Table 1. Descriptions of the hydrazine cohort (not monitored for radiation) and the asbsestos cohort (monitored for external radiation)

	Hydrazine Cohort	Asbestos Cohort
Number of subjects	6,107	4,563
Percent Male	100	94.0
Average follow-up time (years)	29.0	26.1
Average age (years) at start of follow-up	34.6	33.9
Number of person-years of follow-up	176,886	118,749
Number of total deaths	1,391	875
Number of cancer deaths	404	258
Total mortality rate (per 100,000/year)	786	737
Total cancer-mortality rate (per 100,000/year)	228	217
Pay type (percent of total)		
Salaried managerial/professional	45.1	33.6
Salaried technical/administrative	43.7	11.1
Hourly/union	11.3	50.7
Unknown	0.0	4.6

Table 2. Number of subjects, by category of presumptive hydrazine (HYD) exposure and asbestos (ASB) exposure* and by minimum duration (6 or 24 months) in selected jobs for defining exposure**

Exposure Variable	High	Medium	Low	Unexposed	Total
HYD-6	1,053	654	32	4,368	6,107
HYD-24	827	592	42	4,646	6,107
ASB-6	142	177	394	3,850	4,563

* For each exposure variable, a worker is classified in the category of his or her highest exposure level at the end of follow-up.

** Either 6 or 24 months of employment in selected jobs is required to be classified in the high-, medium-, or low-exposure categories. These categories reflect the relative probability of hydrazine exposure, rather than the amount of exposure.

Table 3. Adjusted rate ratios (RR; and 95% CIs)* for the effects of high and medium hydrazine exposure versus no exposure on **lung-cancer** mortality (ICD-9 162), by definition of hydrazine exposure (6- or 24-month criterion) and lag (in years) for measuring hydrazine exposure (N = 6,107; 146 cancer deaths)

Hydrazine Variable	Lag (Yrs)	High Exposure			Medium Exposure		
		No. Cancer Deaths	RR	95% CI	No. Cancer Deaths	RR	95% CI
HYD-6	0	44	1.68	(1.12, 2.52)	5	0.41	(0.17, 1.02)
	10	42	1.70	(1.13, 2.56)	4	0.36	(0.13, 0.98)
	15	41	1.93	(1.27, 2.93)	4	0.42	(0.15, 1.16)
HYD-24	0	36	1.70	(1.11, 2.59)	7	0.66	(0.31, 1.44)
	10	34	1.76	(1.15, 2.71)	6	0.65	(0.28, 1.49)
	15	34	2.10	(1.36, 3.25)	5	0.65	(0.26, 1.62)

* Estimated rate ratios are adjusted for age at death (continuous), pay type (two fixed binary variables), and time since hire or transfer to the SSFL (continuous).

Table 4. Adjusted rate ratios (RR; and 95% CIs)* for the effects of high and medium hydrazine exposure versus no exposure on **hemato- and lymphopoietic-cancer** mortality (ICD-9 200-208), by definition of hydrazine exposure (6- or 24-month criterion) and lag (in years) for measuring hydrazine exposure (N = 6,107; 41 cancer deaths)

Hydrazine Variable	Lag (Yrs)	High Exposure			Medium Exposure		
		No Cancer Deaths	RR	95% CI	No. Cancer Deaths	RR	95% CI
HYD-6	0	11	2.00	(0.88, 4.55)	7	1.80	(0.75, 4.28)
	10	11	2.26	(0.99, 5.16)	6	1.79	(0.71, 4.54)
	15	11	2.83	(1.22, 6.56)	5	1.79	(0.65, 4.94)
HYD-24	0	7	1.27	(0.51, 3.14)	6	1.51	(0.61, 3.72)
	10	7	1.49	(0.60, 3.69)	5	1.52	(0.57, 4.07)
	15	6	1.42	(0.54, 3.72)	4	1.32	(0.45, 3.90)

* Estimated rate ratios are adjusted for age at death (continuous), pay type (two fixed binary variables), and time since hire or transfer to the SSFL (continuous).

Table 5. Adjusted rate ratios (RR; and 95% CI)* for the effects of high hydrazine exposure (HYD-6) versus no exposure on lung-cancer mortality and hemato/lymphopoietic-cancer mortality, by decade of exposure (zero lag)

Decade of Exposure	Lung Cancer		Hemato/Lymphopoietic Cancer	
	RR	95% CI	RR	95% CI
1950-59	0.88	(0.54, 1.44)	0.86	(0.32, 2.28)
1960-69	2.01	(1.21, 3.33)	2.45	(0.91, 6.58)
1970-79	1.45	(0.70, 3.01)	0.00	(0.00, **)
1980-89	0.46	(0.06, 3.64)	0.89	(0.00, **)

* Estimated rate ratios are adjusted for age at death (continuous), pay type (two fixed binary variables), and time since hire or transfer to the SSFL (continuous).

** Upper limits cannot be estimated because of small numbers of outcome events in the high-exposure category.

Table 6. Adjusted rate ratios (RR; and 95% CIs)* for the effects of high and medium hydrazine exposure versus no exposure on **bladder- and kidney-cancer** mortality (ICD-9 188, 189), by definition of hydrazine exposure (6- or 24-month criterion) and lag (in years) for measuring hydrazine exposure (N = 6,107; 22 cancer deaths)

Hydrazine Variable	Lag (Yrs)	High Exposure			Medium Exposure		
		No. Cancer Deaths	RR	95% CI	No. Cancer Deaths	RR	95% CI
HYD-6	0	8	1.83	(0.68, 4.92)	0	---	---
	10	7	1.50	(0.55, 4.12)	0	---	---
	15	7	1.65	(0.59, 4.56)	0	---	---
HYD-24	0	8	2.55	(0.94, 6.86)	0	---	---
	10	7	2.12	(0.77, 5.83)	0	---	---
	15	6	1.80	(0.63, 5.12)	0	---	---

* Estimated rate ratios are adjusted for age at death (continuous), pay type (two fixed binary variables), and time since hire or transfer to the SSFL (continuous).

Table 7. Adjusted rate ratios (RR; and 95% CIs)* for the effects of high and medium hydrazine exposure versus no exposure on **upper-aerodigestive-tract-cancer** mortality (ICD-9 140-150, 161), by definition of hydrazine exposure (6- or 24-month criterion) and lag (in years) for measuring hydrazine exposure (N = 6,107; 25 cancer deaths)

| Hydrazine Variable | Lag (Yrs) | High Exposure | | | Medium Exposure | | |
		No. Cancer Deaths	RR	95% CI	No. Cancer Deaths	RR	95% CI
HYD-6	0	3	0.51	(0.14, 1.82)	3	1.20	(0.35, 4.17)
	10	3	0.56	(0.15, 2.03)	3	1.35	(0.39, 4.73)
	15	3	0.69	(0.19, 2.53)	3	1.69	(0.47, 6.06)
HYD-24	0	2	0.41	(0.09, 1.86)	2	0.83	(0.19, 3.63)
	10	2	0.46	(0.10, 2.09)	2	0.96	(0.22, 4.23)
	15	2	0.57	(0.13, 2.61)	2	1.18	(0.26, 5.27)

* Estimated rate ratios are adjusted for age at death (continuous), pay type (two fixed binary variables), and time since hire or transfer to the SSFL (continuous).

Table 8. Adjusted rate ratios (RR; and 95% CIs)* for the effects of high and medium hydrazine exposure versus no exposure on **pancreatic-cancer** mortality (ICD-9 157), by definition of hydrazine exposure (6- or 24-month criterion) and lag (in years) for measuring hydrazine exposure (N = 6,107; 23 cancer deaths)

Hydrazine Variable	Lag (Yrs)	High Exposure			Medium Exposure		
		No. Cancer Deaths	RR	95% CI	No. Cancer Deaths	RR	95% CI
HYD-6	0	2	0.37	(0.08, 1.69)	4	1.52	(0.50, 4.62)
	10	2	0.43	(0.09, 1.98)	4	1.77	(0.57, 5.49)
	15	2	0.48	(0.10, 2.25)	4	1.95	(0.62, 6.12)
HYD-24	0	1	0.24	(0.03, 1.85)	4	1.72	(0.56, 5.22)
	10	1	0.28	(0.04, 2.21)	4	2.04	(0.66, 6.31)
	15	1	0.32	(0.04, 2.51)	4	2.26	(0.72, 7.09)

* Estimated rate ratios are adjusted for age at death (continuous), pay type (two fixed binary variables), and time since hire or transfer to the SSFL (continuous).

Table 9. Adjusted rate ratios (RR; and 95% CIs)* for the effects of high and medium hydrazine exposure versus no exposure on **emphysema** mortality (ICD-9 492), by definition of hydrazine exposure (6- or 24-month criterion) and lag (in years) for measuring hydrazine exposure (N = 6,107; 27 cancer deaths)

Hydrazine Variable	Lag (Yrs)	High Exposure			Medium Exposure		
		No. Deaths	RR	95% CI	No. Deaths	RR	95% CI
HYD-6	0	3	0.46	(0.13, 1.63)	4	1.83	(0.61, 5.47)
	10	3	0.49	(0.14, 1.75)	4	2.01	(0.67, 6.07)
	15	3	0.54	(0.15, 1.93)	4	2.18	(0.72, 6.62)
HYD-24	0	3	0.62	(0.17, 2.21)	3	1.77	(0.51, 6.19)
	10	3	0.68	(0.19, 2.43)	3	2.02	(0.57, 7.10)
	15	3	0.74	(0.21, 2.65)	3	2.26	(0.64, 8.02)

* Estimated rate ratios are adjusted for age at death (continuous), pay type (two fixed binary variables), and time since hire or transfer to the SSFL (continuous).

Table 10. Adjusted rate ratios (RR; and 95% CIs) for the effects of high and medium hydrazine exposure versus no exposure on all **smoking-related cancer** mortality, excluding lung cancer (ICD-9 140-150, 157, 161, 188, 189), by definition of hydrazine exposure (6- or 24-month criterion) and lag (in years) for measuring hydrazine exposure (N = 6,107; 70 cancer deaths)

Hydrazine Variable	Lag (Yrs)	High Exposure			Medium Exposure		
		No. Cancer Deaths	RR	95% CI	No. Cancer Deaths	RR	95% CI
HYD-6	0	13	0.82	(0.43, 1.59)	7	0.97	(0.43, 2.17)
	10	12	0.81	(0.41, 1.60)	7	1.06	(0.47, 2.38)
	15	12	0.94	(0.47, 1.86)	7	1.22	(0.54, 2.76)
HYD-24	0	11	0.90	(0.45, 1.80)	6	0.93	(0.40, 2.20)
	10	10	0.89	(0.43, 1.83)	6	1.04	(0.44, 2.46)
	15	9	0.90	(0.42, 1.92)	6	1.17	(0.49, 2.79)

* Estimated rate ratios are adjusted for age at death (continuous), pay type (two fixed binary variables), and time since hire or transfer to the SSFL (continuous).

Table 11. Number (and percent) of current and former smokers among subsets of subjects in the hydrazine and asbestos cohorts who were included in three medical surveys at the SSFL, by exposure category and period

Exposure Category	1961-69		1983-92		
	No. (%) Curr. Smokers	Total Subjects	No. (%) Curr. Smokers	No. (%) Exsmokers	Total Subjects
Hydrazine (HYD-6)					
High	14 (58.3)	24	8 (23.5)	19 (55.9)	34
Medium	14 (63.6)	22	1 (11.1)	6 (66.7)	9
Low/Unexp.	88 (57.1)	154	12 (23.0)	24 (46.2)	52
Total	116 (58.0)	200	21 (22.1)	49 (51.6)	95
Asbestos (ASB-6)					
High	27 (84.4)	32	8 (30.8)	12 (46.2)	26
Medium	15 (57.7)	26	5 (29.4)	7 (41.2)	17
Low	43 (62.3)	69	2 (12.5)	8 (50.0)	16
Unexposed	389 (67.8)	619	95 (34.5)	91 (33.1)	275
Total	474 (63.5)	746	110 (33.0)	118 (35.3)	334