

Needs Assessment for Medical Surveillance of Former Hanford Workers

Phase I - October 1, 1997 Report

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Figure 2. Job-Exposure Matrix

[illegible]

Process Chemicals										First Line Supervisors
										Managers
										Chem, Env, Nuc Engineers
										Civil, Mining, Constr Engineers
										Other Engineers
										Plant Engineers
										Chemists
										Life Scientists
										Materials Scientists
										Physicists
										Other Scientists
										Compliance Inspectors
										Health Physicists
										Industrial Hygienists
										Administrative Office Staff
										Other Professionals
										Environmental Science Techs
										Health Physics Techs
										Ind Safety and Health Techs
										Instr and Control Techs
										Lab Techs
										Other Technicians
										Carpenters
										Electricians
										HVAC Mechanics
										Machinists
										Masons
										Millwrights
										Painters
										Plumbers & Pipefitters
										Structural & Metalworkers
										Vehicle Mechanics
										Welders
										Insulators
										Nuclear Proc & Waste Ops
										Drillers
										Material Moving Equip Ops
										Reactor Operators
										Utilities Operators
										Firefighters
										Food Service Workers
										Janitors and Cleaners
										Laundry Workers
										Laborers
										Light Vehicle Drivers
										Security Guards
Physical Agents										
Noise	*	*	*	*	*	*	*	*	*	
Vibration										
Laser Light										
RF or Microwave radiation										
Miscellaneous										
Nitrates	*	*	*	*	*	*	*	*	*	
Hydrazine	*	*	*	*	*	*	*	*	*	
Sodium dichromate	*	*	*	*	*	*	*	*	*	
Lithium hydroxide	*	*	*	*	*	*	*	*	*	
Asbestos	*	*	*	*	*	*	*	*	*	
Welding fumes	*	*	*	*	*	*	*	*	*	
Formaldehyde	*	*	*	*	*	*	*	*	*	
Herbicide	*	*	*	*	*	*	*	*	*	
Pesticide	*	*	*	*	*	*	*	*	*	
PCBs	*	*	*	*	*	*	*	*	*	
Metal working fluids	*	*	*	*	*	*	*	*	*	
Fuels, greases, oils	*	*	*	*	*	*	*	*	*	
Silica	*	*	*	*	*	*	*	*	*	

Appendix C.

List of Common Occupational Classification Codes

Occupational Exposure Group**COCS Codes**

M1	First Line Supervisors	M010	
M2	Managers	M020	
E1	Chem,Env,Nuc Engineers	E010, E050, E080	
E2	Civil, Mining, Constr Engineers	E020, E090, E140	
E3	Other Engineers	E040, E060, E070, E080, E110, E120, E130	
E4	Plant Engineers	E100	
S1	Chemists	S010	
S2	Other Scientists	S020, S030, S060, S080, S090, S100	
S3	Life Scientists	S040	
S4	Materials Scientists	S050	
S5	Physicists	S070	
P1	Other Professionals	P010, P020, P030, P040, P060, P070, P100, P110, P120, P130, P140, P150, P160, P170	
P2	Compliance Inspectors	P050	
P3	Health Physicists	P080	
P4	Industrial Hygienists	P090	
G1	Administrative Office Staff	G010, G020, G030, G040, G050, G060	
T1	Other Technicians	T010, T020, T030, T090, T100, T110	
T2	Environmental Science Techs	T040	
T3	Health Physics Techs	T050	
T4	Ind Safety and Health Techs	T060	
T5	Instr and Control Techs	T070	
T6	Lab Techs	T080	
C1	Carpenters	C010	
C2	Electricians	C020	
C3	HVAC Mechanics	C030	
C4	Machinists	C040	
C5	Masons	C050	
C6	Millwrights	C060	
C7	Painters	C070	
C8	Plumbers & Pipefitters	C080	
C9	Structural & Metalworkers	C090	
C10	Vehicle Mechanics	C100	
C11	Welders	C110	
C12	Other Crafts	C120	Not included in matrix
C13	Insulators	C130	Added to original COCS
R1	Nuclear Proc & Waste Ops	R010, R050	
R2	Drillers	R020	
R3	Material Moving Equip Ops	R030	
R4	Reactor Operators	R040	
R5	Utilities Operators	R070	
R6	Other Operators	R060, R080	Not included in matrix
L1	Firefighters	L010	
L2	Food Service Workers	L020	
L3	Janitors and Cleaners	L030	
L4	Laundry Workers	L040	
L5	Laborers	L050, L060	
L6	Light Vehicle Drivers	L070	
L7	Security Guards	L080	
L8	Other General Service Workers	L090	Not included in matrix

Exposures by COCS by Decade

	M010				M020-M030				E010, E050 E080				E020, E090 E140				E040 E060-E070 E110-E130				E100				S010			
	40s & 50s				40s & 50s				40s & 50s				40s & 50s				40s & 50s				40s & 50s				40s & 50s			
	60s	70s	80s	90s	60s	70s	80s	90s	60s	70s	80s	90s	60s	70s	80s	90s	60s	70s	80s	90s	60s	70s	80s	90s	60s	70s	80s	90s
Metals	1	1	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1	1	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0
	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0
	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solvents	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	2	2	2	2
	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	2	2	2	2	2
	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	2	2	2	2	2
	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0
	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0
	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0
	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0
RadioactiveMaterial	1	1	1	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1	2	1	1	1
	1	1	1	1	1	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	1	1	1	1	2	1	1	1
	1	1	1	1	1	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	1	1	1	1	2	1	1	1
	2	1	1	1	2	0	0	0	2	1	1	0	0	1	0	0	0	0	0	0	2	1	1	1	2	1	1	1
Acids/Caustics	1	1	1	0	1	1	1	0	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0
	1	1	1	1	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0
	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1

Exposures by COCS by Decade

	M010					M020-M030					E010, E050 E080					E020, E090 E140					E040 E060-E070 E110-E130					E100					S010				
	40s & 50s	60s	70s	80s	90s	40s & 50s	60s	70s	80s	90s	40s & 50s	60s	70s	80s	90s	40s & 50s	60s	70s	80s	90s	40s & 50s	60s	70s	80s	90s	40s & 50s	60s	70s	80s	90s					
Process Chemicals																																			
Uranyl nitrate hexahydrate	1	1	1	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1	1	1	1	0					
Uranium tetrafluoride	1	1	1	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1	1	1	1	0					
Tributyl phosphate	1	1	1	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1	1	1	1	0					
NPH (kerosene)	1	1	1	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1	1	1	1	0					
Physical Agents																																			
Noise	1	1	1	1	1	1	0	0	0	0	1	0	0	0	0	1	1	0	0	0	2	1	0	0	0	0	0	0	0	0					
Vibration	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
Laser Light	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
RF or Microwave radiation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
Miscellaneous																																			
Nitrates	1	1	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1					
Hydrazine	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0					
Sodium dichromate	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0					
Lithium hydroxide	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0					
Asbestos	1	1	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0					
Welding fumes	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0					
Formaldehyde	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0					
Herbicide	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
Pesticide	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
PCBs	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0					
Metal working fluids	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
Fuels, greases, oils	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
Silica	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					

Exposures by COCS by Decade

	S020-030 S060 S080-S100	S040	S050	S070	P010-P040 P060-P070 P100-P170	P050	P080
	40s & 50s 60s 70s 80s 90s	40s & 50s 60s 70s 80s 90s	40s & 50s 60s 70s 80s 90s	40s & 50s 60s 70s 80s 90s	40s & 50s 60s 70s 80s 90s	40s & 50s 60s 70s 80s 90s	40s & 50s 60s 70s 80s 90s
Metals							
Beryllium	0	0	1	1	0	0	0
Cadmium	0	0	1	1	1	0	0
Lead	0	0	1	1	1	0	0
Mercury	0	0	0	0	0	0	2
Chromium	0	0	0	0	0	0	0
Nickel	0	0	1	1	1	0	0
Zirconium/Zircalloy	0	0	1	1	1	0	0
Other/Unknown	0	0	1	1	1	0	0
Solvents							
Chlorinated Solvents	0	0	0	0	0	0	0
Acetonitrile	0	0	1	1	0	0	0
Toluene and Ketones	0	0	2	2	0	0	0
Glycol ethers	0	0	2	2	0	0	0
Paints/Thinners	0	0	2	2	0	0	0
Other solvents	0	0	2	2	0	0	0
Radioactive Material							
Plutonium	0	1	2	1	1	0	1
Uranium	0	1	2	1	1	0	1
Other isotopes	0	1	2	1	1	0	1
Gamma radiation	0	1	2	1	1	0	1
Acids/Caustics							
Stack gas	0	0	0	0	0	0	0
Irritant gases	0	0	0	0	0	0	0
Other	0	0	2	2	2	0	0

Exposures by COCS by Decade

	S020-030				S040				S050				S070				P010-P040 P060-P070 P100-P170				P050				P080				
	S060	S080-S100			40s & 50s	60s	70s	80s	90s	40s & 50s	60s	70s	80s	90s	40s & 50s	60s	70s	80s	90s	40s & 50s	60s	70s	80s	90s	40s & 50s	60s	70s	80s	90s
Process Chemicals																													
Uranyl nitrate hexahydrate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Uranium tetrafluoride	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tributyl phosphate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NPH (kerosene)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Physical Agents																													
Noise	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Vibration	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Laser Light	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0
RF or Microwave radiation	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
Miscellaneous																													
Nitrates	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrazine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sodium dichromate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lithium hydroxide	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Asbestos	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Welding fumes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Formaldehyde	0	0	0	0	0	0	0	0	0	2	2	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Herbicide	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pesticide	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCBs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Metal working fluids	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fuels, greases, oils	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Silica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Exposures by COCS by Decade

	P090	G010-G060	T010-T030 T090-T110	T040	T050	T060	T070
	40s & 50s	40s & 50s	40s & 50s	40s & 50s	40s & 50s	40s & 50s	40s & 50s
	60s	60s	60s	60s	60s	60s	60s
	70s	70s	70s	70s	70s	70s	70s
	80s	80s	80s	80s	80s	80s	80s
	90s	90s	90s	90s	90s	90s	90s
Metals							
Beryllium	0	0	0	0	0	0	0
Cadmium	0	0	0	0	0	0	0
Lead	0	0	0	0	0	0	0
Mercury	0	0	0	0	0	0	0
Chromium	0	0	0	0	0	0	0
Nickel	0	0	0	0	0	0	0
Zirconium/Zircalloy	0	0	0	0	0	0	0
Other/Unknown	0	0	0	0	0	0	0
Solvents							
Chlorinated Solvents	0	0	0	0	0	0	0
Acetonitrile	0	0	0	0	0	0	0
Toluene and Ketones	0	0	0	0	0	0	0
Glycol ethers	0	0	0	0	0	0	0
Paints/Thinners	0	0	0	0	0	0	0
Other solvents	0	0	0	0	0	0	0
Radioactive Material							
Plutonium	0	0	0	0	0	0	0
Uranium	0	0	0	0	0	0	0
Other isotopes	0	0	0	0	0	0	0
Gamma radiation	0	0	0	0	0	0	0
Acids/Caustics							
Stack gas	0	0	0	0	0	0	0
Irritant gases	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0

Exposures by COCS by Decade

	P090	G010-G060	T010-T030 T090-T110	T040	T050	T060	T070
	40s & 50s	40s & 50s	40s & 50s	40s & 50s	40s & 50s	40s & 50s	40s & 50s
	60s	60s	60s	60s	60s	60s	60s
	70s	70s	70s	70s	70s	70s	70s
	80s	80s	80s	80s	80s	80s	80s
	90s	90s	90s	90s	90s	90s	90s
Process Chemicals							
Uranyl nitrate hexahydrate	0	0	0	0	1	0	0
Uranium tetrafluoride	0	0	0	0	1	1	0
Tributyl phosphate	0	0	0	0	1	1	0
NPH (kerosene)	0	0	0	0	1	1	0
Physical Agents							
Noise	0	0	0	0	1	1	1
Vibration	0	0	0	0	0	0	0
Laser Light	0	0	0	0	0	0	0
RF or Microwave radiation	0	0	0	0	0	0	0
Miscellaneous							
Nitrates	0	0	0	0	0	0	0
Hydrazine	0	0	0	0	0	0	0
Sodium dichromate	0	0	0	1	0	0	0
Lithium hydroxide	0	0	0	0	0	0	0
Asbestos	0	0	0	0	1	1	0
Welding fumes	0	0	0	0	1	1	0
Formaldehyde	0	0	0	0	0	0	0
Herbicide	0	0	0	1	0	0	0
Pesticide	0	0	0	1	0	0	0
PCBs	0	0	0	1	0	0	0
Metal working fluids	0	0	0	0	0	0	0
Fuels, greases, oils	0	0	0	0	0	0	0
Silica	0	0	0	0	0	0	0

Exposures by COCS by Decade

	T080	C010	C020	C030	C040	C050	C060
	40s & 50s	40s & 50s	40s & 50s	40s & 50s	40s & 50s	40s & 50s	40s & 50s
	60s	60s	60s	60s	60s	60s	60s
	70s	70s	70s	70s	70s	70s	70s
	80s	80s	80s	80s	80s	80s	80s
	90s	90s	90s	90s	90s	90s	90s
Metals	0	0	0	0	1	0	0
Beryllium	0	0	0	0	1	1	1
Cadmium	0	0	0	0	1	1	1
Lead	1	0	0	0	1	1	1
Mercury	0	0	0	0	1	1	1
Chromium	0	0	0	0	0	0	0
Nickel	0	0	0	0	2	2	2
Zirconium/Zircalloy	0	0	0	0	2	2	2
Other/Unknown	0	0	0	0	1	1	1
Solvents	2	2	2	2	2	2	2
Chlorinated Solvents	2	2	2	2	2	2	2
Acetonitrile	2	2	2	2	2	2	2
Toluene and Ketones	2	2	2	2	2	2	2
Glycol ethers	0	0	0	0	0	0	0
Paints/Thinners	0	0	0	0	1	1	1
Other solvents	2	2	2	2	1	1	1
Radioactive Material	1	1	1	1	1	1	1
Plutonium	1	1	1	1	1	1	1
Uranium	1	1	1	1	1	1	1
Other isotopes	1	1	1	1	1	1	1
Gamma radiation	1	1	1	1	1	1	1
Acids/Caustics	0	0	0	0	0	0	0
Stack gas	0	0	0	0	0	0	0
Irritant gases	0	0	0	0	0	0	0
Other	2	2	2	2	1	1	1

Exposures by COCS by Decade

	T080				C010				C020				C030				C040				C050				C060			
	40s & 50s				40s & 50s				40s & 50s				40s & 50s				40s & 50s				40s & 50s				40s & 50s			
	60s	70s	80s	90s	60s	70s	80s	90s	60s	70s	80s	90s	60s	70s	80s	90s	60s	70s	80s	90s	60s	70s	80s	90s	60s	70s	80s	90s
Process Chemicals																												
Uranyl nitrate hexahydrate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Uranium tetrafluoride	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tributyl phosphate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NPH (kerosene)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Physical Agents																												
Noise	1	1	1	1	2	2	2	2	1	1	1	1	2	2	2	2	2	2	2	2	1	1	1	1	2	2	2	2
Vibration	0	0	0	0	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	
Laser Light	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
RF or Microwave radiation	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Miscellaneous																												
Nitrates	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Hydrazine	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Sodium dichromate	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Lithium hydroxide	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Asbestos	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Welding fumes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Formaldehyde	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Herbicide	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Pesticide	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
PCBs	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Metal working fluids	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Fuels, greases, oils	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Silica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Exposures by COCS by Decade

	C070					C080					C090					C100					C110					C120					C130																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
	40s & 50s					40s & 50s					40s & 50s					40s & 50s					40s & 50s					40s & 50s					40s & 50s																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
Metals	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0</

Exposures by COCS by Decade

	C070					C080					C090					C100					C110					C120					C130				
	40s & 50s	60s	70s	80s	90s	40s & 50s	60s	70s	80s	90s	40s & 50s	60s	70s	80s	90s	40s & 50s	60s	70s	80s	90s	40s & 50s	60s	70s	80s	90s	40s & 50s	60s	70s	80s	90s					
Uranyl nitrate hexahydrate	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
Uranium tetrafluoride	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
Tributyl phosphate	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
NPH (kerosene)	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
Physical Agents	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2					
Noise	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2					
Vibration	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2					
Laser Light	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
RF or Microwave radiation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
Miscellaneous	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
Nitrates	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
Hydrazine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
Sodium dichromate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
Lithium hydroxide	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
Asbestos	1	1	1	1	1	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2				
Welding fumes	0	0	0	0	0	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2					
Formaldehyde	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
Herbicide	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
Pesticide	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
PCBs	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
Metal working fluids	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
Fuels, greases, oils	0	0	0	0	0	2	2	2	2	2	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2				
Silica	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					

Exposures by COCS by Decade

	R010, R050	R020	R030	R040	R060	R070	R080
	40s & 50s	40s & 50s	40s & 50s	40s & 50s	40s & 50s	40s & 50s	40s & 50s
	60s	60s	60s	60s	60s	60s	60s
	70s	70s	70s	70s	70s	70s	70s
	80s	80s	80s	80s	80s	80s	80s
	90s	90s	90s	90s	90s	90s	90s
Metals							
Beryllium	0	0	0	0	0	0	0
Cadmium	0	0	0	0	0	0	0
Lead	1	0	0	0	0	0	0
Mercury	1	0	0	0	0	0	0
Chromium	0	0	0	0	0	0	0
Nickel	0	0	0	0	0	0	0
Zirconium/Zircalloy	0	0	0	0	0	0	0
Other/Unknown	0	0	0	0	0	1	1
Solvents							
Chlorinated Solvents	1	1	1	1	1	0	0
Acetonitrile	1	1	1	1	1	0	0
Toluene and Ketones	1	1	1	1	1	0	0
Glycol ethers	0	0	0	0	0	0	0
Paints/Thinners	0	0	0	0	0	0	0
Other solvents	0	0	1	1	1	0	0
Radioactive Material							
Plutonium	2	1	1	1	1	0	0
Uranium	2	1	1	1	1	0	0
Other isotopes	2	1	1	1	1	0	0
Gamma radiation	2	1	1	1	1	0	0
Acids/Caustics							
Stack Gas	1	1	1	0	0	1	1
Irritant Gases	1	1	1	1	0	0	0
Other	1	1	1	0	0	0	0
Process Chemicals							

Exposures by COCS by Decade

	R010, R050					R020					R030					R040					R060					R070					R080				
	40s & 50s	60s	70s	80s	90s	40s & 50s	60s	70s	80s	90s	40s & 50s	60s	70s	80s	90s	40s & 50s	60s	70s	80s	90s	40s & 50s	60s	70s	80s	90s	40s & 50s	60s	70s	80s	90s					
Uranyl nitrate hexahydrate	2	1	1	1	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
Uranium tetrafluoride	2	1	1	1	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
Tributyl phosphate	2	1	1	1	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
NPH (kerosene)	2	1	1	1	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
Physical Agents																																			
Noise	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2				
Vibration	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	0	0	0	0	0	0	2	2	2	2	2	2	2	2	2	2				
Laser Light	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
RF or Microwave radiation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
Miscellaneous																																			
Nitrates	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1				
Hydrazine	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1				
Sodium dichromate	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1				
Lithium hydroxide	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
Asbestos	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
Welding fumes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2	2	2	2	2	2	2				
Formaldehyde	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
Herbicide	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
Pesticide	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
PCBs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
Metal working fluids	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
Fuels, greases, oils	0	0	0	0	0	2	2	2	2	2	2	2	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
Silica	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1				

Exposures by COCS by Decade

	L010	L020	L030	L040	L050, L060	L070	L080
	40s & 50s	40s & 50s	40s & 50s	40s & 50s	40s & 50s	40s & 50s	40s & 50s
60s							
70s							
80s							
90s							
Metals							
Beryllium	0	0	0	1	0	0	0
Cadmium	0	0	0	1	0	0	0
Lead	0	0	0	1	0	0	0
Mercury	0	0	0	1	1	0	2
Chromium	0	0	0	0	0	0	0
Nickel	0	0	0	1	0	0	0
Zirconium/Zircalloy	0	0	0	1	0	0	0
Other/Unknown	0	0	0	0	0	0	0
Solvents							
Chlorinated Solvents	0	0	1	0	0	0	0
Acetonitrile	0	0	0	0	0	0	0
Toluene and Ketones	0	0	0	0	0	0	0
Glycol ethers	0	0	0	0	0	0	0
Paints/Thinners	0	0	0	0	1	0	0
Other solvents	0	0	0	0	0	0	0
Radioactive Material							
Plutonium	0	0	0	1	0	0	1
Uranium	0	0	0	1	0	0	1
Other isotopes	0	0	0	1	0	0	1
Gamma radiation	0	0	1	1	1	0	1
Acids/Caustics							
Stack Gas	0	0	1	0	0	0	1
Irritant Gases	0	0	1	0	0	0	1
Other	0	0	1	0	0	0	0
Process Chemicals							

Exposures by COCS by Decade

	L010					L020					L030					L040					L050, L060					L070					L080				
	40s & 50s	60s	70s	80s	90s	40s & 50s	60s	70s	80s	90s	40s & 50s	60s	70s	80s	90s	40s & 50s	60s	70s	80s	90s	40s & 50s	60s	70s	80s	90s	40s & 50s	60s	70s	80s	90s					
Physical Agents	Uranyl nitrate hexahydrate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
	Uranium tetrafluoride	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
	Tributyl phosphate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
	NPH (kerosene)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Physical Agents	Noise	2	2	2	2	2	0	0	0	0	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2			
	Vibration	1	1	1	1	1	0	0	0	0	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2			
	Laser Light	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	RF or Microwave radiation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Miscellaneous	Nitrates	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	Hydrazine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	Sodium dichromate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	Lithium hydroxide	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	Asbestos	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
	Welding fumes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	Formaldehyde	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	Herbicide	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	Pesticide	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	PCBs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	Metal working fluids	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	Fuels, greases, oils	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	Silica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		