



# Dose Reconstruction Process Overview

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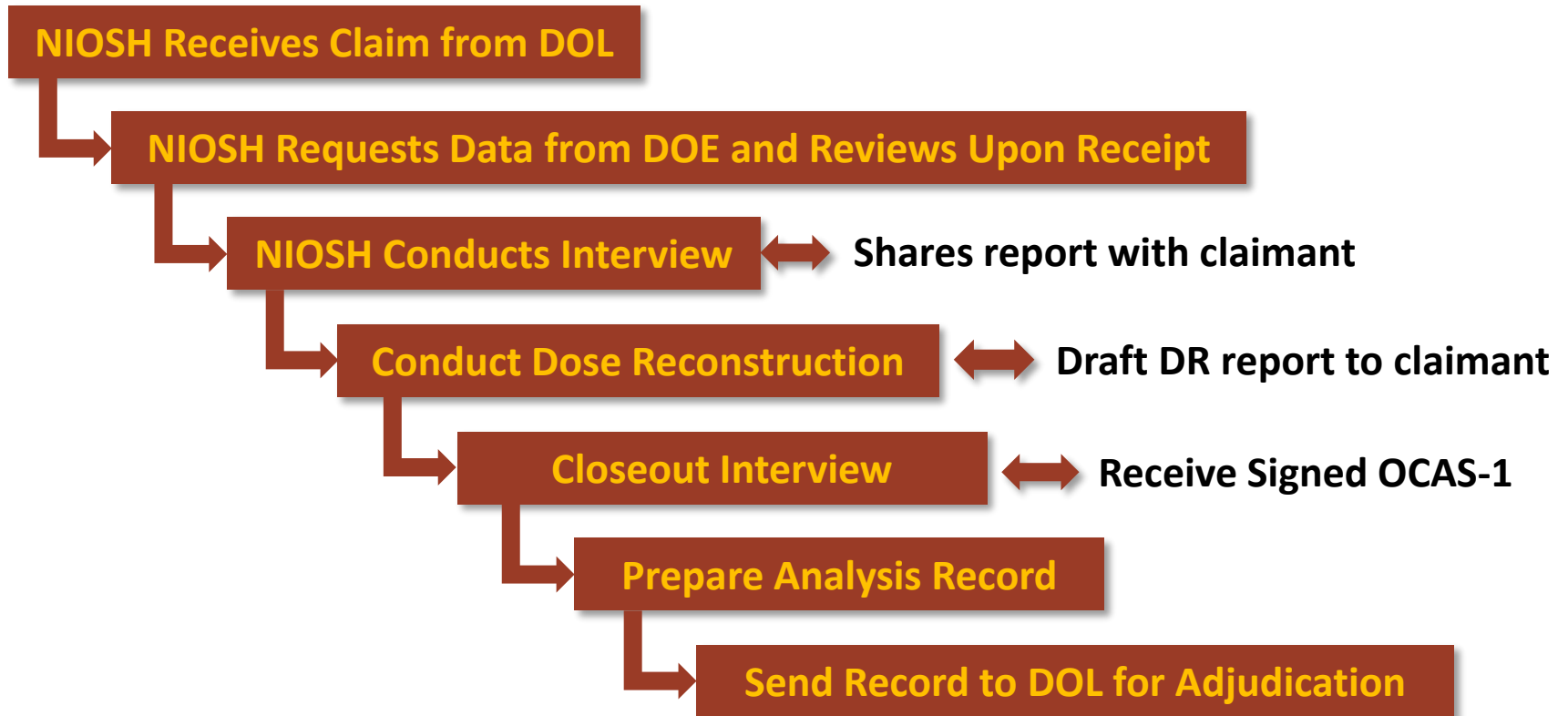
**National Institute for Occupational Safety and Health**

**Division of Compensation Analysis and Support**

Hamilton, OH

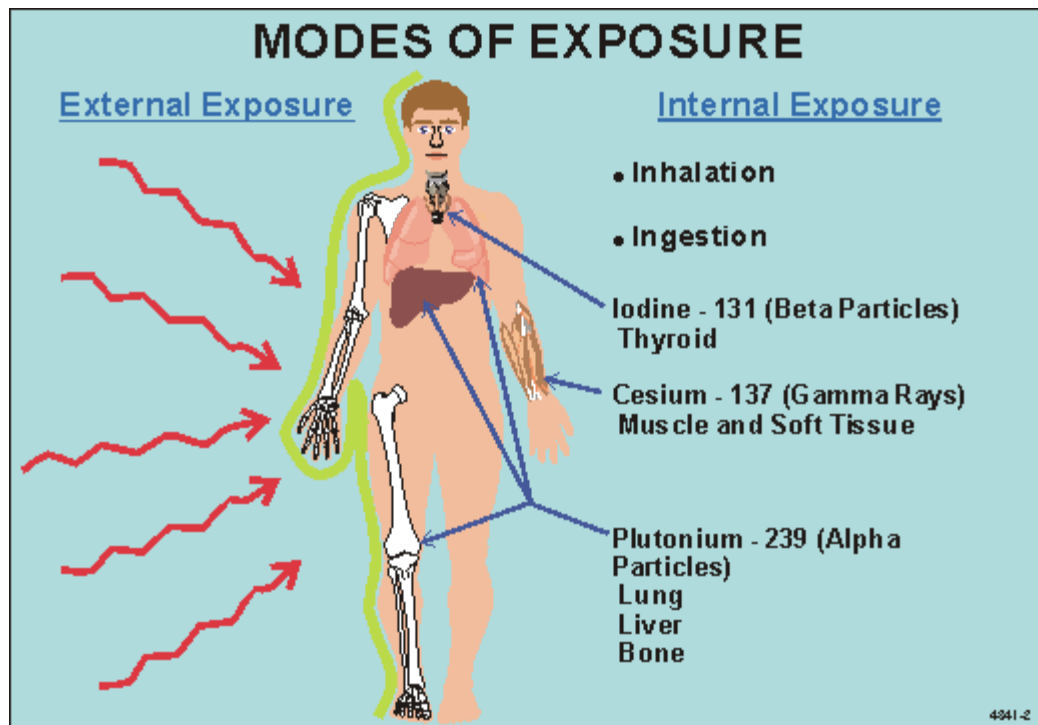
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# Dose Reconstruction Process



# 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

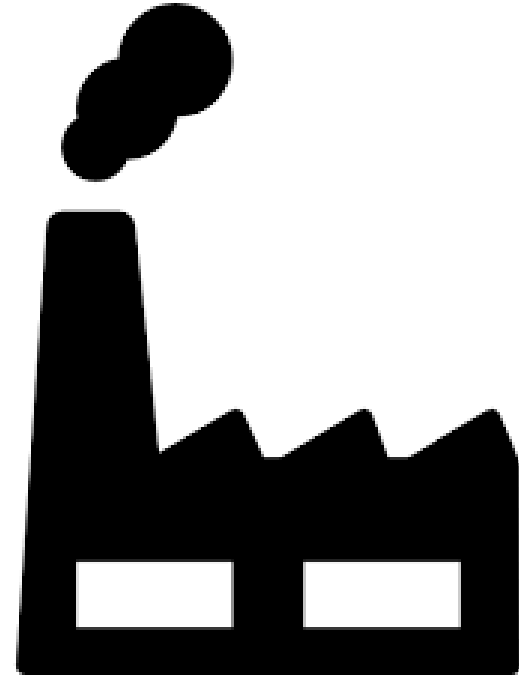
- Includes diagnostic X-rays required as a condition of employment.
- Does not include diagnostic X-rays resulting from illness or injury, or dose resulting from nuclear medicine tests or radiation therapy.



# 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”**
- **Rely on use of area dosimeters, radiation surveys, and air sampling if individual data are not available**
- **If no monitoring data, then use available data on source term, etc.**



## **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)**

## **Basics of Dose Reconstruction - continued**

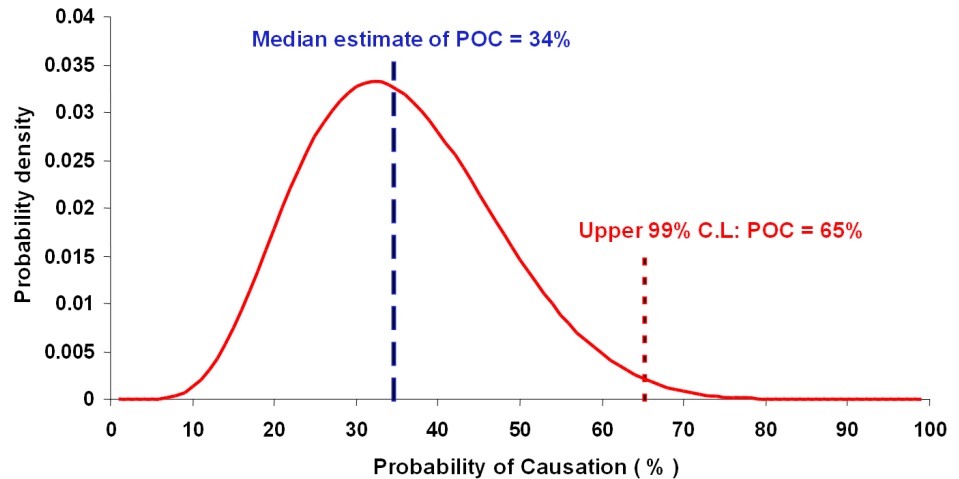
**When individual dose monitoring results are not available, doses can be estimated using:**

- **Co-exposure Models**
- **Surrogate Data**
- **Source-term modeling**

# 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.
- $PoC \geq 50\%$

## Applying Credibility Limits



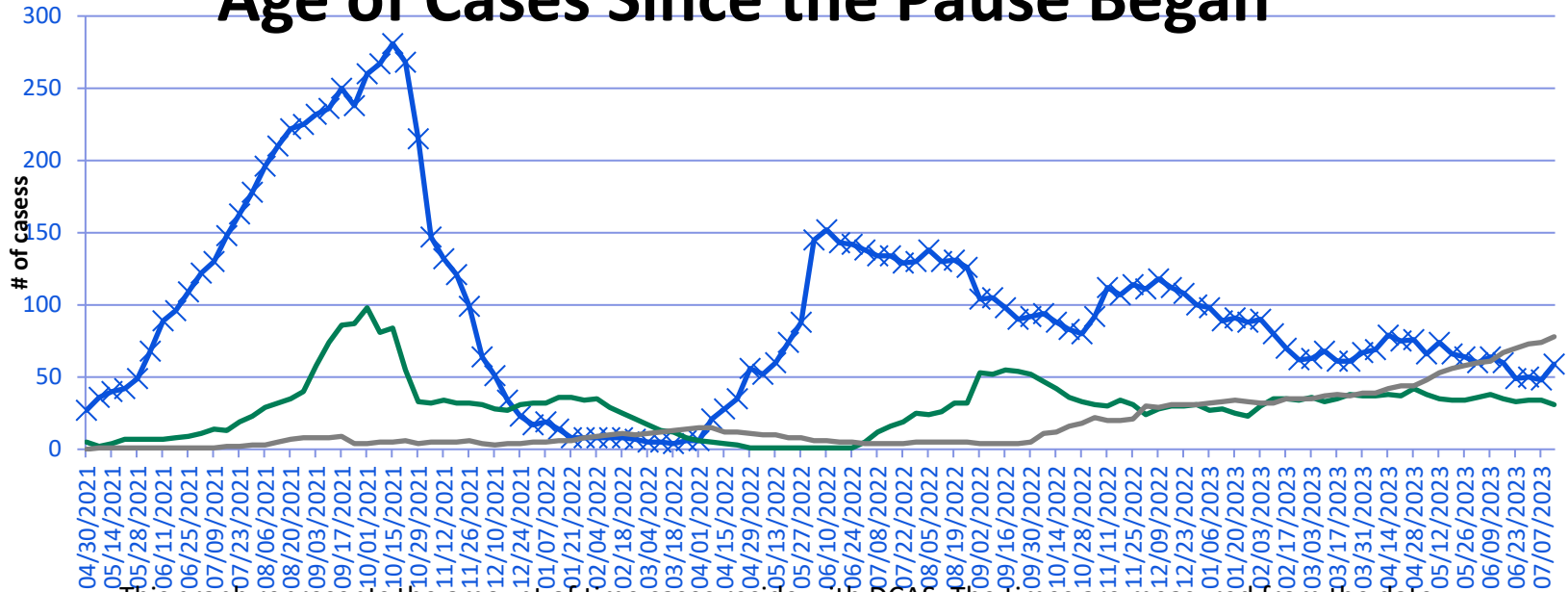
# Claimant Favorable Approach

**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 99<sup>th</sup> percentile credibility limit to determine POC.

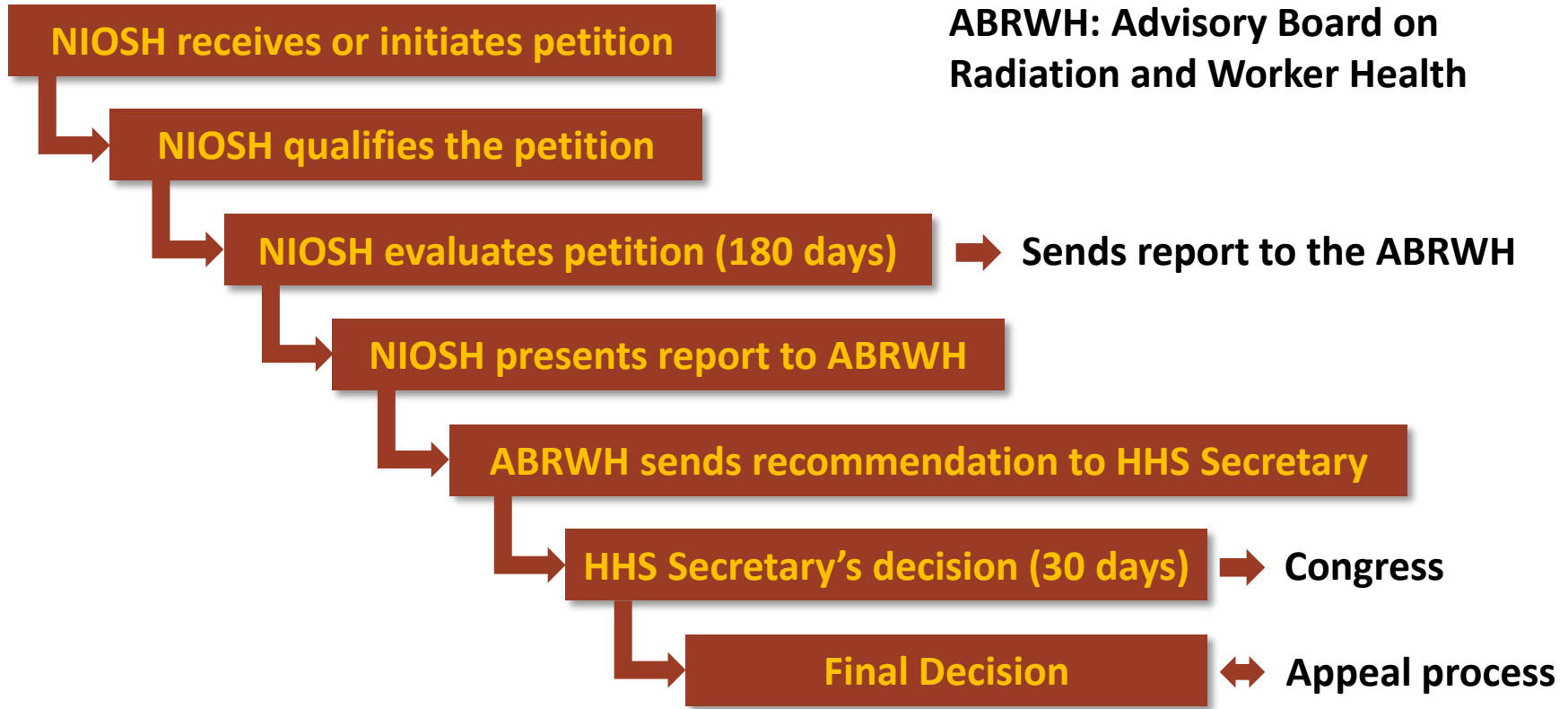
# Age of Cases Since the Pause Began



This graph represents the amount of time cases reside with DCAS. The times are measured from the date the case is received from DOL to the date the draft dose reconstructions are sent to the claimants. DCAS goal is to complete dose reconstructions within 5 months of the receipt of the last data required for dose reconstruction. Pause started in May 2021 and peaked in October of that year.

✕ 6-9 mo    
 — 9-12 mo    
 — > 12 mo

# Special Exposure Cohort Petitioning Process (42 CFR 83)



# Feed Materials Production Center Special Exposure Cohort Designations

- All employees of DOE, DOE contractors, or subcontractors who worked at all locations at the Feed Materials Production Center (FMPC) in Fernald, Ohio, also known as the Fernald Environmental Management Project (FEMP), from January 1, 1968, through December 31, 1978, for a number of work days aggregating at least 250 work days, occurring either solely under this employment or in combination with work days within the parameters established for one or more classes of employees included in the Special Exposure Cohort.

# Feed Materials Production Center Special Exposure Cohort Designations - continued

- All employees of the Feed Materials Production Center (FMPC) in Fernald, Ohio, who were not employed by National Lead of Ohio, NLO, or the Department of Energy or its predecessor agencies, who worked at FMPC from January 1, 1951, through December 31, 1983, for a number of work days aggregating at least 250 work days, occurring either solely under this employment, or in combination with work days within the parameters established for one or more other classes of employees included in the Special Exposure Cohort.



# Feed Materials Production Center Special Exposure Cohort Designations - continued

- All employees of the Department of Energy, its predecessor agencies, and their contractors and subcontractors who worked at the Feed Materials Production Center (FMPC) in Fernald, Ohio, from January 1, 1954, through December 31, 1967, for a number of work days aggregating at least 250 work days, occurring either solely under this employment, or in combination with work days within the parameters established for one or more other classes of employees included in the Special Exposure Cohort.

# Mound Plant Special Exposure Cohort Designations

- Employees of the Department of Energy (DOE), its predecessor agencies, and DOE contractors or subcontractors who worked in any areas at the Mound Plant site from October 1, 1949, through February 28, 1959, for a number of work days aggregating at least 250 work days or in combination with work days within the parameters established for one or more other classes of employees in the SEC.

# Mound Plant Special Exposure Cohort Designations - continued

- All employees of the Department of Energy (DOE), its predecessor agencies, and its contractors and subcontractors who had at least one tritium bioassay sample and worked at the Mound Plant in Miamisburg, Ohio from March 1, 1959 through March 5, 1980, for a number of work days aggregating at least 250 work days, occurring either solely under this employment, or in combination with work days within the parameters established for one or more other classes of employees in the Special Exposure Cohort.

# Mound Plant Special Exposure Cohort Designations - continued

- All employees of the Department of Energy, its predecessor agencies, and their contractors and subcontractors who worked at the Mound Plant in Miamisburg, Ohio, from September 1, 1972, through December 31, 1972, or from January 1, 1975, through December 31, 1976, for a number of work days aggregating at least 250 work days, occurring either solely under this employment or in combination with work days within the parameters established for one or more other classes of employees in the Special Exposure Cohort.

# 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

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DCAS Website

[www.cdc.gov/niosh/ocas](http://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](http://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.

