set

Description

The LAFEMA01 data set contains one analytic file used in a mortality study of white female workers at Los Alamos National Laboratory (LANL), published as a doctoral dissertation in 1987.

The analysis sought to determine whether mortality among these workers differed significantly from the general population of females in the United States and whether the subgroup of this cohort that was exposed to radiation was at an increased risk of dying from cancer when compared to the unexposed group. The analysis focused on 6,573 white (those with race unknown were assumed to be white) females who were employed at LANL between 1943 and 1978, inclusive. Most analyses were further limited to the 5,234 white workers employed at least 6 months. The study found a standardized mortality ratio (SMR) for suicide that was significantly elevated. Rate ratios for cancers of the ovary and pancreas were also significantly elevated for radiation-monitored members of the cohort. Due to the elevated risk of suicide, an elevated rate ratio for deaths due to all causes was also observed for the radiation workers in this cohort.

The single analytic file (LAFEFIL) contains data for 6,790 females of all races employed at LANL and represents a complete roster of females hired through December 31, 1978. Some later hires are included in the file but not in the analysis. External exposure data in the file consist of dates (given in decimalized notation) on which the worker was first monitored, first received a positive exposure, first accumulated 1 rem whole-body dose, first accumulated 5 rems whole-body dose, and first received 10 rems whole-body dose. Whole-body dose was defined as the sum of all

tritium, neutron, and penetrating gamma readings. External readings were available through 1981. Data pertaining to internal plutonium exposure include isotope, dates (in decimalized notation) of first and last samples, and estimated body burdens (in units of both nCi and nCi-years) of plutonium. Dates of first and last sample were through January 1, 1985. Estimated body burdens were taken through December 31, 1984, date of death, or date of the last bioassay sample. The computer code PUQFUA was used to estimate plutonium body burdens incurred by workers through 1984. Demographic data were extracted from a number of sources, including LANL personnel and medical records, and was computerized in 1982 and 1983 by the LANL Epidemiology Section.

Vital status was ascertained for 87% of the 6,790 females through December 31, 1981, the study end date. There were 430 deaths identified in this cohort.

The LANL has been a center for research in nuclear physics and weapons development since the 1940s. Sources of occupational exposures include external radiation, primarily gamma, and potential internal deposition of plutonium-238 and plutonium-239. Pocket chambers or film dosimeters were used for personnel monitoring until 1980, when they were replaced with thermoluminescent dosimeters. Formal bioassay programs to monitor for internal exposures were begun in 1945. Results of both types of monitoring programs reflect technological improvements and changes in concepts and models.

LANL

LAFEMA01 Data Set

Citations

Wiggs, L. D. 1987. "Mortality among females employed by the Los Alamos National Laboratory. An epidemiologic investigation." Ph.D. thesis, University of Oklahoma.

Additional References

Lawrence, J. N. P. 1962. "PUQFUA. An IBM 704 code for computing plutonium body burdens." *Health Physics* 8:61-66

No. of Files: 1		
File 1	No. of Variables	Type of Data
LAFEFIL	38	vital status; external whole-body doses; demographic; plutonium body burden

Summary Death Tables

Cause of Death	No. of Deaths	
	Male†	Female
Infectious & Parasitic Diseases		7
All Malignant Neoplasms		182
• Lip, Oral Cavity & Pharynx		3
• Digestive Organs & Peritoneum		30
• Respiratory System		29
• Bone & Connective Tissue		3
• Skin		5
• Breast		51
• Genitourinary System		32
• Brain/CNS		7
• Other & Unspecified Sites, Except Brain/CNS		10
• Lymphatic/Hematopoietic		12
All Benign Neoplasms		3
All Neoplasms, Unspecified		1
Endocrine, Nutritional, Metabolic Diseases & Immunity Disorders		5
Diseases of Blood & Blood-Forming Organs		0
Mental Disorders		6
Diseases of Nervous System & Sense Organs		4
Diseases of Circulatory System		155
Diseases of Respiratory System		36
Diseases of Digestive System		32
Diseases of Genitourinary System		5
Complications of Pregnancy & Childbirth		4
Diseases of Skin & Subcutaneous Tissue		1
Diseases of Musculoskeletal System & Connective Tissue		3
Congenital Anomalies		1
Symptoms & Ill-Defined Conditions		6
Accidents, Poisoning & Violence (External Causes)		60
Deaths, With ICD Code		511
Deaths, No ICD Code		25
Total Deaths, All Causes		536

† No males were included in this study.

Analytic File Name

LAFEFILE

- 1 CER-assigned ID number
- 2 identifies worker as radiation worker
- 3 sex of the worker
- 4 race
- 5 highest level of education
- 6 vital status from SSA as of 12/31/79
- 7 vital status as of 12/31/81
- 8 ethnicity of the worker
- 9 first job title at LANL
- 10 last job title at LANL
- 11 date worker was born
- 12 date of first hire at LANL
- 13 latest known termination date from LANL
- 14 date worker was last known to be alive
- 15 date last worked
- 16 duration of employment at LANL
- 17 date of death
- 18 cause of death - ICDA 8th revision
- 19 plutonium monitored flag
- 20 isotope of plutonium measured
- 21 number of bioassay samples for worker
- 22 number of valid bioassay readings
- 23 date of first bioassay reading
- 24 date of first positive plutonium uptake

- 25 date of last bioassay reading
- 26 body burden (12/31/84) in nCi-years
- 27 body burden (nCi) at last sample date
- 28 body burden (nCi-years) last sample date
- 29 body burden (nCi) as of 12/31/83
- 30 body burden (nCi) as of 12/31/84
- 31 external monitoring flag
- 32 date first monitored for external radiation
- 33 date external radiation dose greater than 0
- 34 date external radiation dose reached 1 rem
- 35 date external radiation dose reached 5 rems
- 36 date external radiation dose reached 10 rems
- 37 cumulative whole-body dose external
- 38 latest date employed during study

LANL

LASUIA02 Data Set

Description

This data set contains one analytic file that was used in a study of deaths from suicide among female workers at Los Alamos National Laboratory (LANL) in 1988.

A nested case-control study was undertaken to identify characteristics distinguishing white females dying from suicide from white females dying from all other types of injuries and those dying from noninjury causes. Two separate analyses were presented: one contrasting the 19 suicide deaths and the 41 other injury deaths, the other contrasting the 19 suicide deaths and 76 noninjury deaths. External radiation monitoring status and job classification both showed an association with risk of suicide when suicide deaths were compared with noninjury deaths. An association was also found between suicide and external radiation monitoring status when comparing suicide to deaths from all other injuries. No significant associations were found between risk of suicide and duration of employment, plutonium monitoring status, or marital status. Education was controlled in all comparisons.

The single analytic file (LASUFILE) pertains to 136 white females employed at LANL. This number includes all suicide, all other injury deaths, and a 4:1 random sample of all other deaths. External monitoring data consist of dates (in decimalized notation) on which the worker was first monitored, first received a positive exposure, first received 1 rem cumulative whole-body dose, first received 5

rem cumulative whole-body dose, and first received 10 rem cumulative whole-body dose. Whole-body dose was defined as the sum of all tritium, neutron, and penetrating gamma readings. External readings were available through December 31, 1981.

Only eight of the females in this file were monitored for plutonium. Internal exposure data consist of plutonium-239 body burdens that were calculated by the PUQFUA computer code, the official code used at LANL to estimate body burdens from bioassay data. The date of first positive uptake of plutonium was hand-abstracted from data valid through 1986. Plutonium monitoring data include isotope type; first sample date (in decimalized notation); last sample date (decimalized); and estimated whole-body burdens (both nCi and nCi-years) as of December 31, 1983, as of December 31, 1984, and as of the last sample date.

LANL has been a center for research in nuclear physics and weapons development since the 1940s. Sources of occupational exposures include external radiation, primarily gamma, and potential internal deposition of plutonium-238 and plutonium-239. Pocket chambers or film dosimeters were used for personnel monitoring until 1980, when they were replaced with thermoluminescent dosimeters. Formal bioassay programs to monitor for internal exposures were begun in 1945. Results of both types of monitoring programs reflect technological improvements and changes in concepts and models.

LANL

LASUIA02 Data Set

Citations

Wiggs, L. D., C. A. Weber, and E. T. Lee. 1988.
"Suicide mortality among female nuclear
industry workers." *Proceedings of the 116th
Annual Meeting of the American Public Health
Association*, Boston, MA, p. 46.

Additional References

Lawrence, J. N. P. 1962. "PUQFUA, an IBM 704
code for computing plutonium body
burdens." *Health Physics* 8:61-66.

Wiggs, L. D. 1987. "Mortality among females
employed by the Los Alamos National
Laboratory: An epidemiologic investigation,"
Ph.D. thesis, University of Oklahoma.

No. of Files: 1

File Name	No. of Variables	Type of Data
LASUFILE	45	external whole- body dose; plutonium whole- body burden; demographic; vital status

Summary Death Tables

Cause of Death	No. of Deaths	
	Male†	Female
Infectious & Parasitic Diseases		1
All Malignant Neoplasms		26
• Lip, Oral Cavity & Pharynx		1
• Digestive Organs & Peritoneum		7
• Respiratory System		6
• Bone & Connective Tissue		0
• Skin		2
• Breast		6
• Genitourinary System		2
• Brain/CNS		0
• Other & Unspecified Sites, Except Brain/CNS		1
• Lymphatic/Hematopoietic		1
All Benign Neoplasms		1
All Neoplasms, Unspecified		0
Endocrine, Nutritional, Metabolic Diseases & Immunity Disorders		1
Diseases of Blood & Blood-Forming Organs		0
Mental Disorders		1
Diseases of Nervous System & Sense Organs		0
Diseases of Circulatory System		28
Diseases of Respiratory System		4
Diseases of Digestive System		12
Diseases of Genitourinary System		0
Complications of Pregnancy & Childbirth		1
Diseases of Skin & Subcutaneous Tissue		0
Diseases of Musculoskeletal System & Connective Tissue		0
Congenital Anomalies		0
Symptoms & Ill-Defined Conditions		1
Accidents, Poisoning & Violence (External Causes)		60
Deaths, With ICD Code		136
Deaths, No ICD Code		0
Total Deaths, All Causes		136

† No males were included in this study.

LASUIA02 ■

Analytic File Name

LASUFILE

1 CER-assigned ID number	26 date of last bioassay reading
2 type of death	27 body burden (12/31/84) in nCi-years
3 identifies worker as radiation monitored	28 body burden (nCi) at last sample date
4 sex of the worker	29 body burden (nCi-years) last sample date
5 race	30 body burden (nCi) as of 12/31/83
6 highest level of education	31 body burden (nCi) as of 12/31/84
7 vital status from SSA as of 12/31/79	32 external monitored flag
8 vital status as of 12/31/81	33 date first monitored for external radiation
9 ethnicity of the worker	34 date external radiation dose was greater than 0
10 first job title at LANL	35 date external radiation dose reached 1 rem
11 last job title at LANL	36 date external radiation dose reached 5 rems
12 date worker was born	37 date external radiation dose reached 10 rems
13 date of first hire at LANL	38 cumulative whole-body dose external
14 latest known termination date from LANL microfiche	39 latest known date employed in study
15 date worker was last known to be alive	40 state of death
16 date last worked	41 marital status at time of death
17 duration of employment at LANL	42 occupation listed on death certificate
18 date of death	43 autopsy
19 cause of death - ICDA 8th revision	44 grouped recode of last job title
20 plutonium monitored flag	45 grouped occupation on death cert
21 isotope of plutonium measured	
22 number of bioassay samples for employee	
23 number of valid bioassay readings	
24 date of first bioassay reading	
25 date of first positive plutonium uptake	

LINDE

LND87A01 Data Set

Description

This analytic data set consists of one file generated for a cohort mortality study, published in the *Scandinavian Journal Work Environment Health* in 1987, of white males employed at the Linde Plant.

This retrospective cohort mortality study investigated the relationship between exposure to low-level ionizing radiation and subsequent health outcomes among workers at the Linde Plant. Two comparison groups were used in this analysis. The first group consisted of all U.S. white males; the second was the white male population of Erie and Niagara counties in New York State. Significantly increased standardized mortality ratios (SMRs) were observed for all causes of death, laryngeal cancer, all circulatory diseases, arteriosclerotic heart disease, all respiratory diseases, and pneumonia. No association was found with length of employment or with work in the most hazardous areas of the plant. The comparison with regional rates gave similar results.

The single analytic file (MOSTEXP) in this data set consists of one record per person in the study cohort and contains demographic, work history, and vital status data as well as information concerning exposures to chemicals and uranium. Examples of these are exposures to uranium hexafluoride, nitric acid, and hydrofluoric acid.

The cohort was selected from a roster of all persons (1,551) employed at the Linde Plant, which was in operation from 1943 to 1949. All females, non-white males, males of unknown race, and people employed less than 30 days were excluded, leaving 995 white males in the study cohort. Vital status was ascertained for 94.3% of the cohort through December 31, 1979, the study

end date. There were 429 deaths identified, and death certificates were obtained for 406 (94.6%) of these deaths.

At the Linde Plant, Congo pitchblende and uranium from domestic mines were converted to uranium tetrafluoride. This process yielded intermediate products, including uranium oxide, uranium trioxide, and uranium dioxide. Compared to uranium tetrafluoride, these products are relatively insoluble. Workers were also potentially exposed to low levels of external radiation and to a wide variety of chemicals. The more hazardous chemicals included chlorine, hydrofluoric acid, lead sulfate, nickel, nitric acid and nitrogen oxides, silicon dioxide, sulfuric acid, uranium dust, and uranium hexafluoride. Generally, four types of measurements contained information useful in assessing radiation hazards. They were (1) air monitoring results for radon-222 and airborne uranium, (2) measurements of surface contamination, (3) urinalysis results, and (4) personnel film badge results. The first three types of measurements were used to assess the potential for internal radiation exposure for each job that existed at the plant. Three separate analyses were carried out using each type of data, and the results were combined to assign a given job to one of three exposure groups. These data also were used to estimate individual lung doses. The limited film badge data were used to evaluate the potential for exposure to external radiation. Each job at the plant was assigned to one of two categories, namely, jobs with mean weekly film badge results below the minimum detectable level and jobs with mean weekly film badge results above the minimum detectable level.

LINDE

LND87A01 Data Set

Citations

Dupree, E. A., D. L. Cragle, R. W. McLain, D. J. Crawford-Brown, and M. J. Teta. 1987. "Mortality among workers at a uranium processing facility, the Linde Air Products Company Ceramics Plant, 1943-1949." *Scandinavian Journal Work Environmental Health* 13:100-107.

No. of Files: 1		
File Name	No. of Variables	Type of Data
MOSTEXP	38	demographic; work history; vital status; chemical, external, and internal exposure levels

Summary Death Tables

Cause of Death	No. of Deaths	
	Male	Female [†]
Infectious & Parasitic Diseases	5	
All Malignant Neoplasms	73	
• Lip, Oral Cavity & Pharynx	2	
• Digestive Organs & Peritoneum	26	
• Respiratory System	26	
• Bone & Connective Tissue	0	
• Skin	0	
• Breast	0	
• Genitourinary System	7	
• Brain/CNS	2	
• Other & Unspecified Sites, Except Brain/CNS	4	
• Lymphatic/Hematopoietic	6	
All Benign Neoplasms	1	
All Neoplasms, Unspecified	1	
Endocrine, Nutritional, Metabolic Diseases & Immunity Disorders	7	
Diseases of Blood & Blood-Forming Organs	0	
Mental Disorders	5	
Diseases of Nervous System & Sense Organs	1	
Diseases of Circulatory System	216	
Diseases of Respiratory System	29	
Diseases of Digestive System	18	
Diseases of Genitourinary System	3	
Complications of Pregnancy & Childbirth	0	
Diseases of Skin & Subcutaneous Tissue	0	
Diseases of Musculoskeletal System & Connective Tissue	2	
Congenital Anomalies	0	
Symptoms & Ill-Defined Conditions	3	
Accidents, Poisoning & Violence (External Causes)	25	
Deaths, With ICD Code	389	
Deaths, No ICD Code	24	
Total Deaths, All Causes	413	

[†] No females were included in this study.

Analytic File Name

MOSTEXP

- 1 CER-assigned ID number
- 2 first hire into ceramics plant
- 3 last termination date
- 4 multiple hire/term at ceramics plant
- 5 vital status code
- 6 last known date alive
- 7 ICD code for underlying cause of death
- 8 underlying cancer cause of death
- 9 birth date of individual
- 10 ICD code for underlying cause of death
- 11 total days employed at ceramics
- 12 job days with exposure not assignable
- 13 external radiation (er) level most days at
- 14 job days at er level
- 15 date first at er level
- 16 internal radiation (ir) level most days spent at
- 17 job days spent at ir level
- 18 first date at ir level
- 19 uranium deposition (ud) level most days spent at
- 20 job days spent at ud level
- 21 first date at ud level
- 22 nitric acid (hn) level most days spent at
- 23 job days spent at hn level
- 24 first date at hn level
- 25 hydrofluoric acid (hf) level most days spent at
- 26 job days spent at hf level
- 27 first date at hf level
- 28 uranium hexafluoride (hf6) level most days spent at
- 29 job days spent at hf6 level
- 30 first date at hf6 level
- 31 sulfuric acid (h2s) level most days spent at
- 32 job days spent at h2s level
- 33 first date at h2s level
- 34 silicone dioxide (sio) level most days spent at
- 35 job days spent at sio level
- 36 the first date at sio level
- 37 ICD code for underlying cause of death
- 38 sequence number of row

MOUND

MDEXTA02 Data Set

Description

This data set contains one analytic file generated for a cohort mortality study, published in the *Journal of Occupational Medicine* in 1991, of men and women employed at the Mound Plant in Ohio.

This cohort mortality study of Mound workers was conducted to test the association between mortality and exposure to radiation. The published analyses focused on 3,229 white males monitored for exposure to external radiation, who were already employed as of January 1, 1947, or who were subsequently hired before 1979. A strong healthy worker effect was noted among white males who were monitored for external radiation [all causes of death standardized mortality ratio (SMR) = 79, 95% CI = 70-88]. No cause of death was significantly elevated. When mortality for workers who received external, cumulative whole-body doses that were at least 10 mSv was compared with mortality among nonexposed workers, the rate ratios were not significantly elevated for any cause of death. However, a dose-response analysis was conducted considering three categories: nonexposed, or less than 10 mSv cumulative whole-body dose; exposed, 10-49.9 mSv; and exposed, greater than or equal to 50 mSv. This analysis reported a statistically significant relationship between external dose and mortality from all leukemias. This result was based on the identification of two deaths in the highest exposure category, one of which was a chronic lymphatic leukemia (CLL), a type of leukemia which has not been considered a radiogenic cancer.

The analytic file (ANFILE) contains 6,904 records representing each worker first hired from the beginning of the Dayton Project (about 1943) through part of 1979. During the course of the analyses, 20 of these records were found to be duplicates of other records in the file. The analyses in the published paper did not include these 20 duplicate records (N = 6,884). After the paper was published, two additional records were found to be either duplicative or belonging to a person who never worked at Mound. These 22 records are identified in this file by blank ORAUID numbers. Monitoring data in the file include estimated first date of monitoring, cumulative whole-body dose through the end of 1979, and dates on which the cumulative whole-body dose reached 10, 50, or 100 mSv.

Vital status ascertainment was 98.1% complete for the 4,182 white males through January 1, 1980. Death certificates were obtained for 98.8% (586) of the 593 deaths that occurred between 1947 and 1979, inclusive.

Major operations conducted at Mound included the separation, chemistry, and metallurgy of polonium-210 and processing of plutonium-238 for heat sources. Later, small research projects involved other isotopes, including radium and thorium. Mound began its external dosimetry monitoring program in 1947, first using film badges and later switching to thermoluminescent dosimeters (TLDs).

MOUND

MDEXTA02 Data Set

Citation

Wiggs, L. D., C. A. Cox-DeVore, G. S. Wilkinson, and M. Reyes. 1991. "Mortality among workers exposed to external ionizing radiation at a nuclear facility in Ohio." *Journal of Occupational Medicine* 33:632-637.

No. of Files: 1		
File Name	No. of Variables	Type of Data
ANFILE	21	annual, external whole-body doses; work history; vital status; demographic

Summary Death Tables

Cause of Death	No. of Deaths	
	Male	Female
Infectious & Parasitic Diseases	7	0
All Malignant Neoplasms	178	31
• Lip, Oral Cavity & Pharynx	8	1
• Digestive Organs & Peritoneum	40	4
• Respiratory System	72	4
• Bone & Connective Tissue	2	0
• Skin	5	0
• Breast	0	11
• Genitourinary System	19	7
• Brain/CNS	3	1
• Other & Unspecified Sites, Except Brain/CNS	13	1
• Lymphatic/Hematopoietic	16	2
All Benign Neoplasms	2	0
All Neoplasms, Unspecified	1	0
Endocrine, Nutritional, Metabolic Diseases & Immunity Disorders	19	2
Diseases of Blood & Blood-Forming Organs	1	0
Mental Disorders	5	0
Diseases of Nervous System & Sense Organs	7	1
Diseases of Circulatory System	454	19
Diseases of Respiratory System	53	1
Diseases of Digestive System	50	2
Diseases of Genitourinary System	19	2
Complications of Pregnancy & Childbirth	0	1
Diseases of Skin & Subcutaneous Tissue	0	0
Diseases of Musculoskeletal System & Connective Tissue	0	0
Congenital Anomalies	1	0
Symptoms & Ill-Defined Conditions	4	1
Accidents, Poisoning & Violence (External Causes)	99	11
Deaths, With ICD Code	900	71
Deaths, No ICD Code	227	49
Total Deaths, All Causes	1127	120

Analytic File Name

ANFILE

- 1 date of birth
- 2 date of first hire at the Mound Plant
- 3 date of final termination prior to 1980
- 4 duration of employment at Mound
- 5 sex
- 6 race
- 7 education level
- 8 date of death
- 9 cause of death - ICDA 8th rev.
- 10 sex as shown on the death certificate
- 11 race as shown on the death certificate
- 12 current vital status as of 12/31/79
- 13 results of 1982 SSA search
- 14 vital status as of 1983 from SSA
- 15 cum. ext. rad. dose as of 1979
- 16 date cum. ext. rad. dose reached 1 rem
- 17 date cum. ext. rad. dose reached 5 rems
- 18 date cum. ext. rad. dose reached 10 rems
- 19 est. date first measure ext. rad. dose
- 20 state of death
- 21 CER-assigned ID number

MOUND

MDPOLA03 Data Set

Description

This data set consists of one analytic file generated for a cohort mortality study, published in *Health Physics* in 1991, of men who were employed at the Mound Plant.

This cohort mortality study of Mound workers was conducted to test the association between mortality and exposure to polonium-210. The published analyses focused on 4,402 white males employed during 1944-1972, the period during which Mound conducted operations using polonium-210. Of the 4,402 white males, there were 2,181 who were monitored for exposure to polonium. A healthy worker effect was noted among the cohort of 4,402 white males [all causes of death standardized mortality ratio (SMR) = 93, 90% CI = 89-99; all cancer SMR = 100, 90% CI = 89-113]. The SMR for lung cancer was elevated to a level of statistical significance only for workers employed between 1944 and 1945. The SMR for deaths due to all causes for workers exposed to polonium was less than 100 (SMR = 92, 90% CI = 85-98). Although the SMR for lung cancer was elevated (SMR = 113), the 90% confidence limits included 100 (87-117). Dose response analyses using the MOX program were performed using kidney dose as the exposure metric. No statistically significant trends in mortality were observed.

The single analytic file (ANFILE) in this data set contains data for 6,884 workers who were initially hired between 1943

through 1979, inclusive. Exposure data in the file include the estimated first date of monitoring, cumulative whole-body dose through the end of 1979, and dates on which the whole-body dose reached 10, 50, or 100 mSv. Polonium exposure data include the date and volume of the sample, the results of the radiochemical analysis, and any comments specific to the sample or the radiochemical analysis of the sample. An electronic file containing these data was used by Mound staff to calculate kidney and spleen doses due to polonium-210 (in millirems). These organ doses appear in this analytic file.

Vital status was ascertained for 95.6% of the 4,402 white males through January 1, 1984. There were 987 deaths identified in this group, and death certificates were obtained for 97.4% (961) of these deaths. Vital status was ascertained for 96.6% (2,106) of the 2,181 polonium workers, and death certificates were obtained for 98.6% (558) of them.

Major operations conducted at Mound include the separation, chemistry, and metallurgy of polonium-210 and processing of plutonium-238 for heat sources. Later, small research projects involved other isotopes, including radium and thorium. Records pertaining to Mound's external dosimetry monitoring program, first using film badges and later switching to thermoluminescent dosimeters (TLDs), began in 1947. Mound began urine bioassays for polonium in 1944. The last time a worker entered the polonium bioassay program was in 1972.

MOUND

MDPOLA03 Data Set

Citations

Wiggs, L. D., C. A. Cox-DeVore, and G. L. Voelz
1991. "Mortality among a cohort of
workers monitored for Po-210 Exposure
1944-1972." *Health Physics* 61 71-76

No. of Files: 1		
File Name	No. of Variables	Type of Data
ANFILE	27	annual external whole-body doses; work history; vital status; demographic; polonium data

Summary Death Tables

Cause of Death	No. of Deaths	
	Male	Female
Infectious & Parasitic Diseases	8	1
All Malignant Neoplasms	243	49
• Lip, Oral Cavity & Pharynx	10	1
• Digestive Organs & Peritoneum	60	8
• Respiratory System	96	6
• Bone & Connective Tissue	2	0
• Skin	5	0
• Breast	0	18
• Genitourinary System	25	10
• Brain/CNS	5	1
• Other & Unspecified Sites, Except Brain/CNS	18	1
• Lymphatic/Hematopoietic	22	4
All Benign Neoplasms	2	0
All Neoplasms, Unspecified	1	0
Endocrine, Nutritional, Metabolic Diseases & Immunity Disorders	20	5
Diseases of Blood & Blood-Forming Organs	2	0
Mental Disorders	7	0
Diseases of Nervous System & Sense Organs	12	1
Diseases of Circulatory System	545	33
Diseases of Respiratory System	64	5
Diseases of Digestive System	56	4
Diseases of Genitourinary System	21	2
Complications of Pregnancy & Childbirth	0	1
Diseases of Skin & Subcutaneous Tissue	0	0
Diseases of Musculoskeletal System & Connective Tissue	0	0
Congenital Anomalies	1	0
Symptoms & Ill-Defined Conditions	6	1
Accidents, Poisoning & Violence (External Causes)	107	13
Deaths, With ICD Code	1095	115
Deaths, No ICD Code	172	23
Total Deaths, All Causes	1267	138

Analytic File Name

ANFILE

- 1 date of birth
- 2 date of first hire at the Mound Plant
- 3 date of final termination prior to 1980
- 4 duration of employment at Mound
- 5 sex
- 6 race
- 7 education level
- 8 date of death
- 9 cause of death - ICDA 8th revision
- 10 sex as shown on the death certificate
- 11 race as shown on the death certificate
- 12 current vital status as of 12/31/79
- 13 results of 1982 SSA search
- 14 results of 1983 SSA search
- 15 cum. ext. rad. dose as of 1979
- 16 date cum. ext. rad. dose reached 1 rem
- 17 date cum. ext. rad. dose reached 5 rems
- 18 date cum. ext. rad. dose reached 10 rems
- 19 est. date first measure. ext. rad. dose
- 20 kidney dose of Po-210, mrem
- 21 spleen dose of Po-210, mrem
- 22 first sample date for Po-210
- 23 last sample date for Po-210
- 24 date last known alive

- 25 vital status, 1983
- 26 state of death
- 27 CER-assigned ID number

MOUND

MDSMRA01 Data Set

Description

This analytic data set consists of one file generated for a cohort mortality study, published as a LANL Report, of white males employed at the Mound Plant.

A cohort mortality study of workers was conducted to test for an association between mortality and employment at the Mound Plant. The study examined differences in mortality for workers at the plant during its polonium-210 era (1943-1959) and for its plutonium-238 era (1960-1980) by computing period-specific standardized mortality ratios (SMRs) based on U.S. rates. The analysis focused on 4,697 white and presumed white males who were employed between April 1, 1942, and December 31, 1979, at the Mound Plant. SMRs of 96 were observed for both all causes and for all cancers for the study period (1943-1979). No SMR was significantly greater than 100 for these workers. A significantly elevated SMR for lung cancer (SMR = 204, 90% CI = 140, 290) was observed for workers employed during World War II (1943-1945). Similar results were noted for all causes of death, all cancers, cancers of the rectum, nonmalignant respiratory diseases, and all injuries during this time period. SMRs for these causes of death during the polonium era, but after World War II, were not elevated. No elevated SMRs were observed during the plutonium era. A very

strong healthy worker effect was observed for workers in the plutonium era, although the length of follow-up for these workers was relatively short.

The single analytic file (ANFILE) in this data set contains demographic and vital status data for 4,697 white males and presumed white males who were employed between April 1, 1942, and December 31, 1979. Not included in the analytic file are workers employed less than 30 days during this period, workers with unknown birth dates, and workers with both unknown hire and termination dates. No exposure data are included in the file.

Vital status was determined for 97.6% (4,588) of the workers in this file. Death certificates were obtained for 97% (803) of the known deaths.

The Mound Plant has been a center for the separation, chemistry, and metallurgy of polonium-210 and processing of plutonium-238 for heat sources. Other small research projects involved radium and thorium. Workers could have been exposed to external and internal sources of radiation, however, this analysis did not examine exposure data.

MOUND

MDSMRA01 Data Set

Citations

Reyes, M., G. S. Wilkinson, G. L. Tietjen, L. D. Wiggs, and W. A. Galke. 1991. "Mortality among workers at the Mound Facility." Los Alamos Report LA-11997-MS.

No. of Files: 1		
File Name	No. of Variables	Type of Data
ANFILE	11	demographic; work history; vital status; internal deposition

Summary Death Tables

Cause of Death	No. of Deaths	
	Male	Female†
Infectious & Parasitic Diseases	7	
All Malignant Neoplasms	208	
• Lip, Oral Cavity & Pharynx	9	
• Digestive Organs & Peritoneum	48	
• Respiratory System	83	
• Bone & Connective Tissue	2	
• Skin	4	
• Breast	1	
• Genitourinary System	23	
• Brain/CNS	3	
• Other & Unspecified Sites, Except Brain/CNS	16	
• Lymphatic/Hematopoietic	19	
All Benign Neoplasms	2	
All Neoplasms, Unspecified	1	
Endocrine, Nutritional, Metabolic Diseases & Immunity Disorders	17	
Diseases of Blood & Blood-Forming Organs	2	
Mental Disorders	6	
Diseases of Nervous System & Sense Organs	9	
Diseases of Circulatory System	458	
Diseases of Respiratory System	51	
Diseases of Digestive System	49	
Diseases of Genitourinary System	18	
Complications of Pregnancy & Childbirth	0	
Diseases of Skin & Subcutaneous Tissue	0	
Diseases of Musculoskeletal System & Connective Tissue	0	
Congenital Anomalies	0	
Symptoms & Ill-Defined Conditions	5	
Accidents, Poisoning & Violence (External Causes)	93	
Deaths, With ICD Code	926	
Deaths, No ICD Code	26	
Total Deaths, All Causes	952	

† No females were included in this study.

Analytic File Name

ANFILE

- 1 date of birth
- 2 date of first hire at Mound
- 3 date of last termination from
Mound
- 4 date of death
- 5 cause of death - ICD 8th rev.
- 6 sex
- 7 race
- 8 education level
- 9 current vital status as of
12/31/79
- 10 the state of death
- 11 CER-assigned ID number

OR/K-25

ORK25A01 Data Set

Description

This analytic data set consists of one file generated for a study, published in *IARC Scientific Publications*, of nickel workers at the Oak Ridge K-25 Facility.

This study examined mortality patterns in a group of 814 workers potentially exposed to nickel powder because previous studies of workers at nickel refineries had shown excesses of lung and nasal sinus cancers. Between January 1, 1948, and December 31, 1953, the Oak Ridge Gaseous Diffusion Plant (ORGDP, now known as the K-25 Facility) employed over 800 white males in the manufacture of "barrier" material for nuclear weapons. This process required the use of metallic nickel powder. For the study, a comparison group of 7,552 white males employed for at least 1 day at K-25 between January 1, 1948, and December 31, 1953, and who had no indications of occupational involvement in the production of barrier material was selected. Mortality rates in the nickel workers and non-nickel workers were compared with each other and with those of U.S. white males. There was no evidence of increased mortality due to lung cancers or nasal sinus cancers in the nickel workers. Increases, not statistically significant, in mortality due to cancers of the buccal cavity, pharynx, and digestive system were observed in the nickel worker group when compared to the non-nickel worker group.

The single analytic file (K25EVER1) contains one record for each of the 8,378 individuals in the cohort that includes the nickel workers and the comparison group of non-nickel workers. Vital status was ascertained for 100% of the cohort through December 31, 1977, which allowed at least 24 years of follow-up for each individual. There were 137 deaths identified in the nickel worker group and 1,920 deaths in the comparison group. Death certificates were obtained for 97% of the total number (2,057) of deaths.

Radiation monitoring data were not used in this study; however, smoking histories for some workers were available through the plant medical records. All of the nickel workers' medical records and a random sample of 20% of the comparison group's medical records were abstracted for smoking data. Information was obtained for 54% of the nickel workers and for 48% of the other workers whose records were in the sample. The nickel workers had a slightly lower frequency of smoking than the other workers based on the sample. Air monitoring data indicated that nickel workers worked in an environment where nickel levels were above NIOSH standards.

OR/K-25

ORK25A01 Data Set

Citations

Cragle, D. L., D. R. Hollis, and T. H. Newport.
1984. "A retrospective cohort mortality study
among workers occupationally exposed to
metallic nickel powder at the Oak Ridge
Gaseous Diffusion Plant." *IARC Scientific No.*
53:57-63.

No. of Files: 1		
File Name	No. of Variables	Type of Data
K25EVER1	14	vital status; smoking history; work history

Summary Death Tables

Cause of Death	No. of Deaths	
	Male	Female†
Infectious & Parasitic Diseases	19	
All Malignant Neoplasms	427	
• Lip, Oral Cavity & Pharynx	7	
• Digestive Organs & Peritoneum	96	
• Respiratory System	177	
• Bone & Connective Tissue	1	
• Skin	7	
• Breast	0	
• Genitourinary System	50	
• Brain/CNS	14	
• Other & Unspecified Sites, Except Brain/CNS	25	
• Lymphatic/Hematopoietic	50	
All Benign Neoplasms	2	
All Neoplasms, Unspecified	4	
Endocrine, Nutritional, Metabolic Diseases & Immunity Disorders	28	
Diseases of Blood & Blood-Forming Organs	4	
Mental Disorders	12	
Diseases of Nervous System & Sense Organs	13	
Diseases of Circulatory System	1135	
Diseases of Respiratory System	122	
Diseases of Digestive System	81	
Diseases of Genitourinary System	17	
Complications of Pregnancy & Childbirth	0	
Diseases of Skin & Subcutaneous Tissue	1	
Diseases of Musculoskeletal System & Connective Tissue	5	
Congenital Anomalies	7	
Symptoms & Ill-Defined Conditions	99	
Accidents, Poisoning & Violence (External Causes)	220	
Deaths, With ICD Code	2196	
Deaths, No ICD Code	64	
Total Deaths, All Causes	2260	

† No females were included in this study.

Analytic File Name

K25EVER1

- 1 birth date
- 2 worked at K-25 (Y/N)
- 3 first hire date at any Oak Ridge facility
- 4 last termination date
- 5 last known status date
- 6 vital status
- 7 CER-assigned ID number
- 8 3-digit ICD code for cause of death
- 9 first hire at K25 facility
- 10 last term from K25 facility
- 11 smoking history code
- 12 barrier worker (Y/N)
- 13 first date in a nickel department
- 14 sequence number

OR/MULTI

ORMULA01 Data Set

Description

This analytic data set consists of one file generated for a study, published in *Archives of Environmental Health* in 1981, of welders employed at one or more of the three Oak Ridge facilities.

This study examined mortality from various diseases, including cancer of the respiratory system, in a cohort of 1,059 white male welders exposed to nickel compounds. The study also examined the long-term health effects of exposure to several other compounds (dust, fumes, and gases) among welders. A subgroup of these welders was exposed to nickel oxides at the Oak Ridge K-25 Facility, formerly known as the Oak Ridge Gaseous Diffusion Plant (ORGDP). These workers were subjected to air concentrations of nickel higher than proposed standards. However, standardized mortality ratios (SMRs) for lung cancer and diseases of the respiratory system were not higher among K-25 welders than among other welders.

The single analytic file (ANALYSIS) in this data set contains demographic and vital status data for 1,062 individuals. There is one record per person; three individuals were not included in the final analyses. Radiation monitoring data were not used in the analysis.

The study cohort of 1,059 white male welders was determined by examining work histories (payroll records) that specified job titles and job codes indicative of welding. Industrial hygienists at the plant were consulted to avoid possible exclusion of job titles and job codes associated with welding on a full-time basis. Vital status was ascertained for approximately 92% of the study cohort through December 31, 1974, the study end date. There were 173 deaths identified, and death certificates were obtained for 166 (95.9%) of these deaths. Personal radiation monitoring data were not used; however, some air monitoring data and smoking history data were analyzed. Smoking data were obtained for 356 (33.6%) of the 1,059 welders.

OR/MULTI

ORMULA01 Data Set

Citation

Polednak, A. 1981. "Mortality among welders, including a group exposed to nickel oxides." *Archives of Environmental Health* 36(5).

No. of Files: 1		
File Name	No. of Variables	Type of Data
ANALYSIS	12	demographic; vital status

Summary Death Tables

Cause of Death	No. of Deaths	
	Male	Female†
Infectious & Parasitic Diseases	1	
All Malignant Neoplasms	69	
• Lip, Oral Cavity & Pharynx	0	
• Digestive Organs & Peritoneum	15	
• Respiratory System	33	
• Bone & Connective Tissue	0	
• Skin	0	
• Breast	1	
• Genitourinary System	5	
• Brain/CNS	3	
• Other & Unspecified Sites, Except Brain/CNS	8	
• Lymphatic/Hematopoietic	4	
All Benign Neoplasms	0	
All Neoplasms, Unspecified	0	
Endocrine, Nutritional, Metabolic Diseases & Immunity Disorders	1	
Diseases of Blood & Blood-Forming Organs	0	
Mental Disorders	0	
Diseases of Nervous System & Sense Organs	3	
Diseases of Circulatory System	149	
Diseases of Respiratory System	28	
Diseases of Digestive System	17	
Diseases of Genitourinary System	2	
Complications of Pregnancy & Childbirth	0	
Diseases of Skin & Subcutaneous Tissue	0	
Diseases of Musculoskeletal System & Connective Tissue	1	
Congenital Anomalies	0	
Symptoms & Ill-Defined Conditions	11	
Accidents, Poisoning & Violence (External Causes)	43	
Deaths, With ICD Code	325	
Deaths, No ICD Code	9	
Total Deaths, All Causes	334	

† No females were included in this study.

Analytic File Name

ANALYSIS

- 1 CER-assigned ID number
- 2 birth date of individual
- 3 first hire as a welder
- 4 vital status
- 5 last date status date
- 6 the underlying cause of death
- 7 number of days worked at K25
- 8 days as a welder not at K25
- 9 the year of birth
- 10 first hire year as a welder
- 11 latency time
- 12 sequence number of row

OR/MULTI

ORMULA02 Data Set

Description

This analytic data set consists of one file generated for a study, published in *Radiation Research* in 1990, of white males who worked at the Oak Ridge facilities during World War II (WWII).

This study demonstrated that Poisson regression methods can effectively describe the effect of multiple risk factors on cause-specific mortality. The cohort was defined as 28,008 white males who were employed for at least 1 month at any one of the three Oak Ridge facilities. During WWII (1943-1947), two of the facilities (Y-12 and K-25) were plants that produced enriched uranium, and Oak Ridge National Laboratory was a research and development facility. During WWII, radiation monitoring programs were in developmental stages; only persons considered likely to be exposed, or those who were thought to be representative samples of workers likely to be exposed, were monitored. The paper discusses how a modified version of the traditional standardized mortality ratio (SMR) analysis was used to compare the cause-specific mortality experience of these workers with the U.S. population. The SMR for all causes was 1.11, and there was a significant upward trend of 0.74% per year. The excess mortality was primarily due to lung cancer and diseases of the respiratory system.

The single analytic file (PHASE1B) in this data set contains 28,008 records, one for each person in the cohort. Each record consists of demographic, vital status, and work history data and external exposure indicators. The indicators were used as surrogates for external exposure data and were determined by analyzing job title and department combinations, categorizing each combination by risk of exposure.

The cohort included only those workers who were hired at one of the facilities between the start of operations at that respective facility and December 31, 1947. Each person was considered to have entered the cohort on January 1, 1950. Vital status was ascertained for 98.1% of the cohort through December 31, 1979, the study end date. There were 11,671 deaths identified, and death certificates were obtained for 96.8% of these deaths.

Because radiation monitoring programs were still in developmental stages, complete personal monitoring data for this cohort were not available during the time period. Therefore, exposure indices based on job title and department combinations were developed as surrogates for monitoring data.

OR/MULTI

ORMULA02 Data Set

Citation

Frome, E. L., D. L. Cragle, and R. W. McLain.
1990. "Poisson regression of the mortality
among a cohort of World War II nuclear
industry workers." *Radiation Research*
123:138-152.

No. of Files: 1		
File Name	No. of Variables	Type of Data
PHASE1B	22	demographic; vital status; work history; time at exposure level

Summary Death Tables

Cause of Death	No. of Deaths	
	Male	Female [†]
Infectious & Parasitic Diseases	150	
All Malignant Neoplasms	2188	
• Lip, Oral Cavity & Pharynx	75	
• Digestive Organs & Peritoneum	486	
• Respiratory System	877	
• Bone & Connective Tissue	22	
• Skin	33	
• Breast	5	
• Genitourinary System	255	
• Brain/CNS	67	
• Other & Unspecified Sites, Except Brain/CNS	174	
• Lymphatic/Hematopoietic	194	
All Benign Neoplasms	7	
All Neoplasms, Unspecified	25	
Endocrine, Nutritional, Metabolic Diseases & Immunity Disorders	151	
Diseases of Blood & Blood-Forming Organs	9	
Mental Disorders	81	
Diseases of Nervous System & Sense Organs	76	
Diseases of Circulatory System	5727	
Diseases of Respiratory System	790	
Diseases of Digestive System	470	
Diseases of Genitourinary System	147	
Complications of Pregnancy & Childbirth	0	
Diseases of Skin & Subcutaneous Tissue	6	
Diseases of Musculoskeletal System & Connective Tissue	25	
Congenital Anomalies	13	
Symptoms & Ill-Defined Conditions	338	
Accidents, Poisoning & Violence (External Causes)	1046	
Deaths, With ICD Code	11249	
Deaths, No ICD Code	367	
Total Deaths, All Causes	11616	

[†] No females were included in this study.

Analytic File Name

PHASE1B

- 1 CER-assigned ID number
- 2 cancer cause in not underlying
- 3 birth date
- 4 last date known alive
- 5 length of employment in days
- 6 date of first hire
- 7 last termination date before 1/1/48
- 8 hire date if after 1/1/48
- 9 vital status of individual
- 10 number of days at yes exposure level
- 11 number of days at no exposure level
- 12 number of days at Substitute Alloy Material (SAM) Laboratory
- 13 number of days at unknown level
- 14 underlying cause of death code
- 15 facility of employment
- 16 category of duration of employment
- 17 highest socioeconomic status reached
- 18 first socioeconomic status
- 19 exposed on job (yes, no, unknown)
- 20 age category at 1945
- 21 this variable was not used in analysis
- 22 sequence number of row

OR/MULTI

ORMULA03 Data Set

Description

This analytic data set consists of one file generated for a study, published in the *American Journal of Public Health* in 1992, examining ill-defined causes of death of white males at the three Oak Ridge facilities.

This study determined the association between various factors and a recorded ill-defined cause of death. A matched pair case-control study, with one control per case and within an occupational cohort of workers at three facilities (the Oak Ridge Y-12 and K-25 Plants and the Oak Ridge National Laboratory), was conducted. The study found a strong association between the ill-defined classification given as a cause of death and particular certifiers, especially if the certifier was a medical examiner. Results from other cohort mortality studies of workers at the Oak Ridge facilities have indicated unusual increases in the rate of deaths due to unexplained or unspecified causes. In this study, the standardized mortality ratio (SMR) for deaths coded to these categories was 3.05 (338 observed versus 110.92 expected).

The single analytic file in this data set contains 1,216 records, one for each case and each matched control. The file contains demographic, work history, and fatality data, plus codes for the different certifiers. Each individual in this cohort must have worked for more than 30 days at any Oak Ridge facility between 1943 and 1982 and must have died between 1945 and 1982. Death certificates were obtained for 608 cases in which deaths were due to unexplained or unspecified causes. Based on cause of death and matching birth and death dates within 2 years (plus or minus), a control was selected for each case. The control also had to work at the same facility as the case.

Death certificates were obtained for all 1,216 cases and controls, from which considerable data in addition to cause of death were abstracted.

Personal or environmental radiation monitoring data were not used in this study.

OR/MULTI

ORMULA03 Data Set

Citations

Cragle, D. L., and A. Fetcher. 1992. "Risk factors associated with the classification of unspecified and/or unexplained causes of death in an occupational cohort." *American Journal of Public Health* 82(3):455-457.

No. of Files: 1		
File Name	No. of Variables	Type of Data
ANALYSIS	38	demographic; work history; death certificate data

Summary Death Tables

Cause of Death	No. of Deaths	
	Male	Female†
Infectious & Parasitic Diseases	7	
All Malignant Neoplasms	141	
• Lip, Oral Cavity & Pharynx	6	
• Digestive Organs & Peritoneum	41	
• Respiratory System	53	
• Bone & Connective Tissue	1	
• Skin	1	
• Breast	0	
• Genitourinary System	13	
• Brain/CNS	3	
• Other & Unspecified Sites, Except Brain/CNS	8	
• Lymphatic/Hematopoietic	15	
All Benign Neoplasms	1	
All Neoplasms, Unspecified	1	
Endocrine, Nutritional, Metabolic Diseases & Immunity Disorders	13	
Diseases of Blood & Blood-Forming Organs	0	
Mental Disorders	2	
Diseases of Nervous System & Sense Organs	3	
Diseases of Circulatory System	300	
Diseases of Respiratory System	34	
Diseases of Digestive System	25	
Diseases of Genitourinary System	8	
Complications of Pregnancy & Childbirth	0	
Diseases of Skin & Subcutaneous Tissue	0	
Diseases of Musculoskeletal System & Connective Tissue	2	
Congenital Anomalies	0	
Symptoms & Ill-Defined Conditions	607	
Accidents, Poisoning & Violence (External Causes)	70	
Deaths, With ICD Code	1214	
Deaths, No ICD Code	2	
Total Deaths, All Causes	1216	

† No females were included in this study.

Analytic File Name

ANALYSIS

- 1 autopsy code
- 2 autopsy used to complete death certificate
- 3 case/control indicator
- 4 case/control indicator
- 5 death certificate certifier
- 6 code indicating name of certifier
- 7 continuous employment indicator
- 8 date of birth
- 9 date of death
- 10 East Tennessee county of death
- 11 East Tennessee county of residence
- 12 employment duration
- 13 facility first employed
- 14 first hire date at any Oak Ridge facility
- 15 code for hospital name
- 16 code for hospital status
- 17 type of hospital
- 18 cause of death
- 19 CER-assigned ID number
- 20 job classification per death certificate
- 21 last job title per CER Data Model
- 22 number of days employed at Oak Ridge
- 23 last term date from any Oak Ridge facility
- 24 marital status
- 25 mobility indicator

- 26 worked at more than one fac. indicator
- 27 death cert. physician attending (Y/N)
- 28 place of death
- 29 place of last residence
- 30 set number
- 31 state of birth
- 32 state of death
- 33 state of last known residence
- 34 was state of last residence Tennessee
- 35 was state of birth Tennessee
- 36 was state of death Tennessee
- 37 code for Tennessee county of death
- 38 code for Tennessee county of residence

OR/X-10

ORX10A01 Data Set

Description

This analytic data set consists of four files generated for the cohort mortality study, published in the *British Journal of Industrial Medicine* in 1985, of white males employed at Oak Ridge National Laboratory (ORNL).

The publication focuses on 8,375 white males employed at ORNL for at least 1 month (30 days) between 1943 and 1972. The study presents internal comparisons of mortality (standardized rate ratios) between subgroups of the cohort according to radiation dose level and duration of employment in various job categories. No consistent gradients of cause-specific mortality were assessed with respect to radiation exposure. Among monitored workers, deficits in mortality due to arteriosclerotic heart disease and all cancers were found. However, elevated (but not statistically significant) standardized mortality ratios (SMRs) were seen for all leukemias, cancer of the prostate, and Hodgkin's disease.

There are four analytic files in the ORX10A01 data set. The first file (X1CH0210) provides information for 12 employment groupings, which were based on an examination of each individual's work history and on the calculation of a 10-year latency period for each person. The second file (X1CH0810) contains external radiation doses as assessed from external monitoring data. The third file (X1CH1201) contains all demographic data and summary exposure data pertaining to the cohort. This file contains one record per individual in the cohort, whereas the other files may contain several or no records per individual, depending on the availability of monitoring data for those individuals. The fourth file (CUMEXP) contains all internal monitoring data pertinent to the cohort.

Vital status was ascertained for 92.2% of the cohort of 8,375 white males through December 31, 1977, the study end date. There were 966 deaths identified, and death certificates were obtained for 939 (97.2%) of these deaths. External and internal exposures to radiation were examined.

ORNL began monitoring personnel for exposure to penetrating external radiation, primarily gamma rays, in 1943. Pocket chambers were used until June 1944, when film dosimeters (film badges) became the primary dosimeters. Film dosimeters were used for personnel monitoring until 1975, when they were replaced with thermoluminescent dosimeters (TLDs). From 1943 until the early 1950s, the usual practice was to provide personal dosimeters to only those workers entering designated areas where the potential for exposure was presumed to exist. Subsequently, all workers at ORNL were monitored for exposure to radiation. In 1951, based primarily on the potential for contamination from their work area, some workers began to be monitored by urine bioassays for internal exposure to radionuclides. Additional workers were monitored to evaluate exposures incurred during incidents. Internal exposures were determined by results of urine and fecal bioassays and whole-body counting. For purposes of the study, internal monitoring results were used to place the worker into one of three exposure categories each year. Quantitative dose estimates due to internally deposited radionuclides are not available because they usually were not required to be calculated in the past, and all of the basic data needed to compute doses for the many radionuclides used at ORNL are not computerized. However, knowledgeable plant health physicists and dosimetrists state that the majority of internal monitoring results for this cohort suggest small internal doses, especially when compared to external doses.

OR/X-10

ORX10A01 Data Set

Citations

Checkoway, H., R. M. Mathew, C. M. Shy, J. E. Watson, W. G. Tankersley, S. H. Wolf, J. C. Smith, and S. A. Fry. 1985. "Radiation, work experience, and cause-specific mortality among workers at an energy research laboratory." *British Journal of Industrial Medicine* 42:525-533.

No. of Files: 4		
File Name	No. of Variables	Type of Data
X1CH0210	49	work history
X1CH0810	71	external radiation dose
X1CH1201	38	demographic; summary exposure; vital status
CUMEXP	71	internal monitoring

Summary Death Tables

Cause of Death	No. of Deaths	
	Male	Female†
Infectious & Parasitic Diseases	6	
All Malignant Neoplasms	194	
• Lip, Oral Cavity & Pharynx	4	
• Digestive Organs & Peritoneum	45	
• Respiratory System	61	
• Bone & Connective Tissue	4	
• Skin	4	
• Breast	0	
• Genitourinary System	22	
• Brain/CNS	9	
• Other & Unspecified Sites, Except Brain/CNS	15	
• Lymphatic/Hematopoietic	30	
All Benign Neoplasms	0	
All Neoplasms, Unspecified	1	
Endocrine, Nutritional, Metabolic Diseases & Immunity Disorders	12	
Diseases of Blood & Blood-Forming Organs	2	
Mental Disorders	3	
Diseases of Nervous System & Sense Organs	6	
Diseases of Circulatory System	472	
Diseases of Respiratory System	42	
Diseases of Digestive System	26	
Diseases of Genitourinary System	15	
Complications of Pregnancy & Childbirth	0	
Diseases of Skin & Subcutaneous Tissue	1	
Diseases of Musculoskeletal System & Connective Tissue	1	
Congenital Anomalies	1	
Symptoms & Ill-Defined Conditions	28	
Accidents, Poisoning & Violence (External Causes)	129	
Deaths, With ICD Code	939	
Deaths, No ICD Code	27	
Total Deaths, All Causes	966	

† No females were included in this study.

Analytic File Name**X1CH0210**

- 1 CER-assigned ID number
- 2 total time spent in grp 01
- 3 total time spent in grp 02
- 4 total time spent in grp 03
- 5 total time spent in grp 04
- 6 total time spent in grp 05
- 7 total time spent in grp 06
- 8 total time spent in grp 07
- 9 total time spent in grp 08
- 10 total time spent in grp 09
- 11 total time spent in grp 10
- 12 total time spent in grp 11
- 13 total time spent in grp 12
- 14 date first worked in grp 01
- 15 date first worked in grp 02
- 16 date first worked in grp 03
- 17 date first worked in grp 04
- 18 date first worked in grp 05
- 19 date first worked in grp 06
- 20 date first worked in grp 07
- 21 date first worked in grp 08
- 22 date first worked in grp 09
- 23 date first worked in grp 10
- 24 date first worked in grp 11
- 25 date first worked in grp 12
- 26 1-yr date of eligibility into grp 01
- 27 1-yr date of eligibility into grp 02
- 28 1-yr date of eligibility into grp 03
- 29 1-yr date of eligibility into grp 04
- 30 1-yr date of eligibility into grp 05
- 31 1-yr date of eligibility into grp 06
- 32 1-yr date of eligibility into grp 07
- 33 1-yr date of eligibility into grp 08

- 34 1-yr date of eligibility into grp 09
- 35 1-yr date of eligibility into grp 10
- 36 1-yr date of eligibility into grp 11
- 37 1-yr date of eligibility into grp 12
- 38 10-yr date of eligibility into grp 01
- 39 10-yr date of eligibility into grp 02
- 40 10-yr date of eligibility into grp 03
- 41 10-yr date of eligibility into grp 04
- 42 10-yr date of eligibility into grp 05
- 43 10-yr date of eligibility into grp 06
- 44 10-yr date of eligibility into grp 07
- 45 10-yr date of eligibility into grp 08
- 46 10-yr date of eligibility into grp 09
- 47 10-yr date of eligibility into grp 10
- 48 10-yr date of eligibility into grp 11
- 49 10-yr date of eligibility into grp 12

Analytic File Name**X1CH0810**

- 1 CER-assigned ID number
- 2-36 annual film badge dose by year, 1943 - 1977
- 37-71 cumulative film badge dose by year, 1943 - 1977

Analytic File Name**X1CH1201**

- 1 CER-assigned ID number
- 2 highest internal exposure code
- 3 code for highest in vivo value
- 4 highest bioassay value ever
- 5 number of times individual was hired
- 6 current employee
- 7 final termination date of individual
- 8 sex code
- 9 race code
- 10 number of facilities
- 11 first date of hire at ORNL
- 12 duration of employment at ORNL
- 13 exposure to mercury
- 14 beryllium exposure indicator
- 15 exposure to lead
- 16 birth date
- 17 date of death
- 18 vital status
- 19 DAG code
- 20 cumulative neutron dose
- 21 year of earliest neutron record
- 22 number of neutron records
- 23 neutron exposure flag
- 24 date of last observation
- 25 total film badge dose at ORNL
- 26 total number of film badge records
- 27 days from final term to date last observation
- 28 film badge error flag
- 29 year of first exposure at ORNL

- 30 length of follow-up in years
- 31 first year in vivo monitoring
- 32 total number of in vivo records
- 33 first monitoring year of bioassay
- 34 total number of bioassay records
- 35 status of internal monitoring
- 36 earliest internal monitoring year
- 37 underlying cause of death
- 38 other cancers

Analytic File Name

CUMEXP

- 1 CER-assigned ID number
- 2-36 highest annual internal exposure code by year, 1943 - 1977
- 37-71 highest cumulative internal exposure code by year, 1943 - 1977

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ORX10A02 Data Set

Description

This analytic data set consists of three files that were used in updated analyses, presented in two papers, of white males employed at the Oak Ridge National Laboratory (ORNL).

Both papers analyzed data for a cohort of 8,318 white males employed at ORNL for at least 30 days between 1943 and 1972. In the first paper (JAMA 1991), two types of analyses were performed. The first was a cause-specific mortality analysis comparing the study population to the mortality of white males in the U.S. The second was an analysis of the relationship between protracted exposure to low levels of external penetrating ionizing radiation and mortality within the study population. Compared with the mortality experience of all U.S. white males, relatively low mortality was observed for most causes of death. However, mortality from leukemia was elevated in the total cohort and in workers who had at some time been monitored for exposure to internally deposited radionuclides. The second publication (AJIM 1993) examines the role of possible selection and confounding factors not previously studied. Risks associated with length of time in 15 job categories were considered as proxies for the effects of other occupational carcinogens. The findings suggest that selection factors and potential for chemical exposure do not account for the previously noted association of external radiation dose with cancer mortality.

There are three analytic files in the ORX10A02 data set. The first file (X1UPGEN2) contains demographic and some work history data for the entire cohort. The original study (ORX10A01) contained 8,375 males, but further investigation revealed that 57 individuals in the original cohort were not white males. The second file (X1UPFLAT) contains annual and cumulative external whole-body doses for each individual. The third file (X1UPJTGB)

contains a record for each individual, including the unique job title of the individual and the number of days, by year, that the person retained the job title.

Vital status was ascertained for 91.8% of the cohort (96.5% of potential person-years of follow-up), and 1,524 deaths were identified by the end of 1984, the study end date. Death certificates were obtained for 1,490 (97.8%) of these deaths. External radiation monitoring data were used to compile annual and cumulative whole-body doses. For the 4.9% of the work-years for which external monitoring data were not available, doses were estimated. By using internal monitoring data qualitatively as a "yes/no" indicator of potential exposure to internal radiation, workers who had at some time been monitored for internal exposure (N = 3,763) generally had higher external doses; 50% of those ever monitored, but only 8% of those never monitored, for internal exposure had cumulative external doses greater than 1 rem (10 mSv).

ORNL began monitoring personnel for exposure to external penetrating radiation, primarily gamma rays, in 1943. Pocket chambers were used until June 1944, when film dosimeters (film badges) became the primary dosimeter. Film dosimeters were used for personnel monitoring until 1975, when they were replaced with thermoluminescent dosimeters (TLDs). From 1943 until the early 1950s, the usual practice was to provide personal dosimeters to only those workers entering designated areas where there was a potential for exposure. Subsequently, all workers at ORNL were monitored.

Based primarily on the potential for contamination from their work area, some workers were monitored for internal exposure to radionuclides beginning in 1951. Additional workers were

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ORX10A02 Data Set

- monitored to evaluate exposures incurred during incidents.
- Internal exposures were determined by examining results of
- urine and fecal bioassays and whole-body counting. Quantitative
- dose estimates due to internally deposited radionuclides are not
- available because they usually were not required to be
- calculated in the past. Also, all of the basic data needed to
- compute doses for the many radionuclides used at ORNL are not
- computerized. However, knowledgeable plant health physicists
- and dosimetrists state that the majority of internal monitoring
- results for this cohort suggest small internal doses, especially
- when compared to external doses.

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ORX10A02 Data Set

Citations

- Wing, S., C. M. Shy, J. Wood, S. Wolf, D. Cragle, and E. L. Frome. 1991. "Mortality among workers at Oak Ridge National Laboratory." *The Journal of the American Medical Association* 265(11):1397-1402.
- Wing, S., C. M. Shy, J. Wood, S. Wolf, D. Cragle, W. Tankersley, and E. L. Frome. 1993. "Job factors, radiation and cancer mortality at Oak Ridge National Laboratory: Follow-up through 1984." *American Journal of Industrial Medicine* 23:265-279.

No. of Files: 3		
File Name	No. of Variables	Type of Data
X1UPGEN2	24	demographic; work history
X1UPFLAT	90	annual and cumulative external, whole-body dose
X1UPJTGB	46	work history

Summary Death Tables

Cause of Death	No. of Deaths	
	Male	Female†
Infectious & Parasitic Diseases	6	
All Malignant Neoplasms	345	
• Lip, Oral Cavity & Pharynx	6	
• Digestive Organs & Peritoneum	94	
• Respiratory System	101	
• Bone & Connective Tissue	5	
• Skin	8	
• Breast	0	
• Genitourinary System	41	
• Brain/CNS	15	
• Other & Unspecified Sites, Except Brain/CNS	26	
• Lymphatic/Hematopoietic	49	
All Benign Neoplasms	1	
All Neoplasms, Unspecified	1	
Endocrine, Nutritional, Metabolic Diseases & Immunity Disorders	15	
Diseases of Blood & Blood-Forming Organs	2	
Mental Disorders	5	
Diseases of Nervous System & Sense Organs	9	
Diseases of Circulatory System	738	
Diseases of Respiratory System	73	
Diseases of Digestive System	45	
Diseases of Genitourinary System	16	
Complications of Pregnancy & Childbirth	0	
Diseases of Skin & Subcutaneous Tissue	2	
Diseases of Musculoskeletal System & Connective Tissue	2	
Congenital Anomalies	2	
Symptoms & Ill-Defined Conditions	55	
Accidents, Poisoning & Violence (External Causes)	172	
Deaths, With ICD Code	1489	
Deaths, No ICD Code	34	
Total Deaths, All Causes	1523	

† No females were included in this study.

Analytic File Name

X1UPGEN2

- 1 highest internal exposure index
- 2 status of internal monitoring
- 3 earliest year for internal monitoring
- 4 sex code
- 5 race code
- 6 number of facilities worked at
- 7 first hire date at ORNL
- 8 birth date
- 9 flag indicating deleted from study
- 10 vital status of individual
- 11 underlying cause of death
- 12 other cancers
- 13 date of last observation
- 14 date of death
- 15 cutoff date of study (12/31/84)
- 16 flag indicating current employee
- 17 last termination date from ORNL
- 18 number of times hired at ORNL
- 19 number of days employed at ORNL
- 20 old ID number
- 21 length of follow-up
- 22 date of first internal monitoring
- 23 pay code
- 24 CER-assigned ID number

Analytic File Name

X1UPFLAT

- 1-42 annual whole-body dose by year, 1943 - 1984
- 43-84 cumulative body dose by year, 1943 - 1984
- 85 CER-assigned ID number
- 86 missing quarter was estimated
- 87 missing years est. by nearby yrs.
- 88 missing years est. from dept. median
- 89 missing years est. from plant median
- 90 no. of years of data for person

Analytic File Name

X1UPJTGB

- 1 variable created by SAS procedure
- 2 variable created by SAS procedure
- 3 CER-assigned ID number
- 4 job title grouping code
- 5-46 duration in job through year, 1943 - 1984

OR/X-10

ORX10A03 Data Set

Description

This analytic data set consists of one file generated for a doctoral dissertation completed in 1983 that examined the cancer mortality of workers at Oak Ridge National Laboratory (ORNL).

The dissertation investigated the relationship between cancer mortality and occupational exposure to radiation among the male employees at ORNL. The study was based on a case-control study nested in a cohort study, using two controls per case. Results indicated that certain subgroups encountered excess cancer mortality risk in relation to radiation exposure.

The single analytic file (NAIMA) in this data set contains data relating to demographics, work history, exposure index rankings, internal hazard codes based on urine bioassay data, vital status, and causes of death. There are 1,785 records in this file, including one record for each of the 423 cases and one record for each of the 846 matched controls (the case-control

group), plus one record for each of the remaining 516 workers in the overall cohort. A case was defined to be any male employee who died between January 1943 and December 1977, whose death certificate indicated cancer as the cause of death. Controls were selected from the "population at risk" at ORNL, excluding those who died of cancer. The controls could be either dead or alive.

Vital status was ascertained for 91.7% of the male controls and for 66.5% of the female controls through December 31, 1977, the study end date.

Personal monitoring data were used to place workers into exposure classes; doses were not calculated. Groups based on job title were also formed for the analysis. Smoking histories were obtained for a sample (25%) of the cohort. Exposures to lead, beryllium, and mercury were also considered in the analysis.

OR/X-10

ORX10A03 Data Set

Citations

Elghany, Naima Abd. 1983. "An epidemiological study of cancer mortality among workers exposed to occupational low levels of ionizing radiation." Ph.D. dissertation, University of North Carolina, Chapel Hill.

No. of Files: 1		
File Name	No. of Variables	Type of Data
NAIMA	111	demographic; work history; exposure index ranking; internal hazard code; vital status; cause of death

Summary Death Tables

Cause of Death	No. of Deaths	
	Male	Female [†]
Infectious & Parasitic Diseases	1	
All Malignant Neoplasms	499	
• Lip, Oral Cavity & Pharynx	8	
• Digestive Organs & Peritoneum	115	
• Respiratory System	162	
• Bone & Connective Tissue	6	
• Skin	13	
• Breast	1	
• Genitourinary System	76	
• Brain/CNS	18	
• Other & Unspecified Sites, Except Brain/CNS	32	
• Lymphatic/Hematopoietic	68	
All Benign Neoplasms	0	
All Neoplasms, Unspecified	0	
Endocrine, Nutritional, Metabolic Diseases & Immunity Disorders	4	
Diseases of Blood & Blood-Forming Organs	1	
Mental Disorders	0	
Diseases of Nervous System & Sense Organs	2	
Diseases of Circulatory System	210	
Diseases of Respiratory System	24	
Diseases of Digestive System	5	
Diseases of Genitourinary System	9	
Complications of Pregnancy & Childbirth	0	
Diseases of Skin & Subcutaneous Tissue	1	
Diseases of Musculoskeletal System & Connective Tissue	0	
Congenital Anomalies	2	
Symptoms & Ill-Defined Conditions	15	
Accidents, Poisoning & Violence (External Causes)	8	
Deaths, With ICD Code	781	
Deaths, No ICD Code	0	
Total Deaths, All Causes	781	

[†] No females were included in this study.

Analytic File Name

NAIMA

- 1 CER-assigned ID number
- 2 flag indicating completeness of job title grouping
- 3 autopsy performed (Y/N)
- 4 smoking code
- 5 current vital status
- 6 cumulative film badge reading
- 7 total film badge record count
- 8 film badge readings with no errors
- 9 total film badge record count, no error
- 10 film badge readings with minor errors
- 11 total film badge record count, minor
- 12 film badge readings with serious errors
- 13 cum. "serious" badge record count yr. exp.
- 14 unusable film badge readings
- 15 total film badge record count, unusable
- 16 film badge, minor errors, pending
- 17 total film badge record count, minor pending
- 18 film badge, serious errors, pending
- 19 total film badge record count, serious pending
- 20 film badge, unusable, pending
- 21 total film badge record count, unusable pending
- 22 film badge with unknown code
- 23 total film badge record count, unknown
- 24 used to get random order sort
- 25 number of facilities
- 26 date of birth
- 27 entry date into the study
- 28 exit date from the study
- 29 ICD code for underlying cause of death
- 30 cancer code
- 31 year of death
- 32 month of death
- 33 day of death
- 34 ICD code for underlying cause of death
- 35 cancer code
- 36 this variable not used in analysis
- 37 first use in population
- 38 last 2 digits of CER-assigned ID number
- 39 start year at ORNL
- 40 stop year at ORNL
- 41 year of birth
- 42 date began work at ORNL
- 43 date ended work at ORNL
- 44 date of birth
- 45 date of death
- 46 mortality status
- 47 year of death
- 48 person is a case (Y/N)
- 49 cancer death (Y/N)
- 50 stop date of follow-up
- 51 start date of follow-up
- 52 year of first hire
- 53 match criteria 2
- 54 match criteria 3
- 55 sex code
- 56 race code
- 57 type of cancer (if applicable)
- 58 eligible for inclusion (Y/N)
- 59 one of 3 cancers (Y/N)
- 60 case/control category by race
- 61 match group code
- 62 type of control
- 63 description if case or control
- 64 date of death
- 65 age at first hire at ORNL
- 66 duration of employment at ORNL in years
- 67 cumulative external exposure thru 1978
- 68 cumulative external exposure thru 1977
- 69 internal hazard code
- 70 internal hazard code from bioassay
- 71 internal hazard code
- 72 person exposed to mercury (Y/N)
- 73 exposed to beryllium (Y/N)
- 74 person exposed to lead (Y/N)
- 75 age at last termination
- 76 the date 12/31/77 in SAS format
- 77 the date 12/31/79 in SAS format
- 78 age at death or age on 12/31/77
- 79 age at death or age on 12/31/79
- 80 year of last termination
- 81 latency based on 1977 date
- 82 latency based on 1979 date
- 83 job title grouping code
- 84 duration of job with job title grouping
- 85 cumulative duration of all jobs at ORNL
- 86 exposure index (ei)
- 87 total duration of employment at ORNL
- 88 total exposure score
- 89 total job days at ei level 1
- 90 total job days at ei level 2
- 91 total job days at ei level 3
- 92 number of employment periods at ORNL
- 93 number of different jobs at ORNL
- 94 date of first hire
- 95 date of last termination
- 96 employment status
- 97 total exposure score in ei level 1
- 98 total exposure score in ei level 2
- 99 total exposure score in ei level 3
- 100 cumulative dose score in ei level 1
- 101 cumulative dose score in ei level 1,2
- 102 cumulative dose score in ei level 1,2,3
- 103 observation number
- 104 duration of employment at ORNL in months
- 105 duration of job title group in months
- 106 duration at ei level 1
- 107 duration at ei level 2
- 108 duration at ei level 3
- 109 first pay code
- 110 last pay code
- 111 sequence number of row

OR/Y-12

ORY12A01 Data Set

Description

This data set consists of three analytic files for the cohort mortality study, published in the *American Journal of Epidemiology* in 1988, of white males employed at the Y-12 Facility.

This study examines the mortality of a cohort of 6,781 white males who worked at the Y-12 Facility for at least 30 days between May 4, 1947 and December 31, 1974. This cohort included workers who were known to have worked only at Y-12. Individuals who worked at Y-12 when Tennessee Eastman Corporation (TEC) operated the facility (which was before May 4, 1947) or who worked at any other DOE-owned or operated facility were excluded. Workers in this cohort were exposed to low levels of alpha and gamma radiation while working with uranium compounds at an enriched nuclear materials fabrication plant. Relative to U.S. white males, the cohort experienced mortality deficits from all causes of death combined, from cardiovascular diseases, and from most site-specific cancers. When compared with national and state rates, excess mortality due to cancer of the lungs, brain, and central nervous system were seen. Dose-response trends, which diminished in magnitude when a 10-year latency assumption was applied, were detected for lung cancer mortality with respect to cumulative alpha and gamma radiation. The most pronounced trend associated with gamma doses was among workers who received doses equal to or greater than 5 rems of alpha radiation. There were 22 workers who received greater than or equal to 10 rems of external radiation, including 8 workers involved in a criticality accident at the facility in 1958.

There are three analytic files in this data set. The first file (LDBEST01) contains annual and cumulative lung doses for

each person for the years 1947 through 1979. Estimates of doses delivered to the lungs were based on results of urinalysis measurements and in vivo counting of internally deposited uranium. The second file (Y1ANGEL14) contains demographic, work history, and vital status data for the cohort. The third file (Y1ANFB03) contains annual and cumulative penetrating doses that were compiled from external personnel monitoring information. Periods in which a worker was not in the monitoring program were assigned doses of zero, under the assumption that only workers with a reasonable likelihood of exposure had been monitored.

Vital status was ascertained for 6,477 workers (95.5% of the cohort) through December 31, 1979, the study end date. There were 862 deaths identified (12.7%), and death certificates were obtained for 846 (98.1%) of these deaths. Eighty-five percent of the cohort was followed for at least 10 years. The median duration of follow-up was 20.6 years, and the cohort contributed 133,535 person years of observation.

Workers at Y-12 were exposed to radiation resulting from external sources (primarily gamma radiation from the uranium decay series) and from internal deposition of uranium (primarily alpha particles). Personal monitoring for external exposure began in 1948 with the use of film dosimeters. They were used for personnel monitoring until the late 1970s, when they were replaced with thermoluminescent dosimeters (TLDs). Monitoring for internal exposure to uranium began in 1950, but was not in full effect until 1953. By 1961, the internal monitoring program included in vivo measurements, such as lung counting. Metabolic models were used to convert urinalysis and in vivo measurements to lung doses for each worker.

ORY-12

ORY12A01 Data Set

Citations

Checkoway, H., N. Pearce, D. J. Crawford-Brown, and D. L. Cagle. 1988. "Radiation doses and cause-specific mortality among workers at a nuclear materials fabrication plant." *American Journal of Epidemiology* 127(2):255-266.

No. of Files: 3		
File Name	No. of Variables	Type of Data
LDBEST01	77	annual and cumulative lung dose
Y1ANGE14	27	demographic; work history; vital status
Y1ANFB03	77	annual and cumulative penetrating dose

Summary Death Tables

Cause of Death	No. of Deaths	
	Male	Female†
Infectious & Parasitic Diseases	3	
All Malignant Neoplasms	197	
• Lip, Oral Cavity & Pharynx	1	
• Digestive Organs & Peritoneum	38	
• Respiratory System	94	
• Bone & Connective Tissue	0	
• Skin	3	
• Breast	0	
• Genitourinary System	16	
• Brain/CNS	14	
• Other & Unspecified Sites, Except Brain/CNS	12	
• Lymphatic/Hematopoietic	19	
All Benign Neoplasms	0	
All Neoplasms, Unspecified	3	
Endocrine, Nutritional, Metabolic Diseases & Immunity Disorders	7	
Diseases of Blood & Blood-Forming Organs	3	
Mental Disorders	5	
Diseases of Nervous System & Sense Organs	7	
Diseases of Circulatory System	382	
Diseases of Respiratory System	37	
Diseases of Digestive System	29	
Diseases of Genitourinary System	8	
Complications of Pregnancy & Childbirth	0	
Diseases of Skin & Subcutaneous Tissue	0	
Diseases of Musculoskeletal System & Connective Tissue	0	
Congenital Anomalies	0	
Symptoms & Ill-Defined Conditions	35	
Accidents, Poisoning & Violence (External Causes)	129	
Deaths, With ICD Code	845	
Deaths, No ICD Code	16	
Total Deaths, All Causes	861	

† No females were included in this study.

Analytic File Name

IDBEST01

- 1 CER-assigned ID number
- 2 2-digit ID number
- 3 year of birth
- 4 year of first hire
- 5 year of last termination
- 6 year follow-up started
- 7 year follow-up ended
- 8 status of individual in study
- 9 annual lung dose for 1947
- 10 cumulative lung dose thru 1947
- 11 annual lung dose for 1948
- 12 cumulative lung dose thru 1948
- 13 annual lung dose for 1949
- 14 cumulative lung dose thru 1949
- 15 annual lung dose for 1950
- 16 cumulative lung dose thru 1950
- 17 annual lung dose for 1951
- 18 cumulative lung dose thru 1951
- 19 annual lung dose for 1952
- 20 cumulative lung dose thru 1952
- 21 annual lung dose for 1953
- 22 cumulative lung dose thru 1953
- 23 annual lung dose for 1954
- 24 cumulative lung dose thru 1954
- 25 annual lung dose for 1955
- 26 cumulative lung dose thru 1955
- 27 annual lung dose for 1956
- 28 cumulative lung dose thru 1956
- 29 annual lung dose for 1957
- 30 cumulative lung dose thru 1957
- 31 annual lung dose for 1958
- 32 cumulative lung dose thru 1958

- 33 annual lung dose for 1959
- 34 cumulative lung dose thru 1959
- 35 annual lung dose for 1960
- 36 cumulative lung dose thru 1960
- 37 annual lung dose for 1961
- 38 cumulative lung dose thru 1961
- 39 annual lung dose for 1962
- 40 cumulative lung dose thru 1962
- 41 annual lung dose for 1963
- 42 cumulative lung dose thru 1963
- 43 annual lung dose for 1964
- 44 cumulative lung dose thru 1964
- 45 annual lung dose for 1965
- 46 cumulative lung dose thru 1965
- 47 annual lung dose for 1966
- 48 cumulative lung dose thru 1966
- 49 annual lung dose for 1967
- 50 cumulative lung dose thru 1967
- 51 annual lung dose for 1968
- 52 cumulative lung dose thru 1968
- 53 annual lung dose for 1969
- 54 cumulative lung dose thru 1969
- 55 annual lung dose for 1970
- 56 cumulative lung dose thru 1970
- 57 annual lung dose for 1971
- 58 cumulative lung dose thru 1971
- 59 annual lung dose for 1972
- 60 cumulative lung dose thru 1972
- 61 annual lung dose for 1973
- 62 cumulative lung dose thru 1973
- 63 annual lung dose for 1974
- 64 cumulative lung dose thru 1974
- 65 annual lung dose for 1975
- 66 cumulative lung dose thru 1975
- 67 annual lung dose for 1976
- 68 cumulative lung dose thru 1976
- 69 annual lung dose for 1977

- 70 cumulative lung dose thru 1977
- 71 annual lung dose for 1978
- 72 cumulative lung dose thru 1978
- 73 annual lung dose for 1979
- 74 cumulative lung dose thru 1979
- 75 total number of years of internal exposure
- 76 total cumulative lung dose
- 77 ICD-8 death code

Analytic File Name

Y1ANGE14

- 1 CER-assigned ID number
- 2 total penetrating dose
- 3 2-digit ID number
- 4 year of birth
- 5 date last observation
- 6 year of first hire
- 7 vital status of individual
- 8 year of last termination
- 9 date of first hire at Y-12
- 10 year follow up started
- 11 sex code
- 12 year follow-up ended
- 13 race code
- 14 status of individual in study
- 15 birth date of individual
- 16 last termination date at Y-12
- 17 number of days employed at Y-12
- 18 current employment indicator
- 19 recoded vital status
- 20 length of company service
- 21 length of follow-up
- 22 age at first hire at Y-12
- 23 first pay code at Y-12
- 24 last pay code known for an individual
- 25 cause of death
- 26 cancer code (ICD) if applicable
- 27 cause of death - numeric

Analytic File Name

Y1ANFB03

- 1** CER-assigned ID number
- 2** 2-digit ID number
- 3** year of birth
- 4** date of first hire at Y-12
- 5** year of termination at Y-12
- 6** year follow-up started for this person
- 7** ending year of follow-up for this person
- 8** vital status
- 9-41** annual penetrating dose by year, 1947 - 1979
- 42-74** cumulative penetrating dose by year, 1947 - 1979
- 75** total number of years with penetrating data
- 76** 3-digit ICD code
- 77** total cumulative penetrating dose

ORY-12

ORY12A02 Data Set

Description

This analytic data set consists of one file generated for a study, published in the *Journal of Occupational Medicine* in 1984, of white males exposed to elemental mercury at the Oak Ridge Y-12 Facility.

This study examined the mortality experience of a group of white male workers who were exposed to elemental mercury and mercury vapors. The mortality experience of the mercury workers was examined with respect to mercury-sensitive systems, including lung, liver, and kidney organs, and the central nervous system (CNS). Statistically significant excesses of deaths from cancer of the lung, brain, and CNS were observed in the group not involved in the mercury process. Exposure to mercury vapors at Y-12 was not found to be related to any excess of deaths from diseases or cancers of target organs for mercury, but an excess of lung cancer was observed in the mercury worker group. No excesses were found when level of exposure and length of exposure were considered.

The single analytic file (MERANAL2) in this data set contains demographic, vital status, and employment data and results of urinalysis monitoring (for mercury). There is one record for each

of 5,664 workers; one individual was not included in the final analyses.

The overall population was defined as all white males who worked at least 4 months at Y-12 between January 1, 1953, and April 30, 1958. These criteria allowed 5,663 individuals to enter the study. The study group was separated into two smaller ones. The first group consisted of 3,530 workers for whom no urinalysis results were recorded and who were presumed as never having been monitored for mercury exposure. The remaining 2,133 were placed into the mercury worker group because their records contained results of mercury urinalyses.

Vital status was ascertained for all 5,663 workers through December 31, 1978, the study end date. There were 1,140 deaths identified, and death certificates were obtained for 1,125 (98.7%) of these deaths.

Records indicating participation in a mercury urinalysis program were used to classify the individual as a mercury worker. Personal radiation monitoring data were not used in the study.

ORY-12

ORY12A '2 Data Set

Citations

Cragle, D. L., D. R. Hollis, J. Qualters, W. G. Tankersley, and S. A. Fry. 1984. "A mortality study of men exposed to elemental mercury." *Journal of Occupational Medicine* 26(11):817-821.

No. of Files: 1

File Name	No. of Variables	Type of Data
MERANAL2	19	demographic; vital status; work history; results of urinalysis monitoring

Summary Death Tables

Cause of Death	No. of Deaths	
	Male	Female†
Infectious & Parasitic Diseases	3	
All Malignant Neoplasms	274	
• Lip, Oral Cavity & Pharynx	4	
• Digestive Organs & Peritoneum	54	
• Respiratory System	123	
• Bone & Connective Tissue	3	
• Skin	4	
• Breast	0	
• Genitourinary System	26	
• Brain/CNS	18	
• Other & Unspecified Sites, Except Brain/CNS	18	
• Lymphatic/Hematopoietic	24	
All Benign Neoplasms	0	
All Neoplasms, Unspecified	3	
Endocrine, Nutritional, Metabolic Diseases & Immunity Disorders	10	
Diseases of Blood & Blood-Forming Organs	3	
Mental Disorders	3	
Diseases of Nervous System & Sense Organs	7	
Diseases of Circulatory System	536	
Diseases of Respiratory System	59	
Diseases of Digestive System	39	
Diseases of Genitourinary System	10	
Complications of Pregnancy & Childbirth	0	
Diseases of Skin & Subcutaneous Tissue	1	
Diseases of Musculoskeletal System & Connective Tissue	1	
Congenital Anomalies	2	
Symptoms & Ill-Defined Conditions	45	
Accidents, Poisoning & Violence (External Causes)	128	
Deaths, With ICD Code	1124	
Deaths, No ICD Code	15	
Total Deaths, All Causes	1139	

† No females were included in this study.

Analytic File Name

MERANAL2

- 1 CER-assigned ID number
- 2 length of employment at Y-12
- 3 length of employment between 1953-1957
- 4 underlying cause of death (3 digits)
- 5 vital status
- 6 underlying cause of death
- 7 cancer cause of death
- 8 last date known alive
- 9 birth date
- 10 first hire date at Y-12 facility
- 11 Oak Ridge first hire
- 12 last termination date from Y-12
- 13 Oak Ridge last term
- 14 date of first mercury monitoring
- 15 first mercury monitoring date > p.a.l.
- 16 added mercury worker
- 17 early mercury worker
- 18 mercury workers
- 19 sequence number of row

ORY-Y-12

ORY12A03 Data Set

Description

This analytic data set consists of one file generated for a cohort mortality study, published in *Journal of Occupational Medicine* in March 1981, of white males at the Oak Ridge Y-12 Facility.

The study examined the mortality experience of white male workers employed at a uranium enrichment facility (the Y-12 Facility) between June 1943 and May 1947. During this time, the plant was operated for the government by the Tennessee Eastman Corporation (TEC). In May 1947, Union Carbide Corporation Nuclear Division became the operating contractor. With this transition, significant changes were made to plant processes, and most of the Y-12 work force was replaced. These occurrences led epidemiologists to study the Y-12 workers employed by TEC (the TEC cohort) separately from those working at the Y-12 Facility after May 1947 (the Y-12 cohort). The TEC cohort was selected for this mortality study because (1) a long period of follow-up was available, (2) data were available showing that average levels of airborne uranium dust were high in certain departments, (3) the size of the sample was large, and (4) data were limited on the possible long-term health effects of uranium exposure in human populations.

Standardized mortality ratios (SMRs) for various causes of death in the entire cohort were generally less than 1.00; however, after correction for missing death certificates and unascertained deaths, the SMR for lung cancer was 1.22. Other causes of particular interest, including bone cancer, leukemia, and diseases of respiratory and genitourinary systems, did not exhibit high SMRs. The authors suggested that an increased number of lung cancer

deaths occurred in chemical workers who were 45 or more years old when first hired.

The single analytic file (FROMEPOL) in this data set contains 38,521 records, i.e., one record for each person who had a payroll record at the plant when TEC was the operating contractor. Application of the cohort selection criteria reduced the cohort under study to 18,869 white males. The records excluded from the analysis pertained to females (about 18,100), non-white males, individuals who worked less than 2 days at Y-12, and those lacking essential vital status and demographic data. Records for the study cohort can be determined by examining the published manuscript for all the criteria and checking certain variables in the file. The file contains demographic, work history, vital status, and some urinalysis data.

Vital status was ascertained for 97.6% of the cohort through December 31, 1973, the study end date. There were 5,394 deaths identified in this cohort, and death certificates were obtained for 5,133 (95.2%) of these deaths. The study had 494,742 person-years of follow-up.

The TEC cohort did not wear personal dosimeters (film badges); however, exposure to penetrating external (gamma) radiation was low due to the nature of plant operations. The primary radiological hazard for the TEC cohort was inhalation of uranium compounds. Some urinalysis for uranium was performed for individuals working in areas of airborne material, and these data were used in the analysis.

ORY-12

ORY12A03 Data Set

Citations

Polednak, A. P., and E. L. Frome. 1981.
"Mortality among men employed
between 1943 and 1947 at a uranium-
processing plant." *Journal of Occupa-
tional Medicine* 23(3):169-178.

No. of Files: 1		
File Name	No. of Variables	Type of Data
FROMEPOL	27	demographic; work history; vital status; results of some urinalysis monitoring

Summary Death Tables

Cause of Death	No. of Deaths	
	Male	Female
Infectious & Parasitic Diseases	115	14
All Malignant Neoplasms	933	291
• Lip, Oral Cavity & Pharynx	30	6
• Digestive Organs & Peritoneum	227	47
• Respiratory System	354	26
• Bone & Connective Tissue	11	4
• Skin	18	10
• Breast	1	63
• Genitourinary System	101	67
• Brain/CNS	32	15
• Other & Unspecified Sites, Except Brain/CNS	72	20
• Lymphatic/Hematopoietic	87	33
All Benign Neoplasms	2	6
All Neoplasms, Unspecified	14	4
Endocrine, Nutritional, Metabolic Diseases & Immunity Disorders	61	24
Diseases of Blood & Blood-Forming Organs	11	4
Mental Disorders	39	6
Diseases of Nervous System & Sense Organs	41	8
Diseases of Circulatory System	2682	355
Diseases of Respiratory System	355	52
Diseases of Digestive System	236	51
Diseases of Genitourinary System	73	20
Complications of Pregnancy & Childbirth	0	7
Diseases of Skin & Subcutaneous Tissue	3	4
Diseases of Musculoskeletal System & Connective Tissue	11	9
Congenital Anomalies	9	6
Symptoms & Ill-Defined Conditions	167	27
Accidents, Poisoning & Violence (External Causes)	683	111
Deaths, With ICD Code	5435	999
Deaths, No ICD Code	306	125
Total Deaths, All Causes	5741	1124

Analytic File Name

FROMEPOL

- 1 CER-assigned ID number
- 2 year of birth
- 3 birth date
- 4 sex code
- 5 race code
- 6 year of first hire at plant
- 7 first date of hire at plant
- 8 multiple hire/term from plant
- 9 termination year
- 10 last termination date from plant
- 11 worked in alpha 1 (Y/N)
- 12 worked in alpha 2 (Y/N)
- 13 worked in beta 1 (Y/N)
- 14 worked in beta 2 (Y/N)
- 15 worked in electrical department (Y/N)
- 16 worked in office (Y/N)
- 17 worked in other departments (Y/N)
- 18 duration in weeks in alpha 1
- 19 duration in weeks in beta 1
- 20 vital status code
- 21 date of death
- 22 code for underlying cause of death
- 23 underlying cancer cause of death
- 24 urinalysis test number
- 25 date of urinalysis
- 26 urinalysis test results
- 27 sequence number of row

ORY-12

ORY12A04 Data Set

Description

This analytic data set consists of one file generated for a study, published in *Environmental Research* and in *Toxicology and Industrial Health*, of white males exposed to phosgene at the Oak Ridge Y-12 Facility from 1943 to 1945.

Studies of humans and animals indicate that exposure to high levels of phosgene result in short-term health effects that include emphysema, pulmonary edema, pneumonitis, and other possible effects. This study examined the mortality experience of workers exposed to phosgene gas while working at the Oak Ridge Y-12 Facility from 1943 through 1945. The study population consisted of 18,869 white males employed at Y-12 while Tennessee Eastman Corporation was the operating contractor (1943-1945). There were two groups of interest: the first group included 699 white males that received daily exposure to low levels of phosgene, and the second group consisted of 106 men with definite acute exposures and symptoms that indicated exposure to levels as high as 50 ppm or higher. No evidence of excess overall mortality or mortality from diseases to the respiratory system was found. Pneumonitis was diagnosed in 23.6% of the 106 workers in the second group.

The primary author analyzed updated information for this cohort approximately 5 years after the initial study. The major finding in the updated study was the occurrence of 5 deaths in the second group of 106 workers due to respiratory diseases (1.88 deaths expected), although the standardized mortality ratio did not reach statistical significance. There were no deaths due to lung cancer in the second group despite 33 to 35 years of follow-up.

The single analytic file (ANALYSIS) consists of 106 records, one for each person in the second group. The file contains demographic and work history data.

Vital status was ascertained through December 31, 1973, for the initial study and through December 31, 1978, for the updated study. There were 29 deaths identified in the highly exposed group for the first study, and 41 deaths found for the group in the updated study.

No personal monitoring data were used in either study.

ORY-12

ORY12A04 Data Set

Citations

Polednak, A. P. 1980. "Mortality among men occupationally exposed to phosgene in 1943-1945." *Environmental Research* 22:357-367.

Polednak, A. P., and D. R. Hollis. 1985. "Mortality and causes of death among workers exposed to phosgene in 1943-1945." *Toxicology and Industrial Health* 1(2):137-148.

No. of Files: 1

File Name	No. of Variables	Type of Data
ANALYSIS	11	demographic; work history

Summary Death Tables

Cause of Death	No. of Deaths	
	Male	Female†
Infectious & Parasitic Diseases	0	
All Malignant Neoplasms	3	
• Lip, Oral Cavity & Pharynx	0	
• Digestive Organs & Peritoneum	2	
• Respiratory System	0	
• Bone & Connective Tissue	0	
• Skin	0	
• Breast	0	
• Genitourinary System	1	
• Brain/CNS	0	
• Other & Unspecified Sites, Except Brain/CNS	0	
• Lymphatic/Hematopoietic	0	
All Benign Neoplasms	0	
All Neoplasms, Unspecified	0	
Endocrine, Nutritional, Metabolic Diseases & Immunity Disorders	1	
Diseases of Blood & Blood-Forming Organs	0	
Mental Disorders	2	
Diseases of Nervous System & Sense Organs	0	
Diseases of Circulatory System	18	
Diseases of Respiratory System	5	
Diseases of Digestive System	3	
Diseases of Genitourinary System	0	
Complications of Pregnancy & Childbirth	0	
Diseases of Skin & Subcutaneous Tissue	0	
Diseases of Musculoskeletal System & Connective Tissue	0	
Congenital Anomalies	0	
Symptoms & Ill-Defined Conditions	1	
Accidents, Poisoning & Violence (External Causes)	7	
Deaths, With ICD Code	40	
Deaths, No ICD Code	0	
Total Deaths, All Causes	40	

† No females were included in this study.

Analytic File Name

ANALYSIS

- 1 CER-assigned ID number
- 2 sex code
- 3 race code
- 4 vital status code
- 5 cause of death code
- 6 birth date
- 7 date first exposed to phosgene
- 8 date of first hire at TEC
- 9 last termination date from TEC
- 10 death date of the individual
- 11 sequence number of row

PANTEX

PXSMRA01 Data Set

Description

This data set consists of one file generated for a cohort mortality study, published in *Health Physics* in 1985, of white male workers at the Pantex Plant in Texas.

This cohort mortality study of white male Pantex Plant workers was conducted to determine if there was an association between employment at the facility and mortality from various causes. A sub-analysis examined the association between mortality and exposure to external radiation. The published analysis focused on 3,564 white and presumed white males who were ever employed by the prime contractor operating the plant between the start of plant operations in 1951 and December 31, 1978, the study end date. The sub-analysis focused on the 209 workers who were exposed to 1 rem or more through 1978. Total and cause-specific mortality was compared with expected mortality based on U.S. death rates. Significantly fewer deaths than expected from all causes of death, all cancers, digestive cancers, lung cancer, arteriosclerotic heart disease, and digestive diseases were observed. No causes of death occurred significantly more frequently than expected. Analyses of worker mortality by duration of employment, time since first employment, and cumulative radiation exposure greater than 1 rem produced similar results. No evidence was found that mortality

from any cause of death was increased as a result of employment at the Pantex Plant.

The single analytic file (ANFILE) contains demographic and exposure data for 5,438 male and female workers employed either by the prime contractor or by one of several subcontractors from the beginning of plant operations through 1981. Exposure data in the file include exposure monitoring status and cumulative external radiation doses (in millirems) through 1980.

Vital status was ascertained for 97% of the 3,564 white male Pantex workers included in the analysis. Death certificates were obtained for 96% (257) of the 269 known employee deaths.

The Pantex Plant is a large facility that has been engaged in the assembly and disassembly of nuclear weapons since 1951. Sources of occupational exposures include external radiation, both gamma and neutron, from nuclear weapons components. Workers may also be exposed to x-rays while using industrial radiographic equipment. All exposure readings in the file are film badge measurements and were available on: for workers employed after 1963.

PANTEX

PXSMRA01 Data Set

Citations

Acquavella, J. F., L. D. Wiggs, R. J. Waxweiler, D. G. Macdonnell, G. L. Tietjen, and G. S. Wilkinson. 1985. "Mortality among workers at the Pantex Weapons Facility." *Health Physics* 48:735-746.

No. of Files: 1		
File Name	No. of Variables	Type of Data
ANFILE	16	demographic; exposure

Summary Death Tables

Cause of Death	No. of Deaths	
	Male	Female
Infectious & Parasitic Diseases	2	0
All Malignant Neoplasms	62	4
• Lip, Oral Cavity & Pharynx	1	0
• Digestive Organs & Peritoneum	15	1
• Respiratory System	18	2
• Bone & Connective Tissue	0	0
• Skin	0	0
• Breast	0	0
• Genitourinary System	6	1
• Brain/CNS	4	0
• Other & Unspecified Sites, Except Brain/CNS	9	0
• Lymphatic/Hematopoietic	9	0
All Benign Neoplasms	0	0
All Neoplasms, Unspecified	1	0
Endocrine, Nutritional, Metabolic Diseases & Immunity Disorders	6	0
Diseases of Blood & Blood-Forming Organs	0	0
Mental Disorders	0	0
Diseases of Nervous System & Sense Organs	3	1
Diseases of Circulatory System	163	8
Diseases of Respiratory System	14	1
Diseases of Digestive System	11	1
Diseases of Genitourinary System	3	0
Complications of Pregnancy & Childbirth	0	0
Diseases of Skin & Subcutaneous Tissue	0	0
Diseases of Musculoskeletal System & Connective Tissue	0	0
Congenital Anomalies	1	0
Symptoms & Ill-Defined Conditions	4	2
Accidents, Poisoning & Violence (External Causes)	60	3
Deaths, With ICD Code	330	20
Deaths, No ICD Code	1	0
Total Deaths, All Causes	331	20

Analytic File Name

ANFILE

- 1 external radiation monitoring flag
- 2 cumulative external radiation (mrem)
- 3 birth state
- 4 education
- 5 race
- 6 sex
- 7 current vital status
- 8 SSA status
- 9 ICDA death code (8th rev.)
- 10 person-years, always 0.00
- 11 death date
- 12 birth date
- 13 termination date
- 14 hire date
- 15 CER-assigned ID number
- 16 death state

ROCKY FLATS

RFPLUA01 Data Set

Description

This analytic data set consists of one file generated for a cohort mortality study, published in the *American Journal of Epidemiology*, of white males employed at the Rocky Flats Plant (RFP).

A cohort mortality study of RFP workers was conducted to test for an association between mortality and exposure to plutonium. The analysis described in the publication focused on 5,413 white male workers employed for 2 or more years between 1951 and 1979. Fewer deaths than expected were found for all causes of death, all cancers, and lung cancer. No bone cancer was observed. An excess of brain tumors was found. Elevated rate ratios for all causes of death and all lymphopoietic neoplasms were found when workers with plutonium body burdens greater than or equal to 2 nanocuries (nCi) were compared to those with body burdens less than 2 nCi. No elevated rate ratios were noted for bone and liver cancers.

The single analytic file (ANFILE) in this data set contains demographic and exposure data for 7,616 white males initially employed by RFP between 1951 (construction phase) and the end of 1979. Females, nonwhite males, and workers with missing sex or race were not included in the analytic file. Data pertaining to each

worker's exposure to external ionizing radiation include: monitoring status and the date it was determined, date of first monitoring, and dates of achieving 1 rem, 5 rems, and 10 rems cumulative external whole-body doses through 1978. Dates of exposure to plutonium-239 cover years 1952 (partial year) through 1977 and include monitoring status, date of first urine bioassay sample, dates of first achieving body burdens of 2 nCi and 5 nCi, and the fraction of maximum permissible body burdens of plutonium acquired as of December 1977.

Vital status was ascertained for 98.9% of the 5,413 white males employed for 2 or more years through December 31, 1979, the study end date. There were 409 deaths identified in this group.

RFP has been a weapons production facility since 1952. Sources of occupational exposure include external radiation, both gamma and neutron, and potential for internal deposition of plutonium-239. Film dosimeters and thermoluminescent dosimeters were used to monitor for external radiation. Formal bioassay programs to monitor for internal exposures were begun in 1952. Results of both types of monitoring programs reflect technological improvements and changes in concepts and models during these years.

ROCKY FLATS

RFPLUA01 Data Set

Citations

Wilkinson, G. S., G. L. Tietjen, L. D. Wiggs, W. A. Galke, J. F. Acquavella, M. Reyes, G. Voeltz, and R. J. Waxweiler, 1987. "Mortality among plutonium and other radiation workers at a plutonium weapons facility." *American Journal of Epidemiology* 125:231-250.

No. of Files: 1		
File Name	No. of Variables	Type of Data
ANFILE	22	demographic; work history; vital status; summary whole-body external ionizing radiation dose; plutonium body burden results

Summary Death Tables

Cause of Death	No. of Deaths	
	Male	Female [†]
Infectious & Parasitic Diseases	4	
All Malignant Neoplasms	180	
• Lip, Oral Cavity & Pharynx	3	
• Digestive Organs & Peritoneum	47	
• Respiratory System	60	
• Bone & Connective Tissue	2	
• Skin	4	
• Breast	0	
• Genitourinary System	24	
• Brain/CNS	12	
• Other & Unspecified Sites, Except Brain/CNS	12	
• Lymphatic/Hematopoietic	16	
All Benign Neoplasms	3	
All Neoplasms, Unspecified	6	
Endocrine, Nutritional, Metabolic Diseases & Immunity Disorders	10	
Diseases of Blood & Blood-Forming Organs	1	
Mental Disorders	6	
Diseases of Nervous System & Sense Organs	8	
Diseases of Circulatory System	358	
Diseases of Respiratory System	49	
Diseases of Digestive System	25	
Diseases of Genitourinary System	6	
Complications of Pregnancy & Childbirth	0	
Diseases of Skin & Subcutaneous Tissue	0	
Diseases of Musculoskeletal System & Connective Tissue	1	
Congenital Anomalies	2	
Symptoms & Ill-Defined Conditions	13	
Accidents, Poisoning & Violence (External Causes)	96	
Deaths, With ICD Code	748	
Deaths, No ICD Code	6	
Total Deaths, All Causes	774	

[†] No females were included in this study.

Analytic File Name

ANFILE

- 1 CER-assigned ID number
- 2 birth date
- 3 hire date
- 4 termination date
- 5 death date
- 6 ICD death code, 8th rev.
- 7 current vital status
- 8 sex
- 9 race
- 10 education level
- 11 date first achieved 2 nCi Pu
- 12 fraction of maximum permissible body burden
- 13 Pu monitoring flag
- 14 first date at which external exposure reached 1 rem
- 15 first date at which external exposure reached 5 rems
- 16 first date at which external exposure reached 10 rems
- 17 cumulative external exposure as of 12/78
- 18 external monitoring flag
- 19 date first achieved 5 nCi Pu
- 20 first sample date for Pu
- 21 estimated first external sample date
- 22 state of death

2 of 2

SAVANNAH RIVER

SRC88A01 Data Set

Description

This analytic data set consists of one file generated for a retrospective cohort mortality study, published in the *American Journal of Industrial Medicine* in 1988, of white males employed at the Savannah River Site (SRS).

The published paper describes the overall and cause-specific mortality for a cohort of 9,860 white males who were hired between 1952 (when the facility began operation) and December 31, 1974, and who were employed at SRS for at least 90 days during this time. Exposures to radiation or chemicals were not considered. Separate analyses were presented for hourly employees (6,687) and salaried employees (2,745) by time period of first hire and by length of employment. These workers experienced mortality comparable to that of U.S. males and, in fact, exhibited fewer deaths than expected in many categories of diseases. Specifically, fewer deaths were noted in the categories of all causes, all cancers, cancer of the digestive organs, lung cancer, brain cancer (hourly workers only), diabetes, all diseases of the circulatory system, all respiratory diseases, all digestive system diseases, all diseases of the genitourinary system (hourly workers only), and all external causes of death. A statistically significant, and as yet

unexplained, increase in leukemia mortality appeared in a subset of the hourly workers who were first hired before 1955 and were employed between 5 and 15 years.

The one analytic file (SRANA4) in this data set contains one record per person in the cohort, including demographic, work history, and vital status data on all members of the cohort.

Hourly employees were judged to be those employees who worked for 90 or more consecutive days at an hourly classification and less than 90 consecutive days at a salaried classification. Salaried employees were judged to be those employees who worked 90 or more consecutive days in a salaried classification and less than 90 days in an hourly classification. A third category consisted of those who worked 90 or more days consecutively in both classifications. Vital status was ascertained for 94.2% (N = 9,288) of the cohort through December 31, 1980, the study end date. There were 1,091 deaths identified, and death certificates were obtained for 96.9% of these deaths.

No personal monitoring data were used in this analysis.

SAVANNAH RIVER

SRC88A01 Data Set

Citations

Cragle, D., R. McLain, J. Qualters, J. L. S. Hickey, G. Wilkinson, W. G. Tankersley, and C. C. Lushbaugh. 1988. "Mortality among workers at a nuclear fuels production facility." *American Journal of Industrial Medicine* 14:379-401.

No. of Files: 1		
File Name	No. of Variables	Type of Data
SRANA4	16	demographic; work history; vital status

Summary Death Tables

Cause of Death	No. of Deaths	
	Male	Female†
Infectious & Parasitic Diseases	7	
All Malignant Neoplasms	215	
• Lip, Oral Cavity & Pharynx	7	
• Digestive Organs & Peritoneum	49	
• Respiratory System	84	
• Bone & Connective Tissue	2	
• Skin	5	
• Breast	0	
• Genitourinary System	17	
• Brain/CNS	7	
• Other & Unspecified Sites, Except Brain/CNS	12	
• Lymphatic/Hematopoietic	32	
All Benign Neoplasms	4	
All Neoplasms, Unspecified	1	
Endocrine, Nutritional, Metabolic Diseases & Immunity Disorders	13	
Diseases of Blood & Blood-Forming Organs	1	
Mental Disorders	4	
Diseases of Nervous System & Sense Organs	9	
Diseases of Circulatory System	518	
Diseases of Respiratory System	27	
Diseases of Digestive System	42	
Diseases of Genitourinary System	5	
Complications of Pregnancy & Childbirth	0	
Diseases of Skin & Subcutaneous Tissue	1	
Diseases of Musculoskeletal System & Connective Tissue	1	
Congenital Anomalies	1	
Symptoms & Ill-Defined Conditions	16	
Accidents, Poisoning & Violence (External Causes)	191	
Deaths, With ICD Code	1056	
Deaths, No ICD Code	34	
Total Deaths, All Causes	1090	

† No females were included in this study.

Analytic File Name

SRANA4

- 1 birth date
- 2 hire date into construction category
- 3 number of days in construction
- 4 termination date from construction category
- 5 last date known alive
- 6 hire date into hourly category
- 7 number of days in hourly
- 8 termination date from hourly category
- 9 hire date into salaried category
- 10 number of days in salaried category
- 11 termination date from salaried category
- 12 CER-assigned ID number
- 13 status of person
- 14 underlying cause of death
- 15 cancer cause of death
- 16 sequence number of row

6

CEDR Working Data Sets

Descriptions of working data sets currently available are presented in this section. **Figure 6-1** presents a summary table that alphabetically lists the short name for each data set and provides a more descriptive name for each data set and a brief description.

The following pages present a description of each working data set that identifies each facility from which the data were collected and describes the data available. Subsequent pages list the variables found in each working file of the data set.

As explained in Section 2, working data sets are dynamic in nature and may be replaced periodically with more recent files. They also contain some of the least refined data collected by the researcher, and the level of validation varies from file to file and study to study. Therefore, users should realize that precautions should be taken when working with these data.

Figure 6-1. CEDR Working Data Sets Currently Available

Data Set	General Name	Brief Description*	Page
HFWS89W01	Hanford Site epidemiologic data	Three working files for 45,499 Hanford workers initially employed between 1944 and 1978 containing job histories, external dosimetry data, and internal deposition data	121
LAFACW01	Los Alamos National Laboratory (LANL) epidemiologic data	Four working files for 23,240 LANL workers from 1943 to 1978 containing demographic data, radiation data, plutonium bioassay data, and estimated plutonium body burdens	123
MDFACW01	Mound Plant epidemiologic data	Four working files for 6,882 Mound Plant workers from 1941 to 1979 containing demographic data, occupational histories, external dosimetry information, and urine bioassay results	127
†ORISEWDS	Epidemiologic data for various DOE sites as provided by Oak Ridge Institute for Science & Education (ORISE)	Twenty-eight working files for approximately 420,000 individuals who worked at one or more of 59 DOE sites from 1943 to 1988. Data files, segregated by data category, include demographics, work histories, personnel monitoring, and vital status.	129
RFFACW01	Rocky Flats Plant epidemiologic data	Three working files for workers at the Rocky Flats Plant containing demographic data, urine results, and external ionizing radiation data	139
ZAFACW01	Zia Company (at LANL) epidemiologic data	Three working files for 15,309 Zia workers at LANL from 1946 to 1986 containing demographic data, external ionizing radiation data, and plutonium bioassay data	141

* The numbers in the brief description represent the number of workers in the file, which is not necessarily the number of workers included in the published studies.

† A few of the files in this working data set may not be available through CEDRtext until October 1993.

HANFORD

HFW89W01 Data Set

Description

The HFW89W01 data set consists of three working files prepared for mortality studies of workers at the Hanford Facility.

This working data set consists of three working files that were generated by the Epidemiology and Biometry Department (EBD) of Pacific Northwest Laboratory (PNL) for mortality studies of workers initially employed at the Hanford Facility between 1944 and 1978. Data were obtained in various formats and media from the facilities where the workers were employed and from several other agencies, including the Hanford Environmental Health Foundation (HEHF) and the Social Security Administration. The files in HFW89W01 originated as part of EBD's data base of information supporting their mortality studies; several of which were completed in 1992, of operations workers at Hanford.

The three files in the HFW89W01 working data set are roughly segregated by the following types of data: demographic, external radiation dosimetry, and internal monitoring results. Data pertaining to an individual that appear in one or more files may be linked together by use of the individual pseudo-identifier number that was assigned to each worker. To help ensure data integrity, similar data from various sources and files, such as those in the HFC78A01, were compared for inconsistencies. Discrepancies were resolved with assistance from the appropriate department or organization.

The first working file (JOB89) consists primarily of demographic data that were provided to EBD by HEHF in 1988. JOB89 includes employment and job histories, social class data, and vital status data for the years 1944 through 1987 for operations workers at Hanford. Social class was assigned by EBD using Bureau of Census job codes that were modified to correct inconsistencies between

recorded job descriptions and assigned codes. These modifications corrected the most frequent inconsistencies. The modifications also corrected descriptions and codes that were important for use by EBD in assigning social class and for defining special categories of nuclear workers. Sequential entries for periods of continuous employment in which the social class code did not change were combined. Sequential entries were also combined if the time interval between the termination code and the next code was less than 1 month. JOB89 contains a total of 94,176 records for the 44,408 workers that have job histories.

The second working file (DOS89) contains external dosimetry data for the years 1944 through 1989. Occupational radiation exposure data, including occupational exposures received offsite for operations workers and construction workers, were provided by the PNL Health Physics Department (HPD) in 1990. The HPD is responsible for radiological protection and monitoring services for the entire Hanford Site. The EBD excluded exposure data for individuals solely employed as construction workers; however, doses received by operations workers while performing construction work were retained. Annual whole-body doses for each worker were compiled from dose estimates generated during onsite monitoring for radiation by PNL. DOS89 has a total of 429,795 records for the 45,499 workers that were monitored.

The third working file (INT89) contains internal monitoring results for the years 1944 through 1989. Data on workers with confirmed internal depositions of various radionuclides, including plutonium, were provided by PNL's HPD in 1991. This file contains one record for each of the 560 workers with internal depositions.

Working File Name	Working File Name	Working File Name
JOB89	DOS89	INT89
<ul style="list-style-type: none"> 1 CER-assigned ID number 2 date of birth (month, day, year) 3 sex of worker 4 race of worker 5 century of birth 6 date of social class entry 7 Bureau of Census job code 8 social class 9 date of social class exit 10 status of worker at social class exit 	<ul style="list-style-type: none"> 1 CER-assigned ID number 2 sex of worker 3 date of birth (century, year, month, day) 4 year of external dosimetry 5 type of work performed during year 6 penetrating radiation dose 7 neutron radiation dose 8 tritium radiation dose 9 total whole body penetrating radiation dose 10 x-ray radiation dose 11 extremity radiation dose 12 non-penetrating radiation dose 13 fast neutron radiation dose 14 slow neutron radiation dose 	<ul style="list-style-type: none"> 1 CER-assigned ID number 2 year of first plutonium deposition 3 amount of plutonium deposition 4 type of deposition 5 year of first other type of deposition 6 amount of deposition other than plutonium 7 strontium flag

LANL

LAFACW01 Data Set

Description

The LAFACW01 data set consists of four working files prepared for epidemiologic studies of workers at Los Alamos National Laboratory (LANL).

The LAFACW01 data set consists of four related working files that were generated by the Epidemiology Section at LANL for mortality studies of workers employed at LANL. Data were obtained in various formats and media from different LANL departments and other agencies. Personnel data were abstracted from microfiche copies of each worker's personnel records. Supplemental data were obtained from LANL's security badge book, personnel security questionnaires, LANL medical records, and personnel records from other employers under study by LANL. Death information was abstracted from death certificates obtained from various states. Computerized external ionizing radiation data, plutonium bioassay results, and estimated plutonium body burdens were obtained from LANL health physics.

The four files in the LAFACW01 data set are segregated by type of data: demographic, external exposure, plutonium bioassay results, and plutonium depositions. Data pertaining to an individual that appear in one or more files may be linked by the individual pseudo-identifier number assigned to each worker.

The first working file (LAPFILE) contains demographic information, including birth and death dates, race, sex, work histories, coded cause of death, and state of death. The file includes 23,240 workers hired between 1943 and 1978, inclusive. A few later hires are also included. The file includes 6,803 females, 16,317 males and 120 workers with unknown sex. Race was determined for 68% of the workers. A roster of LANL workers was submitted to the Social Security Administration (SSA) for vital status ascertainment. Information on vital status through December 31, 1983, was

obtained in 1987. There are 3,368 deaths identified in this working file. Cause of death information (ICDA-8) is not available for 122 deaths.

The second file (LAEFILE) contains external radiation exposure data consisting of annual whole-body doses, in centirem, where the whole-body dose was defined to be the sum of gamma, neutron, and tritium doses. During the early years of the monitoring programs, 1943 to 1945, pocket chambers were used to measure exposure to radiation, and no official records of these early readings exist with the current LANL health physics group. Film dosimeters (badges) were used to measure exposures from 1944 through 1979, when thermoluminescent dosimeters (TLDs) replaced them. This file contains 97,309 records of exposure data from 1944 through 1985 for 11,917 monitored workers. These data include all measurements for individuals while working at LANL. Workers who were employed both at LANL and by a contractor may have measurements for both periods of employment. Therefore, all measurements in this file may not fall within a worker's period of employment at LANL.

The third working file (LABFILE) contains plutonium bioassay data for 1944 through October 1985. There are 73,908 records for 4,358 individuals. Measurements in 1944 are for nose swipes or urine samples. In March 1945, a formal bioassay program was established. Before 1968, all urine bioassay results were for plutonium-239 because that was the isotope used in that time frame. After then, the results are labelled as plutonium-238 or plutonium-239. Until 1952, results were units of cpm/24 hours; from 1952 through 1977, they were dpm/24 hours; and from 1977 to 1985, they were pCi/24 hours. Generally, they are annual measurements, but some individuals have multiple readings for one plutonium isotope within a year and some have separate readings for both isotopes within a year. All measurements are

LAFACW01 Data Set

- included in the file for each monitored worker. Some workers
- may have measurements that do not fall within the LANL
- period of employment.
-
- The fourth working file (LACFILE) contains estimated
- plutonium whole-body burdens as of January 1, 1987. There are
- 6,902 records for 4,329 individuals. Results are given separately
- for the two isotopes of plutonium (238 and 239) in units of
- nanocuries (nCi) and nCi-years. The computer code PUQFUA
- was utilized at LANL to estimate plutonium body burdens using
- bioassay data.
-

Working File Name

LAPFILE

1 CER-assigned ID number

2 sex

3 race

4 date of birth

5 date of first hire at LANL

6 latest termination date from LANL

7 first job title at LANL

8 last known job title at LANL

9 date of death

10 cause of death - ICDA 8th revision

11 state of death

- 1** CER-assigned ID number
- 2** sex
- 3** race
- 4** date of birth
- 5** date of first hire at LANL
- 6** latest termination date from LANL
- 7** first job title at LANL
- 8** last known job title at LANL
- 9** date of death
- 10** cause of death - ICDA 8th revision
- 11** state of death

Working File Name

LAEFILE

1 CER-assigned ID number

2 year worker monitored for external radiation

3 annual whole-body dose in centirem

- 1** CER-assigned ID number
- 2** year worker monitored for external radiation
- 3** annual whole-body dose in centirem

Working File Name

LABFILE

1 CER-assigned ID number

2 date counts were taken on
bioassay sample

3 measured value of bioassay
reading

4 type of assay

- 1 CER-assigned ID number
- 2 date counts were taken on bioassay sample
- 3 measured value of bioassay reading
- 4 type of assay

Working File Name

LACFILE

- 1** CER-assigned ID number
- 2** date at which body burden is estimated
- 3** estimated body burden (nCi)
- 4** estimated body burden (nCi-years)
- 5** number bioassay samples for employee
- 6** isotope of plutonium measured

- 1** CER-assigned ID number
- 2** date at which body burden is estimated
- 3** estimated body burden (nCi)
- 4** estimated body burden (nCi-years)
- 5** number bioassay samples for employee
- 6** isotope of plutonium measured

MOUND

MDFACW01 Data Set

Description

The MDFACW01 data set consists of four working files prepared for epidemiologic studies of workers at the Mound Plant in Ohio.

The MDFACW01 data set consists of four working files that were generated by the Epidemiology Section at the Los Alamos National Laboratory (LANL) for mortality studies of workers employed at Mound. Data were obtained in various formats and media from Mound departments and other agencies. Demographic data were collected from two primary sources of records provided by the personnel department at Mound. Supplemental data were obtained from the Social Security Administration's (SSA's) 941A forms, Mound medical and health physics records, and from records previously collected. Death information was abstracted from death certificates obtained from various states. Radiation exposure and polonium bioassay data, in hard copy, were provided by the health physics department at Mound.

The four files in the MDFACW01 data set are segregated by type of data: demographic, work history, external exposure and polonium bioassay results. Data pertaining to an individual that appear in one or more files may be linked by the individual pseudo-identifier number assigned to each worker.

The first working file (PERSON) contains demographic information, including race, sex, and birth date; limited work history information; and death information, such as cause of death, date of death, and state of death, for 6,882 male and female workers hired between 1941 and 1979, inclusive. The file includes 1,692 females, 5,183 males and 7 with unknown sex. Race was determined for 88%

of the workers. A roster of Mound workers was submitted to the SSA for vital status ascertainment. Information on vital status through December 31, 1983, was obtained in 1987. There are 1,716 deaths identified in this working file. Cause of death information (ICDA-8) is not available for 9 deaths.

The second working file (MNDOCCUP) contains occupational histories of each employee. There are 20,977 records containing job titles and employment dates for 6,771 individuals. The earliest job date is January 1, 1941, and the latest is January 15, 1981. The file includes dates started on the job, the verbatim job title used by Mound, and an alphanumeric job code used by Mound that was associated with each job title.

The third working file (MNDEXTER) contains the external exposure data. There are 31,844 records for 4,081 individuals. The years covered by this file are 1947 through 1979. The variables include annual neutron, tritium, and whole-body dose (in millirems) incurred while working at the Mound Plant and the neutron, tritium, and whole-body doses received prior to employment at Mound.

The fourth working file (MNDPOLON) contains results of polonium urine bioassays between March 30, 1944, and June 5, 1984. There are 201,652 records for 2,788 individuals. The data include the date of the sample, polonium activity in the sample, volume of urine in the sample, and any comments about the particular sample or its results.

Working File Name	Working File Name	Working File Name	Working File Name
PERSON	MNDEXTER	MNDOCCUP	MNDPOLON
1 CER-assigned ID number 2 sex 3 race 4 date of birth 5 date of first hire at Mound 6 date of last termination from Mound 7 date of death 8 cause of death - ICDA 8th revision 9 the state of death	1 CER-assigned ID number 2 date started on this job 3 job title 4 job code	1 CER-assigned ID number 2 neutron dose prior to date of hire 3 tritium dose prior to date of hire 4 whole-body dose prior to date of hire 5 year of exposure 6 yearly neutron exposure 7 tritium exposure for the year 8 whole-body exposure for the year	1 CER-assigned ID number 2 date of sample 3 polonium activity in counts per minute 4 volume of the sample for analyses 5 comments regarding the sample

OR SITE

ORISEWDS Data Set

Description

The ORISEWDS data set is comprised of 28 working files that were developed by the Center for Epidemiologic Research (CER), Medical Sciences Division, Oak Ridge Institute for Science and Education (ORISE). CER obtained these data in various formats and media from the facilities where the workers were employed and from several other agencies, such as the Social Security Administration. To ensure the integrity of the data in the transcription from hard copy to electronic media, a double-entry method was used whereby one person entered the data and a second person entered the same data for verification purposes.

The files in the ORISEWDS working data set originated as part of CER's data model. Most of the files contain a large volume of data, which usually pertain to more than one site or facility, and are maintained in a relational data base management system. This design provides efficient data storage and facilitates the frequent addition of new or corrected data. The dynamic nature of the data model means that the working files comprising the ORISEWDS data set are a snapshot of the files at CER and that subsequent updates that will be placed in CEDR may be different from the current working files in the ORISEWDS data set.

The files in the ORISEWDS are roughly segregated by type of data rather than by facility. Each worker has been assigned a unique

pseudo-identification number, which can be used to relate data that may appear in a number of files. This allows users to compile all data for a given individual or cohort.

There are ten files in the ORISEWDS data set that primarily contain demographic and work history data. They are MR, EMP, PAYCD, JOB, DEPTCD, MVITAL, DEATH, ERR, MERGED, and FIXED. The MR (master roster) file contains one record per person. All other files may have multiple records, or no records, for an individual, depending on the type and availability of the data. The remaining working files in the ORISEWDS data set contain data relating to personal radiation monitoring information that was obtained from various facilities at which the individual worked. Due to the volume and nature of these data, they are segregated by facility and by type of monitoring, such as external monitoring, whole-body counting, and urinalysis results. The individual pseudo-identifier number in these files allow these data to be linked to pertinent data that may appear in other files in the ORISEWDS data set. Therefore, the proper combination of files will provide a complete picture of data for an individual or for a particular cohort of interest. More detailed information about each of the working files in the ORISEWDS data set is provided in the file-level metadata.

Working File Name	Working File Name	Working File Name	Working File Name
DEATH	DEPTCD	EMP	ERROR
<ul style="list-style-type: none"> 1 underlying cancer cause of death coded to ICD8 rules 2 underlying cancer cause of death coded to ICD9 rules 3 date of death 4 cause of death coded to ICD8 rules 5 cause of death coded to ICD9 rules 6 status of ICD coding 7 CER-assigned ID number 8 state of death 9 status of verification 	<ul style="list-style-type: none"> 1 CER-assigned ID number 2 date department code become effective 3 date archive flag 4 date estimation flag 5 department code archive flag 6 code value for department 7 facility code 8 plant code archive flag 9 plant code 	<ul style="list-style-type: none"> 1 CER-assigned ID number 2 facility code 3 date of hire at facility 4 hire date archive flag 5 date of termination at facility 6 termination date archive flag 7 first hire/last term. flag 8 flag indicating if person is active 9 date associated with active employees 10 hire/term. estimation flag 	<ul style="list-style-type: none"> 1 CER-assigned ID number 2 facility code 3 name of program detecting error 4 date error was detected 5 error code 6 comment field #1 7 comment field #2 8 comment field #3

Working File Name	Working File Name	Working File Name	Working File Name
FIXED	JOB	MERGED	MR
1 CER-assigned ID number	1 CER-assigned ID number	1 request number of merge	1 CER-assigned ID number
2 facility code	2 date job code/title became effective	2 date merge took effect	2 sex code of individual
3 name of program detecting error	3 date estimation flag	3 ID merged "into"	3 sex archive flag
4 date error was detected	4 date archive flag	4 ID merged "from"	4 race code
5 error code	5 code associated with job title	5 status of merge	5 race archive flag
6 date error was fixed	6 job code archive flag	6 person making request	6 birth date of individual
7 comment field #1	7 job title archive flag		7 birth date estimation flag
8 comment field #2	8 facility code		8 birth date archive flag
9 comment field #3	9 job title per the facility		9 number of facilities worked at
10 source of how error was fixed			10 facility 1
			11 facility 2
			12 facility 3
			13 facility 4
			14 facility 5
			15 facility 6
			16 facility 7
			17 facility 8
			18 facility 9
			19 facility 10

Working File Name**PAYCD**

- 1 CER-assigned ID number
- 2 facility code
- 3 date pay code became effective
- 4 date archive flag
- 5 date estimation flag
- 6 pay code archive flag
- 7 pay code for this individual

Working File Name**MOVITAL**

- 1 CER-assigned ID number
- 2 agency (source) supplying vital status
- 3 year submission was made
- 4 sequential submission number for this year
- 5 vital status
- 6 status date
- 7 comment flag
- 8 state of vital status

Working File Name**FMPCFB**

- 1 CER-assigned ID number
- 2 badge number of individual
- 3 birth date of individual
- 4 sex code of individual
- 5 result date of FB/TLD reading
- 6 link code indicating how record was linked
- 7 file identification
- 8 termination code (if applicable)
- 9 cost center employee assigned to
- 10 beta exposure
- 11 gamma exposure
- 12 beta year-to-date exposure
- 13 gamma year-to-date exposure
- 14 beta code
- 15 gamma code
- 16 employee's beta dose for period
- 17 employee's gamma dose for employment period
- 18 excess beta code
- 19 excess gamma code
- 20 damaged badge code
- 21 total exceeded flag
- 22 data entry code
- 23 radiation constant
- 24 start and end period

Working File Name**FMPCURIN**

- 1 CER-assigned ID number
- 2 badge number of individual
- 3 CER file identifier
- 4 date sample was taken
- 5 a flag associated with some date
- 6 month sample was taken
- 7 day sample was taken
- 8 year sample was taken
- 9 hour when sample was taken
- 10 result of urinalysis sample
- 11 a flag associated with urinalysis result
- 12 result of urinalysis sample
- 13 (this field is unknown)
- 14 starting and ending year
- 15 Fernald cost center
- 16 type of sample taken
- 17 plant number
- 18 plant area
- 19 a code to indicate employee's work level
- 20 a code to indicate employee's job code
- 21 the shift the sample was taken
- 22 record sequence number
- 23 sex code of the person
- 24 sample grouping code
- 25 urinalysis constraint
- 26 material exposure code
- 27 sample requisition number
- 28 code for material analyzed for
- 29 number assigned to sample

- 30 employee job title
- 31 employee's department/division
- 32 location of where employee worked
- 33 reason for sample
- 34 other job comments
- 35 comments
- 36 (unknown)
- 37 link code indicating how record was linked
- 38 link code indicating how record was linked
- 39 CER file identifier

Working File Name

FMPCWBC

- 1 CER file identifier
- 2 CER-assigned ID number
- 3 badge number of individual
- 4 thorium worker
- 5 termination date
- 6 last day worked by employee
- 7 medical flag
- 8 in vivo counting date
- 9 description of plant area (building) where employee worked
- 10 employee's job title
- 11 days off without exposure
- 12 counting time in relation to shift
- 13 result of U-235 in vivo count
- 14 result of total uranium in vivo count
- 15 result of thorium in vivo count
- 16 result of lead-212 in vivo count
- 17 result of actinium in vivo count
- 18 result of additional material in the in vivo count
- 19 result of a second additional material in the in vivo count
- 20 remarks field
- 21 remarks field
- 22 flag indicating general text on form
- 23 row number
- 24 code indicating how record was linked
- 25 CER-assigned ID number

Working File Name

LINDE_FB

- 1 CF t-assigned ID number
- 2 beginning date for this monitoring record
- 3 badge number
- 4 job description
- 5 beta reading
- 6 gamma reading
- 7 total external dose
- 8 comments regarding exposure
- 9 flag indicating employer
- 10 pass number of linking software
- 11 a code indicating how record was linking

Working File Name

K25WBC

- 1 CER-assigned ID number
- 2 code indicating how record was linked
- 3 unique identifier assigned to run
- 4 date of the run
- 5 run made for a control
- 6 department code at time of run
- 7 year of birth of individual
- 8 sex of individual
- 9 weight of subject
- 10 chest thickness of subject
- 11 amount of surface contamination
- 12 length of run in minutes
- 13 type of analysis performed
- 14 type of material exposed to
- 15 front-to-back ratio
- 16 amount of thorium in lungs
- 17 amount of U-235 in lungs
- 18 cesium 137 count at time of run
- 19 potassium count at time of run
- 20 amount of U-238 in lungs
- 21 actinium count at time of the run
- 22 lead 212 count at time of the run
- 23 technetium count at time of run
- 24 month results reported
- 25 current department code of subject

Working File Name

K25URIN

- 1 CER-assigned ID number
- 2 code indicating how record was linked
- 3 number assigned to bioassay sample
- 4 code indicating division of individual
- 5 department code of individual
- 6 code indicating subgroup of department
- 7 salaried/hourly indicator
- 8 type or reason for analysis
- 9 number of times recalled
- 10 shift employee worked
- 11 frequency of monitoring
- 12 date sample was taken
- 13 radioisotope/chemical sampling for
- 14 results of the urinalysis
- 15 building/area where employee worked
- 16 sample taken for IH or HP purposes
- 17 time sample was taken

Working File Name

K25EXT

- 1 CER-assigned ID number
- 2 code indicating how record was linked
- 3 year of monitoring
- 4 quarter of monitoring
- 5 result for beta exposure
- 6 result for gamma exposure
- 7 result for skin dose
- 8 result for penetrating dose
- 9 plant code
- 10 group code
- 11 code showing if film was damaged
- 12 rack number used in processing
- 13 tray number used in processing
- 14 film density behind plastic shield
- 15 film density behind aluminum shield
- 16 film density behind cadmium shield
- 17 film density behind open window
- 18 neutron dose
- 19 individual's department code
- 20 4-digit year of monitoring
- 21 sequence number if multiple quarter results
- 22 quarter film was input
- 23 flag showing if film was damaged
- 24 date of birth of individual
- 25 TLD damage flag
- 26 date TLD was damaged
- 27 comments on damaged, lost, estimated TLD

- 28 TLD number
- 29 date TLD was read
- 30 penetrating dose per TLD reading
- 31 skin dose per TLD reading
- 32 date TLD was assigned
- 33 schedule for exchanging TLD
- 34 date of comment
- 35 comments on TLD readings
- 36 plant code
- 37 department of employment

Working File Name

X10EXT

- 1 CER-assigned ID number
- 2 code indicating how record was linked
- 3 date of birth
- 4 service date of employee
- 5 department code employee assigned to
- 6 sex of employee
- 7 employee status
- 8 sample date
- 9 film badge year
- 10 film badge quarter
- 11 film badge week
- 12 ORNL employee designation
- 13 monitoring information
- 14 additional monitoring information
- 15 skin dose in mrem
- 16 penetrating dose in mrem
- 17 sort key for employee's records
- 18 damaged/lost film badge codes

Working File Name**X10URIN**

- 1 CER-assigned ID number
- 2 code indicating how record was linked
- 3 sample date
- 4 isotope monitored
- 5 result of sample in DPM
- 6 result count for 24 hour voiding
- 7 department code employee assigned to
- 8 flag linking employee's department

Working File Name**X10WBC**

- 1 CER-assigned ID number
- 2 code indicating how record was linked
- 3 division employee worked in
- 4 health physics area (building)
- 5 count date
- 6 reason for whole body count
- 7 body area of whole body count
- 8 ORNL assigned serial number of run
- 9 result in terms of MPOB
- 10 comments about the whole body count
- 11 department code employee assigned to
- 12 flag linking employee to department

Working File Name**Y12WBC**

- 1 CER-assigned ID number
- 2 code indicating how record was linked
- 3 unique identification number for run
- 4 date run was made
- 5 run made for a control
- 6 department code at time of run
- 7 year of birth of person
- 8 sex on person
- 9 weight of subject in pounds
- 10 chest thickness of person
- 11 surface contamination
- 12 length of run in minutes
- 13 analysis and target materials code
- 14 material type and additional information
- 15 front-to-back contamination ratio
- 16 amount of U-235 in lungs
- 17 amount of thorium in lungs
- 18 cesium 137 count
- 19 potassium count
- 20 amount of U-238 in lungs
- 21 reported month
- 22 type analysis pre-1971
- 23 pre-1971 count of U-235
- 24 activity of actinium detected
- 25 activity of lead detected
- 26 activity of technetium detected

Working File Name**SRSFILE1**

- 1 CER-assigned ID number
- 2 code indicating how record was linked
- 3 payroll status (salary, non-exempt, etc)
- 4 craft classification
- 5 employee number
- 6 birth date of employee
- 7 service date of employee
- 8 plant service year
- 9 health physics area where exposed
- 10 specific identifier of where exposed
- 11 department of employee's supervisor
- 12 employee status at time of reading
- 13 transuranic registry number
- 14 accumulated plant tritium exposure
- 15 accumulated plant neutron exposure
- 16 accumulated plant skin exposure
- 17 accumulated plant gamma exposure

Working File Name**SRSFILE2**

- 1 CER-assigned ID number
- 2 code indicating how record was linked
- 3 body burden received
- 4 nuclide of exposure
- 5 body organ receiving dose
- 6 month of intake
- 7 year of intake

Working File Name**SRSFILE3**

- 1 CER-assigned ID number
- 2 code indicating how record was linked
- 3 annual tritium exposure
- 4 annual neutron exposure
- 5 annual skin (open window) exposure
- 6 annual shielded exposure
- 7 year of exposure

Working File Name**SRSFILE4**

- 1 CER-assigned ID number
- 2 code indicating how record was linked
- 3 health physics area
- 4 health physics department
- 5 year of exposure
- 6 annual open window exposure
- 7 annual shielded exposure
- 8 annual tritium exposure
- 9 annual neutron exposure
- 10 accumulated open window exposure
- 11 accumulated shielded exposure
- 12 accumulated tritium exposure
- 13 accumulated neutron exposure
- 14 special codes and notes

Working File Name**Y12EXT5080**

- 1 CER-assigned ID number
- 2 code indicating how record was linked
- 3 year of monitoring
- 4 quarter of monitoring
- 5 beta exposure
- 6 gamma exposure
- 7 skin dose in mrem
- 8 penetrating dose in mrem
- 9 code indicating plant
- 10 facility group code
- 11 film description code
- 12 rack number when processed
- 13 tray number when processed
- 14 film density behind plastic shield
- 15 film density behind aluminum shield
- 16 film density behind cadmium shield
- 17 film density behind open window
- 18 neutron dose
- 19 department number for this individual
- 20 4-digit year of monitoring
- 21 quarter of monitoring
- 22 multiple sequence number
- 23 quarter film was input
- 24 damaged film flag

Working File Name

Y12URIN

- 1 CER-assigned ID number
- 2 code indicating how record was linked
- 3 date of voiding
- 4 sequence number if multiple samples
- 5 sample scheduling code
- 6 urinalysis sampling technique
- 7 department code at time of sample
- 8 number of regular plate counts taken
- 9 urine volume in sample
- 10 time since last void
- 11 flag indicating if sample usable
- 12 plate 1 count
- 13 plate 1 second count
- 14 plate 2 count
- 15 plate 2 second count
- 16 plate 3 count
- 17 plate 3 second count
- 18 fluorometric sampling code
- 19 type of participation
- 20 routine sample flag
- 21 special departmental sample
- 22 averaged results flag
- 23 data change flag
- 24 flag showing person removed from program
- 25 result in disintegrations per minute
- 26 background count for plating

27 flag showing if calculations were made

28 result received in past 91 days (Y/N)

Working File Name

Y12EXT8184

- 1 CER-assigned ID number
- 2 code indicating how record was linked
- 3 year TLD was assigned to individual
- 4 quarter TLD was assigned
- 5 beta position (1) from TLD reader
- 6 gamma position (2) from TLD reader
- 7 skin dose in mrem
- 8 penetrating dose in mrem
- 9 plant code
- 10 group code
- 11 flag indicating if TLD was damaged
- 12 date if damaged
- 13 damaged, lost, or estimated comment
- 14 TLD number
- 15 date TLD was read
- 16 lab report on penetrating dose
- 17 date TLD was assigned
- 18 department code for person at this time
- 19 result code if damaged, lost, estimated
- 20 date of birth
- 21 code indicating when TLD is exchanged

ROCKY FLATS

RFFACW01 Data Set

Description

The RFFACW01 data set consists of three working files prepared for epidemiologic studies of workers at the Rocky Flats Plant (RFP).

The RFFACW01 data set consists of three working files that were generated by the Epidemiology Section at the Los Alamos National Laboratory (LANL) for mortality studies of workers employed at RFP. Data were obtained in various formats and media from Rocky Flats departments and other agencies. Demographic data were collected from two primary sources of records provided by the personnel department at RFP. Supplemental data were obtained from RFP medical and health physics records. Death information was abstracted from death certificates obtained from various states. External radiation exposure and plutonium bioassay data were provided by the health physics department at RFP. The external radiation data were computerized by the Epidemiology Section at LANL.

The three files in the RFFACW01 data set are segregated by type of data: demographic, external exposure, and plutonium-239 bioassay results. Data pertaining to an individual that appear in one or more files may be linked by the individual pseudo-identifier number assigned to each worker.

The first working file (PERSON) contains demographic information, including race, sex, birth date, limited work history

information, and death information, such as cause of death, date of death, and state of death for 9,537 males and females hired between 1951 and 1979, inclusive. The file includes 1,563 females, 7,973 males, and 1 with unknown sex. Race was determined for 99% of the workers. A roster of Rocky Flats workers was submitted to the Social Security Administration for vital status ascertainment. Information on vital status through December 31, 1983, was obtained in 1987. There are 1,107 deaths identified in this working file. Cause of death information (ICDA8) is not available for 12 deaths.

The second working file (BIOASSAY) contains results of urine bioassay measurements for gross alpha, uranium, enriched uranium, depleted uranium, plutonium-239, and americium-241 that were made between August 11, 1952, and January 15, 1982. The file contains 209,015 records for 7,761 workers. The data include the date of the sample, type of analysis, activity of each isotope, estimated body burdens for plutonium-239, and estimated body burdens for americium-241.

The third working file (RFEXTRAD) contains external exposure data. There are 83,159 records for 9,388 workers for the years 1951 through 1978. The variables include year of monitoring and annual whole-body doses (in millirems) incurred while working at RFP.

Working File Name

PERSON

- 1 CER-assigned ID number
- 2 sex
- 3 race
- 4 date of birth
- 5 date of first hire
- 6 date of last termination prior to 1980
- 7 date of death
- 8 cause of death - ICDA 8th revision
- 9 state of death

Working File Name

BIOASSAY

- 1 date assigned to sample by Rocky Flats
- 2 CER-assigned ID number
- 3 type of sample assay activity
- 4 activity level (nCi)
- 5 fractional MPBB

Working File Name

RFEXTRAD

- 1 CER-assigned ID number
- 2 year of exposure
- 3 annual whole-body penetrating dose

ZIA

ZAFACW01 Data Set

Description

The ZAFACW01 data set consists of three working files prepared for epidemiologic studies of workers at the Zia Company (Zia).

The ZAFACW01 data set consists of three working files that were generated by the Epidemiology Section at the Los Alamos National Laboratory (LANL) for mortality studies of workers employed at Zia. Data were obtained in various formats and media from Zia, LANL departments, and other agencies. Demographic data were collected from three primary record sources provided by the Zia Company. Supplemental data were obtained from LANL's security badge book, personnel security questionnaires, LANL medical records, and LANL personnel records. Death information was abstracted from death certificates obtained from various states. Computerized data on exposure to external radiation and results of plutonium bioassays were obtained from the health physics department at LANL. Radiation protection and monitoring services are provided for Zia Company by LANL.

The three files in the ZAFACW01 data set are segregated by type of data: demographic, external exposure, and plutonium bioassay results. Data pertaining to an individual that appear in one or more files may be linked by the individual pseudo-identifier number assigned to each worker.

The first working file (ZIAPFILE) contains demographic information, including birth and death dates, race, sex, work histories, coded cause of death, and state of death. The file includes 15,309 workers hired between 1946 and 1978, inclusive. The file includes data for 1,469 females, 11,215 males, and 2,625 workers with unknown sex. Race is determined for 74% of the workers. A roster of Zia workers was submitted to the Social Security Administration for vital status ascertainment. Information on vital status through December 31, 1984, was obtained in 1987.

There are 4,317 deaths identified in this working file.

The second working file (ZIAEFILE) contains external radiation exposure data consisting of annual whole-body doses (in centirem) where the whole-body dose was defined to be the sum of gamma, neutron, and tritium doses. Film dosimeters (badges) were used to measure exposures from 1944 through 1979, when thermoluminescent dosimeters (TLDs) replaced them. This file contains 44,452 records of exposure data from 1944 through 1985 for 5,911 monitored workers. These data include all measurements for individuals while working at Zia. Workers who were employed at Zia and also by LANL or another contractor may have measurements for both periods of employment. Therefore, all measurements in this file may not fall within a worker's period of employment at Zia.

The third working file (ZIABFILE) contains plutonium bioassay data for 1944 through October 1985. There are 35,434 records for 3,104 individuals. Measurements in 1944 are for nose swipes or urine samples. In March 1945, a formal bioassay program was established. Before 1968, all urine bioassay results were for plutonium-239 because that was the isotope used during that time. Beginning in 1968, the results are labelled as plutonium-238 or plutonium-239. Until 1952, results were in units of cpm/24 hours; from 1952 through 1977, they were in dpm/24 hours; and from 1977 to 1985, they were in pCi/24 hours. Generally, they are annual measurements, but some individuals have multiple readings for one plutonium isotope within a year and some have separate readings for both isotopes within a year. All measurements are included in the file for each monitored worker. Some workers may have measurements that do not fall within the Zia period of employment.

Working File Name

ZIAPFILE

- 1 CER-assigned ID number
- 2 sex
- 3 race
- 4 date of birth
- 5 date of first hire at the Zia Company
- 6 latest termination date from Zia Company
- 7 first job title
- 8 last known job title
- 9 date of death
- 10 cause of death - ICDA 8th revision
- 11 state of death

Working File Name

ZIAEFILE

- 1 CER-assigned ID number
- 2 year monitored for external radiation
- 3 annual whole-body dose in centirem

Working File Name

ZIABFILE

- 1 CER-assigned ID number
- 2 date counts taken on bioassay sample
- 3 measured value of Pu bioassay reading
- 4 type of assay

APPENDIX A

Glossary

NOTE: For definitions of epidemiological terms, readers are referred to *A Dictionary of Epidemiology* edited by John M. Last for the International Epidemiological Association (1983).

Analytic Data Set	The collection of static files that contain the data upon which a researcher directly bases a study's reported findings.
Analytic File	A static file containing data upon which a researcher directly bases a study's reported findings.
Bulletin Board	A mechanism that allows users to post and review information much like traditional bulletin boards. <i>CEDR OnLine</i> is a customized electronic bulletin board designed specifically for CEDR users.
CEDR	The acronym for the Comprehensive Epidemiologic Data Resource. The CEDR Program is managed by the U.S. Department of Energy, Office of Health (EH-421).
CEDR OnLine	A customized electronic bulletin board that facilitates information exchange among CEDR users.
CEDRtext	A text-based CEDR software tool that allows authorized CEDR users to view essential aspects of CEDR data sets on-line.
CER	The acronym for the Center for Epidemiologic Research at the Oak Ridge Institute for Research and Education.
Ci	The abbreviation for curie. The curie is a unit of measure used to describe the amount of radioactivity in material. One curie is that amount of radioactive material in which 37 billion (3.7×10^{10}) atoms are transformed per second. Fractions of a curie may be shown as nanocuries (nCi) or picocuries (pCi).
CI	The acronym for Confidence Interval.

CNS	The acronym for central nervous system.
Cohort	Any designated group of persons who are followed or traced over a period of time. For example, a cohort may be defined as all white males working at a specific facility during a specific period of time.
cpm	Counts per minute.
Data Set	A collection of logically related files. CEDR contains two types of data sets: analytic and working.
DOE	The acronym for the U.S. Department of Energy.
dpm	Disintegrations per minute.
Facility	A specific DOE plant. It may be one of several DOE plants or facilities, such as X-10, at a particular DOE site.
File	A collection of similarly structured records that contain a set of variables.
HP	The acronym for health physics.
IARC	The acronym for International Agency for Research on Cancer.
ICD Codes	The International Classification of Diseases diagnostic codes are standardized codes used to classify morbidity and mortality information for statistical purposes. The 8th revision of the ICD codes (ICD-8, ICDA-8) are currently used in various CEDR files.
Informix	A commercially available relational data base management system that is used to manage the CEDR data.
Internet	A worldwide network for computer communications.
ISQL	Interactive standard query language that is used to query an Informix data base.
MPBB	The acronym for Maximum Permissible Body Burden.

mSv	Millisievert. A millisievert equals 1/1,000 rem. Please refer to definition of rem .
NIOSH	The acronym for the National Institute for Occupational Safety and Health.
Po	The accepted symbol for polonium.
ppm	Parts per million.
Primary User	An authorized CEDR user who is assigned a CEDR account number and may be the direct recipient of CEDR data.
pseudo-identifier	A unique, impersonal identifier sometimes referred to as the CER-assigned ID number.
Pu	The accepted symbol for the element plutonium.
rem	A measure of radiation dose related to biological effect. Fractions of a rem may be shown as millirem or centirem. Also, 1 rem equals 1 centisievert (cSv), and 100 rem equals 1 sievert (Sv).
rlogin	A remote log-in command allowing access to remote computers on the Internet.
SAS	A commercially available statistical analysis software package.
Secondary User	An authorized CEDR user with whom a primary user may share CEDR data.
Site	A geographical area on which one or more major facilities or plants are located. For example, the Oak Ridge Site includes the X-10, Y-12, and K-25 facilities. A site is sometimes referred to as a reservation.
SMR	The acronym for Standardized Mortality Ratio.
SSA	The acronym for Social Security Administration.
Structured Documentation	Information that describes CEDR data.
telnet	The terminal emulation protocol that is used on Internet.

TLD	Thermoluminescent dosimeter used to assess exposure to radiation.
U	The accepted symbol for uranium.
UNIX	A computer operating system. The CEDRtext application and the CEDR data reside on a UNIX-based computer.
Variable	A specific field or data element in a file.
Working Data Set	The collection of dynamic files that contains the data from which a researcher selects variables to analyze and forms an initial analytic data set. The data in working data sets may be gathered from a variety of sources and contain the least refined form of data in CEDR.
Working File	A dynamic file that contains the data from which a researcher selects variables to analyze and forms an initial analytic data set. The data in working files may be gathered from a variety of sources and contain the least refined form of data in CEDR.
xterm	A terminal emulation for the X-Window system.

APPENDIX B

User Authorization

Instructions for Completion of Confidentiality Statements Required for Access to the Comprehensive Epidemiologic Data Resource (CEDR)

I. General Instructions

The attached confidentiality statements must be completed and returned to the Department of Energy (DOE) at the following address before the data being made available through the CEDR Program can be released.

Barbara G. Brooks
CEDR Program Manager
Office of Health, EH-421
U.S. Department of Energy
Washington, DC, 20585

The first confidentiality statement assures DOE that the data will be used in a manner which ensures the protection of individual privacy and in compliance with DOE regulations. The additional three forms are required by the States of Alabama, Pennsylvania, and Rhode Island. Upon receipt of the completed statements, the Office of Health at DOE will retain the DOE statements and will forward the others to the appropriate state officials. The review of these statements should take place in a very short time. Written approval is needed from the State of Pennsylvania; a signed release from Pennsylvania will be sent to you and to DOE. Within two weeks after the date of your approval by Pennsylvania, DOE will review the completed confidentiality statements and will notify you when your application is approved. Personnel at Lawrence Berkeley Laboratory (LBL) will contact you to establish your account.

II. Specific Instructions for Each Statement

DOE Confidentiality Statements (Attachments 1 and 2)

There are two types of statements: The first is for a "Primary User" who is defined as the person to whom a CEDR account number is given and who is the actual recipient of the data from the CEDR personnel at LBL. It is self-explanatory and should be completed by those who wish to establish their own CEDR account.

The second statement is for "Secondary Users" who are defined to be those with whom a primary user may share CEDR data. Secondary users do not interact directly with LBL and the CEDR information system and do not need their own CEDR account. The statement is self-explanatory and should be completed by those having access to CEDR data though the primary user's account.

Pennsylvania's Individual Case Record Release Form (Attachment 3)

Each prospective CEDR user must complete this self-explanatory form and return it to DOE. Personnel in DOE's Office of Health will submit it to the Pennsylvania Department of Health for written approval.

Alabama's Confidentiality Statement for CEDR Users (Attachment 4)

Each prospective CEDR user must complete this self-explanatory form and return it to DOE. Personnel in DOE's Office of Health will submit it to the Alabama Department of Public Health before allowing the user access to the CEDR data.

Rhode Island's Research Assurance Form (Attachment 5)

Each prospective CEDR user must complete this form and return it to DOE. Personnel in DOE's Office of Health will submit it to the Rhode Island Department of Health before allowing the user access to the CEDR data.

Most of the questions and terms are self-explanatory. However, Item 5 (b) means that computer tapes or other electronic media containing data originating from Rhode Island's vital records should be completely erased or returned to DOE. In Item 7, please note that the data should be returned to DOE.

**U.S. DEPARTMENT OF ENERGY COMPREHENSIVE EPIDEMIOLOGIC DATA RESOURCE (CEDR)
Confidentiality Statement for Primary Users**

In order to access the epidemiologic data in CEDR, I, the primary user, agree to the following conditions which are necessary to ensure the protection of individual privacy and to comply with certain regulations and agreements.

1. I understand that the Department of Energy (DOE) releases CEDR data for statistical purposes only. Therefore, I will not link data from CEDR with any other sources of information that leads to the identification of an individual having records in CEDR. I accept responsibility for any misuse of the data provided to me and agree to hold DOE harmless for such misuse.
2. I will not disclose CEDR data to any parties other than those working directly with or for me on the specific project for which I am using CEDR data. I will designate these individuals as Secondary Users and will ensure their submittal of Confidentiality Statements. I will not by any means disclose CEDR data to anyone else.
3. I will not allow the use of my CEDR account number by anyone else.
4. I agree that if a publication results from the analysis of CEDR data, the primary author will provide a copy of the analysis files to CEDR when the study is prepared for presentation or is accepted for publication. I understand that all analysis files will be made available to other CEDR users.
5. I agree to acknowledge the use of CEDR data in any resulting publications or presentations and agree to include a disclaimer statement that the protocol and results of my study were not reviewed by DOE and that conclusions do not necessarily reflect those of the U.S. Government or DOE.

User Signature (written and printed) _____

Date _____

Organization, Address, Phone No. _____

Description of Statistical Use of the Data _____

There will be Secondary Users of my CEDR Data. ☐ No ☐ Yes

Names of Secondary Users whose Confidentiality Statements Are Attached _____

DOE Reviewing Official _____ Date _____

U.S. DEPARTMENT OF ENERGY COMPREHENSIVE EPIDEMIOLOGIC DATA RESOURCE
Confidentiality Statement for Secondary Users

In order to access the epidemiologic data in CEDR, I agree to the following conditions which are necessary to ensure the protection of individual privacy and to comply with certain regulations and agreements.

1. I understand that the Department of Energy (DOE) releases CEDR data for statistical purposes only. Therefore, I will not link data from CEDR with any other sources of information that leads to the identification of an individual having records in CEDR. I accept responsibility for any misuse of the data provided to me and agree to hold the Department of Energy harmless for such misuse.
2. I will not disclose CEDR data to any other parties, either by allowing them to see the data, giving them copies of the data, or by any other means.
3. I agree that if a publication results from the analysis of CEDR data, the primary author will provide a copy of the analysis files to CEDR when the study is prepared for presentation or is accepted for publication. I understand that all analysis files will be made available to other CEDR users.
4. I agree to acknowledge the use of CEDR data in any resulting publications or presentations and agree to include a disclaimer statement that the protocol and results of my study were not reviewed by DOE and that conclusions do not necessarily reflect those of the U.S. Government or DOE.

User Signature (written and printed) _____

_____ Date _____

Organization, Address, Phone No. _____

Description of Statistical Use of the Data _____

DOE Reviewing Official _____

_____ Date _____

CONFIDENTIALITY STATEMENT FOR USERS OF ALABAMA DEATH CERTIFICATE DATA FROM CEDR

I, the undersigned, hereby agree to the following terms and conditions related to the use of information obtained from Alabama death certificates contained in the Department of Energy Comprehensive Epidemiologic Data Resource (CEDR) data base:

1. All identifiable data obtained from Alabama death certificates contained in the CEDR data base will be used only for scientific research and statistical purposes. No data will be published or released in any form if a particular individual or establishment supplying the information or described in it is identifiable. Furthermore, the identifiable information will not be used as a basis for legal, administrative, or other actions which may directly affect those particular individuals or establishments as a result of their specific identification in this project.
2. No data from Alabama death certificates contained in CEDR will be linked to computer files or other sources of information that might lead to identification of individuals or establishments.
3. No data from Alabama death certificates contained in CEDR will be used to compile lists of individuals or establishments for commercial purposes.
4. Information obtained from Alabama death certificates from the CEDR data base will not be disclosed to any parties other than those working directly on the specific project for which CEDR data is being used and for which a CEDR Confidentiality Statement for Primary Users has been signed. In no way will Alabama death certificate data be disclosed to anyone else.

THIS CONFIDENTIALITY STATEMENT MUST BE SIGNED BY THE PRIMARY USER.

Signature _____ Date _____

Typed Name _____

Title _____

Organization _____

Address _____

Name of Study _____

DOE Approval _____ Date _____

PENNSYLVANIA DEPARTMENT OF HEALTH APPLICATION FOR ACCESS TO PROTECTED DATA
Individual Case Record Release Form

I. Original Study Title/Applicant Information:

Study Title: _____

Applicant: _____

Application Number and Approval Date: _____

II. Information to be Released:

Organization Name (that is requesting the data): _____

Study Title: _____

Data to be Released: _____

Please attach a Summary Study Protocol.

III. Applicant Assurances (to be completed by the organization that will receive the data):

The undersigned hereby agrees that use of the individual case record data obtained from Pennsylvania death records will not be undertaken for any purposes other than the above stated study to the extent approved separately in writing by the Department.

Name: _____

Title: _____

Address: _____

Telephone Number: _____

Signature: _____

Date: _____

RESEARCH ASSURANCES FORM

Division of Vital Records, R.I. Department of Health

1. The purpose of this research study is (please summarize in space below or attach additional sheets if necessary):

2. I acknowledge that access to information contained in vital records furnished by the Division of Vital Records is granted solely upon the condition that I agree to utilize said information in the manner and upon the terms set forth in this Research Assurances Form. Specifically, I agree to comply with the following conditions:
 - a) That the information will be used solely for the purpose stated above;
 - b) That no communication shall be made with individuals named or listed on vital records, or with family members, or with informants (individual or institutional), unless approval in writing has been obtained from the Director of Health or his designee;
 - c) That no information from vital records shall be published or disseminated in a form that might permit identification of individuals named or listed in vital records;
 - d) That no statement shall be made indicating or suggesting that interpretations drawn from vital statistics are those of the Department of Health or of the state of Rhode Island; and
 - e) That the confidentiality of all information obtained from vital records will be maintained as required by Chapter 5-37.3-4 of the General Laws of Rhode Island and by all federal and state laws and regulations related to confidentiality of such information, and by requirements specified by the Institutional Review Board of the Department for the protection of human subjects.

3. I understand that the Rhode Island Department of Health reserves the right to final determination of access to confidential information it provides for research purposes, and may terminate access at any time.

4. I understand that I cannot use any information provided under this agreement for any commercial purpose, as defined in Section 38-2-6 of the General Laws of Rhode Island.

5. I agree that all information provided under this agreement, when disposed of, will be handled as follows:
- a) Paper records will be shredded or burned; and
 - b) Computer tapes will be completely erased or returned to the Division of Vital Records. Computer diskettes will be returned to the Division of Vital Records.
6. I accept responsibility for any misuse of the information provided and agree to hold Rhode Island Department of Health harmless for such misuse.
7. Should I fail to comply with the terms and conditions of this Research Assurance Form, access to information on vital records will be terminated immediately, and all data will be returned to the Division of Vital Records. I understand that unauthorized disclosure of information from confidential records may be punishable, upon conviction, by a fine and/or imprisonment or both, and/or civil penalties as prescribed by law.

(Signature)_____

(Title)_____

(Organization)_____

(Date)_____

Approved by: _____
(Signature of State Registrar)

APPENDIX C

**U.S. DEPARTMENT OF ENERGY COMPREHENSIVE EPIDEMIOLOGIC DATA RESOURCE (CEDR)
Data Request Form**

To request CEDR data, complete this form and mail or fax to:

**CEDR Project
Lawrence Berkeley Laboratory
1 Cyclotron Road, MS 50B-3238
Berkeley, CA 94720
Phone: 510-486-4136
FAX: 510-486-6363**

**YOU MUST BE AN AUTHORIZED CEDR
PRIMARY USER TO REQUEST CEDR
ANALYTIC OR WORKING DATA SETS.
HOWEVER, STRUCTURED DOCUMENTATION
FOR CEDR DATA SETS IS AVAILABLE TO
ANYONE UPON REQUEST.**

Primary User Name: _____
Organization: _____
Address: _____

Phone: _____

Data Sets Requested:

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

(Please attach an additional page if you wish to receive additional data sets.)

Please indicate the type on which you wish to receive the data:

- ☐ 9-track tape (IBM unlabelled, ASCII)
☐ 9-track tape (IBM unlabelled, EBCDIC)
☐ 5 1/4" diskette (DOS format)
☐ 3 1/2" diskette (DOS format)
☐ Other, please specify: _____

I agree to use CEDR data as specified in the DOE CEDR Confidentiality Statement.

Signature: _____ Date: _____

APPENDIX D

Site and Facility Descriptions

This appendix provides a reference of all facilities/plants and sites for which data exist in CEDR. The analytic data sets that include data from the facility or site are also provided as a cross-reference.

Fernald Facility

The Fernald facility, located at Fernald, Ohio, is approximately 20 miles northwest of Cincinnati. National Lead Company of Ohio (NLO), a subsidiary of National Lead Industries, was the original operating contractor. In 1992, Fernald Environmental Restoration Management Company (FERMCO), a subsidiary of Fluor-Daniel, took over the management of the facility. Early processes included receiving, sampling, and assaying foreign and domestic uranium ores; chemical processing; reduction of uranium tetrafluoride to metal; and fabrication of the metal by rolling and machining into fuel shapes. The processes changed somewhat in later years, and all plants at the facility were used for production of slightly enriched (less than 1% of U-235) metal. The facility was in operation from 1951 to 1989 as a feed materials plant; it is currently undergoing environmental restoration.

Analytic Data Set: FRW83A01

Hanford Site

The Hanford facility encompasses 560 square miles within the Columbia River Basin in southeastern Washington State. This semidesert area is located north of the cities of Richland, Kennewick, and Pasco (combined population 100,000). Activities at Hanford, which formerly focused on plutonium production,

have shifted to environmental restoration, in managing the wastes generated by past reactor and processing operations, and to research and development for advanced reactors, energy technologies, basic sciences, and waste disposal technologies. The site has been in use since 1943; however, several of its facilities are no longer operational.

Analytic Data Sets: HFC78A01, HF189A01, HFS93A03

Linde Plant

The Linde Plant, located in Buffalo, New York, was in operation from 1943 to 1949. The primary operation at the plant was uranium processing, whereby Congo pitchblende and domestic uranium ores were converted to uranium tetrafluoride. The Linde Plant also developed and produced barrier material for the Oak Ridge Gaseous Diffusion Plant (now the K-25 Site). The Manhattan Engineer District constructed four buildings on land owned by Union Carbide Corporation. Upon termination of the contract with the Atomic Energy Commission, ownership of the facility was transferred to Union Carbide.

Analytic Data Set: LND87A01

Los Alamos National Laboratory Facility

The Los Alamos National Laboratory (LANL) facility occupies about 43 square miles (27,800 acres) in Los

Alamos County, New Mexico, approximately 60 miles north of Albuquerque and 25 air miles northwest of Santa Fe. The laboratory is situated on the Pajarito Plateau, which is made up of finger-like mesas ranging in elevation from 6,200 to 7,800 ft. LANL was

established in January 1943 as Project Y of the War Department's World War II Manhattan Engineer District. The mission of Project Y was the design and assembly of the first nuclear fission bomb. After World War II, LANL has continued to design fission and, subsequently, fusion-based nuclear weapons. LANL has played a major role in the research and development of nuclear reactors, and it has had a long-standing interest in nuclear fusion power generation. In the 1960s and 1970s, LANL greatly expanded its research and development activities through large areas of physics, chemistry, and material science.

Analytic Data Sets: LAFEMA01, LASUIA02

Mound Plant

The Mound Plant is located on a 306-acre site in southern Montgomery County in southwestern Ohio, within the southern boundary of the Miamisburg city limits and approximately 0.6 miles due east of the Great Miami River.

The facility is located about 10 miles south southwest of Dayton and 31 miles north northeast of Cincinnati. This facility was operated first by the Monsanto Chemical Corporation and later by EG&G. From 1943 to 1948, the work was done under the title of Dayton Project. During this period, work was carried out at several locations within the city of Dayton. In 1948, operations were consolidated at the current central Mound Plant. In 1991, EG&G replaced Monsanto Chemical Corporation as the operating

contractor. Historically, major operations conducted there included the separation, chemistry, and metallurgy of polonium-210 and the processing of plutonium-238 for heat sources. Later, small research projects involved other isotopes, including radium and thorium.

Analytic Data Sets: MDSMRA01, MDEXTA02, MDPOLA03

Oak Ridge Site

This DOE site includes X-10 [Oak Ridge National Laboratory (ORNL)], Y-12 Plant, and K-25 [Oak Ridge Gaseous Diffusion Plant (ORGDP)].

Martin Marietta Energy Systems, Inc. is the contractor currently operating all three facilities.

Analytic Data Sets: ORMULA01, ORMULA02, ORMULA03, ORK25A01, ORX10A01, ORX10A02, ORX10A03, ORY12A01, ORY12A02, ORY12A03, ORY12A04

Oak Ridge K-25 Facility

The Oak Ridge K-25 facility, previously called the Oak Ridge Gaseous Diffusion Plant (ORGDP), occupies a 1,500-acre area adjacent to the Clinch River, approximately 13 miles west of downtown Oak Ridge, Tennessee. The K-25 facility originally produced enriched uranium hexafluoride for defense purposes. Due to a declining demand for enriched uranium, the enrichment process at the K-25 facility was placed on standby in 1985 and subsequently shutdown in 1987. The K-25 facility now serves as a center for applied technology and is the location of many contractor central staff functions, including the operation of waste treatment and storage facilities.

Analytic Data Sets: ORK25A01, ORMULA01, ORMULA02, ORMULA03

Oak Ridge Y-12 Facility

Oak Ridge Y-12 Facility

The Oak Ridge Y-12 facility occupies an 811-acre site in the Bear Creek Valley, approximately 2 miles from Oak Ridge, Tennessee. The Y-12 Plant, built in 1943 as part of the Manhattan Project, was established to separate uranium isotopes by the electromagnetic process. The original operating contractor was Tennessee Eastman Corporation (TEC). In May 1947, Union Carbide Corporation Nuclear Division became the operating contractor. At the time of this change, the work force at the plant had a significant turnover, and the processes changed from uranium enrichment to manufacturing and developmental engineering of enriched uranium metal products. For these reasons, a split in the plant population was identified for epidemiological purposes. The workers employed at the plant when TEC was the operating contractor are known as the TEC population, while workers employed from May 1947 onward are known as the Y-12 population.

Analytic Data Sets: ORY12A01, ORY12A02, ORY12A03, ORY12A04, ORMULA01, ORMULA02, ORMULA03

Oak Ridge X-10 Facility

The Oak Ridge X-10 facility, also known as the Oak Ridge National Laboratory (ORNL), occupies several sites and covers approximately 2,900 acres in Melton Valley and Bethel Valley, 10 miles southwest of downtown Oak Ridge, Tennessee. ORNL's mission is to conduct applied research and engineering development in support of DOE programs in fusion, fission, conservation, fossil, and other energy technologies and to perform basic scientific research in selected areas of the physical and life sciences. The site has been in use since 1943.

Analytic Data Sets: ORX10A01, ORX10A02, ORX10A03, ORMULA01, ORMULA02, ORMULA03

Pantex Plant

Pantex Plant

The 9,100-acre Pantex Plant is located in the Panhandle of Texas in Carson County about 17 miles northeast of downtown Amarillo and 10 miles west of downtown Panhandle. The site was first used in 1942 by the Army Ordnance Corps for loading conventional ammunition shells and bombs during World War II. In 1950, the U.S. Atomic Energy Commission started rehabilitating portions of the original plant and building new facilities for fabricating chemical high explosives used in nuclear weapons and for final assembly of nuclear weapons. These new functions began in 1951. The Pantex Plant has been the nation's primary weapons assembly/disassembly plant. It received conventional (non-nuclear) high-explosive materials and prefabricated nuclear weapons components from external suppliers. Historically, there have been three major operations: (1) production of new nuclear weapons; (2) maintenance, modification, and quality assurance testing of nuclear weapons already in the military stockpile; and (3) retirement by disassembly of nuclear weapons no longer required in the military stockpile.

The high explosives shipped to the Pantex Plant were fabricated into the required shapes for use in nuclear weapons. All other nuclear weapons components were supplied by other manufacturers. These components were then assembled to produce nuclear weapons for delivery to the U.S. Department of Defense.

The Pantex Plant has also conducted research and development work on conventional high explosives to support weapons design and development programs for the U.S. Department of Energy.

Analytic Data Set: PXSMRA01

Rocky Flats Plant

The Rocky Flats Plant almost covers 11 square miles. It is located at Golden, Colorado, in northern Jefferson County, about 16 air miles northwest of Denver. Historically, major operations conducted there included fabrication and assembly (of plutonium, beryllium, uranium, and other metals), plutonium recovery, americium separation, and research and development. Support operations included quality control, safety, maintenance, and utilities. Construction of the plant began in 1951, and limited production operations commenced in 1952. By 1954, the plant was fully operational. In 1989, all production of nuclear weapons components ceased. A period of cleanup and new production preparation began. The end of the Cold War has left the future of the plant in doubt. Environmental restoration activities are underway. The plant was operated by three contractors beginning with Dow Chemical Company (1951), followed by Rockwell International (1975), and finally by EG&G (1990).

Analytic Data Set: RFPLUA01

plant includes five large production reactors, two chemical separation plants, plants for reprocessing irradiated nuclear fuel, a fuel fabrication plant, a heavy water manufacturing plant, and a variety of research and development laboratories. E.I. duPont de Nemours and Company was the original operating contractor until 1989, when Westinghouse assumed management of the operations.

Analytic Data Set: SRC88A01

Zia Company

The Zia Company was a support services contractor to the Los Alamos National Laboratory (LANL) from April 1, 1946, to June 30, 1986. At that time, Pan American World Services replaced the Zia Company as the primary support services contractor to LANL. Later, Pan American World Services was sold to Johnson Controls World Services Incorporated, the current contractor. The Zia Company's offices were located in Los Alamos, New Mexico, and its employees worked throughout the LANL facilities. In April 1946, the Zia Company replaced the U.S. Army Corp of Engineers Base Post as the provider of construction, maintenance, and quasi-governmental functions. As the 1940s ended, and the 1950s began, civilian government appeared in Los Alamos County and the quasi-governmental activities were turned over to the local government. Support services provided by the Zia Company toward the end of its contract included construction and maintenance at the technical sites of LANL.

Analytic Data Set: LAFEMA01, LASUIA02

Savannah River Site

The Savannah River Plant covers a 315-square-mile site near Aiken, South Carolina. At the inception of the plant in 1952, the primary process was the production of nuclear fuels and other materials. The physical

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12 / 29 / 93

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