

Building Trades Medical Screening Program (BTMed)

Mortality Study Update 2019

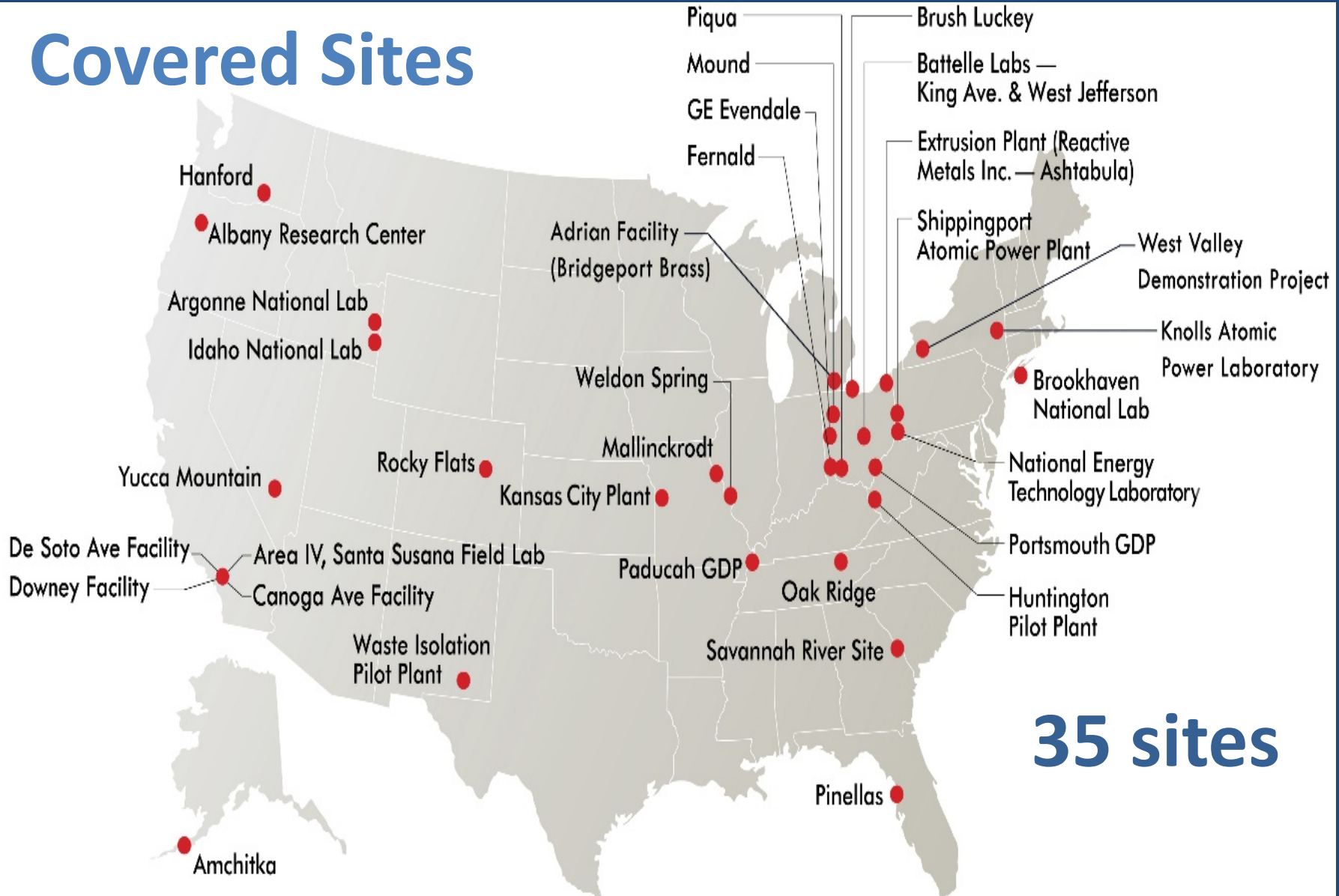
Overview of BTMed

Screening program for DOE construction workers

- Created in 1996
- Funded by DOE
- No cost to the worker
- Covers 35 DOE sites
- 38,500 screens completed by 23,300 workers.



Covered Sites



35 sites

Screening Exam Components

Purpose of screening exams:

- *Identify individual health impact from work on DOE site*

- Medical History Questionnaire
- Occupational History
- Comprehensive Exam
- Labs
- Spirometry
- Audiometry
- Chest X-Ray

BTMed National Medical Screening Program

www.btmed.org – 1-800-866-9663

Exposures

Asbestos
Beryllium
Cadmium
Chromium
Lead
Mercury
Noise
Radiation
Silica
Solvents ...and others

Health Effects

Asbestosis
Chronic Beryllium Disease
COPD
Dust-related Lung Disease
Lung Cancer
Mesothelioma
Pleural Plaques
Radiation-Related Cancers
Silicosis
Hearing Loss and others...

Jobs

Boilermaker	Painter
Carpenter	Pipefitter
Electrician	Plumber
Equip Operator	Roofer
Insulator	Sandblaster
Iron Worker	Steamfitter
Laborer	Welder
Mason	...and others

Mortality of Older Construction and Craft Workers Employed at Department of Energy (DOE) Nuclear Sites: Follow-Up Through 2011

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Updated Analyses

- Increased population size through new BTMed participants.
- Extended follow-up through December 2016.

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Mortality of older construction and craft workers employed at department of energy nuclear sites: Follow-up through 2016

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BTMed Mortality: Cohort & Follow-up

- Workers completing a work history interview through December 31, 2016.
 - Included all sites covered by BTMed.
 - Workers must have demographic data needed for vital status ascertainment through the National Death Index (NDI).
- NDI follow-up through December 31, 2016
 - Workers not deceased through NDI assumed alive.
 - ICD cause of death obtained from the NDI-Plus system.

Data Analysis Methods

- Expected deaths: U.S. death rates using the NIOSH LTAS System with 119 causes.
 - Person-years for each individual began at completion of work history interview or first BTMed exam.
 - Expected deaths calculated by application of age, gender, race, and calendar time specific deaths rates to cohort person-years.
- Outcome: Standardized Mortality Ratio (SMR)
 - $SMR = (\text{observed deaths} / \text{expected deaths}) \times 100$
 - Cause-specific SMRs calculated based on DOE site, trade, and DOE work time periods.

BTMed Mortality: Vital Status & Demographics

Vital Status: Alive = 18883 Deceased = 5203

Age at Cohort Entry, Mean (STD): 60.2 (12.6)

Years of DOE Work, Mean (STD): 10.5 (10.0)

Gender and Race Distribution		# Workers	%
Gender	Female	1,683	6.99%
	Male	22,403	93.01%
Race	Nonwhite	2,952	12.26%
	White	21,134	87.74%
	Total Cohort	24,086	100.00%

BTMed Mortality: All Cause Mortality

Age at Cohort Entry	Vital Status		All Causes SMR	Lower 95% CI	Upper 95% CI
	Workers	Deaths			
<40	1043	26	0.93	0.61	1.36
40-49	3678	191	0.87	0.75	1.36
50-59	6770	747	1.11	1.03	1.19
60-69	6603	1305	1.12	1.06	1.18
70+	5992	2934	1.09	1.05	1.13
All Ages	24086	5203	1.09	1.06	1.12

Abbreviations: CI, confidence interval; SMR, standardized mortality ratio .

BTMed Mortality: Cancer Mortality

Cause of Death	Obs.	Exp.	SMR	P-value	95% CI	
					Lower	Upper
All Causes	5203	4791.29	1.09	<0.01	1.06	1.12
All Cancers	1553	1254.58	1.24	<0.01	1.18	1.30
MN trachea, bronchus, lung	532	378.68	1.40	<0.01	1.29	1.53
MN kidney	49	35.30	1.39	<0.05	1.03	1.84
MN mesothelioma ¹	59	9.25	6.38	<0.01	4.86	8.23
MN lymphatic & hematopoietic	162	129.54	1.25	<0.01	1.07	1.46
Hodgkin's disease	4	2.16	1.85		0.50	4.74
Non-Hodgkin's lymphoma	59	48.75	1.21		0.92	1.56
Multiple myeloma	35	26.05	1.34		0.94	1.87
All Leukemia	64	52.57	1.22		0.94	1.55

¹ Mesothelioma by ICD-10 Codes

BTMed Mortality: Respiratory Disease Mortality

Cause of Death	Obs.	Exp.	SMR	P-value	95% CI	
					Lower	Upper
All Causes	5203	4791.29	1.09	<0.01	1.06	1.12
Diseases respiratory system	732	505.14	1.45	<0.01	1.35	1.56
Acute resp. infection (except. flu, & pneumonia)	0	0.51	0.00		0.00	7.27
Influenza	5	2.98	1.68		0.55	3.92
Pneumonia	85	103.67	0.82		0.65	1.01
COPD	429	292.96	1.46	<0.01	1.33	1.61
Asthma	4	3.36	1.19		0.32	3.05
Asbestosis	80	2.23	35.90	<0.01	28.47	44.68
Silicosis	5	0.26	19.28	<0.01	6.26	45
Other pneumoconiosis	8	1.26	6.34	<0.01	2.74	12.5
Other respiratory diseases	116	97.92	1.18		0.98	1.42

BTMed Mortality: Other Conditions

Cause of Death	Obs.	Exp.	SMR	P-value ¹	95% CI	
					Lower	Upper
All Causes	5203	4791.29	1.09	<0.01	1.06	1.12
Transportation injuries	73	45.30	1.61	<0.01	1.26	2.03
Accidental poisoning	41	25.34	1.62	<0.01	1.16	2.19

BTMed Mortality: Selected Causes by Trade

Trade	SMR by Cause and (95% CI) [Observed Deaths]			
	All Cancers	Lung Cancer	Mesothelioma	COPD
Carpenter	1.26 (1.03-1.52) [108]	1.42 (0.99-1.96) [36]	6.27 (1.71-16.05) [4]	1.50 (1.02-2.13) [31]
Electrician	1.14 (1.00-1.29) [256]	1.32 (1.06-1.62) [90]	9.06 (5.18-14.72) [16]	1.23 (0.96-1.57) [67]
Iron Worker	1.12 (0.89-1.39) [81]	1.62 (1.13-2.24) [36]	3.57 (0.43-12.90) [2]	1.46 (0.95-2.16) [25]
Laborer	1.35 (1.16-1.56) [189]	1.58 (1.22-2.01) [66]	3.39(0.70-9.92) [3]	1.83 (1.37-2.38) [54]
Operating Engineer	1.44 (1.17-1.74) [105]	1.38 (0.94-1.97) [31]	0.00 (0.00-6.74) [0]	1.66 (1.10-2.40) [28]
Pipe Trades	1.25 (1.11-1.40) [283]	1.30 (1.04-1.60) [88]	9.80 (5.71-15.69) [17]	1.32 (1.04-1.66) [73]
Sheet Metal Worker	1.20 (0.95-1.50) [78]	1.77 (1.24-2.47) [35]	5.89 (1.22-17.22) [3]	1.48 (0.94-2.22) [22]
Teamster	1.19 (0.90-1.55) [56]	1.27 (0.75-2.00) [18]	2.86 (0.07-15.95) [1]	2.25 (1.45-3.32) [25]
All Other Trades	1.24 (1.12-1.37) [397]	1.36 (1.14-1.62) [132]	5.75 (3.06-9.84) [13]	1.42 (1.16-1.72) [103]
Overall	1.24 (1.18-1.30) [1553]	1.40 (1.29-1.53) [532]	6.38 (4.86-8.23) [59]	1.46 (1.33-1.61) [429]

BTMed Mortality: Selected Causes by Trade

Trade	SMR by Cause and (95% CI) [Observed Deaths]	
	Kidney Cancers	All Lymphatic & Hematopoietic Cancers
Carpenter	2.49 (0.91-5.41) [6]	1.56 (0.85-2.63) [14]
Electrician	1.41 (0.64-2.67) [9]	1.14 (0.75-1.65) [27]
Iron Worker	0.97 (0.12-3.49) [2]	1.45 (0.72-2.59) [11]
Laborer	1.62 (0.59-3.52) [6]	0.95 (0.50-1.62) [13]
Operating Engineer	0.96 (0.12-3.47) [2]	1.99 (1.11-3.28) [15]
Pipe Trades	1.24 (0.54-2.44) [8]	1.38 (0.95-1.94) [33]
Sheet Metal Worker	1.62 (0.33-4.73) [3]	0.73 (0.24-1.71) [5]
Teamster	0.00 (0.00-2.82) [0]	1.43 (0.58-2.96) [7]
All Other Trades	1.44 (0.77-2.46) [13]	1.14 (0.80-1.57) [37]
Overall	1.39 (1.03-1.84) [49]	1.25 (1.07-1.46) [162]

BTMed Mortality: Selected Causes by Year of First DOE Site Employment

Year of First DOE Work	SMR by Cause and (95% CI) [Observed Deaths]			
	All Cancers	Lung Cancer	Mesothelioma	COPD
Before 1960	1.24 (1.13-1.35) [466]	1.45 (1.23-1.70) [150]	9.83 (6.72-13.88) [32]	1.55 (1.33-1.79) [179]
1960-1969	1.25 (1.10-1.41) [263]	1.31 (1.05-1.62) [87]	7.02 (3.62-12.27) [12]	1.26 (0.97-1.61) [65]
1970-1979	1.24 (1.12-1.38) [374]	1.33 (1.11-1.58) [127]	5.27 (2.63-9.43) [11]	1.74 (1.43-2.11) [106]
1980-1989	1.34 (1.20-1.49) [331]	1.64 (1.36-1.95) [126]	1.98 (0.41-5.78) [3]	1.20 (0.90-1.56) [54]
1990+	1.00 (0.83-1.20) [119]	1.15 (0.83-1.55) [42]	1.47 (0.04-8.19) [1]	1.25 (0.81-1.85) [25]
Overall	1.24 (1.18-1.30) [1553]	1.40 (1.29-1.53) [532]	6.38 (4.86-8.23) [59]	1.46 (1.33-1.61) [429]

BTMed Mortality

Comparison of Follow-up through 2011 and 2016

Cause of Death	2016		2011	
	Obs	SMR	Obs	SMR
All Causes	5203	1.09	2801	1.06
All Cancers	1553	1.24	919	1.29
MN trachea, bronchus, lung	532	1.40	327	1.43
MN kidney	49	1.39	22	1.14*
MN mesothelioma	59	6.38	36	6.86
MN lymphatic & hematopoietic	162	1.25	95	1.31
Diseases respiratory system	732	1.45	364	1.32
COPD	429	1.46	219	1.40
Asbestosis	80	35.90	37	27.04
Silicosis	5	19.28	1	5.80
Other pneumoconiosis	8	6.34	3	3.30*
Transportation injuries	73	1.61	40	1.39*
Accidental poisoning	41	1.62	17	1.44*

Conclusions

- Construction workers employed at DOE sites have a significantly increased risk for occupational illnesses.
- Risks are associated with employment during all time periods covered including possibly after 1990.
- These workers are at increased risk of death for all cancers combined.
 - Cancer risks by cause closely match the cancers identified for DOE compensation from radiation exposures.
- The high risk of lung cancer supports the value of early lung cancer detection, which was started by BTMed in 2011.
- COPD is an important risk for construction workers.
 - Smoking is a major risk factor for COPD .
 - Research within this population supports an important contribution by occupational exposures to vapors, gases, dusts, and fumes.