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Supplemental Material

Volatile Hydrocarbon Exposures and Incident Coronary Heart Disease Events: Up to Ten Years of Follow-up among *Deepwater Horizon* Oil Spill Workers

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Table S1. Spearman correlation coefficients between cumulative exposure to crude oil chemicals among DWH disaster oil spill workers (N=22,655), 2010-2019

Cumulative daily maximum	THC	Benzene	Toluene	Ethylbenzene	Xylene
Benzene	0.91				
Toluene	0.90	0.95			
Ethylbenzene	0.93	0.94	0.93		
Xylene	0.92	0.90	0.91	0.95	
n-Hexane	0.90	0.88	0.89	0.91	0.87

Cumulative daily average	THC	Benzene	Toluene	Ethylbenzene	Xylene
Benzene	0.91				
Toluene	0.91	0.96			
Ethylbenzene	0.94	0.94	0.94		
Xylene	0.91	0.87	0.89	0.92	
n-Hexane	0.88	0.88	0.89	0.90	0.84

Abbreviations: DWH, Deepwater Horizon; THC, total hydrocarbons

Table S2. Characteristics of the *DWH* disaster oil spill workers by outcome status (CHD vs. no CHD)^a

Characteristic ^b	CHD Cases (n=509)	Non-Cases (n=22,146)
	n (%)	n (%)
Age at enrollment (years)		
20-29	11 (2.2)	4792 (21.6)
30-39	47 (9.2)	5539 (25.0)
40-49	142 (27.9)	5443 (24.6)
50-59	196 (38.5)	4566 (20.6)
≥60	113 (22.2)	1806 (8.2)
Sex		
Male	454 (89.2)	18173 (82.1)
Female	55 (10.8)	3973 (17.9)
Race		
White	334 (65.6)	14732 (66.5)
Black	113 (22.2)	5190 (23.4)
Asian	7 (1.4)	195 (0.9)
American Indian or Alaskan Native	16 (3.1)	384 (1.7)
Native Hawaiian or Pacific Islander	0 (0.0)	47 (0.2)
Other race	15 (3.0)	1018 (4.6)
Multiracial	24 (4.7)	580 (2.6)
Hispanic ethnicity		
No	479 (94.1)	20662 (93.3)
Yes	30 (5.9)	1484 (6.7)
Educational attainment		
Less than high school	113 (22.2)	3357 (15.2)
High school diploma/GED	180 (35.4)	6517 (29.4)
Some college/2-year degree	140 (27.5)	6711 (30.3)
4-year college graduate or more	76 (14.9)	5561 (25.1)
Weight classification		
Underweight or normal (BMI < 25)	96 (18.9)	6050 (27.3)
Overweight (25 ≤ BMI < 30)	209 (41.1)	9210 (41.6)
Obese I (30 ≤ BMI < 35)	129 (25.3)	4504 (20.3)
Obese II (BMI ≥ 35)	75 (14.7)	2382 (10.8)
Reported pre-cleanup diabetes diagnosis		
No	431 (84.7)	21190 (95.7)
Yes	78 (15.3)	956 (4.3)
Reported pre-spill hypertension diagnosis		

No	306 (63.1)	17939 (82.3)
Yes	179 (36.9)	3855 (17.7)
Missing	24	352
Smoking status		
Current heavy smoker (≥ 20 cigarettes/day)	89 (17.5)	2177 (9.8)
Current light smoker (< 20 cigarettes/day)	113 (22.2)	4411 (19.9)
Former smoker	135 (26.5)	4648 (21.0)
Never smoked	172 (33.8)	10910 (49.3)
Residential county proximity to Gulf of Mexico ^c		
Direct or indirect contact	372 (73.1)	12967 (58.6)
Other Gulf state residence	90 (17.7)	4549 (20.5)
Non-Gulf state residence	47 (9.2)	4630 (20.9)
Previous oil spill cleanup work		
No	444 (87.2)	19365 (87.4)
Yes	65 (12.8)	2781 (12.6)
Previous oil industry experience		
No	399 (78.4)	18714 (84.5)
Yes	110 (21.6)	3432 (15.5)
Time from exposure to CHD event		
0-1.9 years	191 (37.5)	N/A
2-3.9 years	113 (22.2)	N/A
4-5.9 years	95 (18.7)	N/A
6 years or more	110 (21.6)	N/A
Ever had to stop working due to heat		
No	271 (57.8)	13112 (65.9)
Yes	198 (42.2)	6782 (34.1)
Missing	40	2252
Worked any job involving oily wildlife, oily plants, or dead animal recovery		
No	347 (69.4)	15940 (73.0)
Yes	153 (30.6)	5896 (27.0)
Missing	9	310

Abbreviations: *DWH*, *Deepwater Horizon*; CHD, coronary heart disease; GED, General Equivalency Diploma; BMI, body mass index

^aIncident CHD events defined as either a self-reported physician-diagnosed myocardial infarction or an International Classification of Disease-coded fatal CHD event that occurred after the last day of participants' oil spill cleanup work

^bAll characteristics were self-reported or derived from information that was self-reported at enrollment.

^cDirect proximity is defined as living in a county directly adjacent to the Gulf of Mexico; indirect is defined as living in a county adjacent to coastal counties.

Table S3. Distribution of stabilized inverse probability of exposure, censoring, and overall weights in analysis of cumulative daily maximum exposure to crude oil chemicals and incident CHD events^a among *DWH* disaster oil spill workers (N=22,655), 2010-2019

Exposure	IPEW	IPCW	Overall Weight^b
	<i>Mean (Range)</i>	<i>Mean (Range)</i>	<i>Mean (Range)</i>
THC	1.00 (0.30, 10.36)	1.00 (0.58, 2.67)	1.00 (0.21, 10.96)
Benzene	1.00 (0.29, 15.50)	1.00 (0.56, 2.81)	1.00 (0.18, 15.50)
Toluene	1.00 (0.30, 16.74)	1.00 (0.56, 2.81)	1.00 (0.20, 16.74)
Ethylbenzene	1.00 (0.29, 9.02)	1.00 (0.56, 2.81)	1.01 (0.20, 9.44)
Xylene	1.00 (0.35, 8.98)	1.00 (0.56, 2.81)	1.00 (0.22, 8.98)
n-Hexane	1.01 (0.29, 8.91)	1.00 (0.56, 2.81)	1.01 (0.19, 12.48)

Abbreviations: CHD, coronary heart disease; *DWH*, *Deepwater Horizon*; IPEW, inverse probability of exposure weight; IPCW, inverse probability of censoring weight; THC, total hydrocarbons

^aIncident CHD events defined as either a self-reported physician-diagnosed myocardial infarction or an International Classification of Disease-coded fatal CHD event that occurred after the last day of participants' oil spill cleanup work

^bOverall weights are the product of IPEW and IPCW.

Table S4. Associations between cumulative exposure to crude oil chemicals and incident CHD events^a among *DWH* disaster oil spill workers, without application of IP-censoring weights (N=22,655), 2010-2019

Exposure		Cumulative daily maximum			Cumulative daily average		
		Total Cases (n=509)	Total N (n=22,655)	HR (95% CI) ^b	Total Cases (n=509)	Total N (n=22,655)	HR (95% CI) ^b
THC, ppm-days ^c	Q1	75	4531	Referent	88	4533	Referent
	Q2	111	4531	1.25 (0.91, 1.73)	106	4529	1.07 (0.79, 1.44)
	Q3	105	4531	1.17 (0.85, 1.62)	97	4531	0.93 (0.68, 1.26)
	Q4	102	4531	1.17 (0.85, 1.63)	104	4531	1.00 (0.74, 1.35)
	Q5	116	4531	1.42 (1.01, 1.99)	114	4531	1.20 (0.88, 1.64)
	Per ln(ppm-day) increase ^d			1.05 (1.00, 1.10)			1.04 (0.99, 1.11)
Benzene, ppb-days ^c	Q1	73	4531	Referent	74	4533	Referent
	Q2	113	4531	1.29 (0.92, 1.79)	112	4529	1.33 (0.96, 1.85)
	Q3	113	4531	1.31 (0.94, 1.82)	116	4531	1.30 (0.94, 1.80)
	Q4	81	4531	0.90 (0.63, 1.28)	81	4531	0.91 (0.64, 1.29)
	Q5	129	4531	1.44 (1.03, 2.00)	126	4531	1.36 (0.98, 1.91)
	Per ln(ppb-day) increase ^d			1.04 (0.99, 1.08)			1.03 (0.99, 1.08)
	Per quintile increase ^e			1.03 (0.96, 1.10)			1.02 (0.95, 1.09)
Toluene, ppb-days ^c	Q1	80	4531	Referent	84	4531	Referent
	Q2	109	4531	1.17 (0.85, 1.61)	106	4531	1.08 (0.79, 1.49)
	Q3	99	4531	1.02 (0.74, 1.41)	105	4531	1.04 (0.76, 1.43)
	Q4	92	4531	0.92 (0.66, 1.28)	83	4531	0.77 (0.55, 1.07)
	Q5	129	4531	1.24 (0.90, 1.71)	131	4531	1.26 (0.90, 1.76)
	Per ln(ppb-day) increase ^d			1.04 (0.99, 1.09)			1.03 (0.97, 1.08)
	Per quintile increase ^e			1.02 (0.95, 1.09)			1.02 (0.94, 1.10)
Ethylbenzene, ppb-days ^c	Q1	83	4531	Referent	82	4531	Referent
	Q2	104	4531	1.00 (0.73, 1.38)	103	4531	1.08 (0.79, 1.49)
	Q3	114	4531	1.12 (0.82, 1.53)	116	4531	1.16 (0.85, 1.59)
	Q4	93	4531	0.87 (0.63, 1.21)	95	4531	0.93 (0.67, 1.29)
	Q5	115	4531	1.18 (0.85, 1.64)	113	4531	1.21 (0.87, 1.68)
	Per ln(ppb-day) increase ^d			1.03 (0.99, 1.08)			1.03 (0.98, 1.09)
	Per quintile increase ^e			1.01 (0.94, 1.08)			1.01 (0.94, 1.08)

Xylene, ppb-days ^c	Q1	87	4533	Referent	99	4531	Referent
	Q2	104	4529	1.10 (0.81, 1.48)	97	4531	0.88 (0.65, 1.17)
	Q3	110	4531	1.15 (0.85, 1.54)	97	4534	0.88 (0.66, 1.18)
	Q4	90	4531	0.86 (0.63, 1.17)	94	4528	0.79 (0.59, 1.07)
	Q5	118	4531	1.23 (0.90, 1.67)	122	4531	1.11 (0.83, 1.49)
	Per ln(ppb-day) increase ^d			1.04 (0.97, 1.11)			1.02 (0.95, 1.10)
	Per quintile increase ^e			1.02 (0.95, 1.09)			1.01 (0.94, 1.09)
n-Hexane, ppb-days ^c	Q1	75	4531	Referent	76	4577	Referent
	Q2	100	4531	1.08 (0.77, 1.51)	108	4485	1.21 (0.87, 1.68)
	Q3	115	4531	1.25 (0.90, 1.74)	101	4531	1.07 (0.77, 1.49)
	Q4	102	4531	0.99 (0.71, 1.39)	106	4531	1.03 (0.74, 1.43)
	Q5	117	4531	1.34 (0.95, 1.88)	118	4531	1.32 (0.94, 1.85)
	Per ln(ppb-day) increase ^d			1.03 (0.99, 1.08)			1.03 (0.98, 1.08)
	Per quintile increase ^e			1.04 (0.97, 1.12)			1.03 (0.96, 1.10)

Abbreviations: CHD, coronary heart disease; *DWH*, *Deepwater Horizon*; THC, total hydrocarbons; ppm, parts per million; ppb, parts per billion; IP, inverse probability; HR, hazard ratio; CI, confidence interval

^aIncident CHD events defined as either a self-reported physician-diagnosed myocardial infarction or an International Classification of Disease-coded fatal CHD event that occurred after the last day of participants' oil spill cleanup work

^bInverse probability exposure-weighted Cox proportional hazards models accounted for age, sex, race, ethnicity, weight class, smoking, pre-cleanup diabetes, education, residential proximity to the Gulf of Mexico, previous oil spill cleanup work, and previous oil industry experience. Covariates were coded as shown in Table 1 except for race, which was coded as White, Black, and other/multiracial groups.

^cSee Table 2 for the range (minimum, maximum) of exposure values corresponding to each exposure quintile.

^dExposure-response analyses of ln-transformed continuous cumulative exposures (in units of ppm-days for THC and ppb-days for all other exposure agents). Exposures were ln-transformed to reduce skewness.

^eAnalysis performed only for comparison with the quantile g-computation model on BTEX-H (benzene, toluene, ethylbenzene, xylene, n-hexane) mixture. Each exposure quintile was assigned an integer score (Q1=1, Q2=2, Q3=3, Q4=4, and Q5=5).

Table S5. Modification of the associations between cumulative daily average exposure to crude oil chemicals and incident CHD events^a by smoking status among *DWH* disaster oil spill workers (N=22,655), 2010-2019

Exposure		Ever smokers			Never smokers			Interaction p ^e
		Total Cases (n=337)	Total N (n=11,573)	HR (95% CI) ^b	Total Cases (n=172)	Total N (n=11,082)	HR (95% CI) ^b	
THC, ppm-days ^c	Q1	52	1894	Referent	36	2639	Referent	0.43
	Q2	72	2265	1.21 (0.82, 1.78)	34	2264	0.87 (0.51, 1.47)	
	Q3	60	2405	0.88 (0.59, 1.30)	37	2126	0.99 (0.59, 1.66)	
	Q4	74	2485	1.13 (0.78, 1.66)	30	2046	0.83 (0.49, 1.42)	
	Q5	79	2524	1.36 (0.92, 2.00)	35	2007	1.00 (0.59, 1.70)	
	Per ln(ppm-day) increase ^d			1.06 (0.98, 1.14)			1.03 (0.95, 1.13)	
Benzene, ppb-days ^c	Q1	42	1826	Referent	32	2707	Referent	0.81
	Q2	75	2339	1.57 (1.03, 2.38)	37	2190	1.10 (0.63, 1.93)	
	Q3	76	2369	1.48 (0.98, 2.25)	40	2162	1.12 (0.65, 1.95)	
	Q4	58	2459	1.07 (0.70, 1.65)	23	2072	0.70 (0.38, 1.29)	
	Q5	86	2580	1.62 (1.07, 2.46)	40	1951	1.14 (0.64, 2.03)	
	Per ln(ppb-day) increase ^d			1.03 (0.97, 1.10)			1.04 (0.97, 1.12)	
Toluene, ppb-days ^c	Q1	49	1840	Referent	35	2691	Referent	0.39
	Q2	72	2336	1.23 (0.82, 1.85)	34	2195	0.90 (0.52, 1.57)	
	Q3	63	2318	1.05 (0.70, 1.59)	42	2213	1.06 (0.63, 1.80)	
	Q4	63	2531	0.95 (0.63, 1.44)	20	2000	0.57 (0.30, 1.06)	
	Q5	90	2548	1.44 (0.95, 2.18)	41	1983	1.00 (0.57, 1.73)	
	Per ln(ppb-day) increase ^d			1.04 (0.97, 1.11)			1.03 (0.95, 1.11)	
Ethylbenzene, ppb-days ^c	Q1	46	1827	Referent	36	2704	Referent	0.09
	Q2	73	2312	1.34 (0.89, 2.01)	30	2219	0.72 (0.41, 1.25)	
	Q3	70	2398	1.19 (0.79, 1.78)	46	2133	1.13 (0.68, 1.90)	
	Q4	66	2483	1.15 (0.76, 1.73)	29	2048	0.70 (0.40, 1.23)	
	Q5	82	2553	1.53 (1.01, 2.31)	31	1978	0.79 (0.45, 1.39)	
	Per ln(ppb-day) increase ^d			1.05 (0.98, 1.12)			1.03 (0.96, 1.10)	
Xylene, ppb-days ^c	Q1	63	2008	Referent	36	2523	Referent	0.08
	Q2	67	2246	0.99 (0.69, 1.43)	30	2285	0.84 (0.50, 1.40)	
	Q3	54	2335	0.78 (0.54, 1.14)	43	2199	1.23 (0.76, 1.98)	

	Q4	69	2447	0.92 (0.64, 1.31)	25	2081	0.68 (0.39, 1.16)	
	Q5	84	2537	1.16 (0.81, 1.66)	38	1994	1.17 (0.71, 1.94)	
	Per ln(ppb-day) increase ^d			1.04 (0.94, 1.15)			1.04 (0.91, 1.18)	
n-Hexane, ppb-days ^c	Q1	44	1849	Referent	32	2728	Referent	0.42
	Q2	67	2263	1.24 (0.81, 1.91)	41	2222	1.13 (0.65, 1.97)	
	Q3	65	2437	1.09 (0.71, 1.68)	36	2094	1.01 (0.57, 1.77)	
	Q4	77	2488	1.27 (0.84, 1.94)	29	2043	0.74 (0.41, 1.34)	
	Q5	84	2536	1.57 (1.02, 2.42)	34	1995	0.96 (0.54, 1.71)	
	Per ln(ppb-day) increase ^d			1.06 (1.00, 1.13)			1.00 (0.94, 1.06)	

Abbreviations: CHD, coronary heart disease; *DWH*, *Deepwater Horizon*; THC, total hydrocarbons; ppm, parts per million; ppb, parts per billion; HR, hazard ratio; CI, confidence interval

^aIncident CHD events defined as either a self-reported physician-diagnosed myocardial infarction or an International Classification of Disease-coded fatal CHD event that occurred after the last day of participants' oil spill cleanup work

^bInverse probability exposure-weighted Cox proportional hazards models accounted for age, sex, race, ethnicity, weight class, smoking, pre-cleanup diabetes, education, residential proximity to the Gulf of Mexico, previous oil spill cleanup work, and previous oil industry experience. Covariates were coded as shown in Table 1 except for race, which was coded as White, Black, and other/multiracial groups.

^cSee Table 2 for the range (minimum, maximum) of exposure values corresponding to each exposure quintile.

^dExposure-response analyses of ln-transformed continuous cumulative exposures (in units of ppm-days for THC and ppb-days for all other exposure agents). Exposures were ln-transformed to reduce skewness.

^ep-value for joint Wald test that assessed effect measure modification of the associations between crude oil exposures and hazard of CHD by smoking

Table S6. Modification of the associations between cumulative daily average exposure to crude oil chemicals and incident CHD events^a by highest education attained among *DWH* disaster oil spill workers (N=22,655), 2010-2019

Exposure		High school or less			More than high school			Interaction P ^e
		Total Cases (n=293)	Total N (n=10,167)	HR (95% CI) ^b	Total Cases (n=216)	Total N (n=12,488)	HR (95% CI) ^b	
THC, ppm-days ^c	Q1	32	1276	Referent	56	3257	Referent	0.22
	Q2	60	2003	1.33 (0.84, 2.09)	46	2526	0.88 (0.57, 1.35)	
	Q3	56	2098	1.10 (0.70, 1.75)	41	2433	0.72 (0.47, 1.12)	
	Q4	74	2318	1.40 (0.90, 2.16)	30	2213	0.61 (0.38, 0.97)	
	Q5	71	2472	1.43 (0.91, 2.25)	43	2059	1.03 (0.66, 1.62)	
	Per ln(ppm-day) increase ^d			1.07 (0.98, 1.17)			1.00 (0.92, 1.08)	
Benzene, ppb-days ^c	Q1	25	1118	Referent	49	3415	Referent	0.60
	Q2	65	2137	1.53 (0.94, 2.50)	47	2392	1.16 (0.74, 1.83)	
	Q3	65	2134	1.48 (0.91, 2.41)	51	2397	1.13 (0.72, 1.76)	
	Q4	50	2230	1.06 (0.64, 1.75)	31	2301	0.73 (0.44, 1.20)	
	Q5	88	2548	1.70 (1.04, 2.75)	38	1983	1.06 (0.65, 1.74)	
	Per ln(ppb-day) increase ^d			1.07 (0.99, 1.15)			1.00 (0.94, 1.06)	
Toluene, ppb-days ^c	Q1	27	1130	Referent	57	3401	Referent	0.48
	Q2	63	2115	1.40 (0.86, 2.29)	43	2416	0.80 (0.52, 1.25)	
	Q3	63	2096	1.30 (0.80, 2.12)	42	2435	0.76 (0.49, 1.17)	
	Q4	54	2293	1.01 (0.61, 1.67)	29	2238	0.54 (0.33, 0.88)	
	Q5	86	2533	1.52 (0.93, 2.47)	45	1998	1.01 (0.62, 1.65)	
	Per ln(ppb-day) increase ^d			1.06 (0.98, 1.15)			1.00 (0.93, 1.07)	
Ethylbenzene, ppb-days ^c	Q1	28	1120	Referent	54	3411	Referent	0.07
	Q2	63	2130	1.33 (0.83, 2.13)	40	2401	0.83 (0.53, 1.31)	
	Q3	60	2181	1.22 (0.76, 1.96)	56	2350	1.08 (0.71, 1.65)	
	Q4	70	2282	1.29 (0.81, 2.06)	25	2249	0.55 (0.33, 0.92)	
	Q5	72	2454	1.43 (0.89, 2.32)	41	2077	1.01 (0.63, 1.64)	
	Per ln(ppb-day) increase ^d			1.05 (0.97, 1.13)			1.01 (0.94, 1.07)	
Xylene, ppb-days ^c	Q1	42	1571	Referent	57	2960	Referent	0.28
	Q2	56	1919	1.20 (0.79, 1.82)	41	2612	0.66 (0.43, 1.02)	
	Q3	54	1971	1.20 (0.79, 1.82)	43	2563	0.67 (0.44, 1.02)	

	Q4	62	2248	1.12 (0.75, 1.67)	32	2280	0.54 (0.34, 0.85)	
	Q5	79	2458	1.46 (0.98, 2.18)	43	2073	0.89 (0.56, 1.41)	
	Per ln(ppb-day) increase ^d			1.09 (0.96, 1.24)			0.96 (0.86, 1.07)	
n-Hexane, ppb-days ^c	Q1	29	1121	Referent	47	3456	Referent	0.15
	Q2	57	2166	1.15 (0.71, 1.88)	51	2319	1.27 (0.81, 1.99)	
	Q3	57	2194	1.09 (0.67, 1.77)	44	2337	1.00 (0.63, 1.58)	
	Q4	73	2231	1.27 (0.79, 2.04)	33	2300	0.72 (0.44, 1.19)	
	Q5	77	2455	1.37 (0.84, 2.25)	41	2076	1.28 (0.78, 2.09)	
	Per ln(ppb-day) increase ^d			1.03 (0.96, 1.10)			1.01 (0.94, 1.08)	

Abbreviations: CHD, coronary heart disease; *DWH*, *Deepwater Horizon*; THC, total hydrocarbons; ppm, parts per million; ppb, parts per billion; HR, hazard ratio; CI, confidence interval

^aIncident CHD events defined as either a self-reported physician-diagnosed myocardial infarction or an International Classification of Disease-coded fatal CHD event that occurred after the last day of participants' oil spill cleanup work

^bInverse probability exposure-weighted Cox proportional hazards models accounted for age, sex, race, ethnicity, weight class, smoking, pre-cleanup diabetes, education, residential proximity to the Gulf of Mexico, previous oil spill cleanup work, and previous oil industry experience. Covariates were coded as shown in Table 1 except for race, which was coded as White, Black, and other/multiracial groups.

^cSee Table 2 for the range (minimum, maximum) of exposure values corresponding to each exposure quintile.

^dExposure-response analyses of ln-transformed continuous cumulative exposures (in units of ppm-days for THC and ppb-days for all other exposure agents). Exposures were ln-transformed to reduce skewness.

^ep-value for joint Wald test that assessed effect measure modification of the associations between crude oil exposures and hazard of CHD by education

Table S7. Modification of the associations between cumulative daily average exposure to crude oil chemicals and incident CHD events^a by obesity status among *DWH* disaster oil spill workers (N=22,655), 2010-2019

Exposure		Not obese (BMI < 30)			Obese (BMI ≥ 30)			Interaction p ^e
		Total Cases (n=305)	Total N (n=15,565)	HR (95% CI) ^b	Total Cases (n=204)	Total N (n=7,090)	HR (95% CI) ^b	
THC, ppm-days ^c	Q1	51	3262	Referent	37	1271	Referent	0.53
	Q2	62	3140	1.24 (0.82, 1.87)	44	1389	0.89 (0.56, 1.44)	
	Q3	63	3089	1.19 (0.80, 1.79)	34	1442	0.63 (0.38, 1.04)	
	Q4	62	3038	1.18 (0.79, 1.76)	42	1493	0.79 (0.49, 1.28)	
	Q5	67	3036	1.41 (0.93, 2.14)	47	1495	1.01 (0.62, 1.62)	
	Per ln(ppm-day) increase ^d			1.09 (1.01, 1.17)			1.00 (0.91, 1.09)	
Benzene, ppb-days ^c	Q1	41	3266	Referent	33	1267	Referent	0.25
	Q2	63	3098	1.56 (0.98, 2.49)	49	1431	1.14 (0.69, 1.88)	
	Q3	71	3078	1.63 (1.04, 2.57)	45	1453	0.97 (0.58, 1.61)	
	Q4	56	3118	1.26 (0.79, 2.02)	25	1413	0.57 (0.32, 1.00)	
	Q5	74	3005	1.67 (1.05, 2.65)	52	1526	1.17 (0.68, 1.99)	
	Per ln(ppb-day) increase ^d			1.08 (1.02, 1.14)			0.98 (0.91, 1.06)	
Toluene, ppb-days ^c	Q1	49	3270	Referent	35	1261	Referent	0.47
	Q2	60	3108	1.18 (0.76, 1.82)	46	1423	1.03 (0.62, 1.70)	
	Q3	65	3101	1.24 (0.81, 1.90)	40	1430	0.79 (0.47, 1.31)	
	Q4	56	3074	1.03 (0.67, 1.61)	27	1457	0.54 (0.31, 0.95)	
	Q5	75	3012	1.40 (0.89, 2.20)	56	1519	1.12 (0.67, 1.89)	
	Per ln(ppb-day) increase ^d			1.07 (1.00, 1.14)			0.99 (0.91, 1.07)	
Ethylbenzene, ppb-days ^c	Q1	42	3263	Referent	40	1268	Referent	0.03
	Q2	62	3113	1.53 (0.98, 2.40)	41	1418	0.76 (0.47, 1.23)	
	Q3	80	3056	1.82 (1.18, 2.81)	36	1475	0.64 (0.39, 1.05)	
	Q4	57	3092	1.33 (0.84, 2.09)	38	1439	0.69 (0.42, 1.12)	
	Q5	64	3041	1.64 (1.03, 2.61)	49	1490	0.92 (0.56, 1.51)	
	Per ln(ppb-day) increase ^d			1.09 (1.02, 1.16)			0.98 (0.91, 1.07)	
Xylene, ppb-days ^c	Q1	57	3245	Referent	42	1286	Referent	0.62
	Q2	59	3140	1.02 (0.69, 1.50)	38	1391	0.78 (0.49, 1.24)	
	Q3	64	3075	1.10 (0.75, 1.62)	33	1459	0.68 (0.42, 1.09)	
	Q4	56	3048	0.89 (0.60, 1.31)	38	1480	0.73 (0.46, 1.16)	

	Q5	69	3057	1.21 (0.82, 1.80)	53	1474	1.11 (0.71, 1.73)	
	Per ln(ppb-day) increase ^d			1.05 (0.95, 1.16)			1.01 (0.89, 1.14)	
n-Hexane, ppb-days ^c	Q1	43	3311	Referent	33	1266	Referent	0.44
	Q2	63	3029	1.32 (0.83, 2.10)	45	1456	1.04 (0.62, 1.76)	
	Q3	63	3086	1.29 (0.81, 2.04)	38	1445	0.79 (0.46, 1.34)	
	Q4	69	3072	1.33 (0.84, 2.11)	37	1459	0.72 (0.42, 1.24)	
	Q5	67	3067	1.43 (0.89, 2.30)	51	1464	1.20 (0.70, 2.05)	
	Per ln(ppb-day) increase ^d			1.06 (1.00, 1.12)			1.00 (0.93, 1.08)	

Abbreviations: CHD, coronary heart disease; *DWH*, *Deepwater Horizon*; BMI, body mass index; THC, total hydrocarbons; ppm, parts per million; ppb, parts per billion; HR, hazard ratio; CI, confidence interval

^aIncident CHD events defined as either a self-reported physician-diagnosed myocardial infarction or an International Classification of Disease-coded fatal CHD event that occurred after the last day of participants' oil spill cleanup work

^bInverse probability exposure-weighted Cox proportional hazards models accounted for age, sex, race, ethnicity, weight class, smoking, pre-cleanup diabetes, education, residential proximity to the Gulf of Mexico, previous oil spill cleanup work, and previous oil industry experience. Covariates were coded as shown in Table 1 except for race, which was coded as White, Black, and other/multiracial groups.

^cSee Table 2 for the range (minimum, maximum) of exposure values corresponding to each exposure quintile.

^dExposure-response analyses of ln-transformed continuous cumulative exposures (in units of ppm-days for THC and ppb-days for all other exposure agents). Exposures were ln-transformed to reduce skewness.

^ep-value for joint Wald test that assessed effect measure modification of the associations between crude oil exposures and hazard of CHD by obesity

Table S8. Associations between cumulative exposure to crude oil chemicals and incident CHD events^a among *DWH* disaster oil spill workers who were ≥ 40 years at enrollment (N=12,266), 2010-2019

Exposure		Cumulative daily maximum			Cumulative daily average		
		Total Cases (n=451)	Total N (n=12,266)	HR (95% CI) ^b	Total Cases (n=451)	Total N (n=12,266)	HR (95% CI) ^b
THC, ppm-days ^c	Q1	65	2649	Referent	76	2610	Referent
	Q2	100	2526	1.45 (1.02, 2.07)	95	2516	1.14 (0.81, 1.59)
	Q3	97	2460	1.35 (0.95, 1.91)	89	2449	0.96 (0.68, 1.34)
	Q4	90	2355	1.32 (0.92, 1.88)	96	2402	1.09 (0.78, 1.51)
	Q5	99	2276	1.52 (1.05, 2.20)	95	2289	1.19 (0.84, 1.69)
	Per ln(ppm-day) increase ^d			1.05 (1.00, 1.11)			1.05 (0.99, 1.11)
Benzene, ppb-days ^c	Q1	64	2680	Referent	65	2651	Referent
	Q2	101	2450	1.39 (0.96, 2.01)	98	2427	1.39 (0.96, 2.00)
	Q3	105	2461	1.41 (0.98, 2.04)	109	2462	1.42 (0.99, 2.05)
	Q4	72	2397	0.95 (0.64, 1.41)	72	2385	0.95 (0.64, 1.39)
	Q5	109	2278	1.44 (1.00, 2.09)	107	2341	1.37 (0.94, 2.00)
	Per ln(ppb-day) increase ^d			1.04 (0.99, 1.08)			1.03 (0.99, 1.08)
Toluene, ppb-days ^c	Q1	69	2697	Referent	72	2689	Referent
	Q2	96	2419	1.30 (0.91, 1.87)	94	2398	1.18 (0.83, 1.70)
	Q3	95	2445	1.17 (0.82, 1.67)	101	2413	1.22 (0.86, 1.73)
	Q4	83	2399	0.99 (0.69, 1.44)	72	2386	0.79 (0.54, 1.15)
	Q5	108	2306	1.27 (0.89, 1.81)	112	2380	1.31 (0.90, 1.91)
	Per ln(ppb-day) increase ^d			1.04 (0.99, 1.09)			1.03 (0.98, 1.09)
Ethylbenzene, ppb-days ^c	Q1	74	2695	Referent	70	2670	Referent
	Q2	92	2488	1.06 (0.74, 1.51)	92	2421	1.20 (0.84, 1.72)
	Q3	104	2470	1.14 (0.81, 1.62)	111	2480	1.35 (0.95, 1.91)
	Q4	85	2358	0.92 (0.64, 1.33)	84	2402	1.01 (0.70, 1.45)
	Q5	96	2255	1.16 (0.80, 1.69)	94	2293	1.27 (0.87, 1.85)
	Per ln(ppb-day) increase ^d			1.04 (0.99, 1.09)			1.04 (0.99, 1.10)
Xylene, ppb-days ^c	Q1	77	2543	Referent	87	2501	Referent
	Q2	94	2560	1.16 (0.84, 1.61)	88	2527	0.91 (0.67, 1.25)
	Q3	101	2493	1.20 (0.87, 1.65)	90	2486	0.95 (0.69, 1.30)

	Q4	80	2394	0.86 (0.62, 1.21)	84	2475	0.80 (0.58, 1.10)
	Q5	99	2276	1.22 (0.87, 1.71)	102	2277	1.09 (0.79, 1.51)
	Per ln(ppb-day) increase ^d			1.03 (0.96, 1.11)			1.02 (0.94, 1.10)
n-Hexane, ppb-days ^c	Q1	67	2678	Referent	66	2693	Referent
	Q2	89	2433	1.13 (0.77, 1.64)	97	2391	1.27 (0.87, 1.85)
	Q3	105	2491	1.28 (0.89, 1.85)	93	2433	1.15 (0.79, 1.69)
	Q4	91	2434	0.99 (0.68, 1.44)	92	2502	1.02 (0.70, 1.49)
	Q5	99	2230	1.29 (0.88, 1.91)	103	2247	1.35 (0.91, 2.00)
	Per ln(ppb-day) increase ^d			1.03 (0.99, 1.08)			1.03 (0.98, 1.08)

Abbreviations: *DWH*, *Deepwater Horizon*; THC, total hydrocarbons; ppm, parts per million; ppb, parts per billion; HR, hazard ratio; CI, confidence interval

^aIncident CHD events defined as either a self-reported physician-diagnosed myocardial infarction or an International Classification of Disease-coded fatal CHD event that occurred after the last day of participants' oil spill cleanup work.

^bInverse probability exposure-weighted Cox proportional hazards models accounted for age, sex, race, ethnicity, weight class, smoking, pre-cleanup diabetes, education, residential proximity to the Gulf of Mexico, previous oil spill cleanup work, and previous oil industry experience. Covariates were coded as shown in Table 1 except for race, which was coded as White, Black, and other/multiracial groups.

^cSee Table 2 for the range (minimum, maximum) of exposure values corresponding to each exposure quintile.

^dExposure-response analyses of ln-transformed continuous cumulative exposures (in units of ppm-days for THC and ppb-days for all other exposure agents). Exposures were ln-transformed to reduce skewness.

Table S9. Associations between cumulative exposure to crude oil chemicals and incident CHD events among *DWH* disaster oil spill workers, additionally adjusting for pre-cleanup hypertension (N=22,279), 2010-2019^a

Exposure		Cumulative daily maximum			Cumulative daily average		
		Total Cases (n=485)	Total N (n=22,279)	HR (95% CI) ^b	Total Cases (n=485)	Total N (n=22,279)	HR (95% CI) ^b
THC, ppm-days ^c	Q1	74	4480	Referent	86	4484	Referent
	Q2	107	4460	1.28 (0.91, 1.79)	101	4458	1.07 (0.78, 1.47)
	Q3	100	4457	1.18 (0.84, 1.66)	95	4456	0.94 (0.69, 1.30)
	Q4	92	4427	1.14 (0.80, 1.61)	93	4435	0.94 (0.69, 1.30)
	Q5	112	4455	1.42 (1.00, 2.01)	110	4446	1.21 (0.88, 1.67)
	Per ln(ppm-day) increase ^d			1.05 (0.99, 1.10)			1.04 (0.98, 1.10)
Benzene, ppb-days ^c	Q1	70	4483	Referent	72	4487	Referent
	Q2	108	4448	1.33 (0.93, 1.89)	107	4451	1.35 (0.95, 1.92)
	Q3	108	4464	1.33 (0.94, 1.89)	108	4456	1.26 (0.89, 1.79)
	Q4	74	4443	0.90 (0.62, 1.31)	77	4447	0.90 (0.63, 1.30)
	Q5	125	4441	1.51 (1.06, 2.14)	121	4438	1.41 (0.99, 2.00)
	Per ln(ppb-day) increase ^d			1.04 (0.99, 1.08)			1.03 (0.98, 1.08)
Toluene, ppb-days ^c	Q1	79	4480	Referent	82	4482	Referent
	Q2	103	4453	1.18 (0.84, 1.65)	101	4454	1.10 (0.79, 1.55)
	Q3	92	4458	0.98 (0.70, 1.38)	97	4460	1.00 (0.72, 1.40)
	Q4	87	4438	0.90 (0.63, 1.27)	78	4444	0.78 (0.55, 1.11)
	Q5	124	4450	1.25 (0.90, 1.74)	127	4439	1.30 (0.92, 1.83)
	Per ln(ppb-day) increase ^d			1.04 (0.99, 1.09)			1.03 (0.97, 1.08)
Ethylbenzene, ppb-days ^c	Q1	80	4480	Referent	79	4479	Referent
	Q2	101	4457	1.05 (0.75, 1.48)	99	4457	1.11 (0.79, 1.56)
	Q3	108	4458	1.11 (0.79, 1.55)	109	4459	1.16 (0.83, 1.62)
	Q4	86	4428	0.87 (0.61, 1.24)	89	4439	0.96 (0.68, 1.35)
	Q5	110	4456	1.21 (0.86, 1.71)	109	4445	1.27 (0.90, 1.79)
	Per ln(ppb-day) increase ^d			1.04 (0.99, 1.08)			1.03 (0.98, 1.09)
Xylene, ppb-days ^c	Q1	84	4472	Referent	96	4475	Referent
	Q2	101	4459	1.12 (0.82, 1.54)	93	4460	0.89 (0.66, 1.21)
	Q3	101	4464	1.12 (0.82, 1.53)	93	4464	0.90 (0.67, 1.22)

	Q4	85	4433	0.87 (0.63, 1.20)	86	4433	0.79 (0.58, 1.07)
	Q5	114	4451	1.26 (0.92, 1.73)	117	4447	1.14 (0.85, 1.54)
	Per ln(ppb-day) increase ^d			1.04 (0.97, 1.12)			1.03 (0.95, 1.11)
n-Hexane, ppb-days ^c	Q1	72	4480	Referent	73	4528	Referent
	Q2	97	4444	1.15 (0.80, 1.65)	104	4401	1.23 (0.86, 1.75)
	Q3	108	4463	1.24 (0.87, 1.77)	95	4459	1.07 (0.75, 1.54)
	Q4	96	4440	1.02 (0.71, 1.47)	101	4444	1.06 (0.75, 1.52)
	Q5	112	4452	1.37 (0.95, 1.97)	112	4447	1.33 (0.93, 1.92)
	Per ln(ppb-day) increase ^d			1.03 (0.99, 1.08)			1.03 (0.98, 1.08)

Abbreviations: CHD, coronary heart disease; *DWH*, *Deepwater Horizon*; THC, total hydrocarbons; ppm, parts per million; ppb, parts per billion; HR, hazard ratio; CI, confidence interval

^aIncident CHD events defined as either a self-reported physician-diagnosed myocardial infarction or an International Classification of Disease-coded fatal CHD event that occurred after the last day of participants' oil spill cleanup work. Total N is lower than that shown in Table 3 due to missing values in pre-cleanup hypertension.

^bInverse probability exposure-weighted Cox proportional hazards models accounted for age, sex, race, ethnicity, weight class, smoking, pre-cleanup diabetes, education, residential proximity to the Gulf of Mexico, previous oil spill cleanup work, previous oil industry experience, and pre-cleanup hypertension. Covariates were coded as shown in Table 1 except for race, which was coded as White, Black, and other/multiracial groups.

^cSee Table 2 for the range (minimum, maximum) of exposure values corresponding to each exposure quintile.

^dExposure-response analyses of ln-transformed continuous cumulative exposures (in units of ppm-days for THC and ppb-days for all other exposure agents). Exposures were ln-transformed to reduce skewness.

Table S10. Associations between cumulative exposure to crude oil chemicals and incident CHD events^a among *DWH* disaster oil spill workers, with age modeled as restrictive cubic splines (N=22,655), 2010-2019

Exposure		Cumulative daily maximum			Cumulative daily average		
		Total Cases (n=451)	Total N (n=22,655)	HR (95% CI) ^b	Total Cases (n=451)	Total N (n=22,655)	HR (95% CI) ^b
THC, ppm-days ^c	Q1	65	2649	Referent	88	4533	Referent
	Q2	100	2526	1.28 (0.92, 1.79)	106	4529	1.07 (0.79, 1.47)
	Q3	97	2460	1.18 (0.84, 1.65)	97	4531	0.91 (0.66, 1.24)
	Q4	90	2355	1.18 (0.84, 1.65)	104	4531	1.00 (0.73, 1.36)
	Q5	99	2276	1.44 (1.02, 2.03)	114	4531	1.20 (0.88, 1.65)
	Per ln(ppm-day) increase ^d			1.05 (1.00, 1.10)			1.04 (0.99, 1.11)
Benzene, ppb-days ^c	Q1	64	2680	Referent	74	4533	Referent
	Q2	101	2450	1.30 (0.92, 1.84)	112	4529	1.36 (0.97, 1.91)
	Q3	105	2461	1.29 (0.91, 1.81)	116	4531	1.30 (0.93, 1.82)
	Q4	72	2397	0.88 (0.61, 1.27)	81	4531	0.90 (0.63, 1.29)
	Q5	109	2278	1.43 (1.01, 2.00)	126	4531	1.37 (0.98, 1.93)
	Per ln(ppb-day) increase ^d			1.04 (0.99, 1.08)			1.03 (0.98, 1.08)
Toluene, ppb-days ^c	Q1	69	2697	Referent	84	4531	Referent
	Q2	96	2419	1.17 (0.83, 1.63)	106	4531	1.09 (0.78, 1.52)
	Q3	95	2445	0.99 (0.70, 1.38)	105	4531	1.02 (0.74, 1.42)
	Q4	83	2399	0.88 (0.62, 1.24)	83	4531	0.77 (0.55, 1.09)
	Q5	108	2306	1.23 (0.89, 1.71)	131	4531	1.25 (0.89, 1.76)
	Per ln(ppb-day) increase ^d			1.04 (0.99, 1.09)			1.02 (0.97, 1.08)
Ethylbenzene, ppb-days ^c	Q1	74	2695	Referent	82	4531	Referent
	Q2	92	2488	1.03 (0.73, 1.44)	103	4531	1.11 (0.80, 1.55)
	Q3	104	2470	1.10 (0.79, 1.52)	116	4531	1.15 (0.84, 1.59)
	Q4	85	2358	0.87 (0.62, 1.22)	95	4531	0.96 (0.69, 1.34)
	Q5	96	2255	1.18 (0.84, 1.65)	113	4531	1.21 (0.87, 1.70)
	Per ln(ppb-day) increase ^d			1.03 (0.99, 1.08)			1.03 (0.98, 1.08)
Xylene, ppb-days ^c	Q1	77	2543	Referent	99	4531	Referent
	Q2	94	2560	1.13 (0.83, 1.54)	97	4531	0.91 (0.68, 1.23)
	Q3	101	2493	1.16 (0.85, 1.56)	97	4534	0.91 (0.68, 1.22)

	Q4	80	2394	0.87 (0.64, 1.19)	94	4528	0.82 (0.61, 1.10)
	Q5	99	2276	1.25 (0.91, 1.70)	122	4531	1.14 (0.85, 1.54)
	Per ln(ppb-day) increase ^d			1.04 (0.97, 1.11)			1.02 (0.94, 1.10)
n-Hexane, ppb-days ^c	Q1	67	2678	Referent	76	4577	Referent
	Q2	89	2433	1.10 (0.77, 1.56)	108	4485	1.18 (0.83, 1.67)
	Q3	105	2491	1.24 (0.88, 1.74)	101	4531	1.05 (0.74, 1.49)
	Q4	91	2434	0.99 (0.70, 1.41)	106	4531	1.02 (0.72, 1.44)
	Q5	99	2230	1.35 (0.95, 1.92)	118	4531	1.30 (0.91, 1.85)
	Per ln(ppb-day) increase ^d			1.04 (0.99, 1.08)			1.03 (0.98, 1.08)

Abbreviations: *DWH*, *Deepwater Horizon*; THC, total hydrocarbons; ppm, parts per million; ppb, parts per billion; HR, hazard ratio; CI, confidence interval

^aIncident CHD events defined as either a self-reported physician-diagnosed myocardial infarction or an International Classification of Disease-coded fatal CHD event that occurred after the last day of participants' oil spill cleanup work.

^bInverse probability exposure-weighted Cox proportional hazards models accounted for age, sex, race, ethnicity, weight class, smoking, pre-cleanup diabetes, education, residential proximity to the Gulf of Mexico, previous oil spill cleanup work, and previous oil industry experience. Covariates were coded as shown in Table 1 except for race (coded as White, Black, and other/multiracial groups) and age (coded as restrictive cubic splines).

^cSee Table 2 for the range (minimum, maximum) of exposure values corresponding to each exposure quintile.

^dExposure-response analyses of ln-transformed continuous cumulative exposures (in units of ppm-days for THC and ppb-days for all other exposure agents). Exposures were ln-transformed to reduce skewness.

Table S11. Associations between cumulative exposure to crude oil chemicals and incident non-fatal MI or fatal CHD (a *contributing/underlying* cause of death)^a among *DWH* disaster oil spill workers (N=22,655), 2010-2019

Exposure		Cumulative daily maximum			Cumulative daily average		
		Total Cases (n=536)	Total N (n=22,655)	HR (95% CI) ^b	Total Cases (n=515)	Total N (n=22,655)	HR (95% CI) ^b
THC, ppm-days ^c	Q1	81	4531	Referent	93	4533	Referent
	Q2	117	4531	1.27 (0.92, 1.76)	111	4529	1.07 (0.79, 1.46)
	Q3	111	4531	1.19 (0.86, 1.65)	105	4531	0.96 (0.71, 1.30)
	Q4	110	4531	1.20 (0.87, 1.67)	109	4531	1.01 (0.75, 1.36)
	Q5	117	4531	1.36 (0.97, 1.91)	118	4531	1.20 (0.88, 1.63)
	Per ln(ppm-day) increase ^d			1.05 (1.00, 1.10)			1.05 (0.99, 1.11)
Benzene, ppb-days ^c	Q1	78	4531	Referent	78	4533	Referent
	Q2	118	4531	1.29 (0.92, 1.81)	118	4529	1.36 (0.98, 1.90)
	Q3	119	4531	1.32 (0.95, 1.84)	122	4531	1.33 (0.96, 1.85)
	Q4	88	4531	0.93 (0.65, 1.32)	86	4531	0.94 (0.66, 1.33)
	Q5	133	4531	1.43 (1.02, 1.99)	132	4531	1.40 (1.00, 1.95)
	Per ln(ppb-day) increase ^d			1.04 (1.00, 1.09)			1.04 (0.99, 1.08)
Toluene, ppb-days ^c	Q1	85	4531	Referent	89	4531	Referent
	Q2	113	4531	1.17 (0.85, 1.61)	112	4531	1.10 (0.80, 1.52)
	Q3	105	4531	1.03 (0.74, 1.43)	111	4531	1.05 (0.77, 1.45)
	Q4	100	4531	0.93 (0.67, 1.29)	87	4531	0.79 (0.56, 1.10)
	Q5	133	4531	1.24 (0.90, 1.70)	137	4531	1.26 (0.91, 1.75)
	Per ln(ppb-day) increase ^d			1.04 (0.99, 1.09)			1.03 (0.98, 1.08)
Ethylbenzene, ppb-days ^c	Q1	89	4531	Referent	87	4531	Referent
	Q2	108	4531	1.01 (0.73, 1.39)	111	4531	1.14 (0.83, 1.57)
	Q3	121	4531	1.12 (0.81, 1.53)	120	4531	1.16 (0.85, 1.59)
	Q4	100	4531	0.88 (0.64, 1.22)	101	4531	0.98 (0.71, 1.36)
	Q5	118	4531	1.16 (0.83, 1.61)	117	4531	1.22 (0.88, 1.69)
	Per ln(ppb-day) increase ^d			1.04 (0.99, 1.08)			1.04 (0.99, 1.09)
Xylene, ppb-days ^c	Q1	91	4533	Referent	102	4531	Referent
	Q2	110	4529	1.13 (0.84, 1.53)	104	4531	0.93 (0.70, 1.24)
	Q3	117	4531	1.18 (0.88, 1.59)	105	4534	0.96 (0.72, 1.28)

	Q4	97	4531	0.90 (0.66, 1.22)	99	4528	0.84 (0.63, 1.12)
	Q5	121	4531	1.23 (0.91, 1.67)	126	4531	1.15 (0.86, 1.54)
	Per ln(ppb-day) increase ^d			1.04 (0.97, 1.11)			1.03 (0.95, 1.11)
n-Hexane, ppb-days ^c	Q1	82	4531	Referent	83	4577	Referent
	Q2	102	4531	1.06 (0.75, 1.49)	113	4485	1.17 (0.84, 1.63)
	Q3	121	4531	1.23 (0.88, 1.71)	104	4531	1.03 (0.74, 1.45)
	Q4	108	4531	1.00 (0.71, 1.40)	114	4531	1.05 (0.75, 1.46)
	Q5	123	4531	1.33 (0.94, 1.86)	122	4531	1.27 (0.91, 1.79)
	Per ln(ppb-day) increase ^d			1.03 (0.99, 1.08)			1.03 (0.99, 1.08)

Abbreviations: CHD, coronary heart disease; *DWH*, *Deepwater Horizon*; THC, total hydrocarbons; ppm, parts per million; ppb, parts per billion; HR, hazard ratio; CI, confidence interval

^aIncident events defined as either a self-reported physician-diagnosed myocardial infarction or an International Classification of Disease-coded fatal CHD event (a contributing/underlying cause of death) that occurred after the last day of participants' oil spill cleanup work.

^bInverse probability exposure-weighted Cox proportional hazards models accounted for age, sex, race, ethnicity, weight class, smoking, pre-cleanup diabetes, education, residential proximity to the Gulf of Mexico, previous oil spill cleanup work, and previous oil industry experience. Covariates were coded as shown in Table 1 except for race, which was coded as White, Black, and other/multiracial groups.

^cSee Table 2 for the range (minimum, maximum) of exposure values corresponding to each exposure quintile.

^dExposure-response analyses of ln-transformed continuous cumulative exposures (in units of ppm-days for THC and ppb-days for all other exposure agents). Exposures were ln-transformed to reduce skewness.

Table S12. Associations between cumulative exposure to crude oil chemicals and incident self-reported myocardial infarction among *DWH* disaster oil spill workers (N=22,655), 2010-2019

Exposure		Cumulative daily maximum			Cumulative daily average		
		Total Cases (n=435)	Total N (n=22,655)	HR (95% CI) ^a	Total Cases (n=440)	Total N (n=22,655)	HR (95% CI) ^a
THC, ppm-days ^b	Q1	62	4531	Referent	73	4533	Referent
	Q2	86	4531	1.18 (0.81, 1.72)	84	4529	1.00 (0.71, 1.41)
	Q3	96	4531	1.26 (0.87, 1.82)	86	4531	0.96 (0.68, 1.35)
	Q4	89	4531	1.20 (0.83, 1.74)	92	4531	1.02 (0.73, 1.43)
	Q5	102	4531	1.45 (0.99, 2.12)	100	4531	1.25 (0.89, 1.76)
	Per ln(ppm-day) increase ^c			1.07 (1.01, 1.13)			1.07 (1.00, 1.14)
Benzene, ppb-days ^b	Q1	60	4531	Referent	61	4533	Referent
	Q2	94	4531	1.35 (0.93, 1.96)	92	4529	1.36 (0.93, 1.98)
	Q3	99	4531	1.41 (0.97, 2.03)	103	4531	1.42 (0.98, 2.04)
	Q4	69	4531	0.92 (0.62, 1.37)	70	4531	0.96 (0.65, 1.42)
	Q5	113	4531	1.54 (1.07, 2.23)	109	4531	1.48 (1.02, 2.16)
	Per ln(ppb-day) increase ^c			1.05 (1.00, 1.10)			1.05 (1.00, 1.10)
Toluene, ppb-days ^b	Q1	67	4531	Referent	71	4531	Referent
	Q2	89	4531	1.11 (0.77, 1.60)	89	4531	1.05 (0.73, 1.51)
	Q3	89	4531	1.05 (0.73, 1.51)	90	4531	1.02 (0.71, 1.46)
	Q4	80	4531	0.90 (0.62, 1.31)	71	4531	0.77 (0.53, 1.12)
	Q5	110	4531	1.23 (0.86, 1.76)	114	4531	1.28 (0.88, 1.85)
	Per ln(ppb-day) increase ^c			1.05 (1.00, 1.11)			1.04 (0.98, 1.10)
Ethylbenzene, ppb-days ^b	Q1	69	4531	Referent	69	4531	Referent
	Q2	86	4531	1.04 (0.72, 1.50)	84	4531	1.06 (0.74, 1.52)
	Q3	99	4531	1.15 (0.81, 1.63)	100	4531	1.17 (0.82, 1.66)
	Q4	81	4531	0.90 (0.62, 1.29)	84	4531	0.98 (0.68, 1.40)
	Q5	100	4531	1.25 (0.87, 1.80)	98	4531	1.26 (0.87, 1.81)
	Per ln(ppb-day) increase ^c			1.05 (1.00, 1.10)			1.05 (1.00, 1.11)
Xylene, ppb-days ^b	Q1	70	4533	Referent	79	4531	Referent
	Q2	88	4529	1.20 (0.85, 1.68)	83	4531	0.99 (0.71, 1.37)
	Q3	97	4531	1.26 (0.91, 1.76)	85	4534	0.98 (0.71, 1.36)

	Q4	78	4531	0.93 (0.66, 1.31)	83	4528	0.89 (0.64, 1.23)
	Q5	102	4531	1.35 (0.96, 1.91)	105	4531	1.25 (0.90, 1.73)
	Per ln(ppb-day) increase ^c			1.06 (0.99, 1.14)			1.05 (0.97, 1.14)
n-Hexane, ppb-days ^b	Q1	62	4531	Referent	63	4577	Referent
	Q2	82	4531	1.10 (0.75, 1.61)	90	4485	1.20 (0.82, 1.75)
	Q3	99	4531	1.29 (0.89, 1.87)	85	4531	1.04 (0.71, 1.52)
	Q4	91	4531	1.08 (0.74, 1.58)	96	4531	1.12 (0.77, 1.63)
	Q5	101	4531	1.41 (0.96, 2.07)	101	4531	1.36 (0.93, 1.99)
	Per ln(ppb-day) increase ^c			1.06 (1.01, 1.10)			1.05 (1.00, 1.10)

Abbreviations: *DWH*, *Deepwater Horizon*; THC, total hydrocarbons; ppm, parts per million; ppb, parts per billion; HR, hazard ratio; CI, confidence interval

^aInverse probability exposure-weighted Cox proportional hazards models accounted for age, sex, race, ethnicity, weight class, smoking, pre-cleanup diabetes, education, residential proximity to the Gulf of Mexico, previous oil spill cleanup work, and previous oil industry experience. Covariates were coded as shown in Table 1 except for race, which was coded as White, Black, and other/multiracial groups.

^bSee Table 2 for the range (minimum, maximum) of exposure values corresponding to each exposure quintile.

^cExposure-response analyses of ln-transformed continuous cumulative exposures (in units of ppm-days for THC and ppb-days for all other exposure agents). Exposures were ln-transformed to reduce skewness.

Table S13. Associations between cumulative exposure to crude oil chemicals and incident CHD events after *enrollment* among *DWH* disaster oil spill workers (N=22,526), 2010-2019^a

Exposure		Cumulative daily maximum			Cumulative daily average		
		Total Cases (n=366)	Total N (n=22,526)	HR (95% CI) ^b	Total Cases (n=366)	Total N (n=22,526)	HR (95% CI) ^b
THC, ppm-days ^c	Q1	55	4506	Referent	65	4507	Referent
	Q2	86	4506	1.33 (0.90, 1.97)	82	4504	1.08 (0.75, 1.55)
	Q3	70	4504	1.07 (0.71, 1.59)	66	4505	0.81 (0.56, 1.18)
	Q4	72	4505	1.13 (0.76, 1.68)	72	4505	0.91 (0.63, 1.31)
	Q5	83	4505	1.44 (0.96, 2.18)	81	4505	1.16 (0.80, 1.68)
	Per ln(ppm-day) increase ^d			1.05 (0.99, 1.12)			1.04 (0.97, 1.11)
Benzene, ppb-days ^c	Q1	52	4506	Referent	54	4506	Referent
	Q2	88	4505	1.33 (0.88, 1.99)	87	4505	1.35 (0.91, 2.01)
	Q3	78	4506	1.19 (0.79, 1.80)	79	4505	1.17 (0.78, 1.75)
	Q4	52	4504	0.76 (0.49, 1.18)	52	4505	0.75 (0.49, 1.16)
	Q5	96	4505	1.48 (0.98, 2.21)	94	4505	1.42 (0.95, 2.13)
	Per ln(ppb-day) increase ^d			1.04 (0.99, 1.10)			1.03 (0.98, 1.09)
Toluene, ppb-days ^c	Q1	60	4506	Referent	63	4507	Referent
	Q2	83	4505	1.16 (0.79, 1.70)	79	4504	1.04 (0.71, 1.53)
	Q3	68	4505	0.89 (0.60, 1.32)	72	4505	0.90 (0.61, 1.33)
	Q4	60	4505	0.76 (0.50, 1.14)	57	4505	0.69 (0.46, 1.03)
	Q5	95	4505	1.21 (0.83, 1.78)	95	4505	1.23 (0.82, 1.84)
	Per ln(ppb-day) increase ^d			1.04 (0.99, 1.10)			1.03 (0.97, 1.09)
Ethylbenzene, ppb-days ^c	Q1	61	4507	Referent	58	4506	Referent
	Q2	79	4504	0.99 (0.67, 1.47)	82	4505	1.19 (0.81, 1.76)
	Q3	78	4505	0.97 (0.66, 1.44)	79	4505	1.08 (0.73, 1.60)
	Q4	65	4505	0.79 (0.53, 1.19)	63	4505	0.88 (0.59, 1.32)
	Q5	83	4505	1.15 (0.77, 1.73)	84	4505	1.29 (0.86, 1.93)
	Per ln(ppb-day) increase ^d			1.04 (0.99, 1.10)			1.04 (0.98, 1.10)
Xylene, ppb-days ^c	Q1	65	4506	Referent	75	4506	Referent
	Q2	77	4505	1.12 (0.78, 1.60)	71	4505	0.87 (0.62, 1.23)
	Q3	75	4505	1.07 (0.75, 1.53)	65	4505	0.82 (0.58, 1.16)

	Q4	64	4505	0.85 (0.58, 1.22)	68	4505	0.80 (0.57, 1.13)
	Q5	85	4505	1.25 (0.87, 1.81)	87	4505	1.13 (0.79, 1.60)
	Per ln(ppb-day) increase ^d			1.03 (0.95, 1.13)			1.01 (0.92, 1.11)
n-Hexane, ppb-days ^c	Q1	53	4506	Referent	55	4560	Referent
	Q2	77	4505	1.16 (0.77, 1.75)	78	4451	1.12 (0.74, 1.68)
	Q3	80	4505	1.17 (0.78, 1.77)	72	4505	0.99 (0.66, 1.50)
	Q4	69	4505	0.94 (0.62, 1.43)	77	4505	0.99 (0.66, 1.49)
	Q5	87	4505	1.40 (0.92, 2.13)	84	4505	1.26 (0.83, 1.91)
	Per ln(ppb-day) increase ^d			1.04 (0.99, 1.09)			1.03 (0.98, 1.09)

Abbreviations: CHD, coronary heart disease; *DWH*, *Deepwater Horizon*; THC, total hydrocarbons; ppm, parts per million; ppb, parts per billion; HR, hazard ratio; CI, confidence interval

^aIncident CHD events defined as either a self-reported physician-diagnosed myocardial infarction or an International Classification of Disease-coded fatal CHD event that occurred after study enrollment. Total N is lower than that shown in Table 3 due to exclusion of CHD events that occurred before study enrollment.

^bInverse probability exposure-weighted Cox proportional hazards models accounted for age, sex, race, ethnicity, weight class, smoking, pre-cleanup diabetes, education, residential proximity to the Gulf of Mexico, previous oil spill cleanup work, and previous oil industry experience. Covariates were coded as shown in Table 1 except for race, which was coded as White, Black, and other/multiracial groups.

^cSee Table 2 for the range (minimum, maximum) of exposure values corresponding to each exposure quintile.

^dExposure-response analyses of ln-transformed continuous cumulative exposures (in units of ppm-days for THC and ppb-days for all other exposure agents). Exposures were ln-transformed to reduce skewness.

Table S14. Associations between cumulative exposure to crude oil chemicals and incident CHD events among *DWH* disaster oil spill workers who were not exposed to higher PM_{2.5} from controlled burning activities (N=20,658), 2010-2019^a

Exposure		Cumulative daily maximum			Cumulative daily average		
		Total Cases (n=465)	Total N (n=20,658)	HR (95% CI) ^b	Total Cases (n=465)	Total N (n=20,658)	HR (95% CI) ^b
THC, ppm-days ^c	Q1	75	4518	Referent	88	4520	Referent
	Q2	108	4451	1.26 (0.90, 1.75)	102	4456	1.04 (0.76, 1.42)
	Q3	102	4343	1.19 (0.86, 1.67)	94	4302	0.93 (0.68, 1.27)
	Q4	92	4015	1.18 (0.84, 1.67)	98	4010	1.03 (0.76, 1.41)
	Q5	88	3331	1.32 (0.93, 1.88)	83	3370	1.07 (0.77, 1.49)
	Per ln(ppm-day) increase ^d			1.04 (0.99, 1.10)			1.03 (0.98, 1.09)
Benzene, ppb-days ^c	Q1	72	4494	Referent	73	4502	Referent
	Q2	110	4311	1.35 (0.96, 1.90)	109	4358	1.40 (1.00, 1.97)
	Q3	106	4199	1.31 (0.93, 1.84)	107	4143	1.33 (0.94, 1.86)
	Q4	67	3945	0.85 (0.58, 1.23)	69	3875	0.91 (0.63, 1.32)
	Q5	110	3709	1.46 (1.03, 2.06)	107	3780	1.36 (0.96, 1.93)
	Per ln(ppb-day) increase ^d			1.03 (0.99, 1.08)			1.03 (0.98, 1.08)
Toluene, ppb-days ^c	Q1	80	4511	Referent	84	4517	Referent
	Q2	105	4418	1.16 (0.83, 1.61)	104	4441	1.09 (0.78, 1.51)
	Q3	94	4146	1.02 (0.73, 1.43)	97	4199	1.01 (0.73, 1.41)
	Q4	78	3905	0.82 (0.58, 1.17)	73	3839	0.78 (0.55, 1.10)
	Q5	108	3678	1.21 (0.86, 1.69)	107	3662	1.12 (0.80, 1.56)
	Per ln(ppb-day) increase ^d			1.03 (0.99, 1.08)			1.02 (0.97, 1.07)
Ethylbenzene, ppb-days ^c	Q1	83	4518	Referent	82	4520	Referent
	Q2	103	4487	1.02 (0.73, 1.42)	101	4473	1.09 (0.79, 1.51)
	Q3	109	4366	1.09 (0.78, 1.51)	113	4358	1.17 (0.85, 1.61)
	Q4	82	4042	0.83 (0.59, 1.17)	86	4070	0.94 (0.67, 1.32)
	Q5	88	3245	1.14 (0.81, 1.61)	83	3237	1.08 (0.76, 1.52)
	Per ln(ppb-day) increase ^d			1.03 (0.98, 1.07)			1.02 (0.98, 1.08)
Xylene, ppb-days ^c	Q1	86	4499	Referent	98	4492	Referent
	Q2	102	4451	1.12 (0.82, 1.53)	95	4450	0.90 (0.67, 1.22)
	Q3	104	4309	1.15 (0.84, 1.56)	92	4311	0.90 (0.67, 1.21)

	Q4	82	4065	0.87 (0.63, 1.20)	84	4047	0.80 (0.59, 1.08)
	Q5	91	3334	1.19 (0.86, 1.64)	96	3358	1.09 (0.80, 1.48)
	Per ln(ppb-day) increase ^d			1.03 (0.96, 1.10)			1.02 (0.94, 1.10)
n-Hexane, ppb-days ^c	Q1	75	4527	Referent	76	4574	Referent
	Q2	100	4514	1.09 (0.77, 1.54)	108	4461	1.19 (0.85, 1.67)
	Q3	111	4390	1.22 (0.87, 1.72)	99	4397	1.07 (0.76, 1.50)
	Q4	97	4213	0.98 (0.69, 1.39)	98	4172	1.01 (0.72, 1.43)
	Q5	82	3014	1.24 (0.86, 1.80)	84	3054	1.20 (0.83, 1.73)
	Per ln(ppb-day) increase ^d			1.03 (0.99, 1.07)			1.02 (0.97, 1.06)

Abbreviations: CHD, coronary heart disease; *DWH*, *Deepwater Horizon*; PM_{2.5}, fine particulate matter <2.5 micrometers; THC, total hydrocarbons; ppm, parts per million; ppb, parts per billion; HR, hazard ratio; CI, confidence interval

^aIncident CHD events defined as either a self-reported physician-diagnosed myocardial infarction or an International Classification of Disease-coded fatal CHD event that occurred after the last day of participants' oil spill cleanup work. Total N is lower than that shown in Table 3 due to missing values in PM_{2.5} exposure.

^bInverse probability exposure-weighted Cox proportional hazards models accounted for age, sex, race, ethnicity, weight class, smoking, pre-cleanup diabetes, education, residential proximity to the Gulf of Mexico, previous oil spill cleanup work, and previous oil industry experience. Covariates were coded as shown in Table 1 except for race, which was coded as White, Black, and other/multiracial groups.

^cSee Table 2 for the range (minimum, maximum) of exposure values corresponding to each exposure quintile.

^dExposure-response analyses of ln-transformed continuous cumulative exposures (in units of ppm-days for THC and ppb-days for all other exposure agents). Exposures were ln-transformed to reduce skewness.

Table S15. Associations between cumulative exposure to crude oil chemicals and incident CHD events among *DWH* disaster oil spill workers, additionally adjusting for having to stop working due to heat (N=20,363), 2010-2019^a

Exposure		Cumulative daily maximum			Cumulative daily average		
		Total Cases (n=469)	Total N (n=20,363)	HR (95% CI) ^b	Total Cases (n=469)	Total N (n=20,363)	HR (95% CI) ^b
THC, ppm-days ^c	Q1	41	2678	Referent	57	2817	Referent
	Q2	109	4304	1.55 (1.02, 2.36)	101	4175	1.13 (0.80, 1.61)
	Q3	103	4458	1.38 (0.91, 2.10)	96	4457	0.94 (0.66, 1.35)
	Q4	101	4447	1.39 (0.91, 2.11)	102	4456	1.02 (0.72, 1.45)
	Q5	115	4476	1.61 (1.05, 2.46)	113	4458	1.24 (0.87, 1.76)
	Per ln(ppm-day) increase ^d			1.05 (0.99, 1.12)			1.05 (0.99, 1.12)
Benzene, ppb-days ^c	Q1	38	2538	Referent	39	2543	Referent
	Q2	113	4454	1.56 (1.04, 2.35)	111	4461	1.54 (1.03, 2.31)
	Q3	111	4443	1.53 (1.01, 2.30)	115	4440	1.47 (0.98, 2.20)
	Q4	79	4460	1.02 (0.66, 1.56)	79	4460	1.00 (0.66, 1.53)
	Q5	128	4468	1.65 (1.10, 2.48)	125	4459	1.54 (1.02, 2.31)
	Per ln(ppb-day) increase ^d			1.04 (0.99, 1.10)			1.03 (0.98, 1.09)
Toluene, ppb-days ^c	Q1	45	2545	Referent	49	2547	Referent
	Q2	109	4441	1.33 (0.90, 1.97)	105	4454	1.17 (0.80, 1.72)
	Q3	96	4445	1.08 (0.73, 1.60)	105	4441	1.09 (0.74, 1.59)
	Q4	91	4454	0.96 (0.64, 1.43)	80	4462	0.81 (0.55, 1.20)
	Q5	128	4478	1.29 (0.87, 1.89)	130	4459	1.27 (0.87, 1.87)
	Per ln(ppb-day) increase ^d			1.04 (0.98, 1.09)			1.02 (0.96, 1.09)
Ethylbenzene, ppb-days ^c	Q1	48	2542	Referent	47	2541	Referent
	Q2	103	4453	1.12 (0.76, 1.64)	102	4455	1.13 (0.77, 1.67)
	Q3	111	4440	1.14 (0.78, 1.66)	114	4443	1.16 (0.79, 1.70)
	Q4	93	4470	0.91 (0.62, 1.34)	94	4476	0.98 (0.66, 1.45)
	Q5	114	4458	1.23 (0.84, 1.81)	112	4448	1.23 (0.83, 1.81)
	Per ln(ppb-day) increase ^d			1.04 (0.98, 1.09)			1.04 (0.98, 1.10)
Xylene, ppb-days ^c	Q1	67	3425	Referent	80	3531	Referent
	Q2	92	3831	1.19 (0.85, 1.67)	85	3850	0.93 (0.68, 1.29)

	Q3	104	4179	1.18 (0.85, 1.64)	92	4155	0.93 (0.68, 1.27)
	Q4	89	4468	0.89 (0.63, 1.24)	92	4384	0.83 (0.61, 1.14)
	Q5	117	4460	1.22 (0.87, 1.70)	120	4443	1.12 (0.82, 1.52)
	Per ln(ppb-day) increase ^d			1.03 (0.96, 1.11)			1.03 (0.94, 1.11)
n-Hexane, ppb-days ^c	Q1	40	2555	Referent	41	2598	Referent
	Q2	100	4443	1.35 (0.90, 2.04)	107	4405	1.40 (0.94, 2.10)
	Q3	113	4450	1.46 (0.98, 2.18)	100	4456	1.23 (0.82, 1.84)
	Q4	100	4440	1.19 (0.79, 1.79)	104	4443	1.21 (0.81, 1.81)
	Q5	116	4475	1.58 (1.05, 2.37)	117	4461	1.52 (1.02, 2.28)
	Per ln(ppb-day) increase ^d			1.04 (1.00, 1.09)			1.04 (0.99, 1.10)

Abbreviations: *DWH*, *Deepwater Horizon*; THC, total hydrocarbons; ppm, parts per million; ppb, parts per billion; HR, hazard ratio; CI, confidence interval

^aIncident CHD events defined as either a self-reported physician-diagnosed myocardial infarction or an International Classification of Disease-coded fatal CHD event that occurred after the last day of participants' oil spill cleanup work. Total N is lower than that shown in Table 3 due to missing values in the variable for having to stop working due to heat.

^bInverse probability exposure-weighted Cox proportional hazards models accounted for age, sex, race, ethnicity, weight class, smoking, pre-cleanup diabetes, education, residential proximity to the Gulf of Mexico, previous oil spill cleanup work, previous oil industry experience, and having to stop working due to heat. Covariates were coded as shown in Table 1 except for race, which was coded as White, Black, and other/multiracial groups.

^cSee Table 2 for the range (minimum, maximum) of exposure values corresponding to each exposure quintile.

^dExposure-response analyses of ln-transformed continuous cumulative exposures (in units of ppm-days for THC and ppb-days for all other exposure agents). Exposures were ln-transformed to reduce skewness.

Table S16. Associations between cumulative exposure to crude oil chemicals and incident CHD events among *DWH* disaster oil spill workers, additionally adjusting for ever working any jobs that involved oily plants/wildlife or dead animal recovery (N=22,336), 2010-2019^a

Exposure		Cumulative daily maximum			Cumulative daily average		
		Total Cases (n=500)	Total N (n=22,336)	HR (95% CI) ^b	Total Cases (n=500)	Total N (n=22,336)	HR (95% CI) ^b
THC, ppm-days ^c	Q1	74	4486	Referent	87	4492	Referent
	Q2	110	4480	1.23 (0.85, 1.78)	104	4488	0.94 (0.68, 1.30)
	Q3	103	4467	1.19 (0.82, 1.72)	97	4462	0.91 (0.66, 1.26)
	Q4	99	4450	1.17 (0.81, 1.70)	102	4450	0.96 (0.70, 1.32)
	Q5	114	4453	1.44 (0.99, 2.11)	110	4444	1.13 (0.81, 1.56)
	Per ln(ppm-day) increase ^d			1.05 (1.00, 1.11)			1.05 (0.99, 1.11)
Benzene, ppb-days ^c	Q1	71	4487	Referent	72	4495	Referent
	Q2	112	4487	1.37 (0.96, 1.95)	111	4493	1.32 (0.92, 1.89)
	Q3	112	4466	1.42 (0.99, 2.02)	115	4466	1.36 (0.96, 1.93)
	Q4	79	4451	0.97 (0.66, 1.41)	79	4447	0.94 (0.65, 1.36)
	Q5	126	4445	1.57 (1.10, 2.23)	123	4435	1.42 (1.00, 2.04)
	Per ln(ppb-day) increase ^d			1.04 (1.00, 1.09)			1.04 (0.99, 1.09)
Toluene, ppb-days ^c	Q1	79	4488	Referent	83	4490	Referent
	Q2	107	4485	1.09 (0.76, 1.56)	104	4501	0.95 (0.67, 1.34)
	Q3	98	4467	0.95 (0.66, 1.36)	105	4467	1.00 (0.71, 1.41)
	Q4	91	4458	0.85 (0.59, 1.22)	80	4449	0.73 (0.51, 1.05)
	Q5	125	4438	1.19 (0.84, 1.68)	128	4429	1.18 (0.83, 1.67)
	Per ln(ppb-day) increase ^d			1.04 (0.99, 1.09)			1.03 (0.98, 1.09)
Ethylbenzene, ppb-days ^c	Q1	81	4487	Referent	81	4491	Referent
	Q2	103	4483	1.04 (0.73, 1.48)	101	4487	0.99 (0.70, 1.40)
	Q3	112	4471	1.13 (0.80, 1.59)	115	4483	1.16 (0.83, 1.62)
	Q4	91	4459	0.90 (0.63, 1.28)	93	4443	0.94 (0.66, 1.32)
	Q5	113	4436	1.25 (0.88, 1.79)	110	4432	1.22 (0.86, 1.74)
	Per ln(ppb-day) increase ^d			1.04 (0.99, 1.09)			1.04 (0.99, 1.09)
Xylene, ppb-days ^c	Q1	85	4479	Referent	97	4477	Referent
	Q2	103	4483	1.15 (0.84, 1.57)	96	4492	0.90 (0.67, 1.21)

	Q3	109	4476	1.19 (0.87, 1.61)	97	4484	0.94 (0.70, 1.26)
	Q4	87	4459	0.87 (0.63, 1.20)	91	4451	0.81 (0.60, 1.10)
	Q5	116	4439	1.29 (0.94, 1.76)	119	4432	1.17 (0.86, 1.57)
	Per ln(ppb-day) increase ^d			1.05 (0.98, 1.12)			1.04 (0.96, 1.12)
n-Hexane, ppb-days ^c	Q1	73	4488	Referent	74	4538	Referent
	Q2	99	4475	1.19 (0.82, 1.71)	107	4439	1.15 (0.80, 1.68)
	Q3	114	4479	1.32 (0.92, 1.89)	101	4477	1.04 (0.72, 1.52)
	Q4	100	4443	1.12 (0.78, 1.62)	104	4436	1.06 (0.73, 1.54)
	Q5	114	4451	1.46 (1.01, 2.11)	114	4446	1.25 (0.86, 1.83)
	Per ln(ppb-day) increase ^d			1.04 (1.00, 1.08)			1.04 (0.99, 1.08)

Abbreviations: *DWH*, *Deepwater Horizon*; THC, total hydrocarbons; ppm, parts per million; ppb, parts per billion; HR, hazard ratio; CI, confidence interval

^aIncident CHD events defined as either a self-reported physician-diagnosed myocardial infarction or an International Classification of Disease-coded fatal CHD event that occurred after the last day of participants' oil spill cleanup work. Total N is lower than that shown in Table 3 due to missing values in the variable for ever working any jobs that involved oily plants/wildlife or dead animal recovery.

^bInverse probability exposure-weighted Cox proportional hazards models accounted for age, sex, race, ethnicity, weight class, smoking, pre-cleanup diabetes, education, residential proximity to the Gulf of Mexico, previous oil spill cleanup work, previous oil industry experience, and ever working jobs that involved oily plants/wildlife or dead animal recovery. Covariates were coded as shown in Table 1 except for race, which was coded as White, Black, and other/multiracial groups.

^cSee Table 2 for the range (minimum, maximum) of exposure values corresponding to each exposure quintile.

^dExposure-response analyses of ln-transformed continuous cumulative exposures (in units of ppm-days for THC and ppb-days for all other exposure agents). Exposures were ln-transformed to reduce skewness.

Table S17. Associations between single daily maximum exposure to crude oil chemicals and incident CHD events^a among *DWH* disaster oil spill workers (N=22,655), 2010-2016 and 2010-2019

Exposure		Total N (n=22,655)	Until First Follow-up Interview		Until Dec 2019	
			Total Cases (n=383)	HR (95% CI) ^b	Total Cases (n=542)	HR (95% CI) ^b
THC, ppm	Q1 (<0.2)	4534	43	Referent	65	Referent
	Q2 (0.2-0.6)	4656	87	1.60 (1.04, 2.47)	119	1.54 (1.08, 2.20)
	Q3 (0.6-1.2)	4548	83	1.54 (0.99, 2.37)	106	1.37 (0.96, 1.96)
	Q4 (1.3-2.8)	4625	75	1.28 (0.82, 2.00)	114	1.38 (0.97, 1.98)
	Q5 (2.8-22.4)	4292	78	1.61 (1.02, 2.55)	105	1.52 (1.04, 2.20)

Abbreviations: CHD, coronary heart disease; *DWH*, *Deepwater Horizon*; THC, total hydrocarbons; ppm, parts per million; ppb, parts per billion; HR, hazard ratio; CI, confidence interval

^aIncident CHD events defined as either a self-reported physician-diagnosed myocardial infarction or an International Classification of Disease-coded fatal CHD event that occurred after the last day of participants' oil spill cleanup work.

^bInverse probability exposure-weighted Cox proportional hazards models accounted for age, sex, race, ethnicity, weight class, smoking, pre-cleanup diabetes, education, residential proximity to the Gulf of Mexico, previous oil spill cleanup work, and previous oil industry experience. Covariates were coded as shown in Table 1 except for race, which was coded as White, Black, and other/multiracial groups.

Table S18. Associations between cumulative exposure to crude oil chemicals and incident CHD events^a among *DWH* disaster oil spill workers, with time interval in which events were identified coarsened to 4 months (instead of 1 month) (N=22,655), 2010-2019

Exposure		Cumulative daily maximum			Cumulative daily average		
		Total Cases (n=509)	Total N (n=22,655)	HR (95% CI) ^b	Total Cases (n=509)	Total N (n=22,655)	HR (95% CI) ^b
THC, ppm-days ^c	Q1	75	4531	Referent	88	4533	Referent
	Q2	111	4531	1.29 (0.92, 1.81)	106	4529	1.08 (0.79, 1.47)
	Q3	105	4531	1.19 (0.85, 1.67)	97	4531	0.92 (0.67, 1.26)
	Q4	102	4531	1.19 (0.84, 1.67)	104	4531	1.00 (0.73, 1.36)
	Q5	116	4531	1.42 (1.01, 2.01)	114	4531	1.21 (0.88, 1.66)
	Per ln(ppm-day) increase ^d			1.05 (1.00, 1.11)			1.05 (0.99, 1.11)
Benzene, ppb-days ^c	Q1	73	4531	Referent	74	4533	Referent
	Q2	113	4531	1.29 (0.92, 1.83)	112	4529	1.35 (0.96, 1.91)
	Q3	113	4531	1.30 (0.92, 1.83)	116	4531	1.30 (0.93, 1.83)
	Q4	81	4531	0.89 (0.62, 1.28)	81	4531	0.91 (0.63, 1.30)
	Q5	129	4531	1.44 (1.02, 2.02)	126	4531	1.39 (0.99, 1.96)
	Per ln(ppb-day) increase ^d			1.04 (1.00, 1.09)			1.03 (0.99, 1.08)
Toluene, ppb-days ^c	Q1	80	4531	Referent	84	4531	Referent
	Q2	109	4531	1.20 (0.86, 1.67)	106	4531	1.11 (0.80, 1.54)
	Q3	99	4531	1.01 (0.72, 1.42)	105	4531	1.04 (0.75, 1.44)
	Q4	92	4531	0.90 (0.64, 1.27)	83	4531	0.79 (0.56, 1.11)
	Q5	129	4531	1.26 (0.91, 1.75)	131	4531	1.27 (0.91, 1.78)
	Per ln(ppb-day) increase ^d			1.04 (0.99, 1.09)			1.03 (0.98, 1.08)
Ethylbenzene, ppb-days ^c	Q1	83	4531	Referent	82	4531	Referent
	Q2	104	4531	1.03 (0.73, 1.43)	103	4531	1.10 (0.79, 1.53)
	Q3	114	4531	1.10 (0.79, 1.52)	116	4531	1.16 (0.84, 1.59)
	Q4	93	4531	0.87 (0.62, 1.22)	95	4531	0.96 (0.68, 1.33)
	Q5	115	4531	1.19 (0.85, 1.67)	113	4531	1.22 (0.87, 1.71)
	Per ln(ppb-day) increase ^d			1.04 (0.99, 1.08)			1.04 (0.99, 1.09)
Xylene, ppb-days ^c	Q1	87	4533	Referent	99	4531	Referent
	Q2	104	4529	1.12 (0.82, 1.53)	97	4531	0.90 (0.67, 1.21)
	Q3	110	4531	1.16 (0.85, 1.57)	97	4534	0.91 (0.67, 1.22)

	Q4	90	4531	0.87 (0.64, 1.20)	94	4528	0.81 (0.60, 1.09)
	Q5	118	4531	1.25 (0.91, 1.70)	122	4531	1.14 (0.85, 1.53)
	Per ln(ppb-day) increase ^d			1.04 (0.97, 1.11)			1.03 (0.95, 1.11)
n-Hexane, ppb-days ^c	Q1	75	4531	Referent	76	4577	Referent
	Q2	100	4531	1.10 (0.77, 1.57)	108	4485	1.19 (0.84, 1.68)
	Q3	115	4531	1.24 (0.88, 1.75)	101	4531	1.06 (0.75, 1.50)
	Q4	102	4531	1.00 (0.70, 1.42)	106	4531	1.03 (0.73, 1.46)
	Q5	117	4531	1.34 (0.94, 1.92)	118	4531	1.31 (0.92, 1.86)
	Per ln(ppb-day) increase ^d			1.04 (1.00, 1.08)			1.03 (0.99, 1.08)

Abbreviations: CHD, coronary heart disease; *DWH*, *Deepwater Horizon*; THC, total hydrocarbons; ppm, parts per million; ppb, parts per billion; HR, hazard ratio; CI, confidence interval

^aIncident events defined as either a self-reported physician-diagnosed myocardial infarction or an International Classification of Disease-coded fatal CHD event that occurred after the last day of participants' oil spill cleanup work.

^bInverse probability exposure-weighted Cox proportional hazards models accounted for age, sex, race, ethnicity, weight class, smoking, pre-cleanup diabetes, education, residential proximity to the Gulf of Mexico, previous oil spill cleanup work, and previous oil industry experience. Covariates were coded as shown in Table 1 except for race, which was coded as White, Black, and other/multiracial groups.

^cSee Table 2 for the range (minimum, maximum) of exposure values corresponding to each exposure quintile.

^dExposure-response analyses of ln-transformed continuous cumulative exposures (in units of ppm-days for THC and ppb-days for all other exposure agents). Exposures were ln-transformed to reduce skewness.

Table S19. Associations between cumulative exposure to crude oil chemicals and incident CHD events (self-reported myocardial infarction, self-reported blockage in heart arteries, or fatal CHD) among *DWH* disaster oil spill workers (N=22,410), 2010-2019^a

Exposure		Cumulative daily maximum			Cumulative daily average		
		Total Cases (n=839)	Total N (n=22,410)	HR (95% CI) ^b	Total Cases (n=839)	Total N (n=22,410)	HR (95% CI) ^b
THC, ppm-days ^c	Q1	130	4482	Referent	141	4482	Referent
	Q2	182	4482	1.19 (0.92, 1.54)	172	4482	1.06 (0.83, 1.36)
	Q3	167	4482	1.05 (0.81, 1.37)	177	4482	1.04 (0.81, 1.33)
	Q4	167	4482	1.11 (0.85, 1.45)	159	4482	0.95 (0.74, 1.21)
	Q5	193	4482	1.29 (0.99, 1.69)	190	4482	1.18 (0.92, 1.51)
	Per ln(ppm-day) increase ^d			1.04 (0.99, 1.08)			1.03 (0.98, 1.08)
Benzene, ppb-days ^c	Q1	128	4482	Referent	130	4482	Referent
	Q2	183	4482	1.17 (0.89, 1.52)	172	4482	1.16 (0.89, 1.51)
	Q3	173	4482	1.09 (0.84, 1.43)	181	4482	1.13 (0.87, 1.46)
	Q4	148	4482	0.91 (0.69, 1.19)	149	4482	0.93 (0.71, 1.22)
	Q5	207	4482	1.28 (0.98, 1.67)	207	4482	1.25 (0.96, 1.63)
	Per ln(ppb-day) increase ^d			1.03 (0.99, 1.07)			1.02 (0.98, 1.07)
Toluene, ppb-days ^c	Q1	132	4482	Referent	138	4482	Referent
	Q2	171	4483	1.10 (0.85, 1.44)	166	4483	1.03 (0.80, 1.34)
	Q3	169	4481	1.02 (0.78, 1.32)	166	4481	0.99 (0.76, 1.28)
	Q4	152	4482	0.91 (0.69, 1.19)	158	4482	0.92 (0.71, 1.19)
	Q5	215	4482	1.25 (0.97, 1.62)	211	4482	1.18 (0.90, 1.53)
	Per ln(ppb-day) increase ^d			1.03 (0.99, 1.08)			1.02 (0.98, 1.07)
Ethylbenzene, ppb-days ^c	Q1	134	4482	Referent	134	4483	Referent
	Q2	178	4482	1.06 (0.82, 1.38)	165	4481	1.05 (0.81, 1.37)
	Q3	171	4482	1.00 (0.77, 1.30)	176	4482	1.03 (0.80, 1.33)
	Q4	174	4482	1.00 (0.77, 1.31)	175	4482	1.04 (0.80, 1.35)
	Q5	182	4482	1.10 (0.84, 1.44)	189	4482	1.15 (0.89, 1.50)
	Per ln(ppb-day) increase ^d			1.03 (0.99, 1.07)			1.03 (0.98, 1.07)
Xylene, ppb-days ^c	Q1	141	4482	Referent	146	4482	Referent
	Q2	166	4482	1.08 (0.84, 1.38)	168	4482	1.04 (0.82, 1.32)
	Q3	171	4482	1.09 (0.85, 1.38)	161	4482	1.00 (0.78, 1.26)

	Q4	169	4482	1.01 (0.79, 1.29)	167	4482	0.97 (0.77, 1.23)
	Q5	192	4482	1.20 (0.94, 1.53)	197	4482	1.17 (0.92, 1.48)
	Per ln(ppb-day) increase ^d			1.04 (0.98, 1.10)			1.03 (0.97, 1.10)
n-Hexane, ppb-days ^c	Q1	138	4482	Referent	136	4528	Referent
	Q2	147	4482	0.84 (0.64, 1.11)	164	4436	0.98 (0.75, 1.27)
	Q3	187	4482	1.05 (0.81, 1.36)	156	4482	0.88 (0.68, 1.15)
	Q4	176	4482	0.96 (0.74, 1.25)	188	4482	1.02 (0.78, 1.32)
	Q5	191	4482	1.12 (0.86, 1.46)	195	4482	1.15 (0.88, 1.50)
	Per ln(ppb-day) increase ^d			1.03 (0.99, 1.06)			1.02 (0.98, 1.06)

Abbreviations: CHD, coronary heart disease; *DWH*, *Deepwater Horizon*; THC, total hydrocarbons; ppm, parts per million; ppb, parts per billion; HR, hazard ratio; CI, confidence interval

^aIncident events defined as self-reported physician-diagnosed myocardial infarction or blockage in heart arteries, or an International Classification of Disease-coded fatal CHD event that occurred after the last day of participants' oil spill cleanup work. Total N is lower than that shown in Table 3 due to additional exclusion of participants who reported blockage in heart arteries before the last day of oil spill cleanup work.

^bInverse probability exposure-weighted Cox proportional hazards models accounted for age, sex, race, ethnicity, weight class, smoking, pre-cleanup diabetes, education, residential proximity to the Gulf of Mexico, previous oil spill cleanup work, and previous oil industry experience. Covariates were coded as shown in Table 1 except for race, which was coded as White, Black, and other/multiracial groups.

^cSee Table 2 for the range (minimum, maximum) of exposure values corresponding to each exposure quintile.

^dExposure-response analyses of ln-transformed continuous cumulative exposures (in units of ppm-days for THC and ppb-days for all other exposure agents). Exposures were ln-transformed to reduce skewness.

Table S20. Marginal hazard ratios of CHD comparing *DWH* oil spill workers who had high daily maximum daily exposures to spill-related chemicals (in the top 15th and 20th percentile of single daily maximum exposure) for a number of days (≥ 7 and ≥ 14 days) with workers whose daily maximum exposures were in the first quintile of the study population's single daily maximum exposure, 2010-2019

Exposure	Daily Exposure Intensity	Duration at Intensity	Total Cases	Total N	HR (95% CI) ^a
THC	Low (0-0.4 ppm)	≥ 1 day	257	5722	Referent
	Medium (>2.8 ppm)	≥ 7 day	96	3811	1.36 (0.93, 1.99)
	Medium (>2.8 ppm)	≥ 14 day	90	3473	1.48 (0.95, 2.32)
	High (>3.3 ppm)	≥ 7 day	63	2771	1.37 (0.88, 2.13)
	High (>3.3 ppm)	≥ 14 day	57	2438	1.52 (0.87, 2.63)
Benzene	Low (0-1.9 ppb)	≥ 1 day	254	5699	Referent
	Medium (>15.1 ppb)	≥ 7 day	105	4012	1.21 (0.87, 1.68)
	Medium (>15.1 ppb)	≥ 14 day	97	3719	1.15 (0.84, 1.57)
	High (>15.4 ppb)	≥ 7 day	81	3095	1.26 (0.88, 1.79)
	High (>15.4 ppb)	≥ 14 day	73	2821	1.18 (0.84, 1.67)
Toluene	Low (0-7.2 ppb)	≥ 1 day	245	5782	Referent
	Medium (>65.7 ppb)	≥ 7 day	110	4036	1.10 (0.77, 1.57)
	Medium (>65.7 ppb)	≥ 14 day	104	3624	1.20 (0.79, 1.83)
	High (>78.3 ppb)	≥ 7 day	91	3296	1.22 (0.80, 1.85)
	High (>78.3 ppb)	≥ 14 day	86	2975	1.32 (0.81, 2.16)
Ethylbenzene	Low (0-1.4 ppb)	≥ 1 day	269	5464	Referent
	Medium (>15.2 ppb)	≥ 7 day	108	4037	1.14 (0.83, 1.55)
	Medium (>15.2 ppb)	≥ 14 day	99	3694	1.16 (0.84, 1.61)
	High (>19.6 ppb)	≥ 7 day	96	3687	1.13 (0.82, 1.56)
	High (>19.6 ppb)	≥ 14 day	89	3362	1.18 (0.84, 1.65)
Xylene	Low (0.5-11.9 ppb)	≥ 1 day	265	5755	Referent
	Medium (>74.7 ppb)	≥ 7 day	112	4240	1.34 (0.97, 1.84)
	Medium (>74.7 ppb)	≥ 14 day	102	3884	1.36 (0.98, 1.89)
	High (>79.4 ppb)	≥ 7 day	107	3915	1.38 (0.99, 1.91)
	High (>79.4 ppb)	≥ 14 day	98	3587	1.40 (1.00, 1.97)
n-Hexane	Low (0.1-3.6 ppb)	≥ 1 day	243	5627	Referent

Medium (>59.5 ppb)	≥ 7 day	130	4817	1.27 (0.94, 1.71)
Medium (>59.5 ppb)	≥ 14 day	120	4397	1.27 (0.93, 1.74)
High (>107.8 ppb)	≥ 7 day	75	3001	1.24 (0.84, 1.84)
High (>107.8 ppb)	≥ 14 day	72	2723	1.38 (0.89, 2.15)

Abbreviations: CHD, coronary heart disease; *DWH*, *Deepwater Horizon*; THC, total hydrocarbons; ppm, parts per million; ppb, parts per billion; HR, hazard ratio; CI, confidence interval

^aInverse probability exposure-weighted Cox proportional hazards models accounted for age, sex, race, ethnicity, weight class, smoking, pre-cleanup diabetes, education, residential proximity to the Gulf of Mexico, previous oil spill cleanup work, and previous oil industry experience. Covariates were coded as shown in Table 1 except for race, which was coded as White, Black, and other/multiracial groups.

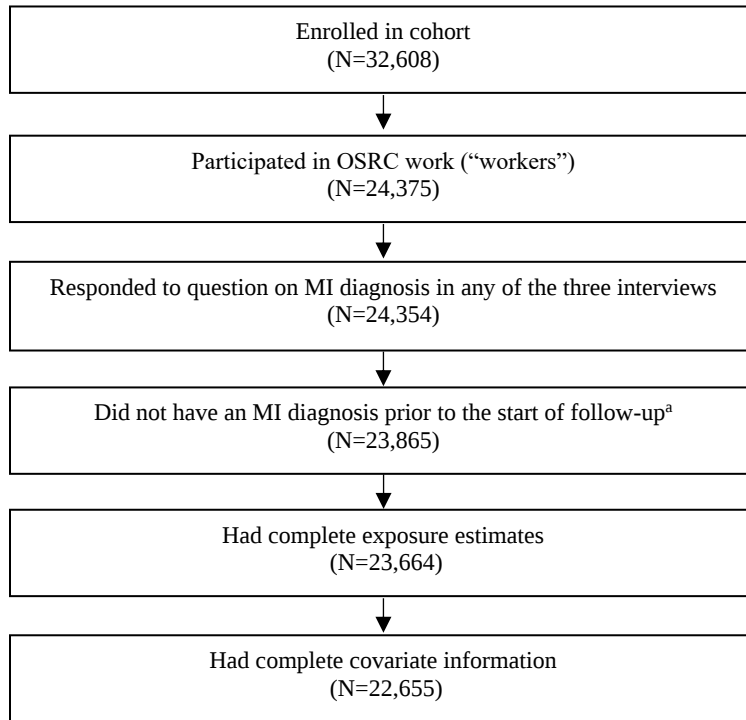


Figure S1. Participant eligibility for the main analysis of cumulative exposure to crude oil chemicals and risk of CHD events

Abbreviations: MI, myocardial infarction; OSRC, oil spill response and cleanup; CHD, coronary heart disease

^a Follow-up started after the last day of each worker's cleanup work.

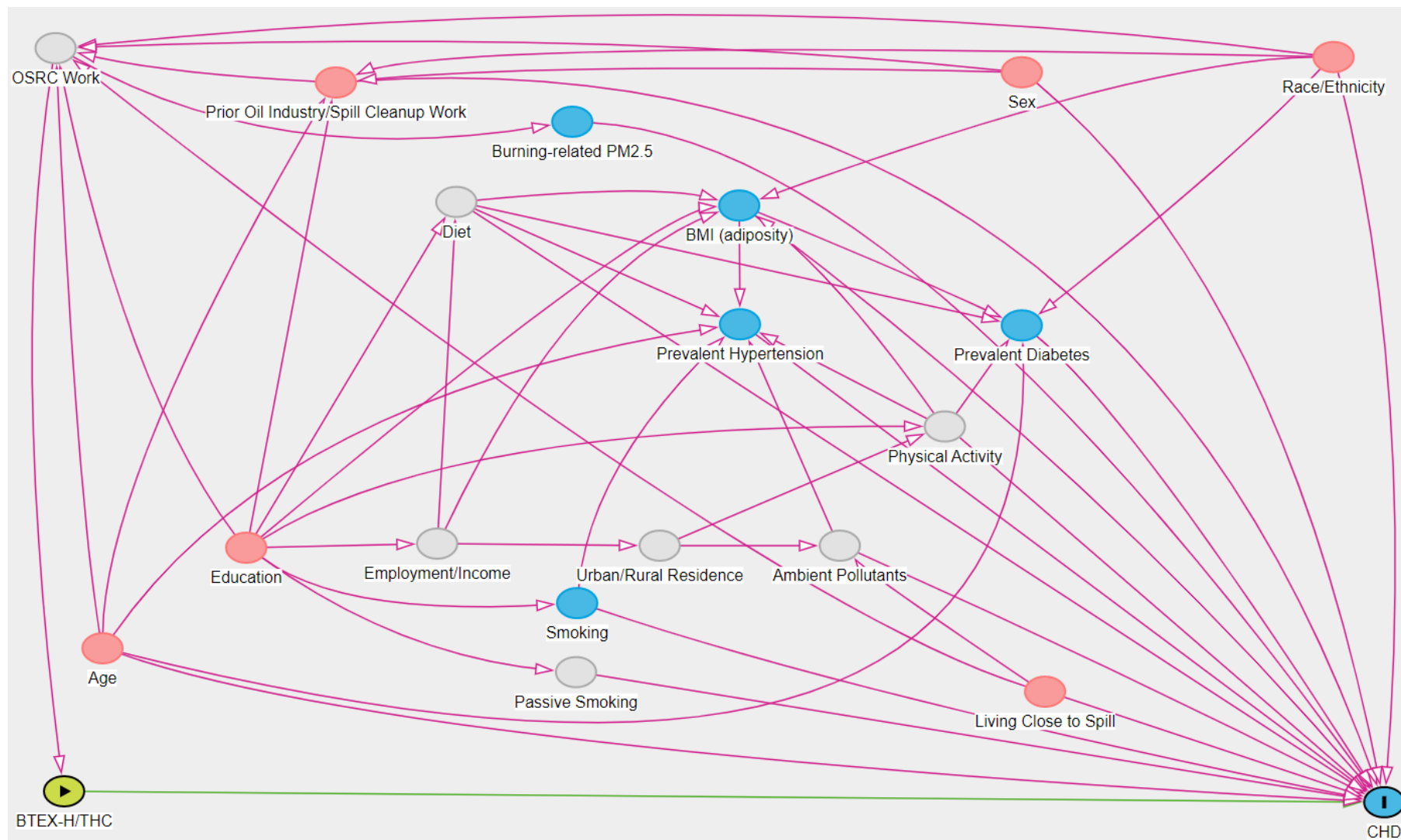


Figure S2. Directed acyclic graph that guided covariate selection for models estimating the relationship of total hydrocarbons (THC), benzene, toluene, ethylbenzene, xylene, and n-hexane (BTEX-H) with risk of coronary heart disease (CHD) among *Deepwater Horizon* oil spill response and cleanup (OSRC) workers, 2010-2019 (N=22,655). Pink ovals denote the minimally sufficient adjustment set; blue ovals denote an ancestor (i.e. predictor) of the outcome that is not part of the minimally sufficient adjustment set; grey ovals denote variables that were unmeasured or unavailable for the entire study population.