The Legacy of the Manhattan Project and Cold War in Iowa

Energy Employees Occupational Illness Compensation Program, EEIOCPA

- **The EEOICPA, recognizes nuclear activities involved unique dangers from exposures to radioactive substances and beryllium which, even in small amounts, can cause disease. Since the inception of the nuclear weapons program hundreds of thousands of nuclear weapons workers were put at risk.**
- **EEOICPA is to provide timely and equitable compensation of covered employees, (or their survivors), for occupational illness. The Department of Labor administers the program.**
- **NIOSH's Office of Compensation Analysis and Support (OCAS) has responsibility under the Act to prepare individual dose reconstructions for specified cancer- related claims.**

Ames Lab

Frank Spedding

- After the discovery of nuclear fission in 1939, the U.S. began a national A bomb effort. In 1942, Iowa State College's Frank H. Spedding set up a Uranium processing facility in an old gymnasium.
- The Ames Project developed methods for purifying, melting and casting uranium metal, casting large ingots for reactor fuel rods. Ames produced >2 million pounds (1,000 tons) of uranium for the Manhattan Project.

Harley Wilhelm, Adrian Daane, Amos Newton, Adolf Voigt, Wayne Keller, C.F. Gray, Frank Spedding, Robert Rundle, James Warf.

Little Ankeny, Old Women's Gymnasium

Major Activities Associated with the Ames Project

Building	Dates	Major Activities
Chemistry Building	1942-1954 ?	• Basic chemical/metallurgical research pertaining to uranium, thorium, plutonium, beryllium, cerium
	1942-1945	• Chemical/metallurgical research on uranium • Process development for uranium metal production
	1943-1944	• Process development for uranium recovery from turnings • Thorium reduction experiments and process development
Annex I	1943-1945	• Uranium metal reduction/production and casting of uranium
	1943-1949	• Process development and early production of thorium metal
Annex II	1944-1947	• Recovery and casting of uranium metal from turnings
Metallurgy Building	1947-1954	• Production and casting of thorium metal

Thorium Processing

Revised HF Thorium fluoride production Bombs —

Here to for we have been using a bomb closure as described on page 63. This type of system has given us much trouble with leaks so a new type has been devised

A thick steel ring was welded around the monel bomb about one inch from the face. This ring was drilled & tapped for ½ inch cap screws at the top of the bomb and back of the ring was located the HF inlet & outlet so that the bomb covers could be removed without making any pipe connections. A blind flange was used for the closure with appropriate holes drilled for the cap screws. This flange had an inset which allowed a ring to fit over the outside of the bomb. For a gasket we used asbestos protected by 26 guage

Cartoon about Fires in the Reduction and Casting Processes and Role of Local Firemen

Cartoon about Explosions and Keeping Secretarial Staff at the Ames Lab

DAILY WEIGHTED AVERAGE EXPOSURE - AMES LABORATORY

Job	No. of Employees	Daily Weighted Concentrations d/m/M³	
		Thorium	Thoron
Simco Unloader	1	7.7	22,000
Extraction Loader Operator	1	111	19,000
Drying Operator	1	1530	1,400
HF Operators	2	3100	30,000
Foreman, Thorium Crude	1	84	3,800
Bomb Unloaders	2	44	3,100
Bomb Loaders	2	852	14,000
Packing & Jolting	1	69	4,800
Weigh Man	1	791	19,000
Foreman Metal Casting	1	0.89	1,900
Casting Operator	1	0.06	1,000
Half-time Derincing Operators	3	49	14,000
Casting & Derincing Operators	3	66	19,000
Thorium Milling Operator	1	61	6,400
Thorium Machining Operation	1	276	2,000
TOTAL PERSONNEL	22		
AVERAGE DAILY WEIGHTED CONCENTRATION		530	13,000

TABLE II (Cont'd)

Operation	Avg. Concentration (d/m/M³) Thorium	Thoron	No. of Samples
7. Loading calcining furnace with 4 trays thorium oxylate	4800	30,000	2
8. Unloading 2 trays thorium oxide in hood (weighs trays and then dumps in hood)	10800	125,000	2
9. Unloading one drum thorium oxide in large hood	7450	360,000	2
10. Loading 4 trays with thorium oxide in large hood	5850	117,000	3
11. Weighing 4 trays, making up weight and transporting to open storage area	1070	27,000	3
12. Levelling off thorium oxide in 6 trays	12000	120,000	2
13. Sweeps up thorium oxide and thorium oxylate	4000	0	1
14. Removing 12 thorium oxide trays from cooling area (Bench) and inserting trays in furnace. Sealing furnace.	132	9,400	3
15. Unloading 4 large trays thorium oxide into large hood. Weigh & dump.	16800	0	1
16. Unloading thorium fluoride furnace. Opening 3 furnaces.	270	33,000	1
17. Unloading 12 trays thorium fluoride in sets of 4 onto buggy carts	78	19,000	3
18. Transporting 12 trays on 3 buggies from HF furnace room to calcining room for cooling. Unloading buggy.	730	19,000	2

USA 012525

In the nine years before I started working for Ames Laboratory two cases of sarcoidosis and two cases of berylliosis were diagnosed in Ames Laboratory employees .

As was said before, in the short time of eight months I have been with Ames Laboratory, two new cases of sarcoidosis were detected. They had developed since the previous half-yearly chest X-ray .

On top of that in these last eight months two other cases of extensive lung anomalies in Ames Laboratory employees were found which also had become apparent since the previous half-yearly chest X-ray .

These two latter cases have now also been referred to Argonne Hospital in Chicago for specialistic differential diagnosis .

The mentioned eight cases of serious lung anomalies, four of which were found within the last eight months, prove that a continued conscientious conduction of periodical physical examinations of Ames Laboratory employees is mandatory .

These eight cases have proven beyond any reasonable doubt that the chest X-ray is an indispensable part of the said physical examination, especially for Ames Laboratory employees .

The fact that four cases of extensive lung anomalies have developed within six months after the previous chest X-ray, indicates that the Ames Laboratory employees must get their chest X-rays every six months .

In the four cases found within the last eight months no anomalies could be detected on percussion and auscultation of the chest .

Thus, the anomalies were found solely and only on the X-ray

To put it in a few words, physical examinations of Ames Lab

Piet F. van Bemmel, M.D.

9 - 16 - 1957.

Early Occupational Health in AEC

- At the time, fears over liability and lack of public trust that might result from disclosure of workplace hazards was of dominant concern. In a memo regarding possible declassification of a study suggesting that occupational radiation exposure levels “may be too high,” the head of the Insurance Branch of the AEC declared:
  - We can see the possibility of a shattering effect on the morale of the employees if they become aware that there was substantial reason to question the standards of safety under which they are working. In the hands of labor unions the results of this study would add substance to demands for extra-hazardous pay . knowledge of the results of this study might increase the number of claims of occupational injury due to radiation.

History of DOE Workers Health

- 1) DOE's early era radiation and chemical dose data are incomplete, flawed, non-existent
- 2) Workers were often not told what they worked with, nor were they monitored or adequately protected.
- 3) An AEC memo stated: "**There are possibly 300 people at Paducah who should be checked out [for Neptunium], but they are hesitant to proceed to intensive studies because of the union's use of this as an excuse for hazard pay."**
- The AEC doctor stated: "**I don't have too much faith in masks, and the dust particles here are about 0.5 micron, the very worst size biologically speaking."**
- The memo urged Union Carbide to: "**get post mortem samples on any of these potentially contaminated men for correlation of tissue content with urine output, but I' m afraid the policy at this plant is to be wary of the unions and any unfavorable public relations."**
- The AEC doctor concluded his memo stating: **"it appears Paducah has a neptunium problem, but we don't have the data to tell them how serious it is."**
- The memo said if the AEC does the conscionable thing and performs the studies, it will cause the government discomfort or impose costs.
- 4) Joe Harding, a Paducah uranium enrichment worker, died of cancer in 1980. His bones were exhumed by his widow and found with sharply elevated levels of uranium. Yet for 15 years DOE battled his widow's claim under the Kentucky worker compensation system, and expended in excess of $1 million in defense costs, only to settled for $12,500 in 1997.

Radiogenic Cancers/Effects

- Leukemia other than CLL
- Thyroid cancer
- Cancer of the breast.
- Cancer of the pharynx.
- Cancer of the esophagus.
- Cancer of the stomach.
- Cancer of the small intestine.
- Cancer of the pancreas.
- Multiple myeloma.
- Lymphomas (except Hodgkin's).
- Bile duct/gall bladder cancer.
- Primary liver cancer
- Cancer of the salivary gland.
- Cancer of the urinary tract.
- Lung cancer
- Bone cancer
- Skin cancer
- Colon cancer
- Posterior subcapsular cataracts
- Non-malignant thyroid nodular disease
- Ovarian cancer
- Parathyroid adenoma
- Tumors of the brain and central nervous system
- Rectal cancer

Beryllium

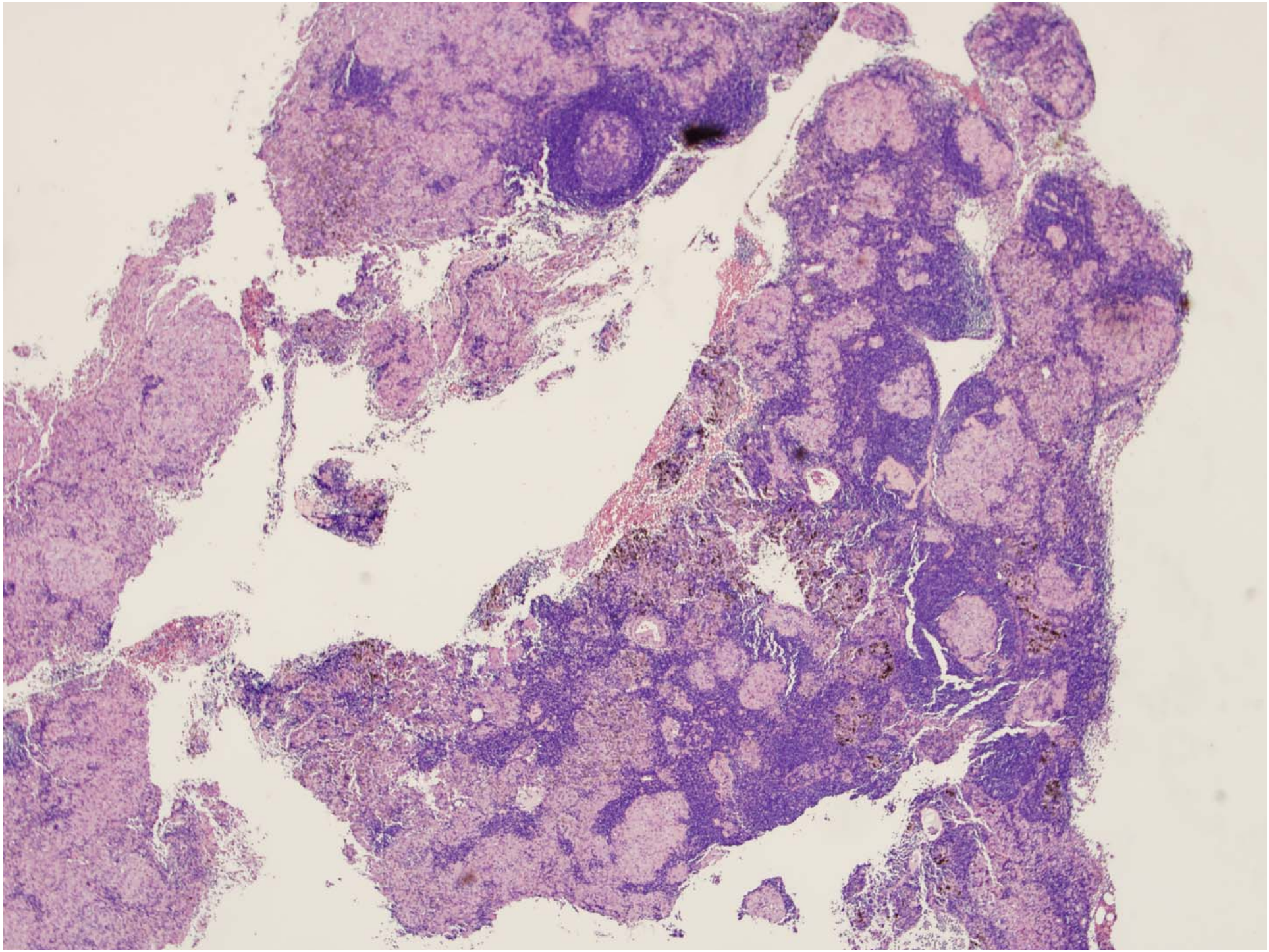
- Beryllium was widely used both in housings of explosive weaponry and in virtually all the tools used as it is a spark-free metal.
  - Berylliosis has been documented in very high prevalence in workforces who machined such casings, Oak Ridge and elsewhere.
- Beryllium screening involves initial assessment of peripheral lymphocyte sensitization, (transformation assay), and subsequently bronchoalveolar lavage and lymphocyte transformation assay of pulmonary lymphocytes.

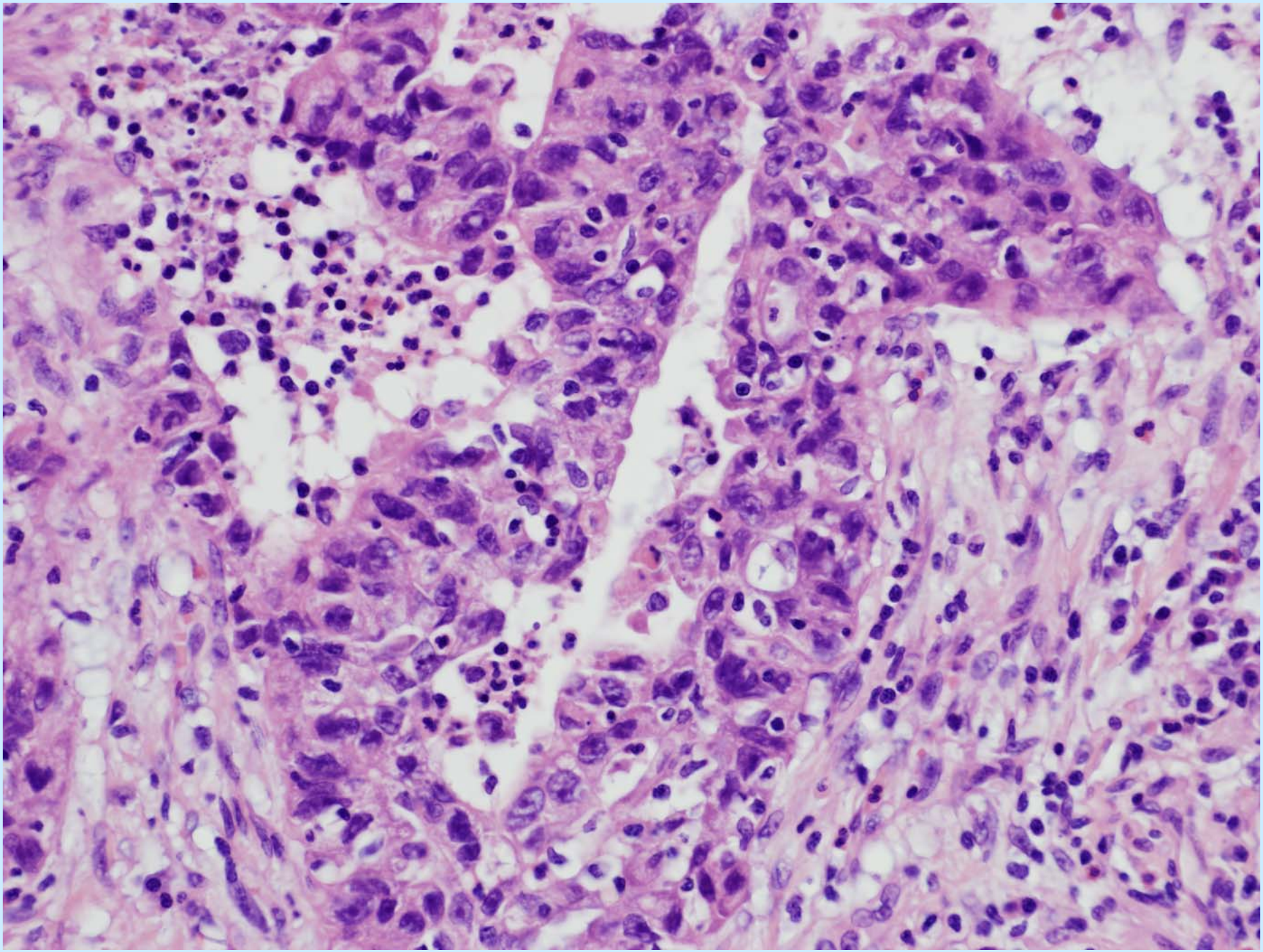
Beryllium Lung Disease

Granulomatous lung disease similar to sarcoidosis

Susceptibility

Risk for CBD does not appear to be dose related.
One of our cases of sensitization occurred in a woman who worked in the laundry for 6 months in 1968, another in a woman who's husband was a Line 1 worker.
Only 1-6% of exposed workers typically develop CBD, manifest by pulmonary granulomas, fibrosis and lymphadenopathy indistinguishable from sarcoidosis.
It may take 40 years for disease to manifest.
Ssusceptibility appears to be familial, (cases have been reported of LPT positive occupationally exposed parents and "unexposed" children).





EEOICPA Claims Process

- Semi litigious as any insurance or workers' compensation system
- Any reasonable uncertainty is to be reconciled to the benefit of the claimant
- Special Exposure Cohorts, groups for which there is not exposure data from which to develop accurate, fair and timely dose reconstruction. Members of such groups become automatically eligible for compensation for any of 22 listed cancers.

Special Exposure Cohort, SEC

- Former workers can petition NIOSH and the radiation Advisory Board to be considered as an SEC.
- SEC status is to be considered when NIOSH cannot estimate radiation doses of the employees with sufficient accuracy; and it is reasonably likely that the radiation doses endangered the health of the employees.

OMB Passback memo

Energy Employees Occupational Illness Compensation Program Act (EEOICPA) Part B. ESA is to be commended for identifying the potential for a large expansion of EEOICPA Part B benefits through the designation of Special Exposure Cohorts (SEC). The Administration will convene a White House-led interagency workgroup including HHS, and Energy to develop options for administrative procedures to contain growth in the costs of benefits provided by the program. Discussions are not limited to, but will involve, the following five options:

1. Require Administration clearance of SEC determination;
2. Address any imbalance in membership of President's Advisory Board on Radiation and Worker Health;
3. Require an expedited review by outside experts of SEC recommendations by NIOSH;
4. Require NIOSH to apply "conflict of interest" rules and constraints to the Advisory Board's contractor; and
5. Require that NIOSH demonstrate that its site profiles and other dose reconstruction guidance are balance.

Daily Thorium Doses Based on Daily Weighted Average Air Concentration for Thorium Workers, 1952

	Lung Type S	Red Marrow Type M	Bone Surface Type M
DCF, Sv/Bq (FGR 13)	1.60E-04	8.82E-05	2.23E-03
Daily weighted average air conc., dpm/m^3	3,100	3,100	3,100
Working hours per day	9	9	9
Breathing rate, m^3/hour	1.4	1.4	1.4
m^3 air intake per day	12.6	12.6	12.6
Intake, dpm/day	39,060	39,060	39,060
Intake, Bq/day	651	651	651
50-year organ dose equivalent, Sv/day	1.04E-01	5.74E-02	1.45E+00
50-year committed organ dose, rem/day	10.4	5.7	145.2

42 CFR Part 83
Class Eligibility Based on Endangerment of Health
§83.13 [c][3][i]

For classes of employees that may have been exposed to radiation during discrete incidents likely to have involved exceptionally high level exposures, such as nuclear criticality incidents or other events involving similarly high levels of exposures resulting from the failure of radiation protection controls, NIOSH will assume for the purpose of this section that any duration of unprotected exposure could cause a specified cancer, and hence may have endangered the health of members of the class. Presence with potential exposure during the discrete incident, rather than a quantified duration of potential exposure, will satisfy the health endangerment criterion.