Historic Use of Records for Hanford Site Dose Reconstruction and Analyses

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HEDR

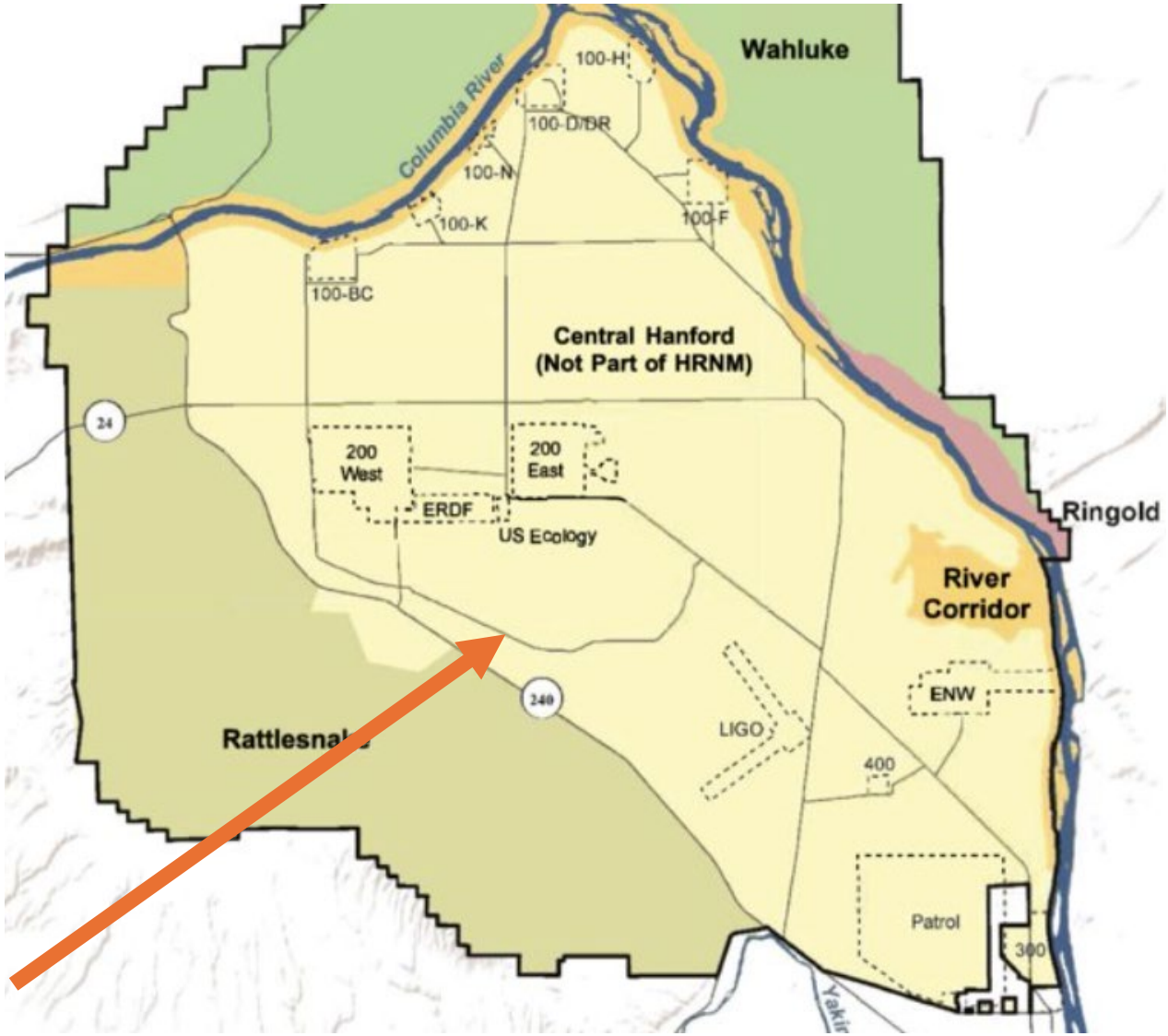
- Focus on *environmental* exposures from Hanford radionuclide releases to the off-site public
- Primary exposure pathways
  - Air submersion
  - Inhalation
  - Ingestion of food products (e.g., milk)
- Dominant radionuclide Iodine-131 (other releases of noble gases, tritium, C-14 resulted in doses 1/1,000,000 lower)
- Most record searches looked for operations and release data
- The HEDR project lasted about 7 years and cost about $30 million
- Provided *dosimetry tools* for the Hanford Thyroid Disease Study

HEDR Use of Hanford Records

- Most Hanford records were “born classified”
- In April 1990, HEDR staff compiled titles of ~11,000 classified documents from the period 1944-1960
  - This period was dictated by a DOE memorandum*
  - Hanford reactor operations (and generation of radioactive materials) started in September 1944
- A total of 1,429 documents were selected for declassification; 1,103 were ultimately declassified. This process took over 2 years
- These documents were made available at the DOE Reading Room in Richland and sent to the DOE Office of Scientific and Technical Information (OSTI)

Hanford Staffing

- Construction and operations crews were not military
- Military personnel on site were probably used as guards at the area fencelines (Bruce's personal opinion!) Later there were anti-aircraft installations outside the areas



Potential for radiation exposure outside the operating areas

The primary on-site exposure pathway is inhalation of I-131

The highest year would be 1945; subsequent years would be about an order of magnitude lower

The figure shows full-time (8760 hours/year) exposure

Military personnel would most likely have resided in the city of Richland when not on duty on-site (food pathways)

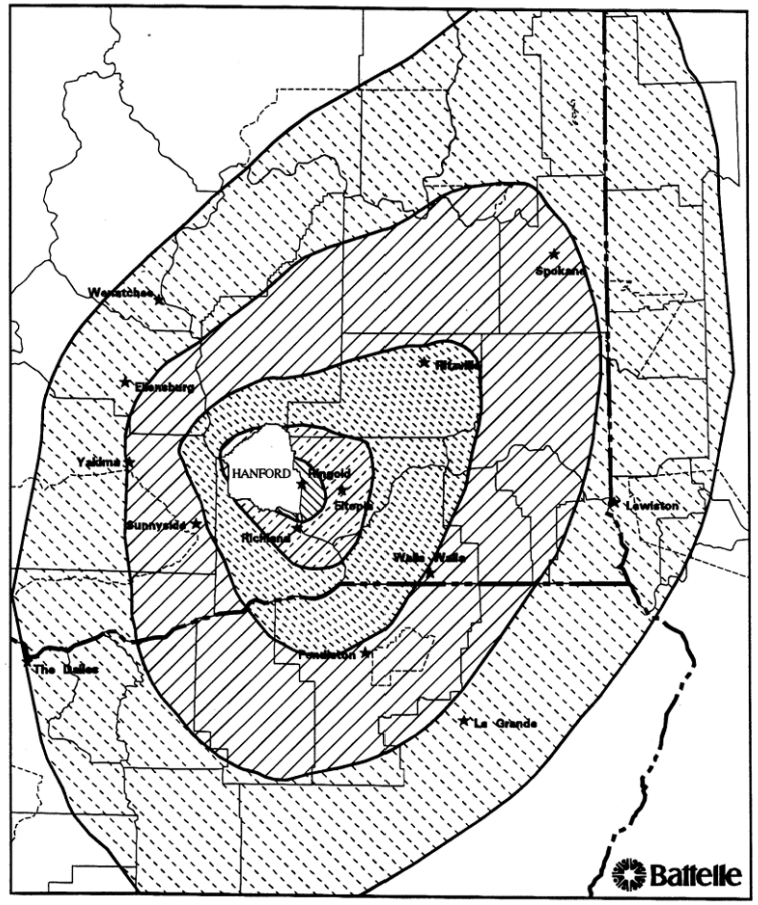


Figure 4.18 Legend. 1945 Iodine-131 Thyroid Dose (rad) from Inhalation[a]

Sex/Age Category				
Male 20-34 years	< 0.005	0.005 - 0.02	0.02 - 0.05	0.05 - 0.17
Female 20-34 years	< 0.005	0.005 - 0.02	0.02 - 0.05	0.05 - 0.17
Male >35 years	< 0.005	0.005 - 0.02	0.02 - 0.05	0.05 - 0.17
Female >35 years	< 0.005	0.005 - 0.02	0.02 - 0.05	0.05 - 0.17

Early Personnel Dosimetry

- Pencil and film badge dosimeter coverage of selected personnel began in the plant operating areas on a regular basis on the following dates:
  - 100-B Area: September 11, 1944 (pencils), Sept. 13, 1944 (film badges); B Reactor became reactive September 15, 1944.
  - 200-W Area: November 7, 1944, T-Section of 200-W was accepted for use October 9, 1944, and the first tracer run of Clinton slugs was started December 6, 1944. All of 200-W was accepted for use on December 18, 1944.
  - 300 Area: November 25, 1944. The 305 Test Pile became reactive February 23, 1944 and production line canning of slugs started May 11, 1944.
  - 100-D: December 5, 1944 and D Reactor started December 6, 1944.
  - 100-F: February 13, 1945 and F Reactor started February 15, 1945.
  - 200-E: March 15, 1945. Area was accepted for use February 2, 1945.

Dosimeter handling

- Dosimeters (“badges”) were not to be taken off site; they were held in racks at the entrance to each operating area
- Pencil crews handled and serviced the pencil dosimeters in each area gatehouse for each shift
- A traveling badge crew serviced the film badges weekly

“Thyroid Checks”

- In addition to the pencil and film dosimeters, thousands of thyroid radioactivity measurements were made on Hanford workers employed in nuclear fuel reprocessing facilities during the years 1944 through 1946. Called "thyroid checks," the measurements were performed in the general plant environment using portable radiation detection instruments. Results of the thyroid check measurements were compared to a screening level for tolerable thyroid exposure from iodine-131 to assure that workers did not receive excessive iodine-131 exposures.
- Located on ~20,000 Personnel Meters Summary record sheets
- These are “unofficial records” left by du Pont. There is no indication that military personnel were monitored…

Potential for Incompleteness

- In December 1942, the U. S. government signed a contract with the E. I. du Pont de Nemours Company for the engineering, design, construction, and operation of the Hanford Engineer Works
- du Pont left the Hanford Site September 1, 1946 – and took all official records with them

Some key references to start with:

- Gydesen SP. 1992. Declassifications Requested By the Technical Steering Panel of Hanford Documents Produced 1944-1960, PNWD-2024 HEDR
- Wilson RH. 1987. Historical Review of Personnel Dosimetry Development and its Use in Radiation Protection Programs at Hanford 1944 to the 1980s. PNL-6125
- Ikenberry TA. 1981. Evaluation of thyroid radioactivity measurement data from Hanford workers, 1944—1946. PNL-7254 HEDR
- Farris WT, et al. 1994. Atmospheric Pathway Dosimetry Report, 1944-1972. PNWD-2228 HEDR
- All this and more are available at the DOE Public Reading Room in the CIC at the WSU Richland campus, and online at OSTI.gov