

ROCKETDYNE WORKER HEALTH STUDY

Appendix A



Combined Rocketdyne Worker Analyses

July 13, 2005

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Appendix A. Combined Rocketdyne Worker Analyses

Appendix A provides summary totals of all Rocketdyne Workers including the Radiation Workers, SSFL Workers, and the Other Rocketdyne Workers (mainly Canoga Park and De Sota Avenue facilities). The Radiation Paper provides the analytical data on Radiation Workers and the Chemical Paper on SSFL and Other Workers. These tabulations are for all workers combined and for white males. In addition comparisons are made with respect to the influence on the SMR values of choosing different general populations to compute the expected values for comparison.

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Appendix Table A1. Demographic and Occupational Characteristics of All Rocketdyne workers employed for at least six months between 1948-1999 by demographic and occupational characteristics

Characteristic	Radiation		SSFL Workers ¹		Other Rocketdyne ²		Total Rocketdyne	
	No.	%	No.	%	No.	%	No.	%
Gender								
Male	5,335	92.0	7,083	84.6	24,775	75.1	37,012	78.8
Female	466	8.0	1,289	15.4	8,204	24.9	9,958	21.2
Race								
White	4,695	80.9	6,629	79.2	24,643	74.7	35,808	76.2
Non-white								
Asian	89	1.5	142	1.7	1,178	3.6	1,407	3.0
Black	199	3.4	189	2.3	1,560	4.7	1,944	4.1
American Indian	18	0.3	10	0.1	96	0.3	121	0.3
Other/Missing	800	13.8	1,402	16.7	5,502	16.7	7,690	16.4
Pay type								
Hourly	3,285	56.6	5,241	62.6	21,076	63.9	29,420	62.6
Salary	2,516	43.4	3,131	37.4	11,903	36.1	17,550	37.4
Year of Birth								
<1920	937	16.2	1,419	16.9	4,847	14.7	7,184	15.3
1920-1929	1,670	28.8	2,155	25.7	6,064	18.4	9,849	21.0
1930-1939	1,701	29.3	2,663	31.8	7,326	22.2	11,643	24.8
1940-1949	769	13.3	1,170	14.0	6,743	20.4	8,652	18.4
1950-1959	534	9.2	680	8.1	4,876	14.8	6,055	12.9
≥1960	190	3.3	285	3.4	3,123	9.5	3,587	7.6
Year of Hire								
<1948	98	1.7	204	2.4	831	2.5	1,127	2.4
1948-1959	2,471	42.6	4,048	48.4	7,990	24.2	14,432	30.7
1960-1969	1,963	33.8	2,501	29.9	11,383	34.5	15,817	33.7
1970-1979	607	10.5	685	8.2	3,530	10.7	4,778	10.2
1980-1989	595	10.3	797	9.5	7,614	23.1	8,981	19.1
≥1990	67	1.2	137	1.6	1,631	4.9	1,835	3.9
Year of Termination								
<1960	319	5.5	16	0.2	35	0.1	365	0.8
1960-1969	2,370	40.9	4,425	52.9	14,269	43.3	21,018	44.7
1970-1979	924	15.9	1,167	13.9	3,859	11.7	5,940	12.6
1980-1989	844	14.5	1,100	13.1	5,003	15.2	6,916	14.7
1990-1999	817	14.1	1,051	12.6	5,697	17.3	7,538	16.0

Characteristic	Radiation		SSFL Workers ¹		Other Rocketdyne ²		Total Rocketdyne	
	No.	%	No.	%	No.	%	No.	%
Active (12/31/1999)	527	9.1	613	7.3	4,116	12.5	5,193	11.1
Duration of employment								
0.5-0.9	215	3.7	366	4.4	2,202	6.7	2,780	5.9
1-4	1,730	29.8	2,821	33.7	13,143	39.9	17,658	37.6
5-9	1,205	20.8	1,587	19.0	6,212	18.8	8,985	19.1
10-14	939	16.2	1,367	16.3	4,626	14.0	6,900	14.7
15-19	579	10.0	690	8.2	2,808	8.5	4,056	8.6
≥20	748	12.9	1,481	17.7	3,832	11.6	5,993	12.8
Missing	385	6.6	60	0.7	156	0.5	598	1.3
Years of follow-up								
<1	95	1.6	46	0.5	357	1.1	498	1.1
1-4	191	3.3	264	3.2	1,091	3.3	1,543	3.3
5-9	349	6.0	344	4.1	1,501	4.6	2,192	4.7
10-19	886	15.3	1,335	15.9	8,831	26.8	11,019	23.5
20-29	1,075	18.5	1,302	15.6	5,061	15.3	7,387	15.7
30-39	2,360	40.7	2,872	34.3	11,089	33.6	16,288	34.7
40-49	837	14.4	2,177	26.0	5,049	15.3	8,003	17.0
≥50	8	0.1	32	0.4	0	0.0	40	0.1
Age at end of follow-up								
<40	356	6.1	392	4.7	3,561	10.8	4,296	9.1
40-49	647	11.2	850	10.2	5,426	16.5	6,884	14.7
50-59	981	16.9	1,510	18.0	7,704	23.4	10,163	21.6
60-69	1,902	32.8	2,958	35.3	8,294	25.1	13,104	27.9
70-79	1,482	25.5	2,033	24.3	5,799	17.6	9,275	19.7
80-89	409	7.1	587	7.0	2,051	6.2	3,038	6.5
≥90	24	0.4	42	0.5	144	0.4	210	0.4
Vital Status as of 12/31/1999								
Alive	4,191	72.2	6,076	72.6	25,367	76.9	35,484	75.5
Dead	1,468	25.3	2,251	26.9	7,429	22.5	11,118	23.7
Lost to follow-up	142	2.4	45	0.5	183	0.6	368	0.8
Total	5,801		8,372		32,979		46,970	

¹ 182 SSFL workers who were monitored for radiation have been included

² 'Other Rocketdyne' comprised of not monitored for radiation workers at non-SSFL facilities such as De Soto Avenue and Canoga Park

Appendix Table A2. Observed and Expected Numbers of Deaths, Standardized Mortality Ratios (SMR), for Rocketdyne Workers Employed for at Least Six Months 1948-1999 and Followed through 1999 by Worker Subpopulations.

Worker Population No. of Workers Person-years of Observation	Monitored for Radiation 5,801 161,605				SSFL ¹ 8,372 254,198				Other Rocketdyne ² 32,979 884,412				Total Rocketdyne 46,970 1,297,821			
	Obs	Exp	SMR	95% CI	Obs	Exp	SMR	95% CI	Obs	Exp	SMR	95% CI	Obs	Exp	SMR	95% CI
All Causes of Death (001-999)	1,468	1,870.3	0.79	0.75-0.83	2,251	2,714.5	0.83	0.80-0.86	7,429	8,270.1	0.90	0.88-0.92	11,118	12,816.9	0.87	0.85-0.88
All Malignant Neoplasms (140-208)	456	504.9	0.90	0.82-0.99	655	735.9	0.89	0.82-0.96	2,086	2,218.8	0.94	0.90-0.98	3,189	3,448.9	0.93	0.89-0.96
Buccal Cavity & Pharynx (140-149)	8	13.0	0.62	0.27-1.22	11	18.6	0.59	0.30-1.06	45	54.6	0.82	0.60-1.10	64	85.9	0.75	0.57-0.95
Esophagus (150)	12	14.0	0.86	0.44-1.50	21	19.4	1.08	0.67-1.65	40	54.4	0.74	0.53-1.00	73	87.5	0.83	0.65-1.05
Stomach (151)	21	17.9	1.17	0.73-1.79	23	25.6	0.90	0.57-1.35	66	76.4	0.86	0.67-1.10	109	119.6	0.91	0.75-1.10
Colorectal (153-154)	56	49.9	1.12	0.85-1.46	70	72.6	0.97	0.75-1.22	177	218.3	0.81	0.70-0.94	303	339.8	0.89	0.79-1.00
Biliary Passages & Liver (155,156)	5	13.5	0.37	0.12-0.86	11	19.2	0.57	0.29-1.03	45	58.3	0.77	0.56-1.03	61	90.7	0.67	0.51-0.86
Pancreas (157)	21	26.3	0.80	0.49-1.22	36	38.2	0.94	0.66-1.31	112	113.8	0.98	0.81-1.18	169	177.8	0.95	0.81-1.11
Larynx (161)	9	5.5	1.63	0.74-3.09	11	7.8	1.41	0.71-2.53	23	21.6	1.06	0.67-1.59	42	34.8	1.21	0.87-1.63
Bronchus, Trachea, & Lung (162)	151	168.8	0.89	0.76-1.05	215	241.2	0.89	0.78-1.02	705	692.4	1.02	0.94-1.10	1,068	1,098.7	0.97	0.92-1.03
Breast (174, 175)	5	5.7	0.88	0.29-2.05	15	16.5	0.91	0.51-1.50	88	97.4	0.90	0.73-1.11	108	119.6	0.90	0.74-1.09
All Uterine (Females only) (179-182)	0	1.2	--	0.00-2.99	4	3.8	1.06	0.29-2.72	15	23.4	0.64	0.36-1.06	19	28.4	0.67	0.40-1.04
Cervix Uteri (180)	0	0.6	--	0.00-5.78	2	1.9	1.07	0.13-3.85	5	12.0	0.42	0.14-0.97	7	14.5	0.48	0.19-0.99
Other Female Genital Organs (183-184)	0	1.7	--	0.00-2.20	4	5.2	0.76	0.21-1.96	27	31.5	0.86	0.57-1.25	31	38.4	0.81	0.55-1.15
Prostate (Males only) (185)	37	39.7	0.93	0.66-1.29	50	53.2	0.94	0.70-1.24	143	145.0	0.99	0.83-1.16	229	237.0	0.97	0.85-1.10
Testes & Other Male Genital Organs (186, 187)	1	1.5	0.69	0.02-3.82	2	2.3	0.88	0.11-3.19	3	6.2	0.48	0.10-1.41	6	9.9	0.60	0.22-1.31
Kidney (189.0-189.2)	12	12.8	0.94	0.49-1.64	21	18.3	1.15	0.71-1.76	53	51.5	1.03	0.77-1.35	86	82.3	1.05	0.84-1.29
Bladder & Other Urinary (188, 189.3-189.9)	8	12.2	0.65	0.28-1.29	16	17.2	0.93	0.53-1.51	42	48.9	0.86	0.62-1.16	65	78.1	0.83	0.64-1.06
Melanoma of Skin (172)	8	9.8	0.82	0.35-1.62	13	14.2	0.92	0.49-1.57	34	40.4	0.84	0.58-1.18	55	64.1	0.86	0.65-1.12
Brain & CNS (191-192)	17	14.8	1.15	0.67-1.83	20	22.0	0.91	0.56-1.41	65	65.0	1.00	0.77-1.28	102	101.5	1.01	0.82-1.22
Thyroid & Other Endocrine Glands (193-194)	0	1.6	--	0.00-2.29	2	2.4	0.82	0.10-2.97	11	7.5	1.47	0.73-2.62	13	11.5	1.13	0.60-1.93
Bone (170)	0	1.0	--	0.00-3.52	1	1.6	0.63	0.02-3.53	10	4.9	2.03	0.97-3.73	11	7.5	1.46	0.73-2.61
All Lymphatic, Haematopoietic Tissue (200-208)	51	49.7	1.03	0.76-1.35	68	72.5	0.94	0.73-1.19	196	215.4	0.91	0.79-1.05	314	336.5	0.93	0.83-1.04
Hodgkins Disease (201)	5	2.5	1.99	0.65-4.63	29	28.3	1.02	0.69-1.47	13	12.1	1.07	0.57-1.84	23	18.6	1.24	0.79-1.86
Non-Hodgkins Lymphoma (200, 202)	19	19.5	0.98	0.59-1.52	5	4.0	1.26	0.41-2.94	75	84.1	0.89	0.70-1.12	122	131.5	0.93	0.77-1.11
Leukemia & Aleukemia (204-208)	25	18.8	1.33	0.86-1.97	23	27.3	0.84	0.53-1.26	76	81.0	0.94	0.74-1.18	124	126.6	0.98	0.81-1.17

Worker Population No. of Workers Person-years of Observation	Monitored for Radiation 5,801 161,605				SSFL¹ 8,372 254,198				Other Rocketdyne² 32,979 884,412				Total Rocketdyne³ 46,970 1,297,821			
Cause of Death (ICD9)	Obs	Exp	SMR	95% CI	Obs	Exp	SMR	95% CI	Obs	Exp	SMR	95% CI	Obs	Exp	SMR	95% CI
Chronic Lymphocytic Leukemia (204.1)	7	3.4	2.04	0.82-4.21	3	4.9	0.61	0.13-1.79	15	13.9	1.08	0.60-1.78	25	22.1	1.13	0.73-1.67
Leukemia other than CLL	18	15.5	1.16	0.69-1.84	20	22.6	0.89	0.54-1.37	61	67.6	0.90	0.69-1.16	99	105.4	0.94	0.76-1.14
Multiple Myeloma	2	8.4	0.24	0.03-0.86	11	12.1	0.91	0.46-1.63	29	35.8	0.81	0.54-1.16	42	56.1	0.75	0.54-1.01
Mesothelioma, MN of pleura/peritoneum ³	1	1.0	1.01	0.03-5.61	0	1.4	0.00	0.00-2.63	7	4.0	1.77	0.71-3.65	8	6.3	1.27	0.55-2.49
Smoking-related cancers	221	252.6	0.87	0.76-1.00	331	360.8	0.92	0.82-1.02	1,020	1,037.2	0.98	0.92-1.05	1,567	1,645.1	0.95	0.91-1.00
AIDS (042-044, 795.8)	1	16.9	0.06	0.00-0.33	5	22.7	0.22	0.07-0.51	33	97.9	0.34	0.23-0.47	39	137.0	0.29	0.20-0.39
Diabetes (250)	18	32.0	0.56	0.33-0.89	30	46.6	0.64	0.43-0.92	127	143.1	0.89	0.74-1.06	175	221.0	0.79	0.68-0.92
Cerebrovascular Disease (430-438)	67	94.0	0.71	0.55-0.91	102	138.2	0.74	0.60-0.90	386	445.3	0.87	0.78-0.96	553	675.7	0.82	0.75-0.89
All Heart Disease (390-398, 404, 410-429)	499	642.8	0.78	0.71-0.85	793	924.1	0.86	0.80-0.92	2,557	2,720.5	0.94	0.90-0.98	3,838	4,274.4	0.90	0.87-0.93
Non-malignant respiratory disease excluding pneumonia and influenza	68	102.2	0.67	0.52-0.84	153	147.3	1.04	0.88-1.22	419	442.1	0.95	0.86-1.04	639	689.3	0.93	0.86-1.00
Emphysema (492)	17	22.8	0.75	0.43-1.19	32	33.3	0.96	0.66-1.36	89	100.2	0.89	0.71-1.09	138	155.8	0.89	0.74-1.05
Cirrhosis of Liver (571)	38	71.5	0.53	0.38-0.73	48	104.3	0.46	0.34-0.61	186	306.6	0.61	0.52-0.70	272	481.1	0.57	0.50-0.64
Nephritis & Nephrosis (580-589)	12	10.2	1.18	0.61-2.06	13	14.7	0.88	0.47-1.51	45	46.0	0.98	0.71-1.31	70	70.7	0.99	0.77-1.25
All External Causes of Death (800-999)	106	159.2	0.67	0.55-0.81	160	237.5	0.67	0.57-0.79	516	773.1	0.67	0.61-0.73	777	1,167.3	0.67	0.62-0.71
Accidents (850-949)	60	92.6	0.65	0.49-0.83	99	138.8	0.71	0.58-0.87	302	447.2	0.68	0.60-0.76	459	677.2	0.68	0.62-0.74
Suicides (950-959)	31	46.5	0.67	0.45-0.95	52	69.1	0.75	0.56-0.99	166	214.0	0.78	0.66-0.90	246	328.8	0.75	0.66-0.85
Unknown Causes of Death	25				50				205				280			

¹ 182 test stand mechanics who were monitored for radiation have been included

² 'Other Rocketdyne' comprised of not monitored for radiation workers at non-SSFL facilities such as De Soto Avenue and Canoga Park

³ Mesothelioma was not a codeable cause of death until 1999: ICD10 (C45). Before 1999, cancer of the pleura and peritoneum (ICD9 158.8, 158.9, 163) have been used as crude approximations of mesothelioma mortality.

Appendix Table A3. Observed and Expected Numbers of Deaths, Standardized Mortality Ratios (SMR), for Rocketdyne Workers Employed for at Least Six Months 1948-1999 and Followed through 1999 by Worker Subpopulations (White Males Only).

Worker Population No. of Workers Person-years of Observation	Monitored for Radiation 4,855 138,836				SSFL ¹ 6,579 206,261				Other Rocketdyne ² 21,304 577,412				Total Rocketdyne ³ 32,587 920,261			
	Obs	Exp	SMR	95% CI	Obs	Exp	SMR	95% CI	Obs	Exp	SMR	95% CI	Obs	Exp	SMR	95% CI
All Causes of Death (001-999)	1,342	1,724.1	0.78	0.74-0.82	1,973	2,405.4	0.82	0.78-0.86	5,825	6,442.0	0.90	0.88-0.93	9,109	10,533.7	0.87	0.85-0.88
All Malignant Neoplasms (140-208)	417	462.1	0.90	0.82-0.99	560	640.4	0.87	0.80-0.95	1,563	1,655.3	0.94	0.90-0.99	2,530	2,747.1	0.92	0.89-0.96
Buccal Cavity & Pharynx (140-149)	8	11.9	0.66	0.24-1.22	11	16.7	0.66	0.33-1.18	33	43.2	0.76	0.51-1.05	51	71.4	0.72	0.53-0.94
Esophagus (150)	10	13.0	0.73	0.32-1.32	20	17.9	1.12	0.68-1.73	34	45.4	0.76	0.52-1.05	64	75.9	0.84	0.64-1.06
Stomach (151)	18	16.3	1.09	0.61-1.67	21	22.8	0.92	0.54-1.35	52	60.1	0.86	0.63-1.12	89	98.9	0.90	0.72-1.11
Colorectal (153-154)	51	46.0	1.11	0.83-1.46	63	63.9	0.98	0.74-1.25	142	166.9	0.85	0.72-1.00	254	275.7	0.92	0.81-1.04
Biliary Passages & Liver (155,156)	5	11.9	0.41	0.09-0.86	11	16.3	0.67	0.34-1.21	33	41.8	0.80	0.54-1.11	49	69.7	0.71	0.52-0.93
Pancreas (157)	21	24.2	0.86	0.50-1.28	29	33.6	0.86	0.55-1.21	86	86.8	0.99	0.78-1.21	135	144.0	0.94	0.79-1.11
Larynx (161)	9	5.2	1.71	0.67-3.03	9	7.3	1.24	0.57-2.36	20	18.6	1.07	0.66-1.66	37	31.0	1.19	0.81-1.61
Bronchus, Trachea, & Lung (162)	140	157.0	0.89	0.75-1.05	186	216.8	0.86	0.74-0.99	562	552.0	1.02	0.94-1.11	884	922.2	0.96	0.90-1.03
Breast (174, 175)	0	0.5	--	0.00-6.72	0	0.8	0.00	0.00-4.81	2	2.0	1.00	0.12-3.63	2	3.3	0.61	0.07-2.19
Prostate (Males only) (185)	35	38.3	0.91	0.64-1.27	48	52.1	0.92	0.68-1.22	133	138.4	0.96	0.80-1.14	215	227.8	0.94	0.82-1.08
Testes & Other Male Genital Organs (186, 187)	1	1.4	0.70	0.02-3.92	2	2.2	0.90	0.11-3.26	3	6.0	0.50	0.10-1.47	6	9.6	0.62	0.17-1.22
Kidney (189.0-189.2)	12	12.1	0.99	0.51-1.73	18	16.8	1.06	0.59-1.62	46	42.9	1.07	0.77-1.40	75	71.6	1.05	0.82-1.31
Bladder & Other Urinary (188, 189.3-189.9)	7	11.8	0.60	0.24-1.23	16	16.3	0.98	0.56-1.60	37	43.2	0.85	0.58-1.16	59	70.9	0.83	0.62-1.06
Melanoma of Skin (172)	8	9.4	0.85	0.37-1.68	13	13.2	0.98	0.47-1.59	27	34.2	0.78	0.50-1.11	47	56.5	0.84	0.61-1.11
Brain & CNS (191-192)	16	13.9	1.14	0.60-1.78	17	19.7	0.86	0.47-1.32	50	51.1	0.99	0.73-1.29	83	84.3	0.98	0.78-1.22
Thyroid & Other Endocrine Glands (193-194)	0	1.5	--	0.00-2.52	2	2.1	0.96	0.12-3.48	10	5.3	1.85	0.77-3.19	12	8.9	1.34	0.62-2.22
Bone (170)	0	1.0	--	0.00-3.81	1	1.4	0.71	0.02-3.96	7	3.8	1.80	0.57-3.40	8	6.2	1.27	0.45-2.33
All Lymphatic, Haematopoietic Tissue (200-208)	47	46.2	1.01	0.73-1.33	59	64.5	0.92	0.70-1.18	154	168.1	0.92	0.78-1.08	259	277.7	0.93	0.82-1.05
Hodgkins Disease (201)	3	2.3	1.29	0.27-3.76	23	25.2	0.91	0.58-1.37	10	9.5	1.05	0.50-1.93	18	15.4	1.16	0.64-1.77
Non-Hodgkins Lymphoma (200, 202)	18	18.1	0.99	0.55-1.50	5	3.6	1.40	0.46-3.27	57	65.5	0.87	0.65-1.11	97	108.4	0.89	0.72-1.08
Leukemia & Aleukemia (204-208)	25	17.5	1.42	0.88-2.04	22	24.4	0.90	0.56-1.36	67	64.0	1.04	0.80-1.31	113	105.5	1.07	0.89-1.29
Chronic Lymphocytic Leukemia (204.1)	7	3.3	2.12	0.68-4.01	3	4.5	0.67	0.14-1.95	14	11.7	1.19	0.59-1.91	24	19.3	1.23	0.75-1.78
Leukemia other than CLL	18	14.4	1.25	0.74-1.98	19	20.1	0.94	0.57-1.47	53	52.8	1.00	0.74-1.29	90	87.0	1.03	0.82-1.26
Multiple Myeloma	1	7.7	0.13	0.00-0.72	9	10.6	0.85	0.39-1.61	19	27.2	0.70	0.39-1.05	29	45.3	0.64	0.41-0.89
Mesothelioma, MN of pleura/peritoneum ⁴	1	0.9	1.06	0.03-5.89	0	1.3	0.00	0.00-2.87	6	3.3	1.81	0.50-3.58	7	5.5	1.26	0.40-2.39
Smoking-related cancers	207	235.2	0.88	0.76-1.01	289	325.3	0.89	0.79-1.00	818	832.1	0.98	0.92-1.05	1,305	1,387.0	0.94	0.89-0.99

Worker Population No. of Workers Person-years of Observation	Monitored for Radiation				SSFL¹				Other Rocketdyne²				Total Rocketdyne³			
	4,855				6,579				21,304				32,587			
	138,836				206,261				577,412				920,261			
Cause of Death (ICD9)	Obs	Exp	SMR	95% CI	Obs	Exp	SMR	95% CI	Obs	Exp	SMR	95% CI	Obs	Exp	SMR	95% CI
AIDS (042-044, 795.8)	1	15.4	0.07	0.00-0.36	5	20.8	0.24	0.08-0.56	28	84.7	0.33	0.22-0.48	34	120.5	0.29	0.20-0.39
Diabetes (250)	16	28.8	0.56	0.32-0.90	28	39.6	0.70	0.45-0.99	89	102.4	0.87	0.69-1.06	133	170.1	0.78	0.65-0.92
Cerebrovascular Disease (430-438)	58	84.4	0.69	0.51-0.88	86	117.5	0.73	0.58-0.90	279	322.7	0.87	0.77-0.97	421	522.8	0.81	0.73-0.89
All Heart Disease (390-398, 404, 410-429)	471	602.7	0.78	0.71-0.86	713	842.1	0.85	0.79-0.91	2,132	2,241.6	0.95	0.91-0.99	3,304	3,673.3	0.90	0.87-0.93
Non-malignant Respiratory Disease excluding Pneumonia and Influenza	62	95.2	0.65	0.50-0.83	134	130.7	1.03	0.86-1.21	327	344.7	0.95	0.85-1.06	522	568.3	0.92	0.84-1.00
Emphysema (492)	16	21.5	0.74	0.43-1.21	29	30.2	0.96	0.64-1.38	76	81.9	0.93	0.73-1.16	121	133.2	0.91	0.76-1.09
Cirrhosis of Liver (571)	32	66.2	0.48	0.32-0.66	40	94.1	0.43	0.30-0.58	149	244.9	0.61	0.52-0.72	221	403.9	0.55	0.48-0.63
Nephritis & Nephrosis (580-589)	11	9.1	1.21	0.60-2.16	9	12.7	0.71	0.33-1.35	32	33.8	0.94	0.62-1.30	52	55.4	0.93	0.69-1.21
All External Causes of Death (800-999)	91	144.1	0.63	0.51-0.78	148	210.0	0.70	0.59-0.83	407	603.6	0.68	0.61-0.74	641	955.3	0.67	0.62-0.73
Accidents (850-949)	55	84.7	0.65	0.48-0.83	91	124.1	0.73	0.59-0.90	241	357.0	0.68	0.59-0.77	384	564.4	0.68	0.62-0.75
Suicides (950-959)	27	43.7	0.62	0.39-0.87	49	63.3	0.77	0.56-1.01	136	176.7	0.77	0.65-0.91	209	283.0	0.74	0.64-0.84
Unknown Causes of Death	24				43				153				221			

¹ 182 test stand mechanics who were monitored for radiation have been included

² Other Rocketdyne' comprised of not monitored for radiation workers at non-SSFL facilities such as De Soto Avenue and Canoga Park

³ Because of race-weighting in SMR calculations, subpopulation sums do not match total exactly. Also 182 workers monitored for radiation are also included in the SSFL population.

⁴ Mesothelioma was not a codeable cause of death until 1999: ICD10 (C45). Before 1999, cancer of the pleura and peritoneum (ICD9 158.8, 158.9, 163) have been used as crude approximations of mesothelioma mortality.

Appendix Table A4. Comparison of expected number of deaths and SMRs using three different sets of mortality rates for 46,970 Rocketdyne workers and 1.3 million at least 6 months, 1948-1999 (gender and race combined). 46,970 total Rocketdyne workers and 1.3 million years of follow-up.

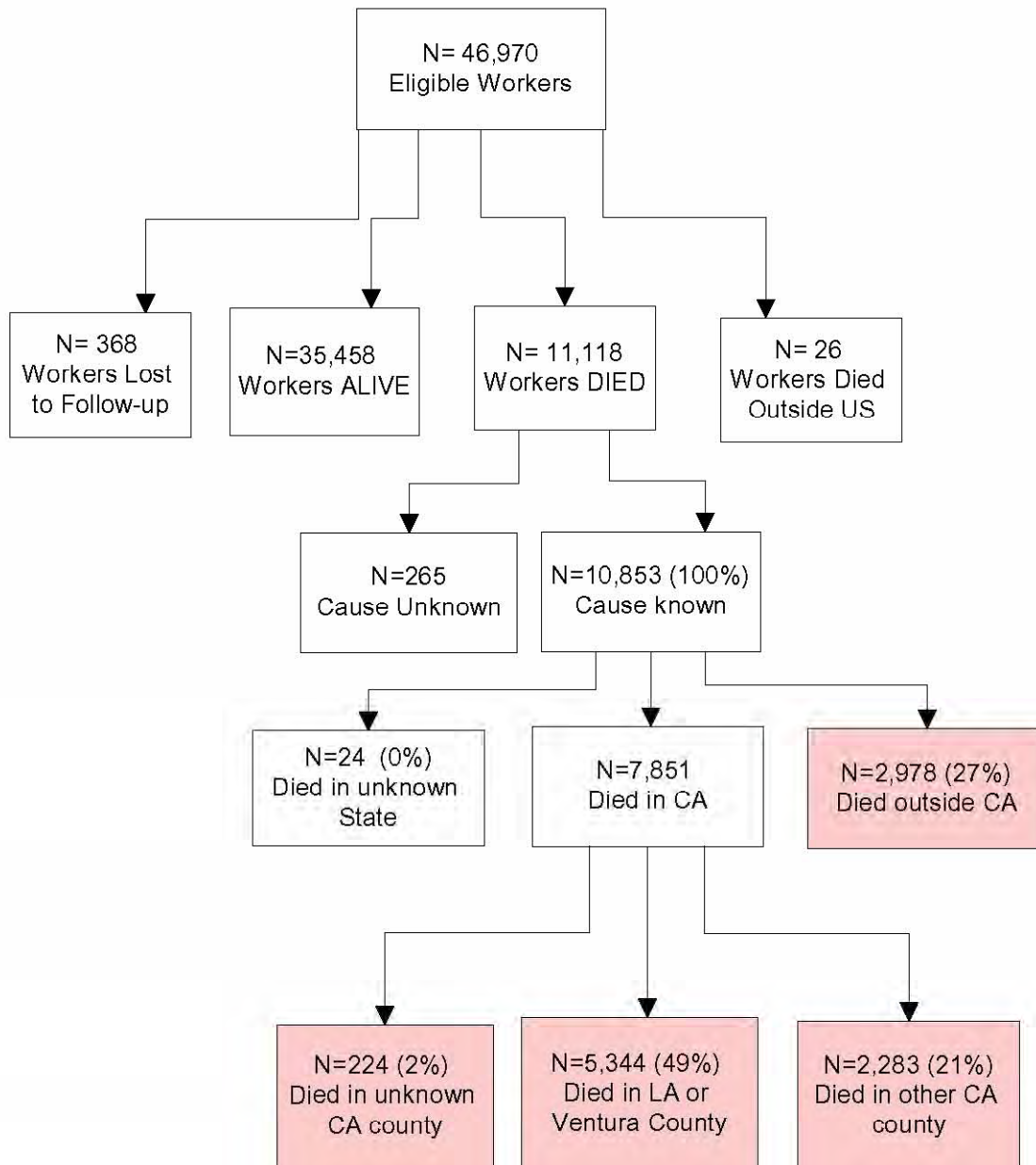
Cause of Death (ICD9)	Population Rates	United States			California			Los Angeles/Ventura County		
	Obs	Exp	SMR	95% CI	Exp	SMR	95% CI	Exp	SMR	95% CI
All Causes of Death (001-999)	11,118	13,873.6	0.80	0.79-0.82	12,816.9	0.87	0.85-0.88	12,943.9	0.86	0.84-0.88
All Malignant Neoplasms (140-208)	3,189	3,727.9	0.86	0.83-0.89	3,448.9	0.93	0.89-0.96	3,388.4	0.94	0.91-0.97
Buccal Cavity & Pharynx (140-149)	64	86.6	0.74	0.57-0.94	85.9	0.75	0.57-0.95	89.4	0.72	0.55-0.91
Esophagus (150)	73	98.0	0.75	0.58-0.94	87.5	0.83	0.65-1.05	84.5	0.86	0.68-1.09
Stomach (151)	109	113.4	0.96	0.79-1.16	119.6	0.91	0.75-1.10	129.6	0.84	0.69-1.02
Colorectal (153-154)	303	382.1	0.79	0.71-0.89	339.8	0.89	0.79-1.00	343.7	0.88	0.79-0.99
Biliary Passages & Liver (155,156)	61	86.2	0.71	0.54-0.91	90.7	0.67	0.51-0.86	100.8	0.61	0.46-0.78
Pancreas (157)	169	182.0	0.93	0.79-1.08	177.8	0.95	0.81-1.11	176.3	0.96	0.82-1.11
Larynx (161)	42	43.3	0.97	0.70-1.31	34.8	1.21	0.87-1.63	38.1	1.10	0.79-1.49
Bronchus, Trachea, & Lung (162)	1,068	1,269.3	0.84	0.79-0.89	1,098.7	0.97	0.92-1.03	1,028.5	1.04	0.98-1.10
Breast (174, 175)	108	118.5	0.91	0.75-1.10	119.6	0.90	0.74-1.09	123.3	0.88	0.72-1.06
All Uterine (Females only) (179-182)	19	29.6	0.64	0.39-1.00	28.4	0.67	0.40-1.04	30.8	0.62	0.37-0.96
Cervix Uteri (180)	7	15.7	0.45	0.18-0.92	14.5	0.48	0.19-0.99	15.9	0.44	0.18-0.91
Other Female Genital Organs (183-184)	31	37.4	0.83	0.56-1.18	38.4	0.81	0.55-1.15	39.6	0.78	0.53-1.11
Prostate (Males only) (185)	229	246.0	0.93	0.81-1.06	237.0	0.97	0.85-1.10	226.0	1.01	0.89-1.15
Testes & Other Male Genital Organs (186, 187)	6	9.8	0.61	0.22-1.33	9.9	0.60	0.22-1.31	10.1	0.59	0.22-1.29
Kidney (189.0-189.2)	86	89.2	0.96	0.77-1.19	82.3	1.05	0.84-1.29	79.5	1.08	0.87-1.34
Bladder & Other Urinary (188, 189.3-189.9)	65	81.9	0.79	0.61-1.01	78.1	0.83	0.64-1.06	79.6	0.82	0.63-1.04
Melanoma of Skin (172)	55	57.2	0.96	0.72-1.25	64.1	0.86	0.65-1.12	61.0	0.90	0.68-1.17
Brain & CNS (191-192)	102	100.6	1.01	0.83-1.23	101.5	1.01	0.82-1.22	104.4	0.98	0.80-1.19
Thyroid & Other Endocrine Glands (193-194)	13	11.2	1.16	0.62-1.99	11.5	1.13	0.60-1.93	12.0	1.08	0.58-1.85
Bone (170)	11	8.8	1.24	0.62-2.23	7.5	1.46	0.73-2.61	8.2	1.35	0.67-2.41
All Lymphatic, Haematopoietic Tissue (200-208)	314	347.9	0.90	0.81-1.01	336.5	0.93	0.83-1.04	342.8	0.92	0.82-1.02
Hodgkins Disease (201)	23	21.1	1.09	0.69-1.63	18.6	1.24	0.79-1.86	19.9	1.15	0.73-1.73
Non-Hodgkins Lymphoma (200, 202)	122	133.3	0.92	0.76-1.09	131.5	0.93	0.77-1.11	133.8	0.91	0.76-1.09
Leukemia & Aleukemia (204-208)	124	130.9	0.95	0.79-1.13	126.6	0.98	0.81-1.17	128.8	0.96	0.80-1.15
Chronic Lymphocytic Leukemia (204.1)	25	25.7	0.97	0.63-1.44	22.1	1.13	0.73-1.67	21.6	1.16	0.75-1.71
Leukemia other than CLL	99	106.1	0.93	0.76-1.14	105.4	0.94	0.76-1.14	107.8	0.92	0.75-1.12
Multiple Myeloma (203)	N/A	N/A	N/A	N/A	56.1	0.75	0.54-1.01	56.6	0.74	0.54-1.00
Mesothelioma, MN of pleura/peritoneum	8	7.0	1.14	0.49-2.25	6.3	1.27	0.55-2.49	5.4	1.47	0.64-2.90
Smoking-related cancers ¹	1,567	1,850.3	0.85	0.81-0.89	1,645.1	0.95	0.91-1.00	1,575.9	0.99	0.95-1.04
AIDS (042-044, 795.8)	39	86.2	0.45	0.32-0.62	137.0	0.29	0.20-0.39	173.6	0.23	0.16-0.31
Diabetes (250)	175	279.3	0.63	0.54-0.73	221.0	0.79	0.68-0.92	248.2	0.71	0.61-0.82
Cerebrovascular Disease (430-438)	553	713.1	0.78	0.71-0.84	675.7	0.82	0.75-0.89	673.6	0.82	0.75-0.89
All Heart Disease (390-398, 404, 410-429)	3,838	4,853.0	0.79	0.77-0.82	4,274.4	0.90	0.87-0.93	4,628.9	0.83	0.80-0.86
Non-malignant respiratory disease excluding pneumonia and influenza	639	734.6	0.87	0.80-0.94	689.3	0.93	0.86-1.00	584.3	1.09	1.01-1.18
Emphysema (492)	138	141.0	0.98	0.82-1.16	155.8	0.89	0.74-1.05	138.7	1.00	0.84-1.18
Cirrhosis of Liver (571)	272	332.7	0.82	0.72-0.92	481.1	0.57	0.50-0.64	528.6	0.52	0.46-0.58
Nephritis & Nephrosis (580-589)	70	111.0	0.63	0.49-0.80	70.7	0.99	0.77-1.25	73.4	0.95	0.74-1.20

Population Rates		United States			California			Los Angeles/Ventura County		
Cause of Death (ICD9)	Obs	Exp	SMR	95% CI	Exp	SMR	95% CI	Exp	SMR	95% CI
All External Causes of Death (800-999)	777	1,133.3	0.69	0.64-0.74	1,167.3	0.67	0.62-0.71	1,133.0	0.69	0.64-0.74
Accidents (850-949)	459	690.2	0.67	0.61-0.73	677.2	0.68	0.62-0.74	597.3	0.77	0.70-0.84
Suicides (950-959)	246	269.9	0.91	0.80-1.03	328.8	0.75	0.66-0.85	329.1	0.75	0.66-0.85
Unknown Causes of Death	280									

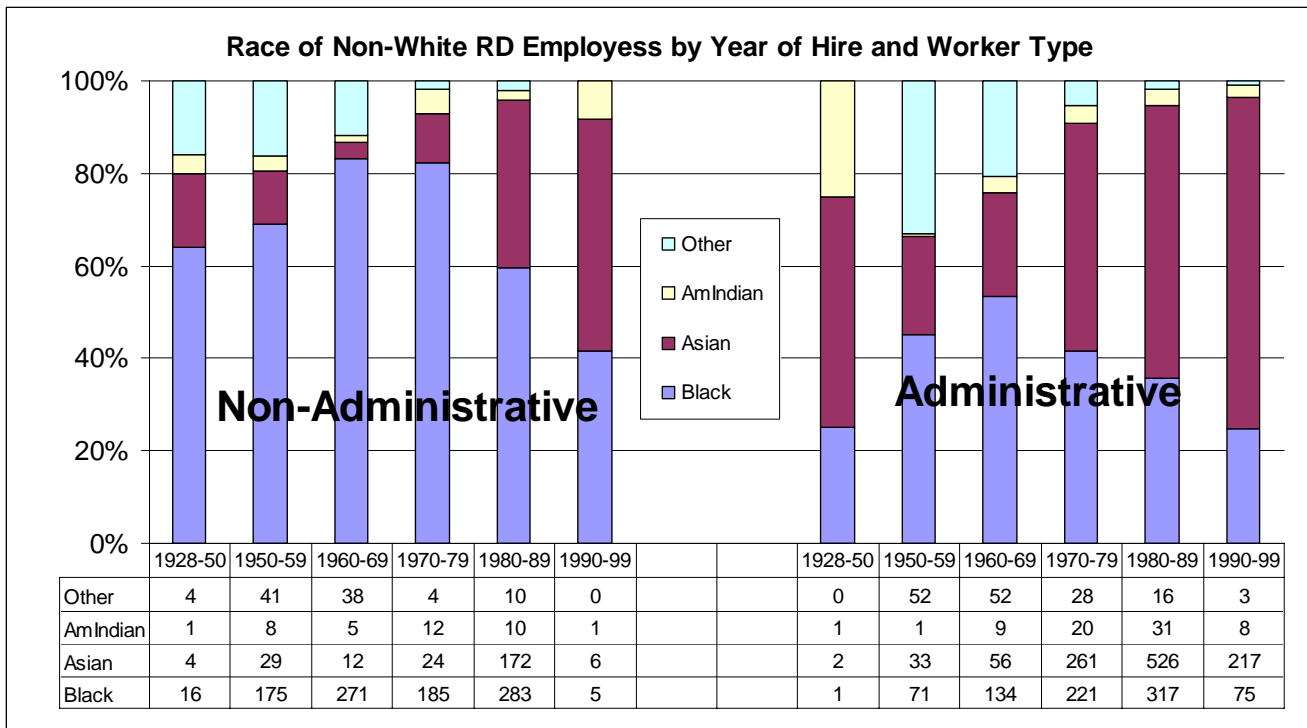
¹ Mesothelioma was not a codeable cause of death until 1999: ICD10 (C45). Before 1999, cancer of the pleura and peritoneum (ICD9 158.8, 158.9, 163) have been used as crude approximations of mesothelioma mortality.

Appendix A5. Place of Death for Rocketdyne Workers

December 1, 2004



Appendix A6.



Distribution of Race of the Non-White Rocketdyne Workers by Year of Hire and Whether Employed in an Administrative Job. Over the year, Black employees were the most prevalent racial group until the 1980s when they were surpassed by Asian employees.