

Online Table 1 Non-radiologic occupational exposures considered in modeling for mortality outcomes of *a priori* interest *

Exposure	Mortality Outcome				
	MN lung	COPD	MN intestine	NHL	Leukaemia excluding CLL
Asbestos	X	X	X	-	-
Coal dust	X	X	X	-	-
Acids Exposure to hydrofluoric acid, nitric acid, and/or nitrogen dioxide	X	X	-	-	-
Machining fluids	-	-	-	-	X
Miscellaneous lab chemicals Potential for exposure to a variety of laboratory chemicals used for analysis, research or process development work, such as acids (e.g. nitric acid, hydrofluoric acid, perchloric acid, sulfuric acid), bases (e.g. sodium hydroxide), acetone and various other reagents and cleaners.	-	-	-	X	X
Miscellaneous dusts Exposure to general building dust encountered by workers during cleaning or servicing of equipment or surfaces; plant dusts contaminated with uranium, graphite, and heat-treating salts encountered by workers during cleaning or servicing; lime and alum used in water treatment operations; cement mortar and similar products used in masonry work. Potential exposure to any specific dusts would have been limited to certain activities and workers involved in these operations.	X	X	X	-	-
Trichloroethylene	-	-	-	X	X
Other solvents Exposure to degreasers such as methyl chloroform and mineral spirits; paint products including xylene, mineral spirits, Stoddard solvent and paint thinners; perchloroethylene for dry cleaning. Use of any specific solvents would have been limited to certain activities and workers.	-	-	-	X	X
Vehicle exhaust	X	X	X	-	-
Welding fumes	X	X	-	-	-

* For parsimony, final model results were not adjusted for non-radiologic occupational exposures when the number of cases was less than 30. Tributylphosphate/kerosene was an exposure of interest at the site but not deemed a major risk factor for the outcomes with at least 30 cases.

CLL, chronic lymphocytic leukaemia; COPD, chronic obstructive pulmonary disease; MN, malignant neoplasm; NHL, non-Hodgkin lymphoma.

Online Table 2 All-cause and all-cancer standardized mortality ratios by race, sex, and pay code,

Fernald Feed Materials Production Center Cohort, 1951-2004 *

	Hourly						Salaried					
	All Causes			All Cancers			All Causes			All Cancers		
	Obs	SMR	95% CI	Obs	SMR	95% CI	Obs	SMR	95% CI	Obs	SMR	95% CI
White Males	1818	1.00	0.95 to 1.04	554	1.16	1.07 to 1.26	672	0.78	0.72 to 0.84	211	0.91	0.79 to 1.04
Non-White Males	74	0.71	0.56 to 0.90	21	0.86	0.53 to 1.31	6	0.47	0.17 to 1.03	0	0	0.00 to 1.40
White Females	44	1.07	0.78 to 1.44	12	1.05	0.54 to 1.84	143	0.82	0.69 to 0.97	54	0.90	0.68 to 1.18
Non-White Females	4	0.82	0.22 to 2.09	1	0.98	0.02 to 5.46	6	1.30	0.48 to 2.83	5	3.93	1.28 to 9.17

* Based on U.S. population rates 1940-2004.

CI, confidence interval; Obs, observed number of deaths; SMR, standardized mortality ratio.

Online Table 3 Observed deaths, standardized mortality ratios, and standardized rate ratios among males by pay code*, Fernald Feed Materials Production Center Cohort, 1951-2004†

Cause ‡	Hourly (n=3633)			Salaried (n=1818)			SRR: Hourly compared to salaried	
	Obs	SMR	95% CI	Obs	SMR	95% CI	SRR	95% CI
<i>All causes</i>	1892	0.98	0.94 to 1.03	678	0.77	0.71 to 0.83	1.30	1.19 to 1.42
<i>All cancers</i>	575	1.15	1.06 to 1.24	211	0.90	0.79 to 1.03	1.29	1.10 to 1.52
<i>MN buccal cavity & pharynx</i>	10	0.87	0.42 to 1.59	5	0.96	0.31 to 2.23	0.98	0.33 to 2.87
<i>MN digestive organs & peritoneum</i>	148	1.21	1.03 to 1.43	53	0.94	0.71 to 1.24	1.30	0.94 to 1.78
MN oesophagus	18	1.25	0.74 to 1.98	5	0.74	0.24 to 1.73	1.71	0.63 to 4.65
MN stomach	18	1.15	0.68 to 1.82	12	1.77	0.91 to 3.09	0.73	0.35 to 1.53
MN intestine	50	1.16	0.86 to 1.53	14	0.71	0.39 to 1.18	1.57	0.86 to 2.86
MN rectum	10	1.07	0.51 to 1.96	3	0.70	0.14 to 2.05	1.44	0.40 to 5.25
MN biliary, liver, gall bladder	15	1.17	0.65 to 1.93	5	0.83	0.27 to 1.93	1.38	0.50 to 3.80
MN pancreas	30	1.20	0.81 to 1.72	12	1.03	0.53 to 1.80	1.22	0.62 to 2.40
MN peritoneum, other & unspecified digestive	7	3.97	1.60 to 8.18	2	2.51	0.30 to 9.07	1.68	0.35 to 8.11
<i>MN respiratory system</i>	230	1.23	1.08 to 1.40	55	0.63	0.47 to 0.82	1.99	1.48 to 2.69
MN larynx	5	0.81	0.26 to 1.89	3	1.07	0.22 to 3.12	0.76	0.18 to 3.22
MN trachea, bronchus, lung	223	1.25	1.09 to 1.42	52	0.62	0.46 to 0.81	2.05	1.51 to 2.79
MN pleura	1	1.89	0.05 to 10.5	0	0.00	0.00 to 15.3	NR	NR
MN other respiratory sites	1	0.96	0.02 to 5.32	0	0.00	0.00 to 7.63	NR	NR
<i>MN breast</i>	1	1.63	0.04 to 9.08	0	0.00	0.00 to 13.0	NR	NR
<i>MN male genital organs</i>	48	1.10	0.81 to 1.45	24	1.26	0.80 to 1.87	0.90	0.55 to 1.48
MN prostate	47	1.11	0.81 to 1.48	24	1.31	0.84 to 1.94	0.88	0.54 to 1.45
<i>MN urinary tract organs</i>	27	1.05	0.69 to 1.53	9	0.74	0.34 to 1.41	1.43	0.67 to 3.07
MN kidney	12	0.95	0.49 to 1.66	3	0.49	0.10 to 1.44	1.88	0.53 to 6.70
MN bladder & other urinary organs	15	1.15	0.64 to 1.89	6	1.00	0.37 to 2.17	1.20	0.46 to 3.13
<i>MN other & unspecified sites</i>	59	0.94	0.71 to 1.21	30	0.99	0.67 to 1.41	0.93	0.60 to 1.45
Mesothelioma	1	1.18	0.03 to 6.60	0	0.00	0.00 to 7.69	NR	NR
MN brain & other nervous	19	1.47	0.89 to 2.30	4	0.63	0.17 to 1.61	2.10	0.70 to 6.27
MN other & unspecified sites (residual)	31	0.90	0.61 to 1.28	16	1.00	0.57 to 1.62	0.88	0.48 to 1.62
<i>MN of lymphatic and haematopoietic tissue</i>	52	1.08	0.81 to 1.42	35	1.52	1.06 to 2.12	0.74	0.48 to 1.14
Non-Hodgkin lymphoma	18	0.97	0.58 to 1.54	12	1.33	0.69 to 2.32	0.82	0.39 to 1.71
Hodgkin's disease	5	1.81	0.59 to 4.22	1	0.76	0.02 to 4.23	1.88	0.22 to 16.1
Leukaemia	17	0.92	0.54 to 1.48	15	1.71	0.95 to 2.81	0.54	0.27 to 1.08
Multiple myeloma	12	1.44	0.75 to 2.52	7	1.82	0.73 to 3.75	0.87	0.34 to 2.26
<i>Benign & unspecified neoplasms</i>	3	0.49	0.10 to 1.43	0	0.00	0.00 to 1.31	NR	NR
BN of eye, brain, other nervous system	0	0.00	0.00 to 5.05	0	0.00	0.00 to 11.5	NR	NR
<i>Diabetes mellitus</i>	31	0.79	0.54 to 1.13	15	0.81	0.45 to 1.34	0.98	0.53 to 1.82
<i>Diseases of the blood & blood-forming organs</i>	6	0.88	0.32 to 1.91	3	0.95	0.20 to 2.78	1.09	0.27 to 4.39
<i>Mental, psychoneurotic & personality disorders</i>	16	0.81	0.46 to 1.32	8	0.87	0.37 to 1.71	0.90	0.38 to 2.12
Alcoholism	3	0.35	0.07 to 1.02	0	0.00	0.00 to 0.90	NR	NR
<i>Nervous system disorders</i>	34	0.99	0.69 to 1.39	17	1.05	0.61 to 1.68	0.91	0.51 to 1.63
<i>Diseases of the heart</i>	670	0.98	0.90 to 1.05	209	0.69	0.60 to 0.79	1.45	1.24 to 1.70
Ischemic heart disease	544	0.95	0.87 to 1.04	177	0.70	0.60 to 0.81	1.38	1.16 to 1.64
Other heart disease	93	1.13	0.92 to 1.39	20	0.54	0.33 to 0.83	2.24	1.38 to 3.64
<i>Other diseases of the circulatory system</i>	135	0.88	0.74 to 1.04	55	0.83	0.62 to 1.07	1.07	0.78 to 1.47
Cerebrovascular disease	82	0.84	0.66 to 1.04	34	0.81	0.56 to 1.13	1.04	0.70 to 1.56
<i>Diseases of the respiratory system</i>	150	0.94	0.80 to 1.11	41	0.57	0.41 to 0.77	1.69	1.19 to 2.39
Pneumonia	34	0.76	0.53 to 1.06	16	0.82	0.47 to 1.33	0.96	0.53 to 1.74
Chronic obstructive pulmonary disease	87	1.01	0.81 to 1.25	17	0.43	0.25 to 0.69	2.37	1.40 to 4.00
Asthma	4	1.51	0.41 to 3.88	1	0.87	0.02 to 4.87	1.97	0.22 to 17.7
Pneumoconiosis & other respiratory disease	23	0.95	0.60 to 1.43	7	0.63	0.25 to 1.30	1.53	0.63 to 3.59
Asbestosis	1	1.83	0.05 to 10.2	0	0.00	0.00 to 13.9	NR	NR

Cause ‡	Hourly (n=3633)			Salaried (n=1818)			SRR: Hourly compared to salaried	
	Obs	SMR	95% CI	Obs	SMR	95% CI	SRR	95% CI
Silicosis	0	0.00	0.00 to 13.4	0	0.00	0.00 to 32.8	NR	NR
Idiopathic pulmonary fibrosis	11	1.77	0.88 to 3.17	3	1.01	0.21 to 2.94	1.86	0.51 to 6.75
<i>Diseases of the digestive system</i>	66	0.80	0.62 to 1.01	31	0.82	0.56 to 1.16	0.99	0.65 to 1.53
Cirrhosis & other chronic liver disease	32	0.76	0.52 to 1.08	18	0.92	0.54 to 1.45	0.83	0.46 to 1.49
<i>Diseases of the genito-urinary system</i>	22	0.76	0.48 to 1.16	8	0.64	0.27 to 1.25	1.30	0.58 to 2.92
Acute glomerulonephritis & renal failure	1	0.33	0.01 to 1.86	0	0.00	0.00 to 2.75	NR	NR
Chronic & unspecified nephritis & renal failure	13	0.83	0.44 to 1.41	6	0.85	0.31 to 1.85	1.06	0.40 to 2.80
<i>Disease of musculoskeletal system & connective tissues</i>	2	0.46	0.06 to 1.65	1	0.49	0.01 to 2.75	1.02	0.09 to 11.4
<i>Symptoms & ill-defined conditions</i>	9	0.48	0.22 to 0.91	3	0.36	0.07 to 1.06	1.96	0.52 to 7.45
<i>Accidents</i>	99	1.07	0.87 to 1.31	28	0.61	0.40 to 0.88	1.84	1.20 to 2.82
Transportation accidents	63	1.37	1.05 to 1.75	15	0.62	0.35 to 1.03	2.27	1.27 to 4.04
<i>Suicide</i>	28	0.82	0.55 to 1.19	17	0.98	0.57 to 1.56	0.82	0.45 to 1.50
<i>Homicide</i>	5	0.40	0.13 to 0.93	2	0.33	0.04 to 1.20	1.20	0.23 to 6.23
<i>Other & unspecified causes</i>	39	0.96	0.68 to 1.31	28	1.38	0.92 to 2.00	0.70	0.43 to 1.14

* Four men of unknown paycode were excluded.

† Based on U.S. population rates 1940-2004 for all outcomes except asbestosis, silicosis and idiopathic pulmonary fibrosis (based on U.S. population rates 1960-2004) and mesothelioma (based on U.S. population rates 1999-2004).

‡ ICD codes were mapped to cause of death categories as described by Robinson and colleagues[23] and as described on the NIOSH website (<http://www.cdc.gov/niosh/ltras/rates.html>).

CI, confidence interval; BN, benign neoplasm; MN, malignant neoplasm; NR, not reported; Obs, observed number of deaths; SMR, standardized mortality ratio; SRR, standardized rate ratio.

Online Table 4 Observed deaths and standardized mortality ratios among females by pay code*, Fernald Feed Materials Production Center Cohort, 1951-2004†

Cause ‡	Hourly (n=183)			Salaried (n=769)		
	Obs	SMR	95% CI	Obs	SMR	95% CI
<i>All causes</i>	48	1.05	0.77 to 1.39	149	0.83	0.70 to 0.98
<i>All cancers</i>	13	1.05	0.56 to 1.79	59	0.97	0.74 to 1.25
<i>MN buccal cavity & pharynx</i>	0	0.00	0.00 to 25.0	0	0.00	0.00 to 5.52
<i>MN digestive organs & peritoneum</i>	3	1.07	0.22 to 3.12	12	1.02	0.53 to 1.79
MN oesophagus	0	0.00	0.00 to 29.4	0	0.00	0.00 to 6.67
MN stomach	0	0.00	0.00 to 13.2	2	1.93	0.23 to 6.96
MN intestine	2	1.66	0.20 to 6.00	4	0.82	0.22 to 2.09
MN rectum	1	4.71	0.12 to 26.2	2	2.31	0.28 to 8.36
MN biliary, liver, gall bladder	0	0.00	0.00 to 12.2	1	0.76	0.02 to 4.22
MN pancreas	0	0.00	0.00 to 5.87	3	1.06	0.22 to 3.11
MN peritoneum, other & unspecified digestive	0	0.00	0.00 to 65.3	0	0.00	0.00 to 15.1
<i>MN respiratory system</i>	5	1.96	0.63 to 4.56	17	1.11	0.64 to 1.77
MN larynx	0	0.00	0.00 to 91.5	0	0.00	0.00 to 17.2
MN trachea, bronchus, lung	5	2.01	0.65 to 4.68	17	1.13	0.66 to 1.81
MN pleura	0	0.00	0.00 to 855	0	0.00	0.00 to 187
MN other respiratory sites	0	0.00	0.00 to 180	0	0.00	0.00 to 38.1
<i>MN breast</i>	3	1.25	0.26 to 3.65	11	0.91	0.46 to 1.63
<i>MN female genital organs</i>	0	0.00	0.00 to 2.41	4	0.56	0.15 to 1.44
MN ovary	0	0.00	0.00 to 4.78	3	0.77	0.16 to 2.25
<i>MN urinary tract organs</i>	0	0.00	0.00 to 10.3	6	3.78	1.39 to 8.23
MN kidney	0	0.00	0.00 to 18.2	3	2.99	0.62 to 8.75
MN bladder & other urinary organs	0	0.00	0.00 to 23.7	3	5.13	1.06 to 15.0
<i>MN other & unspecified sites</i>	0	0.00	0.00 to 2.48	6	0.83	0.30 to 1.80
Mesothelioma	0	0.00	0.00 to 768	0	0.00	0.00 to 105
MN brain & other nervous	0	0.00	0.00 to 12.4	2	1.24	0.15 to 4.47
MN other & unspecified sites (residual)	0	0.00	0.00 to 4.24	3	0.75	0.16 to 2.20
<i>MN of lymphatic and haematopoietic tissue</i>	2	1.80	0.22 to 6.49	3	0.57	0.12 to 1.68
Non-Hodgkin lymphoma	2	4.41	0.53 to 16.0	0	0.00	0.00 to 1.71
Hodgkin's disease	0	0.00	0.00 to 70.1	0	0.00	0.00 to 13.0
Leukaemia	0	0.00	0.00 to 9.23	3	1.61	0.33 to 4.70
Multiple myeloma	0	0.00	0.00 to 17.7	0	0.00	0.00 to 3.96
<i>Benign & unspecified neoplasms</i>	0	0.00	0.00 to 17.9	1	1.20	0.03 to 6.66
BN eye, brain, other nervous system	0	0.00	0.00 to 104	1	7.12	0.18 to 39.7
<i>Diabetes mellitus</i>	1	0.77	0.02 to 4.32	3	0.56	0.12 to 1.63
<i>Diseases of the blood & blood-forming organs</i>	0	0.00	0.00 to 17.3	0	0.00	0.00 to 4.64
<i>Mental, psychoneurotic & personality disorders</i>	0	0.00	0.00 to 5.26	4	2.01	0.55 to 5.15
Alcoholism	0	0.00	0.00 to 42.6	0	0.00	0.00 to 8.50
<i>Nervous system disorders</i>	2	1.67	0.20 to 6.03	3	0.66	0.14 to 1.92
<i>Diseases of the heart</i>	14	1.02	0.56 to 1.71	24	0.55	0.35 to 0.82
Ischemic heart disease	12	1.16	0.60 to 2.03	20	0.62	0.38 to 0.96
Other heart disease	1	0.46	0.01 to 2.54	3	0.41	0.08 to 1.19
<i>Other diseases of the circulatory system</i>	6	1.18	0.43 to 2.57	10	0.62	0.30 to 1.14
Cerebrovascular disease	4	1.11	0.30 to 2.83	4	0.36	0.10 to 0.93
<i>Diseases of the respiratory system</i>	1	0.27	0.01 to 1.51	20	1.32	0.81 to 2.04
Pneumonia	0	0.00	0.00 to 2.98	4	1.08	0.29 to 2.76
Chronic obstructive pulmonary disease	0	0.00	0.00 to 2.15	11	1.29	0.64 to 2.31
Asthma	0	0.00	0.00 to 26.9	1	1.72	0.04 to 9.59
Pneumoconiosis & other respiratory diseases	1	1.83	0.05 to 10.2	4	1.85	0.50 to 4.74
Asbestosis	0	0.00	0.00 to 5530	0	0.00	0.00 to 1298
Silicosis	0	0.00	0.00 to 13286	0	0.00	0.00 to 3697

Cause ‡	Hourly (n=183)			Salaried (n=769)		
	Obs	SMR	95% CI	Obs	SMR	95% CI
Idiopathic pulmonary fibrosis	1	7.40	0.19 to 41.2	0	0.00	0.00 to 6.10
<i>Diseases of the digestive system</i>	2	1.05	0.13 to 3.80	7	0.88	0.35 to 1.81
Cirrhosis & other chronic liver disease	0	0.00	0.00 to 5.36	3	0.88	0.18 to 2.58
<i>Diseases of the genito-urinary system</i>	4	4.26	1.16 to 10.9	3	0.94	0.19 to 2.74
Acute glomerulonephritis & renal failure	1	11.7	0.30 to 65.4	1	3.38	0.09 to 18.9
Chronic & unspecified nephritis & renal failure	1	2.29	0.06 to 12.8	1	0.61	0.02 to 3.41
<i>Diseases of the musculoskeletal system & connective tissues</i>	1	3.50	0.09 to 19.5	0	0.00	0.00 to 3.07
<i>Symptoms & ill-defined conditions</i>	0	0.00	0.00 to 7.87	3	1.77	0.36 to 5.16
<i>Accidents</i>	1	0.67	0.02 to 3.71	4	0.60	0.16 to 1.54
Transportation accidents	0	0.00	0.00 to 5.51	3	0.87	0.18 to 2.55
<i>Suicide</i>	0	0.00	0.00 to 8.98	1	0.42	0.01 to 2.36
<i>Homicide</i>	0	0.00	0.00 to 14.9	0	0.00	0.00 to 4.28
<i>Other & unspecified causes</i>	3	2.08	0.43 to 6.09	6	1.09	0.40 to 2.38

* Two women of unknown paycode were excluded.

† Based on U.S. population rates 1940-2004 for all outcomes except asbestosis, silicosis and idiopathic pulmonary fibrosis (based on U.S. population rates 1960-2004) and mesothelioma (based on U.S. population rates 1999-2004).

‡ ICD codes were mapped to cause of death categories as described by Robinson and colleagues (2006)[23] and as described on the NIOSH website (<http://www.cdc.gov/niosh/ltras/rates.html>).
CI, confidence interval; BN, benign neoplasm; MN, malignant neoplasm; NR, not reported; Obs, observed number of deaths; SMR, standardized mortality ratio.

Online Table 5 Number of cases* and distribution of exposure† across all risk sets by outcome

Target organ: Mortality outcome	Trim (%)‡	No. cases	Internal Dose (µGy)					External Dose (mGy)					Radon Decay Products (WLM)				
			Mean	25th	50th	75th	100th	Mean	25th	50th	75th	100th	Mean	25th	50th	75th	100th
Lung:																	
MN lung	0	269	1100	3.2	92	810	55000	13	0	2	13	320	35	1.1	9	29	750
	1	256	890	2.7	79	700	15000	11	0	1.1	11	130	27	1.1	8.3	27	560
Chronic obstructive pulmonary disease	0	102	1300	6.5	130	940	55000	15	0	2	17	320	39	1.8	12	33	750
	1	99	1000	5.5	110	840	17000	13	0	2	15	143	31	1.7	11	31	570
Lower large intestine:																	
MN intestine	0	61	9.4	0.02	0.71	6.5	470	13	0	2	13	320					
	1	59	7.4	0.02	0.65	5.8	130	12	0	1.4	12	134					
MN stomach	0	28	8.6	0.01	0.6	5.7	490	12	0	1	11	320					
	1	26	6.6	0.01	0.54	5	130	11	0	1	10	120					
Pancreas:																	
MN pancreas	0	41	3.9	0	0.21	2.2	240	12	0	1	11	320					
	1	40	2.9	0	0.18	1.9	62	10	0	1	10	130					
MN bladder	0	21	4.7	0.02	0.36	3	250	14	0	2	15	320					
	1	21	3.6	0.01	0.33	2.7	70	12	0	2	14	130					
Red bone marrow:																	
Non-Hodgkin lymphoma	0	30	26	0.01	1.4	15	1500	12	0	1	10	320					
	1	28	19	0	1.1	13	390	9.9	0	1	8.4	130					
Leukaemia excluding CLL	0	28	31	0.1	2.4	21	1600	14	0	2	15	330					
	1	27	25	0.09	2.2	19	440	12	0	2	13	140					
Multiple myeloma	0	19	30	0.09	2.4	21	1400	14	0	2	14	320					
	1	19	24	0.08	2.2	19	420	12	0	2	13	140					
Kidney:																	
Chronic kidney disease	0	19	120	0.81	12	84	4800	17	0	2.7	19	320					
	1	19	93	0.77	11	77	1500	14	0	2	17	160					
MN kidney	0	15	100	0.32	8.1	69	4800	15	0	2	15	320					
	1	14	79	0.26	7.1	62	1300	13	0	2	14	140					

* Among white males.

† Percentiles of cumulative exposure incorporate a 10-year lag period for all outcomes except leukaemia excluding CLL (two year lag).

‡ Trim percent 0 is untrimmed; trim percent 1 excludes risk sets for which the case exceeded the 99th percentile and all controls that exceed the 99th percentile.

CLL, chronic lymphocytic leukaemia; MN, malignant neoplasm; WLM, working-level months.

Online Table 6 Summary of **univariate** Cox proportional hazards regression models for white male Fernald workers (mortality through 2004) for *a priori* outcomes with fewer than 25 cases.

Outcome	Internal Organ Dose (μGy) [*]			External Dose (mGy) [*]		
	Model [†]	EST	PL 95% CI [‡]	Model [†]	EST	PL 95% CI [‡]
MN bladder	U1	0-0.04 (7) [§]	Ref	U1	0-4.00 (11)	Ref
		>0.04-0.61 (6)	-0.18 (-0.76 to 1.7)		>4.00-13.0 (5)	1.00 (-0.43 to 5.0)
		>0.61 (8)	-0.44 (-0.82 to 0.84)		>13.0 (5)	-0.13 (-0.76 to 1.8)
	U2	ERR (per 100 μGy)	0.11 (-0.40 to 7.7)	U2	ERR (per 100 mGy)	-0.31 (NE to 2.1)
	U3	ERR (per 100 μGy), 1%	2.2 (-1.4 to 14)	U3	ERR (per 100 mGy), 1%	-0.19 (-0.74 to 3.7)
	U4	HR (at 100 μGy)	1.05 (0.019 to 6.6)	U4	HR (at 100 mGy), 1%	0.65 (0.076 to 2.5)
Multiple myeloma	U1	0-1.18 (6)	Ref	U1	0-1.5 (7)	Ref
		>1.18-20.7 (6)	0.37 (-0.63 to 4.1)		>1.5-14.0 (6)	0.42 (-0.59 to 3.8)
		>20.7 (7)	1.2 (-0.41 to 7.5)		>14.0 (6)	0.69 (-0.55 to 5.4)
	U2	ERR (per 100 μGy)	0.20 (-0.069 to 2.2)	U2	ERR (per 100 mGy)	0.24 (-0.31 to 6.1)
	U3	ERR (per 100 μGy), 1%	0.63 (-0.22 to 3.9)	U3	ERR (per 100 mGy), 1%	0.99 (-0.73 to 9.1)
	U4	HR (at 100 μGy)	1.09 (0.60 to 1.4)	U4	HR (at 100 mGy), 1%	1.12 (0.16 to 3.7)
Chronic kidney disease	U1	0-7.72 (6)	Ref	U1	Unexposed (7)	Ref
		>7.72-43.8 (6)	1.1 (-0.41 to 6.7)		>0-7.00 (5)	-0.28 (-0.79 to 1.4)
		>43.8 (7)	0.55 (-0.56 to 4.8)		>7.00 (7)	-0.42 (-0.84 to 1.0)
	U2	ERR (per 100 μGy)	-0.021 (NE to 0.23)	U2	ERR (per 100 mGy)	-0.28 (-0.31 to 2.3)
	U3	ERR (per 100 μGy), 1%	0.019 (-0.067 to 0.55)	U3	ERR (per 100 mGy), 1%	0.0093 (-0.65 to 3.4)
	U4	HR (at 100 μGy)	0.97 (0.78 to 1.07)	U4	HR (at 100 mGy)	0.76 (0.11 to 2.7)
MN kidney	U1	0-6.49 (4)	Ref	U1	Unexposed (5)	Ref
		>6.49-28.0 (6)	2.5 (-0.18 to 16)		>0-19.9 (5)	-0.32 (-0.84 to 2.0)
		>28.0 (5)	0.17 (-0.76 to 5.2)		>19.9 (5)	0.018 (-0.78 to 3.8)
	U2	ERR (per 100 μGy)	0.033 (-0.021 to 0.50)	U2	ERR (per 100 mGy)	0.011 (-0.31 to 4.6)
	U3	ERR (per 100 μGy), 1%	-0.075 (NE to 0.29)	U3	ERR (per 100 mGy), 1%	0.13 (-0.70 to 5.8)
	U4	HR (at 100 μGy)	1.03 (0.87 to 1.1)	U4	HR (at 100 mGy), 1%	1.01 (0.16 to 3.1)

* Target organ for internal dose varied by outcome (online table 5); estimates of cumulative exposure incorporate a 10-year lag period.

† All univariate models are adjusted for pay code (hourly/salaried) and birth year (spline terms) and consider one radiologic exposure at a time. Model U₁ is linear ERR with a categorical treatment of exposure; model U₂ is linear ERR with continuous treatment of exposure; model U₃ is like model U₂, but incorporates a 1% trim; and model U₄ is log-linear with a continuous treatment of exposure.

‡ Profile likelihood 95% confidence intervals.

§ Number of cases in parentheses.

|| 1% denotes a 1% trimmed model which excluded risk sets for which the case exceeded the 99th percentile and all controls that exceed the 99th percentile.

ERR, excess relative risk; EST, estimate; HR, hazard ratio; MN, malignant neoplasm; NE, not estimable.

Online Table 7 Summary of **multivariable** Cox proportional hazards regression models for white male Fernald workers (mortality through 2004) for *a priori* outcomes with fewer than 25 cases.

Outcome	Model †	Internal Organ Dose (μGy) *		External Dose (mGy) *	
		EST	PL 95% CI‡	EST	PL 95% CI‡
MN bladder	M1	0-0.04	Ref	0-4.00	Ref
		>0.04-0.61	-0.47 (-0.93 to 1.3)	>4.00-13.0	0.88 (-0.35 to 4.3)
		>0.61	-0.61 (-0.96 to 0.82)	>13.0	0.17 (-0.88 to 1.7)
	M2	ERR (per 100 μGy)	NS	ERR (per 100 mGy)	NS
Multiple myeloma	M3	ERR (per 100 μGy), 1% §	2.3 (-1.4 to 14)	ERR (per 100 mGy), 1%	-0.43 (-0.74 to 3.6)
	M4	HR (at 100 μGy)	1.25 (0.02 to 7.9)	HR (at 100 mGy)	0.63 (0.072 to 2.6)
Chronic kidney disease	M1	0-1.18	Ref	0-1.5	Ref
		>1.18-20.7	0.42 (-0.83 to 8.7)	>1.5-14.0	0.68 (-0.70 to 9.6)
		>20.7	1.5 (-0.66 to 12)	>14.0	0.45 (-4.3 to 11)
	M2	ERR (per 100 μGy)	0.20 (-0.069 to 2.5)	ERR (per 100 mGy)	0.11 (-0.31 to 6.7)
MN kidney	M3	ERR (per 100 μGy), 1%	0.62 (-0.24 to 4.5)	ERR (per 100 mGy), 1%	0.63 (-0.73 to 10)
	M4	HR (at 100 μGy)	1.08 (0.59 to 1.5)	HR (at 100 mGy)	1.04 (0.14 to 3.7)
Chronic kidney disease	M1	0-7.72	Ref	Unexposed	Ref
		>7.72-43.8	0.83 (-0.38 to 5.8)	>0-7.00	-0.58 (-0.99 to 1.6)
		>43.8	0.56 (-0.53 to 4.1)	>7.00	-0.62 (-0.99 to 1.6)
	M2	ERR (per 100 μGy)	NS	ERR (per 100 mGy)	NS
MN kidney	M3	ERR (per 100 μGy), 1%	0.020 (-0.067 to 0.59)	ERR (per 100 mGy), 1%	-0.02 (-0.65 to 3.7)
	M4	HR (at 100 μGy)	0.98 (0.78 to 1.1)	HR (at 100 mGy)	0.83 (0.11 to 3.0)
MN kidney	M1	0-6.49	NS	Unexposed	NS
		>6.49-28.0		>0-19.9	
		>28.0		>19.9	
	M2	ERR (per 100 μGy)	0.039 (-0.021 to 0.55)	ERR (per 100 mGy)	-0.18 (-0.31 to 4.9)
MN kidney	M3	ERR (per 100 μGy), 1%	NS	ERR (per 100 mGy), 1%	NS
	M4	HR (at 100 μGy)	1.03 (0.86 to 1.1)	HR (at 100 mGy)	0.91 (0.13 to 3.1)

* Target organ for internal dose varied by outcome (online table 5); estimates of cumulative exposure incorporate a 10-year lag period.

† All multivariable models are adjusted for pay code (hourly/salaried) and birth year (spline terms) and consider all radiologic exposures simultaneously. Model M₁ is linear ERR with a categorical treatment of exposure; model M₂ is linear ERR with continuous treatment of exposure; model M₃ is like model M₂, but incorporates a 1% trim; and model M₄ is log-linear with a continuous treatment of exposure.

‡ Profile likelihood 95% confidence intervals.

§ 1% denotes a 1% trimmed model which excluded risk sets for which the case exceeded the 99th percentile and all controls that exceed the 99th percentile.

ERR, excess relative risk; EST, estimate; HR, hazard ratio; MN, malignant neoplasm; NS, no solution found.