Dose Reconstruction Process Overview

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CDC

Dose Reconstruction Process

Receive Claim from DOL

Request Data from DOE and Review Upon Receipt

Conduct Interview

Interview Report to Claimant

Conduct Dose Reconstruction

Draft Dose Reconstruction Report to Claimant

Closeout Interview

Receive Signed OCAS-1

Prepare Analysis Record

Send Analysis Record to DOL

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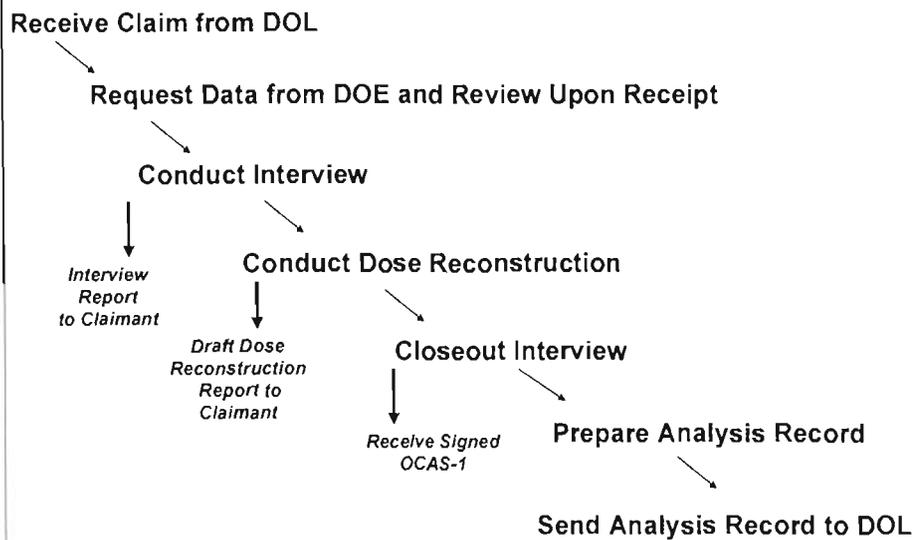
Receive DOL Information

DOL sends the case to NIOSH for dose reconstruction after determining that a claim involves a covered energy employee with cancer.

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Request DOE Information

NIOSH submits a request to DOE for the energy employee's exposure monitoring records upon receipt of the case from DOL.

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Review DOE Information

NIOSH reviews the DOE information to identify potential discrepancies in data

- Potential discrepancies may be corrected during the course of the Telephone Interview

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Perform Telephone Interview

NIOSH performs a CATI interview to:

- Verify information

- Clarify inconsistencies in data

- Obtain additional information on the work history of the energy employee such as exposure incidents, etc.

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Conduct Dose Reconstruction

NIOSH conducts a dose reconstruction to estimate how much radiation an energy employee was exposed to while working at DOE or Atomic Weapons Employer (AWE) work sites.

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Frequently Used Terms

- External dose is dose received from radiation originating outside of the body

- Internal dose is dose received from radiation originating inside the body

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Frequently Used Terms—cont.

Occupational Medical Dose

- Includes diagnostic X-rays required as a condition of employment

- Does not include X-ray resulting from illness or injury, diagnostic X-rays performed for diagnosis of illness, or dose resulting from nuclear medicine tests or radiation therapy

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Frequently Used Terms—cont.

Environmental Dose

- Environmental dose is the dose measured on and around these facilities

- Includes external radiation as well as airborne radioactivity

- Most useful in cases where no dosimetry records exist

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Frequently Used Terms—cont.

- Overestimate

- Best Estimate

- Underestimate

- Partial Estimate

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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

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Basics of Dose Reconstruction—cont.

- Preferentially use individual monitoring data if available and of sufficient quality

- Use standard tools to evaluate "missed dose"

- Rely on use of area dosimeters, radiation surveys and air sampling if individual data not available

- If no monitoring data, use available data on source term, etc.

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Basics of Dose Reconstruction—cont.

- Annual organ doses will be 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 the probability of causation software (IREP)

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Basics of Dose Reconstruction—cont.

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

- Coworker studies

- Surrogate data

- Source-term modeling

Relative Radiation Doses

- On average, everyone receives ~350
  mrem/yr from natural sources

- Chest X-ray <30 mrem

- Legal Occupational Limit 5000 mrem/yr

- Lethal Dose ~350 rem (acute)

  - 1 rem = 1000 mrem

Claimant Favorable Approach

When a choice must be made regarding the application of multiple approaches <u>and</u> there is no information regarding which option is most technically accurate, the approach resulting in the highest probability is chosen.

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Claimant Favorable Approach—cont.

- 99th Percentile Probability of Causation (POC): Defined by regulation, results in compensation for people not harmed by occupational radiation while virtually eliminating the possibility of not identifying a person who was harmed, even if doses are a best estimate

- Diagnosis of multiple cancers

- Multiple cancer POC calculation approach (treat as independent)

- Secondary cancer approach (choose highest primary)

- Multiple applicable cancer models (choose highest)

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Claimant Favorable Approach—cont.

Applying Credibility Limits

Median estimate of PC = 34%

Upper 99% C.L: PC = 65%

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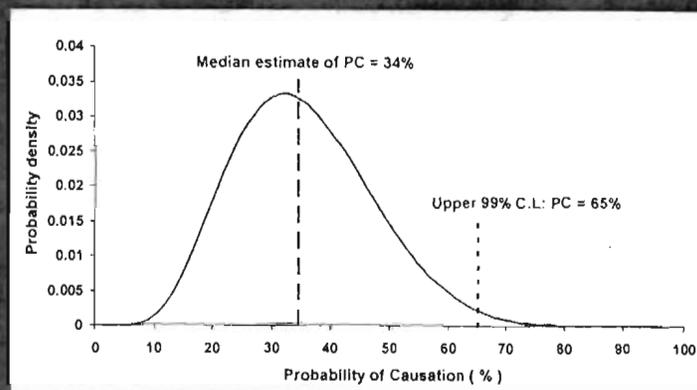
Claimant Favorable Approach—cont.

External Dose
- Dose conversion factor selection typically conservative
- External co-worker data calculations are highly claimant favorable due to inclusion of missed dose
- External co-worker data assignment approach is claimant favorable (50th or 95th percentile selection)
- Unmonitored neutron dose using neutron/gamma ratios is based on claimant-favorable assumptions
- Technical Basis Documents (TBDs) often default to worse case exposure assumptions for unmonitored workers

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Claimant Favorable Approach—cont.

External Ambient Dose

- TBD values are typically based on highest measured data

- Unknown work locations leads to selection of highest TBD values

- Values sometimes include natural background dose

- Ambient dose sometimes double counted if worker was monitored and background subtraction process not known

- 30-250 keV default energy assumption

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Claimant Favorable Approach—cont.

Occupational X-ray Dose

- Photofluorography (PFG) assumption in some cases when no clear evidence

- Default TBD frequencies are generally claimant favorable

- TBD frequencies assumed if data are not available, even if claimant interview indicated no procedures occurred

- In some cases procedures are counted even if voluntary

- Claimant-favorable assumptions applied for skin cases based on entrance skin exposure

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Claimant Favorable Approach—cont.

Internal Dose

- Solubility class assumption – can affect dose by orders of magnitude

- Radionuclides that result in highest organ dose are selected when there is uncertainty

- Organ selection for internal dose calculation is often claimant favorable (e.g., lymphomas)

- Missed dose is based on earliest possible intake date

- Dose assignment for unmonitored workers is based on internal co-worker data if any exposure potential

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Questions?

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