

# HANFORD

## HFMULA02 Data File Set

### Description

This analytic data file set consists of three files supporting the 1989 combined mortality study of males employed at the Hanford, Oak Ridge, and Rocky Flats sites; and three additional files supporting the updated 1993 study of workers at these sites.

An important objective of studies of workers exposed occupationally to chronic low doses of ionizing radiation is to provide a direct assessment of health risks resulting from this exposure. This objective is most effectively accomplished by conducting analyses that allow evaluation of the totality of evidence from multiple study populations.

The 1989 combined study of males employed at Hanford, Oak Ridge and Rocky Flats provides no evidence of a correlation between external radiation exposure and mortality from all cancers, or from leukemia. Of eleven other specific types of cancer analyzed, multiple myeloma was the only cancer found to exhibit a statistically significant correlation with exposure. Estimates of the excess risk of all cancers and of leukemia, based on the combined data, were negative. Upper confidence limits based on the combined data were lower than for any single population, and were similar to estimates obtained from recent analyses of A-bomb survivor data. These results strengthen support for the conclusion that estimates obtained through extrapolation from high-dose data do not seriously underestimate risks of low-dose exposure, but leave open the possibility that extrapolation may overestimate risks.

Each of the 1989 study files in the HFMULA02 data file set represent a particular site. The study population at each site consists of white males monitored for external radiation and employed for at least six months.

HFMUL\_HF has one record for each of 25,241 white male candidates in the study period of 1944 - 1981. This file contains demographic,

work history, vital status and external dosimetry data. HFMUL\_OR has one record for each of 8,375 white male candidates in the study period of 1943 - 1977. This file contains demographic, work history, vital status and external dosimetry data. HFMUL\_RF has one record for each of 7,616 white male candidates in the study period of 1952 - 1979. This file contains demographic, work history, vital status, external dosimetry, and internal deposition data.

Updated 1993 analyses of mortality data on workers at the Hanford Site, Oak Ridge National Laboratory (ORNL), and Rocky Flats Weapons Plant were performed with the objective of providing a direct assessment of health risks resulting from protracted low-dose exposure to ionizing radiation. For leukemia, the combined excess relative risk estimate was negative (-1.0 per Sv), and confidence limits excluded risks that were more than slightly larger than those forming the basis of ICRP recommendations. For all cancer except leukemia, the excess relative risk estimate was 0.0 per Sv, but confidence limits indicated consistency with estimates several times those forming the basis of ICRP recommendations. Of twenty-four cancer types tested, twelve showed positive correlations with radiation dose and twelve showed negative correlations, as would be expected by chance fluctuation. Cancer of the esophagus, cancer of the larynx, and Hodgkin's disease showed statistically significant correlations with radiation dose ( $P < 0.05$ ), but these correlations were interpreted as likely to have resulted from bias or chance fluctuation. Evidence of an increase in the excessive relative risk with increasing age at risk was found for all cancer at both Hanford and ORNL, and both populations showed significant correlations of all cancer with radiation dose among those 75 years and older. Although this age effect may have resulted from bias in the data, its presence suggests that risk estimates based on nuclear worker data be interpreted cautiously.

Each of the three updated 1993 study files in the HFMULA02 data file set represent a particular site. The study population at each site includes white males monitored for external radiation and employed for at least six months. In addition, female workers and a small number of non-white workers are included in the Hanford study population.

HFMUP\_HF has one record for each of 44,156 candidates in the study period of 1944 - 1986. This file contains demographic, work history, vital status, internal deposition and external radiation exposure data. External radiation estimates are provided by type of work: onsite operations, onsite construction or offsite. HFMUP\_OR has one record for each of 8,318 white male candidates in the study period of 1943 - 1984. This file contains demographic, work history, vital status, internal deposition and external dosimetry data. HFMUP\_RF has one record for each of 7,616 white male candidates in the study period of 1952 - 1983. This file contains demographic, work history, vital status, external dosimetry, and internal deposition data.

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 at Hanford since 1944. Annual whole-body doses from 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.

Oak Ridge National Laboratory (ORNL) began monitoring personnel for exposure to external penetrating radiation, primarily gamma rays, in 1943. Pocket chambers were used until June of 1944. At this time, film dosimeters (film badges) became the primary type of dosimeter. In 1975, film badges were replaced with thermoluminescent dosimeters (TLDs).

Until the early 1950s, the usual practice at ORNL was to provide personal dosimeters to only those workers entering designated areas where there was a potential for exposure. After that time, all workers were monitored.

Rocky Flats Plant has been a weapons facility since 1952. Sources of occupational exposure include external radiation, both gamma and neutron, and potential for internal deposition of plutonium-239. Personal film dosimeters and, subsequently, TLDs were used to monitor external exposure to workers. Formal bioassay programs to monitor for internal radiation were initiated in 1952. Results of both types of monitoring programs reflect technological improvements and changes in concepts and models over time. ♦♦

# HANFORD

## HFMULA02 Data File Set

### Citations

Gilbert, E.S., Fry, S.A., Wiggs, L.D., Voelz, G.L., Cragle, D.L. and Petersen, G.R. Analyses of Combined Mortality Data on Workers at the Hanford Site, Oak Ridge National Laboratory, and Rocky Flats Nuclear Weapons Plant, *Radiation Research* 120, 19-35 (1989).

Gilbert, E.S., Cragle, D.L. and Wiggs, L.D. Updated Analyses of Combined Mortality Data for Workers at the Hanford Site, Oak Ridge National Laboratory, and Rocky Flats Weapons Plant, *Radiation Research* 136, 408-421 (1993).

Gilbert, E.S., J.A. Buchanan and N.A. Holter. 1992. Description of the process used to create the 1992 Hanford mortality study database. PNL Technical Report No. PNL-8449.

Number of Analytic Files: 6		
File Name	Number of Variables	Type of Data
HFMUL_HF	52	demographics and vital status
HFMUL_OR	51	demographics and vital status
HFMUL_RF	55	external dosimetry and internal deposition
HFMUP_HF	58	external dosimetry
HFMUP_OR	57	external dosimetry
HFMUP_RF	61	external dosimetry and internal deposition

**Note:** No Summary Death Table currently available

Variables for Analytic File  
HFMUL\_HF

6.9 MB

Name	Description
id	identification number
site	site indicator
birth	birth
sex	sex or worker
race	race of worker
hire	initial employment data (year,month)
final	last employment data (year,month)
dose1943	penetrating dose in mrem by year, 1943-1980
:	
:	
dose1980	
yrfrdose	year of first dose
yrldsdose	year of last on-site dose
cumdose	cumulative penetration dose through 1980, mrem
yrdeath	year of death
cdeath8	cause of death (ICD, 8th revision)
olapst25	overlap, status 25+ rem
genoccat	general occupation category

Variables for Analytic File  
HFMUL\_OR

2.3 MB

Name	Description
id	identification number
site	site indicator
birth	birth
sex	sex of worker
race	race of worker
hire	initial employment data (year,month)
final	last employment data (year,month)
dose1943	penetrating dose in mrem by year, 1943-1980
:	
:	
dose1980	
yrfrdose	year of first dose
yrldsdose	year of last on-site dose
cumdose	cumulative penetration dose through 1980, mrem
yrdeath	year of death
cdeath8	cause of death (ICD, 8th revision)
olapst25	overlap, status 25+ rem

Variables for Analytic File  
HFMUL\_RF

2.2 MB

Name	Description
id	identification number
site	site indicator
birth	birth
sex	sex of worker
race	race of worker
hire	initial employment data (year,month)
final	last employment data (year,month)
dose1943	penetrating dose in mrem by year, 1943-1980
:	
:	
dose1980	
yrfrdose	year of first dose
yrldsdose	year of last on-site dose
cumdose	cumulative penetration dose through 1980, mrem
yrdeath	year of death
cdeath8	cause of death (ICD, 8th revision)
olapst25	overlap, status 25+ rem
pudep	plutonium deposition, percent of maximum permissible body burden
frpupdate	first plutonium deposition date (year, month)
frach2pu	first achieved 2 nCi Pu date (year,month)
frach5pu	first achieved 5 nCi Pu date (year,month)

Variables for Analytic File  
HFMUP\_HF

13.8 MB

Name	Description
id	identification number
site	site indicator
birth	birth
sex	sex of worker
race	race of worker
hire	initial employment data (year,month)
final	last employment data (year,month)
dose1943	1943 penetrating dose, mrem
:	
:	
dose1986	
yrfrdose	year of first dose
yrldsdose	year of last on-site dose
cumdose	cumulative penetration dose through 1986, mrem
yrdeath	year of death
cdeath8	cause of death (ICD, 8th revision)
olapst25	overlap, status 25+ rem
genoccat	general occupation category

Variables for Analytic File  
HFMUP\_OR

2.6 MB

Name	Description
<b>id</b>	identification number
<b>site</b>	site indicator
<b>birth</b>	birth
<b>sex</b>	sex of worker
<b>race</b>	race of worker
<b>hire</b>	initial employment data (year,month)
<b>final</b>	last employment data (year,month)
<b>dose1943</b> ⋮ <b>dose1986</b>	1943 penetrating dose, mrem
<b>yrfrdose</b>	year of first dose
<b>yrldsdose</b>	year of last on-site dose
<b>cumdose</b>	cumulative penetration dose through 1980, mrem
<b>yrdeath</b>	year of death
<b>cdeath8</b>	cause of death (ICD, 8th revision)
<b>olapst25</b>	overlap, status 25+ rem

Variables for Analytic File  
HFMUP\_RF

2.5 MB

Name	Description
<b>id</b>	identification number
<b>site</b>	site indicator
<b>birth</b>	birth
<b>sex</b>	sex of worker
<b>race</b>	race of worker
<b>hire</b>	initial employment data (year,month)
<b>final</b>	last employment data (year,month)
<b>dose1943</b> ⋮ <b>dose1986</b>	1943 penetrating dose, mrem
<b>yrfrdose</b>	year of first dose
<b>yrldsdose</b>	year of last on-site dose
<b>cumdose</b>	cumulative penetration dose through 1978, mrem
<b>yrdeath</b>	year of death
<b>cdeath8</b>	cause of death (ICD, 8th revision)
<b>olapst25</b>	overlap, status 25+ rem
<b>pudep</b>	plutonium deposition, %
<b>frpudate</b>	first plutonium deposi- tion date (year, month)
<b>frach2pu</b>	first achieved 2 nCi Pu date (year,month)
<b>frach5pu</b>	first achieved 5 nCi Pu date (year,month)



# MULTIPLE SITES (Uranium Dust)

## MFD94A01 Data File Set

### Description

This analytic data file set consists of 12 files generated for a nested case-control study of respiratory cancer through 1982 for workers employed at four uranium processing or fabrication operations in Missouri, Ohio, and Tennessee, where there was potential for uranium dust exposure.

The analysis files contain 1,580 observations for the original 790 cases and their matched controls. Cases were identified as those workers employed at least 183 days in any one of these four operations who died before January 1, 1983, with respiratory cancer (ICD8A codes 162.0 through 163.9, inclusive) listed anywhere on the death certificate. Each case was matched with one control. The main analysis file is DEMGEMP, which contains demographic, work history, medical history, and smoking data. The essential exposure files are NEWINT (for internal radiation doses), NEWEXT (for external radiation doses), and EXPCODE (for thorium, radium, and radon exposures). NEWINT and NEWEXT contain cumulative doses lagged 10 years and 20 years before the date of death for each case and matched control. In addition, for each study member there are annual doses by separate operations, annual doses across operations, and annual cumulative doses across operations. EXPCODE contains the number of years with exposure to thorium, radium, and radon lagged 0, 10, and 20 years before the date of death for each case and matched control. Also, there are annual individual indicators of exposure to thorium, radium, and radon. Other supplemental analysis files included in this set are described in further detail in the CEDR documentation.

Two of the four operations were at the Y-12 Facility in Oak Ridge, Tennessee. The first was a uranium enrichment

operation managed by Tennessee Eastman Corporation (TEC) from 1943 to June 1947. The second, managed by Union Carbide Corporation from June 1947 through the end of the study, was a weapons fabrication operation and was referred to in the study as Y-12. The third was the Uranium Division of Mallinckrodt Chemical Works (MCW) located in St. Louis from 1942 to 1958 and in Weldon Spring, Missouri, from 1958 to plant shutdown in 1966. The Feed Materials Production Center (FMPC) located in Fernald, Ohio, was the fourth operation. It came on-line in 1951 and, along with MCW, processed ore concentrate into uranium metal. MCW also processed radium-bearing pitchblend ores. Of the 787 pairs, 567 had been employed in the TEC operation, with 428 of these workers employed only in this operation.

Information collected on all study members included smoking status, socioeconomic status, complete work histories, and radiation monitoring data. Annual doses to the lung resulting from deposited uranium, which was mainly insoluble, were estimated using methodologies appropriate to the type of radiation exposure data that had been collected from each operation. The radiation dose to the lung arose almost exclusively from alpha radiation, but annual whole-body doses from gamma radiation were determined for the FMPC, MCW, and Y-12 workers who had personal monitoring data available for calculating them. In addition, potential for production exposure to thorium existed in all but the TEC operation, and to radium and radon at MCW. The mean cumulative lung doses for cases and controls were 1.52 and 1.49 cGy (rad), respectively, and medians were 0.38 and 0.43 cGy, respectively. ❖

# MULTIPLE SITES

MFD94A01 Data File Set

## Citations

Dupree, E. A., J. P. Watkins, J. N. Ingle, P. W. Wallace, C. M. West, W. G. Tankersley. Uranium Dust Exposure and Lung Cancer Risk in Four Uranium Processing Operations. *Epidemiology* 1995 Jul, 6(4):370-5.

Number of Analytic Files: 12		
File Name	Number of Variables	Type of Data
DEMGEMP	63	demographic; work history; medical history; smoking history
NEWINT	147	internal radiation
NEWEXT	134	external radiation
EXPCODE	104	thorium, radium, and radon exposures
CONT45	50	internal radiation
CHRONSMK	12	smoking history
PAYCODES	8	work history
CASE45	51	internal radiation
MEDREC	18	medical history; smoking history
DAYSEXT	83	external radiation; work history
SMK1580	15	smoking history
DAYSINT	86	internal radiation; work history

**Note:** Summary Death Tables do not apply to this data file set



Variables for Analytic File  
DEMGEMP

630 KB

Name	Description
fmpt0	Fernald term date based on 0 lag
fmpdur0	Fernald emp (in days) based on 0 lag
mcwt0	MCW term date based on 0 lag
mcwdur0	MCW emp (in days) based on 0 lag
tect0	TEC term date based on 0 lag
tecdur0	TEC emp (in days) based on 0 lag
y12t0	Y-12 term date based on 0 lag
y12dur0	Y-12 emp (in days) based on 0 lag
lag0dur	total days employed based on 0 lag
fmpt10	Fernald term date based on 10-year lag
fmpdur10	Fernald emp (in days) based on 10-year lag
mcwt10	MCW term date based on 10-year lag
mcwdur10	MCW emp (in days) based on 10-year lag
tect10	TEC term date based on 10-year lag
tecdur10	TEC emp (in days) based on 10-year lag
y12t10	Y-12 term date based on 10-year lag
y12dur10	Y-12 emp (in days) based on 10-year lag

lag10dur	total days employed based on 10-year lag
fmpt20	Fernald term date based on 20-year lag
fmpdur20	Fernald emp (in days) based on 20-year lag
mcwt20	MCW term date based on 20-year lag
mcwdur20	MCW emp (in days) based on 20-year lag
tect20	TEC term date based on 20-year lag
tecdur20	TEC emp (in days) based on 20-year lag
y12t20	Y-12 term date based on 20-year lag
y12dur20	Y-12 emp (in days) based on 20-year lag
lag20dur	total days employed based on 20-year lag
id	identification number
caseid	identification number of corresponding case
fmpdays	number of days worked at Fernald
mcwdays	number of days worked at MCW
tecdays	number of days worked at TEC
y12days	number of days worked at Y-12
paycode	earliest known paycode for person
tobcode1	earliest smoking code found
tobdate1	tobcode1 record date
tobcode2	heaviest smoking code found
tobdate2	tobcode2 record date
tobcode3	heaviest smoking code < casedod

tobdate3	tobcode3 record date
birth	birth date
casedod	date of death if case or associated case
doefac	number of other DOE non-udust facilities
fhire	first hire date at facility
lcdate	date of diagnosis of lung cancer
lcsite	primary site of lung cancer
ldate	last known status date
lterm	last term date at facility
race	race - values are b and w
sex	sex - values are m and f
ufac1	1st udust facility at which person worked
ufac2	2nd udust facility
ufac3	3rd udust facility
ufac1doh	hire date at 1st udust facility
ufac1dot	term date at 1st udust facility
ufac2doh	hire date at 2nd udust facility
ufac2dot	term date at 2nd udust facility
ufac3doh	hire date at 3rd udust facility
ufac3dot	term date at 3rd udust facility
vstat	vital status
mfacdoh	first hire date at qualifying facility
beflag	is person beryl worker - 0=no, 1=yes
mfac	qualifying udust facility

Variables for Analytic File  
NEWINT

1 MB

Name	Description
fmpint51	calculated FMPC lung dose by year, 1951-1982
fmpint82	calculated FMPC lung dose by year, 1951-1982
id	identification number
mcwint42	calculated MCW lung dose by year, 1942-1966
mcwint66	calculated MCW lung dose by year, 1942-1966
tyint43	calculated TEC/Y-12 lung dose by year, 1943-1982
tyint82	calculated TEC/Y-12 lung dose by year, 1943-1982
int42	cumulative internal dose by year, 1942-1982
int82	cumulative internal dose by year, 1942-1982
totint	total internal cumulated internal dose
caseid	identification number of corresponding case
casedod	date of death if case or associated case
lag0int	total internal based on 0 lag
lag10int	total internal based on 10-year lag
lag20int	total internal based on 20-year lag
lag10dt	10-year lag cutoff date (casedod - 10 years)
lag20dt	20-year lag cutoff date (casedod - 20 years)

MFD94A01

Variables for Analytic File NEWEXT 244 KB		Variables for Analytic File EXPCODE 220 KB		Variables for Analytic File CONT45 324 KB		Variables for Analytic File CHRONSMK 81 KB	
Name	Description	Name	Description	Name	Description	Name	Description
<b>id</b>	identification number	<b>id</b>	identification number	<b>id</b>	identification number	<b>id</b>	identification number
<b>fmpfb52</b>	FMPC film badge reading in mrem by year, 1952-1980	<b>caseid</b>	identification number of corresponding case	<b>caseid</b>	identification number of corresponding case	<b>caseid</b>	identification number of corresponding case
<b>fmpfb80</b>		<b>casedod</b>	date of death if case or associated case	<b>casedod</b>	date of death if case or associated case	<b>smkdate1</b>	earliest smoke history date
<b>mcwfb45</b>	MCW film badge reading in mrem by year, 1945-1966	<b>th42</b>	thorium exposure by year, 1942-1982; 0=not exp, 1=exp	<b>act 45</b>	date the control turned 45 years old	<b>smkdate2</b>	2nd earliest smoke history date
<b>mcwfb66</b>		<b>th82</b>		<b>int43</b>	cumulative internal dose by year, 1943-1982	<b>smkdate3</b>	latest smoke history date
<b>y12fb48</b>	Y-12 film badge reading in mrem by year, 1940-1982	<b>ra42</b>	radium exposure by year, 1942-1966; 0=not exp, 1=exp&nm, 2=exp&mon	<b>int82</b>		<b>smkcode1</b>	code for smkdate1 history
<b>y12fb82</b>		<b>ra66</b>		<b>lag0int</b>	total internal based on 0 lag	<b>smkcode2</b>	code for smkdate2 history
<b>fb45</b>	total external exposure by year, 1945-1982	<b>rn42</b>	radon exposure by year, 1942-1966; 0=not exp, 1=exp@ppb, 2=exp@dpb	<b>lag10int</b>	total internal based on 10-year lag	<b>smkcode3</b>	code for smkdate3 history
<b>fb82</b>		<b>rn66</b>		<b>lag20int</b>	total internal based on 20-year lag	<b>smkfac1</b>	facility for smkhist1 data
<b>totext</b>	total external cumulated external dose	<b>lag0th</b>	# of years exp to thorium - lag on 0 years	<b>lag10dt</b>	10-year lag cutoff date (casedod - 10 years)	<b>smkfac2</b>	facility for smkhist2 data
<b>caseid</b>	identification number of corresponding case	<b>lag10th</b>	# of years exp to thorium - lag on 10 years	<b>lag20dt</b>	20-year lag cutoff date (casedod - 20 years)	<b>smkfac3</b>	facility for smkhist3 data
<b>casedod</b>	date of death if case or associated case	<b>lag20th</b>	# of years exp to thorium - lag on 20 years				
<b>lag0ext</b>	total external based on 0 lag	<b>lag0ra</b>	# of years exp to radium - lag on 0 years				
<b>lag10ext</b>	total external based on 10-year lag	<b>lag10ra</b>	# of years exp to radium - lag on 10 years				
<b>lag20ext</b>	total external based on 20-year lag	<b>lag20ra</b>	# of years exp to radium - lag on 20 years				
<b>lag10dt</b>	10-year lag cutoff date (casedod - 10 years)	<b>lag0rn</b>	# of years exp to radon - lag on 0 years				
<b>lag20dt</b>	20-year lag cutoff date (casedod - 20 years)	<b>lag10rn</b>	# of years exp to radon - lag on 10 years				
		<b>lag20rn</b>	# of years exp to radon - lag on 20 years				

Variables for Analytic File  
**PAYCODES**

98 KB

Name	Description
<b>payfac</b>	fac code of earliest known pay code
<b>jobfac</b>	fac code of earliest known job title
<b>id</b>	identification number
<b>jobdate</b>	start date of earliest known job title
<b>jobtitle</b>	earliest known job title
<b>paydate</b>	start date of earliest known pay code
<b>paycode</b>	earliest known pay code

Variables for Analytic File  
**CASE45**

662 KB

Name	Description
<b>id</b>	identification number
<b>caseid</b>	identification number of corresponding case
<b>casedod</b>	date of death if case or associated case
<b>act 45</b>	date the case turned 45 years old
<b>int42</b>	cumulative internal dose by year, 1942-1982
<b>int82</b>	
<b>lag0int</b>	total internal based on 0 lag
<b>lag10int</b>	total internal based on 10-year lag
<b>lag20int</b>	total internal based on 20-year lag
<b>lag10dt</b>	10-year lag cutoff date (casedod - 10 years)
<b>lag20dt</b>	20-year lag cutoff date (casedod - 20 years)

Variables for Analytic File  
**MEDREC**

56 KB

Name	Description
<b>id</b>	identification number
<b>primsite</b>	primary site
<b>pairorg</b>	paired organ involvement (1-5)
<b>diagdate</b>	date of diagnosis
<b>lngcahis</b>	primary lung cancer histology (1-12)
<b>icdmorph</b>	ICD9 morphology
<b>diagconf</b>	diagnosis confirmation (1-16)
<b>tobuse</b>	tobacco use (1-14)
<b>datasrc</b>	data source (1-7)
<b>placedth</b>	place of death (1-6)
<b>estflag</b>	estimation flag (e or blank)
<b>tobcode1</b>	earliest smoking code found
<b>tobdate1</b>	tobcode1 record date
<b>tobcode2</b>	heaviest smoking code found
<b>tobdate2</b>	tobcode2 record date
<b>tobcode3</b>	heaviest smoking code < casedod
<b>tobdate3</b>	tobcode3 record date

Variables for Analytic File  
**DAYSEXT**

330 KB

Name	Description
<b>id</b>	identification number
<b>caseid</b>	identification number of corresponding case
<b>casedod</b>	date of death if case or associated case
<b>daext45</b>	average daily external exposure by year, 1945-1982
<b>daext82</b>	
<b>daywrk42</b>	number of days worked by year, 1942-1982
<b>daywrk82</b>	

MFD94A01

Variables for Analytic File

SMK1580

119 KB

Name	Description
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<b>id</b>	identification number
<b>caseid</b>	identification number of associated case
<b>mcwcode</b>	MCW smoke code
<b>mcwdate</b>	MCW smoke date
<b>nlocode</b>	Fernald smoke code
<b>nlodate</b>	Fernald smoke date
<b>teccode</b>	TEC smoke code
<b>tecdate</b>	TEC smoke date
<b>y12code</b>	Y-12 smoke code
<b>y12date</b>	Y-12 smoke date
<b>x10code</b>	ORNL smoke code
<b>x10date</b>	ORNL smoke date
<b>k25code</b>	K-25 smoke code
<b>k25date</b>	K-25 smoke date

Variables for Analytic File

DAYSINT

1 MB

Name	Description
------	-------------

<b>id</b>	identification number
<b>caseid</b>	identification number of corresponding case
<b>casedod</b>	date of death if case or associated case
<b>daint42</b>	average daily internal exposure by year, 1942-1982
<b>daint82</b>	
<b>daywrk42</b>	number of days worked by year, 1942-1982
<b>daywrk82</b>	

# MULTIPLE SITES (5 Rem Study)

MFF94A02 Data File Set

## Description

This analytic data file set consists of a single file generated for a retrospective cohort mortality and morbidity study of all workers throughout the United States who received at least 5 rems (50 millisieverts [mSv]) of penetrating ionizing radiation during one calendar year before 1979 while employed at Department of Energy (DOE) nuclear facilities or the U.S. Navy's Nuclear Reactor Propulsion Plants (NRPPs). The registry of 5 rem workers was assembled between 1979 and 1982 in response to Congressional concern about the long-term health effects on DOE and predecessor agency workers of exceeding the 50 mSv occupational radiation standard for external radiation. Civilian NRPP workers were also eligible for the registry.

The study cohort comprised 3,145 persons, including 2,035 DOE workers and 1,010 NRPP personnel from 32 DOE and contractor facilities and seven naval shipyards. The median length of follow-up was 20 years with approximately 69,000 person-years of follow-up with 76% attributed to white males, 4% to black males, 10% to "other" males (race not determinable), 10% to those of undeterminable race and gender, and the remaining less than 1% to females. The total population external radiation dose through 1978 was 718.0 Sv (85% to white males) with a median of 153.4 and a range of 50.0 to 44,010.0 mSv. The median year of hire at the facility of first 50 or more mSv per year exposure (FF50) was 1954, with median length of employment at FF50 being 14 years. Median hire age at FF50 was 27 years, while first yearly exposure to at least 50 mSv occurred at a median age of 33. Approximately two-thirds of the cohort was retired or terminated before 1979.

DOE workers comprised 96.4% of those entering the registry from 1943 through 1959 but only 33% of those entering from 1960 through 1978. More than 80% of the cohort received a 50 mSv or greater exposure in only 1 year.

The analytic file (ELL3145) contains a record for each of the 3,145 cohort members. This file contains demographic; work history; facility; vital status as of December 31, 1984; and exposure information. Vital status was obtained for 86.6% of the population, with 588 identified as deceased. Cause of death was certified by 96.3% of these and included 159 cancers (127 for white males). The analytic file doses for each study member are given in rem. A cumulative dose of 500 mSv (50 rem) or more was acquired by 147 members of the cohort. The standardized mortality ratio for white males was 88 (95% CI = 80-97) for all causes; 109 (95% CI = 90-129) for all cancers; and 115 (95% CI = 61-197) for all lymphoma and hematopoietic cancers.

The DOE workers had been involved from 1947 through 1978 in research, development, and production operations with potential exposure to external and internal radiation as well as to industrial chemicals, depending on the facility of employment and the time period. Non-radiologic hazards included organic solvents, cutting oils, asbestos, and toxic metals, such as uranium, lead, cadmium, nickel, mercury, and beryllium. The NRPP workers had higher potential for radiation and chemical exposures starting in the 1960s during overhauling and refitting of nuclear vessel, with cobalt-60 as a primary source of external radiation. ❖

# MULTIPLE SITES

MFF94A02 Data File Set

## Contact

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Number of Analytic Files: 1		
File Name	Number of Variables	Type of Data
ELL3145	24	demographic; work history; vital status; exposure history

## Summary Death Tables

Cause of Death	No. of Deaths	
	Male	Female †
Infectious & Parasitic Diseases	8	
All Malignant Neoplasms	189	
Lip, Oral Cavity & Pharynx	8	
Digestive Organs & Peritoneum	53	
Respiratory System	70	
Bone & Connective Tissue	1	
Skin	2	
Breast	1	
Genitourinary System	12	
Brain/Central Nervous System (CNS)	6	
Other & Unspecified Sites, Except Brain/CNS	11	
Lymphatic/Hematopoietic	25	
All Benign Neoplasms	2	
All Neoplasms, Unspecified	3	
Endocrine, Nutritional & Metabolic Diseases	6	
Diseases of Blood & Blood-Forming Organs	0	
Mental Disorders	6	
Diseases of Nervous System & Sense Organs	7	
Diseases of Circulatory System	290	
Diseases of Respiratory System	37	
Diseases of Digestive System	19	
Diseases of Genitourinary System	9	
Complications of Pregnancy & Childbirth	0	
Diseases of Skin & Subcutaneous Tissue	0	
Diseases of Musculoskeletal System & Connective Tissue	0	
Congenital Anomalies	1	
Symptoms & Ill-Defined Conditions	9	
Accidents, Poisoning & Violence (External Causes)	57	
Deaths, With ICD Code	643	
Deaths, No ICD Code	21	
Total Deaths, All Causes	664	

† No females were included in this study.

Variables for Analytic File

ELL3145

300 KB

Name	Description
vstat	vital status
ldate	last date known for this individual
fhire	first hire date at facility of 5 rem exposure
lterm	last term date at facility of 5 rem exposure
birth	birth date
ca8	ICD8 code for cancer cause of death
fac1	code of first facility at which the person was known to have worked
fac2	second facility code
fac3	third facility code
fac4	fourth facility code
fac5	fifth facility code
icd8	ICD8 code for underlying cause of death
icd8x	ICD8 code for underlying cause of death
id	identification number
no_fac	number of facilities at which person worked
race	race of worker
sex	sex of worker
fac5rm	code for facility where 5 rem exposure occurred
conhire	continuous employment indicator
firexyr	year in which 5 rem exposure occurred
dose_fex	dose of first exposure in rem

no\_yrex number of years exposed  
 tot\_exp total lifetime recorded exposure in rem  
 borx flag indicating if exposure may have occurred over 2 years

MFF94A02

