Occupational Health Screenings of Former Atomic Weapons Workers in Southeastern Iowa

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PROJECT BACKGROUND

The University of Iowa College of Public Health
Project started in 2001

Funded by DOE under Public Law 102-484 Section 3162 of the 1993 Defense Authorization Act

Goal:

- ***Identifying, locating, and providing former IAAP AEC workers employed in manufacture of nuclear weapons between 1949-1975 with medical evaluation of long term health effects that might have resulted from employment***

IOWA ARMY AMMUNITION PLANT (IAAP)

Located in Middletown, IA (Des Moines County) ~ 70 miles south from Iowa City

Over 19,000 acres of Government Owned – Contractor Operated (GOCO) establishment

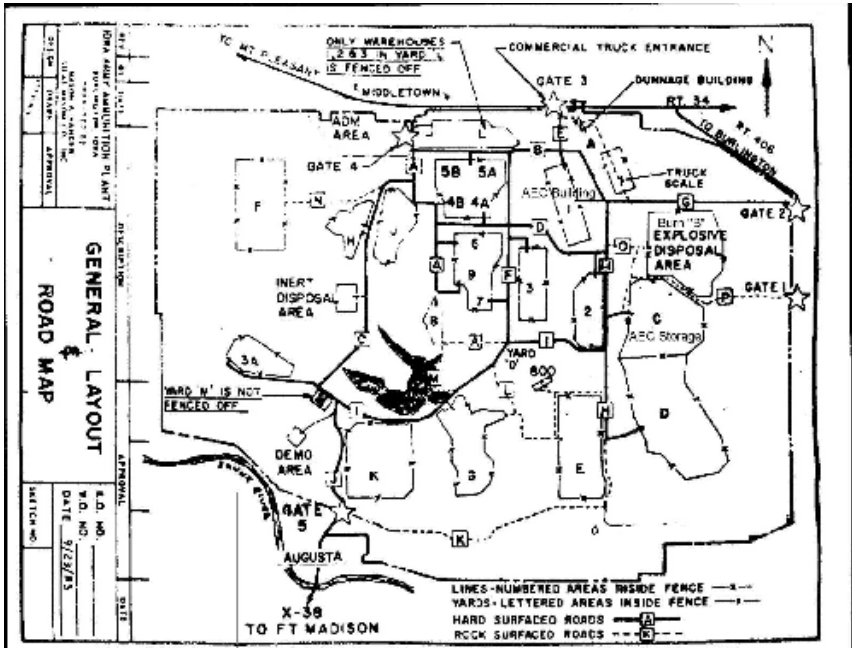
>1000 buildings, 142 miles of roads and 103 miles of railroad tracks

Built between 1941-1943 as conventional munitions Loading, Assembly and Packing (LAP) facility

Still in operation - current workforce approx. 1,000 employees

NUCLEAR WEAPONS PRODUCTION AT IAAP

Atomic weapons assembled, disassembled and repaired between 1949-1975 on <u>Line 1</u> under AEC (pre-DoE) contractual agreements with Silas Mason



Between 1949-1951
the only large scale manufacturer of nuclear weapons in the country

Production moved in 1975 to Pantex, IAAP's sister Plant in Amarillo, TX

NUCLEAR WEAPONS WORKERS

Estimated 5,000 workers (M>F ~80%) worked on AEC Line 1 (workers subgroup Division B) between 1949 and 1975

Considerable cross-over of workforce with adjacent conventional munitions manufacturing lines (70-80% worked on both lines)

Main exposures:

- Ionizing radiation
- Beryllium
- Asbestos
- Solvents
- High explosives
- Isocyanates
- Epoxy adhesives
- Curing agents

RESULTS
New Cancers Detected through Screenings

- **Lung** — **7 (1.0%; N=734 CXR) + 2 post/s**
- **Thyroid (intrathoracic)** — **1 (0.1%; N=734 CXR)**
- **Colon** — **1 (0.2%; N= 652 Hemoccult)**
- **Prostate** — **4 (3%; N=139 PSA)**
- **CLL** — **1 (0.1%; N=932 CBC)**
- **Mesothelioma** — **2 (0.3%; N=734 CXR)**

RESULTS
Sensitization to Beryllium

N =38 (3.5%) with at least one abnormal Beryllium Lymphocyte Proliferation Test (BeLPT)

BeLPT result Be Exposure	Abnormal BeLPT (ever)		Total
	Y	N	
2	**6**	44	50
1	**23**	628	651
0	7	339	346
Total	36*	1,011*	**1,047***
** N= 37 - no job code information available to establish Be exposure category*			

χ2 = 13.70 (exp. 2) vs. (exp. 0)
p <0.05

Odds of abnormal BeLPT in those exposed (1,2) vs. not exposed (0)

OR = 2.09 (95% CI – 0.91 to 4.82)

Odds of abnormal BeLPT in those exposed to highest exposure (2) vs. no exposure (0)

OR = 6.60 (95% CI - 2.12 to 20.54)

***χ2* for linear trend = 8.12; p< 0.005**

RESULTS
Lung Disease Screening

Parenchymal abnormalities only - ILO >0/1

ILO review Be exp	ILO review			Total
	ILO =>1/0	ILO =>2/1	ILO <1/0	
2	3	*1*	30	33
1	45	*2*	371	416
0	22	*1*	220	242
Total	70*	*4**	621*	**691***
**N=26 - no job code information available to establish Be exposure category*				

χ2 = 0.44 (high exposure cat 1,2 vs. no exposure cat 0)
p = 0.51

Odds of parenchymal abnormalities in those exposed (1,2) vs. not exposed (0)
OR = 1.20 (95% CI 0.71 to 2.04)

Odds of parenchymal abnormalities in those exposed to highest exposures (2) vs. no exposure (0)
OR = 1.00 (95% CI 0.28 to 3.54)

Odds of dramatic pulmonary fibrosis (ILO =>2/1) in those exposed to highest exposures (2) vs. no exposure (0)
OR = 7.33 (95% CI 0.45 to 120.35)

RESULTS
Lung Disease Screening

Parenchymal and/or pleural abnormalities*

- **Parenchymal =>1/0** — **N = 72 (9.5%)**
  =>2/1 — ***N = 4 (0.5%)***
- **Pleural** — **N = 47 (6.3%)**
- **Parenchymal and pleural** — **N = 36 (4.9%)**
  =>2/1 — ***N = 5 (0.7%)***

Overall prevalence of IPF reported at 14/100,000 with 75+ y.o. at 88/100,000 (Raghu et al, 2006)

****752 CXRs reviewed by at least 1 ILO reader with the highest reading for 2 and 3 readers reported***

RESULTS
History of Lung Disease
(Screening Interviews/Qnnaires)

- **Wegener's granulomatosis N = 2/1,000**
  - **Prevalence reported at 1/100,000 (Bernalillo County Registry, NM, Coultas et al, 1994)**

- **Sarcoidosis N = 2/1,000**
  - **Prevalence reported at 8/100,000 (Bernalillo County Registry, NM, Coultas et al, 1994)**

- **Bronchiolitis Obliterans**
  Organizing Pneumonia B.O.O.P N = 1/1,000

SUMMARY

Elevated rate of Beryllium sensitization despite low exposures

Fibrotic lung diseases more prevalent than expected (is this an age, smoking or pneumoconiotic effect?)

Implications for more widespread screenings of DoE populations and other workforces utilizing Be alloys


Ampco S-50
BE-CU USA
BERYLCO
BE-CU
USA
MADE IN U.S.A.
AMPCO
1 1/4
CAUTION
Striking face may mushroom. To prevent this hazard, maintain original chamfer by grinding.
AMPCO