Dose Reconstruction Process Overview

Mark R. Rolfes, M.S.

Research Health Physicist

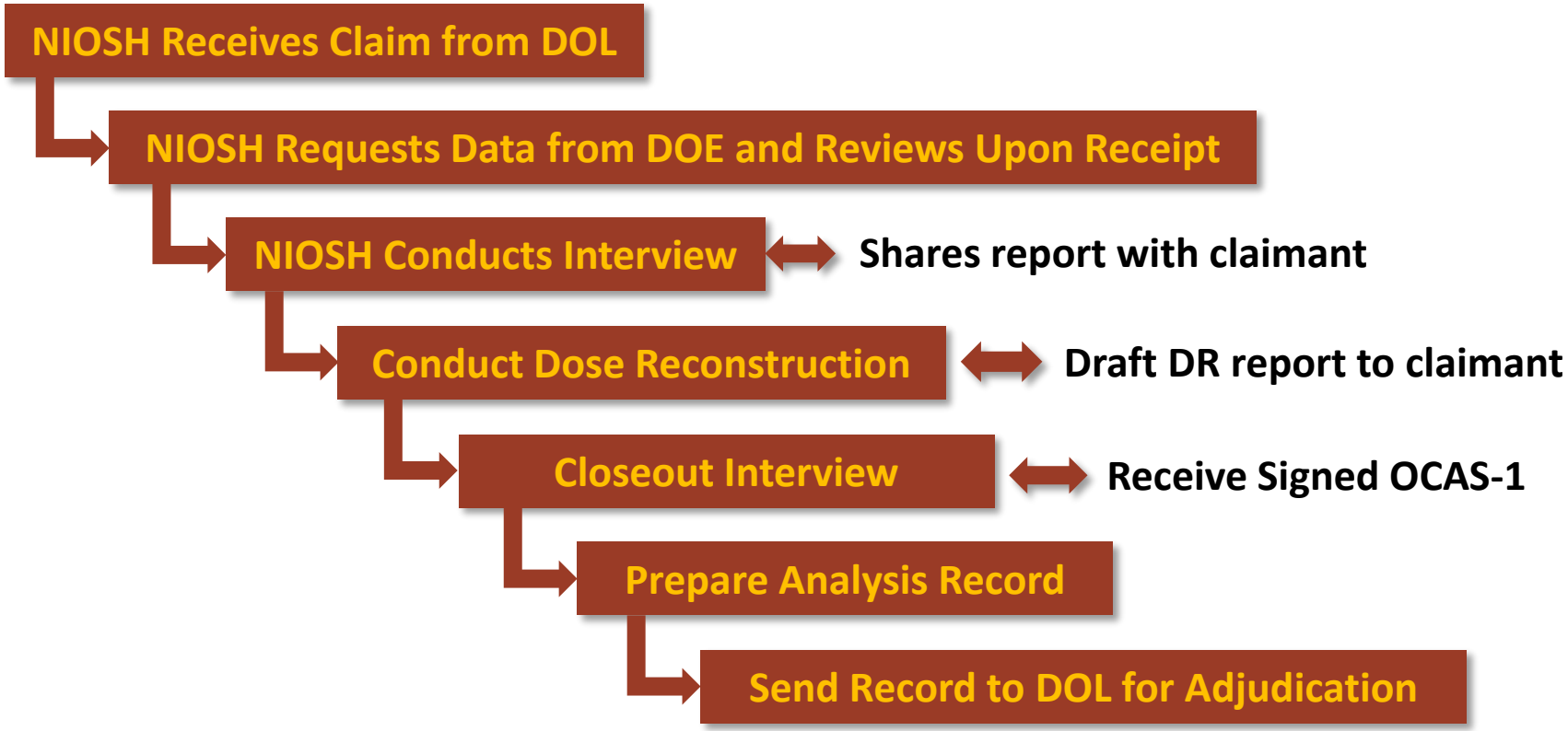
National Institute for Occupational Safety and Health

Division of Compensation Analysis and Support

Portsmouth, OH

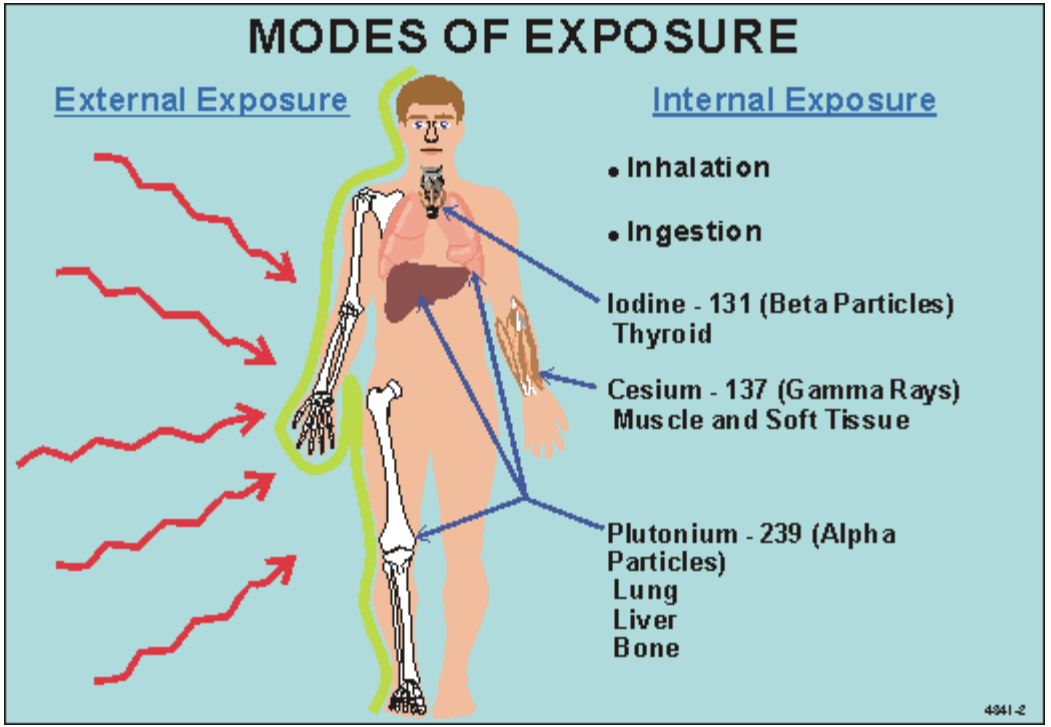
April 10, 2024

Dose Reconstruction Process



Frequently Used Terms

- **External Dose: Dose received from radiation originating outside the body.**
- **Internal Dose: Dose received from radiation originating inside the body.**



Frequently Used Terms - continued

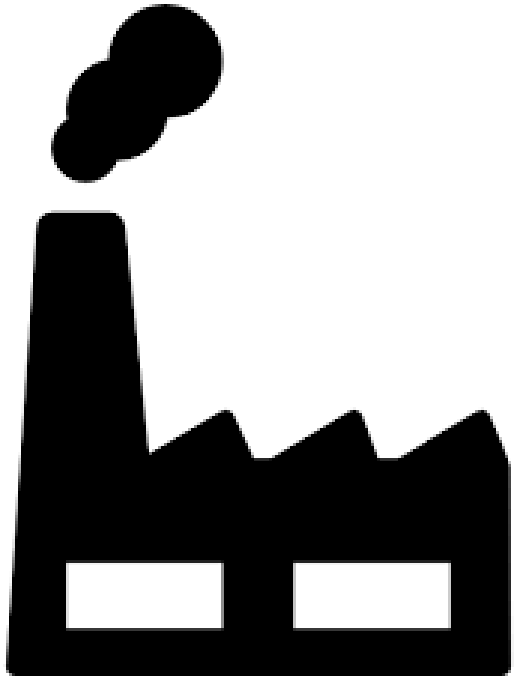
Occupational Medical Dose

- Includes diagnostic X-rays required as a condition of employment.
- Does not include diagnostic X-rays resulting from illness or injury, or dose resulting from nuclear medicine tests or radiation therapy.

Frequently Used Terms - continued

Environmental Dose

- The dose measured on and around these facilities.
- Includes external radiation as well as airborne radioactivity.
- Most useful in cases where no personnel dosimetry records exist.



Frequently Used Terms - continued

- **Overestimate**
- **Best Estimate**
- **Underestimate**
- **Partial Estimate**

Factors Impacting Dose Reconstructions

- Recorded and Missed Dose
- Radiation Types & Energies
- Cancer Type & Number
- Exposure Rate / Age / Latency
- Ethnicity (Skin Cancer)
- Smoking History (Lung Cancer)
- Claimant Favorability
- Special Exposure Cohort Designation

Basics of Dose Reconstruction

- Use all available worker and workplace information to reconstruct dose
- Evaluate all doses of record for data quality shortcomings
- Evaluate potential for undetected dose
- Use recommendations established by national and international organizations

Basics of Dose Reconstruction - continued

- Prefer to use individual monitoring data if available and of sufficient quality
- Use standard methods to evaluate “missed dose”
- If individual monitoring data not available, rely on use of co-exposure data or surrogate data
- If no personnel monitoring data, then use area dosimeters, radiation surveys, air sampling data and source term information

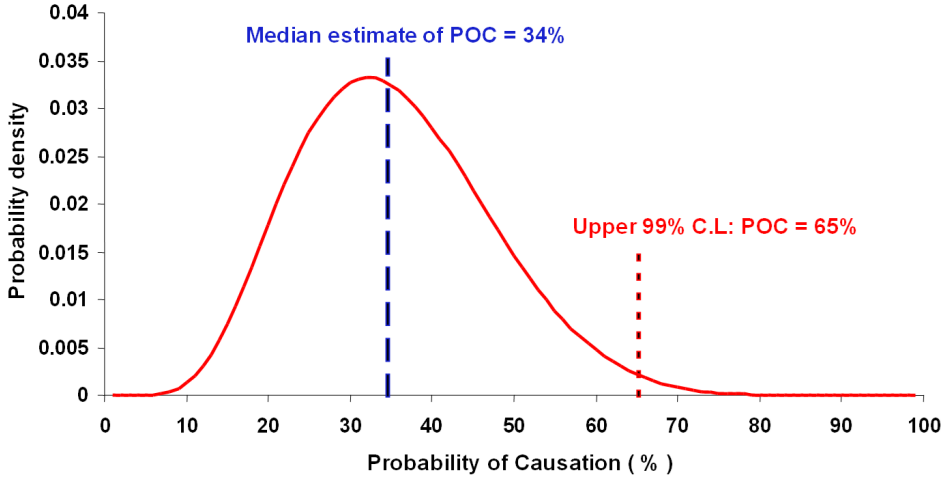
Basics of Dose Reconstruction - continued

- Annual organ doses are computed from date of first employment (as verified by DOL) to date of diagnosis
- When possible, provide an estimate of uncertainty
- Dose output will be compatible with IREP- the probability of causation software (Interactive RadioEpidemiological Program)

Probability of Causation

- The Act set the guidelines for determining probability of causation (PC or PoC).
- Eligible for compensation if the cancer was “at least as likely as not” caused by radiation on the job.
- PoC >= 50%

Applying Credibility Limits



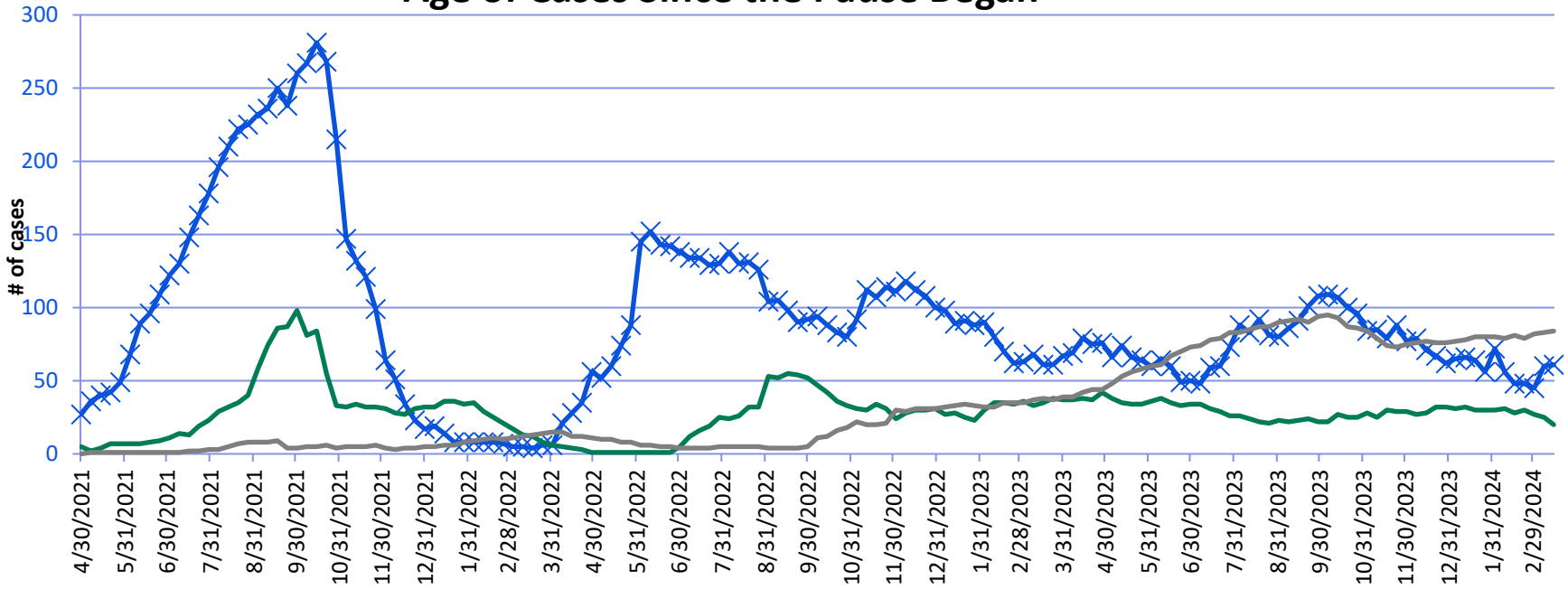
Claimant Favorable Approach

When a choice must be made between different approaches and there is no information about which approach is most technically accurate, NIOSH chooses the approach resulting in the highest probability of causation.

Some examples include:

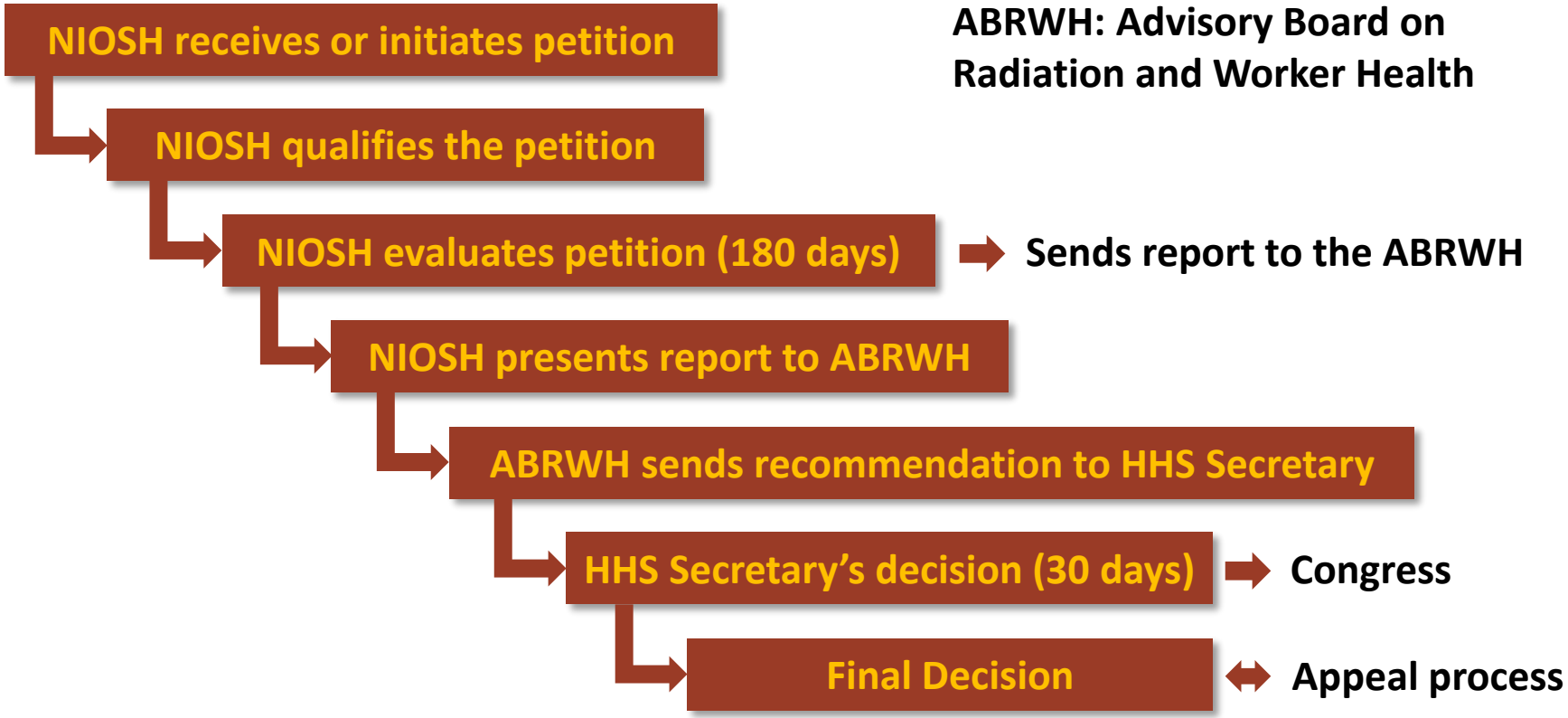
- Conservative dose conversion factors
- Addition of potential missed dose
- Solubility class of radionuclide for internal dosimetry calculations
- Composition of aged WG plutonium
- Upper 99th percentile credibility limit to determine POC.

Age of Cases Since the Pause Began



This represents the time a case is with DCAS measured from the date the case is received from DOL to the date the draft dose reconstructions are sent to claimants. DCAS goal is to complete dose reconstructions within 5 months of the receipt of the last data required for dose reconstruction. The age of cases increased significantly when the pause started in May of 2021 and peaked in October of that year. The processes in place now have reduced the age of cases steadily to date. 76 of 84 cases older than 12 months and 12 of 20 cases between 9 -12 months are not workable, primarily because we are awaiting additional information from claimants, DOE, or DOL or pending revision of a technical document.

Special Exposure Cohort Petitioning Process (42 CFR 83)



ABRWH: Advisory Board on Radiation and Worker Health

Portsmouth Gaseous Diffusion Plant
Special Exposure Cohort Designation

- Employees who worked at least 250 days before February 1, 1992 at the gaseous diffusion plant in Paducah, Kentucky; Portsmouth, Ohio; or Oak Ridge, Tennessee and who were or could have been monitored in those jobs using dosimetry badges.

- The Portsmouth Gaseous Diffusion Plant was one of the SEC classes that Congress included when the Energy Employees Occupational Illness Compensation Program Act was signed.

22 Types of Cancer Covered by the SEC

Anytime
Bone cancer
Kidney cancer
Lung cancer (other than in-situ cancer that is discovered during or after a post-mortem exam)

Onset 2 Years after First Exposure
Leukemia (other than chronic lymphocytic leukemia)

Onset 5 Years after First Exposure	
Multiple myeloma	
Lymphomas (other than Hodgkin's disease)	
Primary cancer of the:	
• Bile ducts • Brain • Breast (female) • Breast (male) • Colon • Esophagus • Gall bladder • Liver (except if cirrhosis or hepatitis B is indicated)	• Ovary • Pancreas • Pharynx • Salivary gland • Small intestine • Stomach • Thyroid • Urinary bladder

General Information

513-533-6825
dcas@cdc.gov

Josh Kinman
SEC Petition Counselor
Phone 513-533-6831
jkinman@cdc.gov

Denise Brock
NIOSH Ombudsman
636-856-0487 or 636-236-0932
CKO7@cdc.gov

DCAS Website

www.cdc.gov/niosh/ocas

Questions?

For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 www.cdc.gov

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.