DEPARTMENT OF HEALTH AND HUMAN SERVICES

42 CFR Part 81

RIN 0920–ZA01

Guidelines for Determining the Probability of Causation Under the Energy Employees Occupational Illness Compensation Program Act of 2000; Notice of Proposed Rulemaking

AGENCY: Department of Health and Human Services.

ACTION: Notice of proposed rulemaking.

SUMMARY: This proposal would implement select provisions of the Energy Employees Occupational Illness Compensation Program Act of 2000 (''EEOICPA'' or ''Act''). The Act requires the promulgation of guidelines, in the form of regulations, for determining whether an individual with cancer shall be found, ''at least as likely as not,'' to have sustained that cancer from exposure to ionizing radiation in the performance of duty for nuclear weapons production programs of the Department of Energy and its predecessor agencies. The guidelines will be applied by the U.S. Department of Labor, which is responsible for determining whether to award compensation to individuals seeking federal compensation under the Act.

DATES: Comments: The Department invites written comments on this Notice of Proposed Rulemaking from interested parties. Comments on the Notice of Proposed Rulemaking must be received by December 4, 2001.

ADDRESSES: Address written comments on the notice of proposed rulemaking to the NIOSH Docket Officer. Submit comments electronically by e-mail to *NIOCINDOCKET@CDC.GOV*. See **SUPPLEMENTARY INFORMATION** for file formats and other information about electronic filing. Alternatively, submit printed comments to the following address: NIOSH Docket Office, Robert A. Taft Laboratories; M/S C34, 4676 Columbia Parkway, Cincinnati, OH 45226.

FOR FURTHER INFORMATION CONTACT: Larry Elliott, Director, Office of Compensation Analysis and Support, National Institute for Occupational Safety and Health, 4676 Columbia Parkway, MS–R45, Cincinnati, OH 45226, Telephone 513–841–4498 (this is not a toll-free number). Information requests can also be submitted by e-mail to OCAS@CDC.GOV

SUPPLEMENTARY INFORMATION:

I. Comments Invited

Interested persons or organizations are invited to participate in this rulemaking by submitting written views, arguments, recommendations, and data. Comments are invited on any topic related to this rulemaking. Some generic topics for comment include the following questions:

(1) Does the proposal make appropriate use of current science and medicine for evaluating and quantifying cancer risks for DOE workers exposed to ionizing radiation in the performance of duty?

(2) Does the proposal appropriately adapt compensation policy as it has been applied for the compensation of veterans with radiation exposure from atomic bombs to compensation policy for radiation-exposed nuclear weapons production workers?

(3) Does the proposal appropriately and adequately address the need to ensure procedures under this rule remain current with advances in radiation health research?

Comments should identify the author(s), return address, and phone number, in case clarification is needed. Comments can be submitted by e-mail to: *NIOCINDOCKET@CDC.GOV*. If submitting comments by e-mail, they should be provided as a Word or Word Perfect file attachment. Printed comments can also be submitted to the address above. The Secretary will consider all communications received on or before the closing date for comments. All comments submitted will be available for examination in the Rule Docket both before and after the closing date for comments. A report summarizing each substantive public contact with personnel involved in this rulemaking will be filed in the docket. An electronic docket containing all comments submitted by e-mail will be available over the Internet on the National Institute for Occupational Safety and Health (NIOSH) homepage at *www.cdc.gov/niosh*.

HHS will request the Advisory Board on Radiation and Worker Health, an advisory committee to HHS established under EEOICPA, to conduct a technical review of this proposal. Notices announcing the meetings of the Board will be published in the **Federal Register**. The record for this rulemaking will remain open until the Board has completed its review.

II. Final Rule

The Department of Health and Human Services (''HHS'') expects to issue a final rule within six months of publication of this notice of proposed rulemaking.

III. Background

A. Statutory Authority

The Energy Employees Occupational Illness Compensation Program Act of 2000(''EEOICPA''), Public Law 106–398, 114 Stat. 1654, 1654A–1231 (October 30, 2000), was enacted as Title XXXVI of the Floyd D. Spence National Defense Authorization Act for Fiscal Year 2001. EEOICPA established a compensation program to provide a lump sum payment of $150,000 and medical benefits as compensation to covered employees suffering from designated illnesses incurred as a result of their exposure to radiation, beryllium, or silica while in the performance of duty for the Department of Energy and certain of its vendors, contractors, and subcontractors. This legislation also provided for payment of compensation to certain survivors of covered employees.

EEOICPA instructed the President to designate one or more federal agencies to carry out the compensation program. Pursuant to this statutory provision, the President issued Executive Order 13179 titled Providing Compensation to America's Nuclear Weapons Workers, which assigned primary responsibility for administering the compensation program to the Department of Labor (''DOL''). 65 FR 77,487 (Dec. 7, 2000). DOL published an interim final rule governing DOL's administration of EEOICPA on May 25, 2001 (66 FR 28948).

The executive order directed HHS to perform several technical and policymaking roles in support of the DOL program:

(1) HHS is to develop guidelines to be used by DOL to assess the likelihood that an employee with cancer developed that cancer as a result of exposure to radiation in performing his or her duties at a DOE facility or Atomic Weapons Employer (AWE) facility. These ''Probability of Causation'' guidelines are the subject of this proposal.

(2) HHS is also to develop methods to estimate radiation doses (''dose reconstruction'') for certain individuals with cancer applying for benefits under the DOL program. These methods are being published simultaneously with this proposal as an interim final rule with request for comments under 42 CFR part 82 in this issue of the Federal Register. HHS is to apply these methods to conduct the program of dose reconstruction required by EEOICPA.

(3) HHS is to staff the Advisory Board on Radiation and Worker Health and provide it with administrative and other necessary support services. The Board, a federal advisory committee, will

advise HHS in implementing its roles under EEOICPA described here.

(4) Finally, HHS is to develop and apply procedures for considering petitions to be added to the *Special Exposure Cohort* established under EEOICPA by classes of employees. Employees included in the *Special Exposure Cohort* who have a *specified cancer* and meet other conditions, as defined by EEOICPA and DOL regulations (66 FR 28948), qualify for compensation under EEOICPA. HHS procedures for considering Special Exposure Cohort petitions are under development. HHS expects to issue these procedures within the next six months.

As provided for under section 3625 of EEOICPA, HHS is implementing its responsibilities with the assistance of the National Institute for Occupational Safety and Health (''NIOSH''), an institute of the Centers for Disease Control and Prevention, HHS.

B. Purpose of Probability of Causation Guidelines

Under EEOICPA, a covered employee seeking compensation for cancer, other than as a member of the *Special Exposure Cohort* seeking compensation for a *specified cancer*, is eligible for compensation only if DOL determines that the cancer was ''at least as likely as not'' (a 50% or greater probability) caused by radiation doses incurred in the performance of duty while working for DOE and/or an atomic weapons employer (AWE) facility. These guidelines provide DOL with the procedure to make these determinations, and specify the information DOL will use.

HHS notes that EEOICPA does not authorize the establishment of new radiation protection standards through the promulgation of these guidelines, and these proposed guidelines would not constitute such new standards.

C. Statutory Requirements for Probability of Causation Guidelines

Section 3623(c) of EEOICPA makes several general requirements concerning the development of these guidelines. It requires the guidelines provide for determinations that are based on the radiation dose received by the employee, incorporating the methods of dose reconstruction to be established by HHS. It requires determinations be based on the upper 99 percent ''confidence interval'' (credibility limit) of the probability of causation in the radioepidemiological tables published under section 7(b) of the Orphan Drug Act (42 U.S.C. 241 note), as such tables may be updated. EEOICPA also requires HHS to consider the type of cancer, past health-related activities, the risk of developing a radiation-related cancer from workplace exposure, and other relevant factors. It is also important to note EEOICPA does not include a requirement limiting the types of cancers to be considered radiogenic for these guidelines.

D. Understanding Probability of Causation

Probability of Causation is a technical term generally meaning an estimate of the percentage of cases of illness caused by a health hazard among a group of persons exposed to the hazard. This estimate is used in compensation programs as an estimate of the probability or likelihood that the illness of an individual member of that group was caused by exposure to the health hazard. Other terms for this concept include ''assigned share'' and ''attributable risk percent''.

In this proposal, the potential hazard is ionizing radiation to which U.S. nuclear weapons workers were exposed in the performance of duty; the illnesses are specific types of cancer. The probability of causation (PC) is calculated as the risk of cancer attributable to radiation exposure (RadRisk) divided by the sum of the baseline risk of cancer to the general population (BasRisk) plus the risk attributable to the radiation exposure, then multiplied by 100 percent, as follows:

$$\frac{\text{RadRisk}}{\text{RadRisk} + \text{BasRisk}} \times 100\% = \text{PC}$$

This calculation provides a percentage estimate between 0 and 100 percent, where 0 would mean 0 likelihood that radiation caused the cancer and 100 would mean 100 percent certainty that radiation caused the cancer.

Scientists evaluate the likelihood that radiation caused cancer in a worker by using medical and scientific knowledge about the relationship between specific types and levels of radiation dose and the frequency of cancers in exposed populations. Simply explained, if research determines that a specific type of cancer occurs more frequently among a population exposed to a higher level of radiation than a comparable population (a population with less radiation exposure but similar in age, gender, and other factors that have a role in health), and if the radiation exposure levels are known in the two populations, then it is possible to estimate the proportion of cancers in the exposed population that may have been caused by a given level of radiation.

If scientists consider this research sufficient and of reasonable quality, they can then translate the findings into a series of mathematical equations that estimate how much the risk of cancer in a population would increase as the dose of radiation incurred by that population increases. The series of equations, known as a dose-response or quantitative risk assessment model, may also take into account other health factors potentially related to cancer risk, such as gender, smoking history, age at exposure (to radiation), and time since exposure. The risk models can then be applied as an imperfect but reasonable approach to determine the likelihood that the cancer of an individual worker was caused by his or her radiation dose.

E. Development and Use of Radioepidemiological Tables and Interactive RadioEpidemiological Program (IREP)

In 1985, in response to a congressional mandate in the Orphan Drug Act, a panel established by the National Institutes of Health developed a set of *radioepidemiological tables.* The tables serve as a reference tool providing probability of causation estimates for individuals with cancer who were exposed to ionizing radiation. Use of the tables requires information about the person's dose, gender, age at exposure, date of cancer diagnosis and other relevant factors. The tables are used by the Department of Veterans Affairs (DVA) to make compensation decisions for veterans with cancer who were exposed in the performance of duty to radiation from atomic weapon detonations.

The primary source of data for the 1985 tables is research on cancer-related deaths occurring among Japanese atomic bomb survivors from World War II.

The 1985 tables are presently being updated by the National Cancer Institute (NCI) and the Centers for Disease Control and Prevention [1] to incorporate progress in research on the relationship between radiation and cancer risk. The draft update has been reviewed by the National Research Council [2]. DOL will employ the updated version of the tables, with certain additional modifications important to claims under EEOICPA (described under ''G'' below), as a basis for determining probability of

[1] Draft Report of the NCI–CDC Working Group to Revise the 1985 NIH Radioepidemiological Tables, May 31, 2000.

[2] A Review of the Draft Report of the NCI–CDC Working Group to Revise the ''1985 Radioepidemiological Tables'', National Research Council.

causation for employees covered under EEOICPA.

A major scientific change achieved by this update is the use of risk models developed from data on the occurrence of cancers (cases of illness) rather than the occurrence of cancer deaths among Japanese atomic bomb survivors. The risk models are further improved by being based on more current data as well. Many more cancers have been modeled in the revised report. The new risk models also take into account factors that modify the effect of radiation on cancer, related to the type of radiation dose, the amount of dose, and the timing of the dose.

A major technological change accompanying this update, which represents a scientific improvement, is the production of a computer software program for calculating probability of causation. This software program, named the *Interactive RadioEpidemiological Program* (IREP), allows the user to apply the NCI risk models directly to data on an individual employee. This makes it possible to estimate probability of causation using better quantitative methods than could be incorporated into printed tables. In particular, IREP allows the user to take into account uncertainty concerning the information being used to estimate probability of causation. There typically is uncertainty about the radiation dose levels to which a person has been exposed, as well as uncertainty relating levels of dose received to levels of cancer risk observed in study populations.

Accounting for uncertainty is important because it can have a large effect on the probability of causation estimates. DVA, in their use of the 1985 radioepidemiological tables, uses the probability of causation estimates found in the tables at the upper 99 percent credibility limit. This means when DVA determines whether the cancer of a veteran was more likely than not caused by radiation, they use the estimate that is 99 percent certain to be greater than the probability that would be calculated if the information on dose and the risk model were perfectly accurate. Similarly, these HHS guidelines, as required by EEOICPA, will use the upper 99 percent credibility limit to determine whether the cancers of employees are at least as likely as not caused by their occupational radiation doses. This will help minimize the possibility of denying compensation to claimants under EEOICPA for those employees with cancers likely to have been caused by occupational radiation exposures.

F. Use of IREP for Energy Employees

The risk models developed by NCI and CDC for IREP provide the primary basis for developing guidelines for estimating probability of causation under EEOICPA. They directly address 33 cancers and most types of radiation exposure relevant to employees covered by EEOICPA. These models take into account the employee's cancer type, year of birth, year of cancer diagnosis, and exposure information such as years of exposure, as well as the dose received from gamma radiation, x rays, alpha radiation, beta radiation, and neutrons during each year. The risk model for lung cancer takes into account smoking history as well. None of the risk models explicitly accounts for exposure to other occupational, environmental, or dietary carcinogens. Models accounting for these factors have not been developed and may not be possible to develop based on existing research. Moreover, DOL could not consistently or efficiently obtain the data required to make use of such models.

IREP models do not specifically include cancers as defined in their early stages: Carcinoma in situ (CIS). These lesions are becoming more frequently diagnosed, as the use of cancer screening tools, such as mammography, have increased in the general population. The risk factors and treatment for CIS are frequently similar to those for malignant neoplasms, and, while controversial, there is growing evidence that CIS represents the earliest detectable phase of malignancy [3]. Therefore, for determining compensation under EEOICPA, HHS is proposing that CIS be treated as a malignant neoplasm of the specified site.

Cancers identified by their secondary sites (sites to which a malignant cancer has spread), when the primary site is unknown, raise another issue for the application of IREP. This situation will most commonly arise when death certificate information is the primary source of a cancer diagnosis. It is accepted in medicine that cancer-causing agents such as ionizing radiation produce primary cancers. This means, in a case in which the primary site of cancer is unknown, the primary site must be established by inference to estimate probability of causation.

HHS is proposing to establish such assignments in these guidelines, based on an evaluation of the relationship between primary and secondary cancer sites using the National Center for Health Statistics (NCHS) Mortality Database for years 1995–1997. Because national cancer incidence databases (e.g., the National Cancer Institute's Surveillance, Epidemiology and End Results program) do not contain information about sites of metastasis, the NCHS database is the best available data source at this time to assign the primary site(s) most likely to have caused the spread of cancer to a known secondary site. For each secondary cancer, the set of primary cancers producing approximately 75% of that secondary cancer among the U.S. population was identified (males and females were considered separately). The sets are tabulated in this rule (Table 1). HHS is proposing that the final assignment of a primary cancer site for an individual claim would be determined by DOL on a case-by-case basis, as the site among possible primary sites which results in the highest probability of causation estimate.

Employees diagnosed with two or more primary cancers also raise a special issue for determining probability of causation. Even under the assumption that the biological mechanisms by which each cancer is caused are unrelated, uncertainty estimates about the level of radiation delivered to each cancer site will be related. While fully understanding this situation requires statistical training, the consequence has simple but important implications. Under this proposal, instead of determining the probability that each cancer was caused by radiation, DOL would have to perform an additional statistical procedure following the use of IREP to determine the probability that *at least one* of the cancers was caused by the radiation. This approach is important to the claimant because it would determine a higher probability of causation than would be determined for either cancer individually.

G. Limitations of IREP for Energy Employees

IREP is being developed to serve the needs of DVA in deciding cancer compensation claims for veterans. This means IREP has to be adapted in various ways to meet the needs of DOL, because the radiation exposure experience of

[3] Kerlikowske, K, J Barclay, D Grady, EA Sickles, and V Ernster. ''Comparison of risk factors for ductal carcinoma in situ and invasive breast cancer.'' J. Natl. Canc. Inst. 89:76–82, 1997.

Grippo, PJ, and EP Sandgren. ''Highly invasive transitional cell carcinoma of the bladder in a simian virus 40 T-antigen transgenic mouse model''. Am. J. Pathol. 157:805–813, 2000.

Correa P. ''Morphology and natural history of cancer precursors'' Chapter 4 in: Cancer Epidemiology and Prevention, 2nd Edition, D Schottenfeld and JF Fraumeni Jr, eds. New York: Oxford University Press, 1996.

employees covered by EEOICPA differs substantially.

Some employees covered by EEOICPA were substantially exposed to radon and other sources of high *linear energy transfer (LET)* radiation. This type of radiation exposure has unique properties affecting cancer risk, which are not addressed in the risk models included in IREP. Specifically, the IREP risk models do not account for a possible *inverse dose-rate effect* for high-LET radiation exposures. This effect means at any particular dose level, especially higher dose levels, a dose of high LET radiation incurred gradually over time is more likely to cause cancer than the same total dose incurred quickly or at once. A substantial body of research supports this finding, including studies of uranium miners,[4] patients exposed to bone-seeking radium alpha particles,[5] and research on the cancer effects of high LET radiation in animals.[6] Because high-LET radiation is an important type of radiation exposure among employees covered by EEOICPA, NIOSH will modify IREP to include uncertainty associated with the assumption of an inverse dose-rate effect for these exposures.

The DOE workforce has been exposed to various types of neutron energies and these exposures are frequently documented in the worker's dosimetry records. The *relative biological effectiveness* (RBE) of radiation exposure, a factor in cancer risk models that accounts for the differing level of cancer risk associated with different forms of radiation, varies as a function of neutron energy.[7] This variation in RBE related to differing neutron energy is not accounted for in the current version of IREP, which contains a single neutron RBE distribution. Therefore, NIOSH will modify IREP for DOE workers to include different RBE distributions for neutrons of various energies.

The currently-available draft of IREP does not incorporate a unique lung cancer model for radon exposure, which is an important exposure for some workers covered under EEOICPA. Using epidemiologic evidence on the lung carcinogenicity of radon exposures, NCI is incorporating a lung cancer model for radon exposures into the revised version of IREP. The data source for this model is the analysis conducted by the federal Radiation Exposure Compensation Act Committee.[8]

NIOSH will modify IREP to eliminate an assumption for non-leukemia cancers that low-level acute radiation doses (defined in IREP as doses between 3 and 30 cSv) cause less risk, per unit of dose, than higher level acute doses. A recent study of the Japanese atomic bomb survivors supports this change.[9]

Additionally, some employees covered by EEOICPA were required, as a condition of employment, to undergo routine medical screening with x rays. The dose resulting from these x rays will be included in their dose reconstruction. This requires NIOSH to add to IREP an RBE distribution appropriate to the low-energy form of radiation produced from some of these x rays.[10]

There is no risk model in IREP for estimating the probability of causation of bone cancer by high-LET radiation exposure. Research has found bone cancer risk substantially and significantly elevated among animals and humans exposed to certain forms of high-LET radiation.[11] NIOSH will add a risk model for bone cancer, based on recently completed assessments of risks associated with plutonium exposures.[12]

Limitations of current research and development have prevented NIOSH from considering and implementing all possible improvements to IREP at the time of this proposal. In the future, NIOSH may make additional changes in IREP to address differences in radiation-related cancer risk between Japanese atomic bomb survivors and employees involved in nuclear weapons production. Some research has shown substantial differences in risk for certain cancers, such as brain cancer and multiple myeloma.[13] The radiation-related risk of these cancers is significantly elevated among employees involved in nuclear weapons production, whereas it is not among the Japanese study population. The IREP risk models for these cancers were produced using data from the Japanese study population.

Similarly, it may be possible to improve the fit of IREP risk models to employees covered by EEOICPA with respect to differences between the frequency of certain cancers in the general population in the United States versus Japan. The IREP risk models include a simplistically derived factor (*risk transfer*) that accounts for these differences, based on expert judgment. For some cancers, such as breast and stomach cancer, sufficient research may exist to improve this factor. In addition, where current IREP risk models could be replaced with risk models based on studies of U.S. DOE workers, or other U.S. populations, this factor could be omitted entirely.

The potential future use of risk models based on studies of U.S. DOE workers may also eliminate limitations arising because data are sparse for certain cancers among the Japanese atomic bomb survivors, such as most specific types of leukemia. Using data on the Japanese cohort, the effect on risk of age at time of exposure to radiation, an important modifier of leukemia risk, cannot be estimated for specific types of leukemia, except chronic myeloid leukemia. It can only be estimated for other leukemia types by using a general leukemia model that combines data from cases of different types of leukemia.

Finally, NIOSH may make modifications in cancer risk models in IREP, as appropriate and if feasible, to account for the changing frequency among the general population (baseline

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[4] Hornung RW, Meinhardt TJ. Quantitative risk assessment of lung cancer in U.S. uranium miners. Health Phys 52: 417–430, 1987.

Lubin JH, Boice JD Jr, Edling C, et al. Radon-exposed underground miners and the inverse dose-rate (protraction enhancement) effects. Health Phys 69:494–500, 1995.

[5] Mays CW, Spiess H. Bone sarcomas in patients given radium-224. In: Radiation Carcinogenesis: Epidemiology and Biological Significance. Boice JD Jr, Fraumeni JF Jr (eds): New York: Raven Press, pp 241–252, 1984.

[6] Luebeck EG, Curtis SB, Cross FT, Moolgavkar SH. Two-stage model of radon-induced malignant lung tumors in rats: effects of cell killing. Radiat. Res. 145:163–173, 1996.

Hall EJ, Miller RC, Brenner DJ. Neoplastic transformation and the inverse dose-rate effect for neutrons. Radiat. Res. 128 (Suppl): S75–S80, 1991.

[7] International Commission on Radiological Protection (ICRP) 60: ''1990 Recommendations of the International Commission on Radiological Protection.'' Ann. ICRP 21(1–3):1–201.

[8] Final Report of the Radiation Exposure Compensation Act Committee, submitted to the Human Radiation Interagency Working Group, July 1996 (Appendix A), 30 pp (plus Figures).

[9] Pierce DA and Preston DL ''Radiation-related cancer risks at low doses among atomic bomb survivors.'' Radiat. Res. 154:178–186, 2000.

[10] ICRU Report 40: The quality factor in radiation protection. Internat. Commission on Radiat. Units and Meas., 33 pp, 1986.

Hall EJ. ''Linear energy transfer and relative biological effectiveness''. Chapter 9 in Radiobiology for the Radiobiologist, 4th Edition. Philadelphia: J.B. Lippincott, 1994.

[11] International Agency for Research on Cancer (IARC). IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, Vol. 78 Ionizing Radiation, Part 2: Some Internally Deposited Radionuclides. Lyon, France: IARC Press, 595 pp, 2001.

[12] Grogan HA, Sinclair WK, and Voillequé PG. ''Risks of fatal cancer from inhalation of ^{239,240}plutonium by humans: a combined four-method approach with uncertainty evaluation'' Health Physics 80:447–461, 2001.

[13] Alexander V and DiMarco JH. ''Reappraisal of brain tumor risk among U.S. nuclear workers: a 10-year review.'' Occupational Medicine: State of the Art Reviews 16(2):289–315, 2001.

Cardis E, Gilbert ES, Carpenter L, et al. ''Effects of low doses and low dose rates of external ionizing radiation: cancer mortality among nuclear industry workers in three countries.'' Radiat. Res. 142:117–132, 1995.

rates) of certain types of cancer in the United States. Certain types of cancer (*e.g.,* lung cancer among women, breast cancer) have become more frequent in recent decades. Similarly, HHS may make modifications in cancer risk models to reflect the differing frequency of certain types of cancer among different racial and ethnic groups in the United States (*e.g.,* multiple myeloma, skin cancers). The effect of these modifications, at such time as they may become feasible, would be to improve the accuracy of probability of causation estimates.

H. Procedures for review and public comment on NIOSH–IREP

As described under Section G above, certain current and potential future changes to the cancer risk models in IREP are particularly appropriate for addressing the radiation exposures and statutory requirements of claimants under EEOICPA. As a result, the version of IREP to include NIOSH modifications will be unique and distinguished as ''NIOSH–IREP.'' This version, which DOL will use to estimate probability of causation under EEOICPA, will be reviewed by the Advisory Board on Radiation and Worker Health. NIOSH–IREP will be available for public review on the NIOSH homepage at: www.cdc.gov/niosh, by September 30, 2001. NIOSH–IREP will include documentation of underlying risk models and calculations. The public will also be able to obtain complete information about NIOSH–IREP, including printed reports, by contacting NIOSH at its toll-free telephone information service: 1–800–35–NIOSH (1–800–356–4674).

The public may comment on NIOSH–IREP at any time. Comments should be sent to NIOSH following instructions at the NIOSH–IREP web page cited above, or by sending printed comments to: NIOSH–IREP Comments, National Institute for Occupational Safety and Health, 4676 Columbia Parkway, MS–R45, Cincinnati, Ohio 45226.
All comments will be considered. In addition, NIOSH will forward all substantive comments to the Advisory Board on Radiation and Worker Health.

I. Updating NIOSH–IREP

NIOSH will periodically revise NIOSH–IREP to add, modify, or replace cancer risk models, improve the modeling of uncertainty, and improve the functionality and user-interface of NIOSH–IREP. Primary sources of potential improvements in cancer risk models include new epidemiologic research on DOE employee populations and periodic updates from scientific committees evaluating such research (*e.g.,* the Committee on Biological Effects of Ionizing Radiation). Further description of the rationale for such scientific improvements is described under paragraph II.G. above.

Improvements may also be directly recommended by the Advisory Board on Radiation and Worker Health, scientific reviews relevant to or addressing this program, public comment, or by DOL, which is the principal user and hence may require functional changes and improvements in the user-interface.

Substantive changes to NIOSH–IREP (changes that would substantially affect estimates of probability of causation calculated using NIOSH–IREP, including the addition of new cancer risk models) will be submitted to the Advisory Board on Radiation and Worker Health for review. Proposed changes provided to the Advisory Board for review will also be made available to the public. Instructions for obtaining relevant materials and providing public comment will be provided in the notice of the Advisory Board meeting, published in the **Federal Register**.

J. Public notice on plans and changes implemented to update NIOSH–IREP

NIOSH will periodically publish a notice in the **Federal Register** informing the public of proposed substantive changes to NIOSH–IREP currently under development, the status of the proposed changes, and the expected completion dates. NIOSH will also publish a notice in the **Federal Register** notifying the public of substantial changes to NIOSH–IREP (changes that would substantially affect estimates of probability of causation calculated using NIOSH–IREP, including the addition of new cancer risk models). In the notice, NIOSH will address relevant comments received by NIOSH.

K. Operating Guide for NIOSH–IREP

DOL will use procedures specified in the *NIOSH–IREP Operating Guide* to calculate probability of causation estimates under EEOICPA. The guide provides current, step-by-step instructions for the operation of NIOSH–IREP. The procedures include entering personal, diagnostic, and exposure data; setting/confirming appropriate values for variables used in calculations; conducting the calculation; and, obtaining, evaluating, and reporting results.

An initial version of the *NIOSH–IREP Operating Guide* will be available to the public online on the NIOSH homepage at: *www.cdc.gov/niosh,* by September 30, 2001. The public will be able to obtain printed copies by contacting NIOSH at its toll-free telephone information service: 1–800–35–NIOSH (1–800–356–4674).

L. Cancer Unrelated to Radiation

Chronic lymphocytic leukemia (CLL) is a form of leukemia not found to be radiogenic in studies conducted worldwide of a wide variety of radiation-exposed populations, including the Japanese atomic bomb survivors, persons exposed to x rays and Thorotrast during medical treatment, and nuclear industry workers.[14] Therefore, for the purposes of this proposed rule, the probability of causation for CLL would be assigned a value of zero. HHS may modify this provision in response to new scientific findings.

IV. History of Rule Development

A. NIOSH Research on the Health of DOE Workers

Expert judgment has been applied to modify certain IREP risk models and develop guidelines for applying these models appropriately for employees covered by EEOICPA. An important basis for this judgment has been the research experience of NIOSH and its external research partners on radiation-related cancers among DOE employees and U.S. uranium miners. NIOSH has conducted a program of federally sponsored health research on DOE employees since 1991. NIOSH completed the principal occupational health research establishing lung cancer risks associated with radon exposure among uranium miners.

[14] Andersson, M, Carstensen B, Visfeldt J. ''Leukemia and other related hematological disorders among Danish patients exposed to Thorotrast.'' Radiat Res 134:224–233, 1993.

Cardis E, Gilbert ES, Carpenter L, et al. ''Effects of low doses and low dose rates of external ionizing radiation: cancer mortality among nuclear industry workers in three countries.'' Radiat. Res. 142:117–132, 1995.

Curtis RE, Boice JD Jr, Stovall M, et al. ''Relationship of leukemia risk to radiation dose following cancer of the uterine corpus.'' J Natl Canc Inst 86:1315–1324, 1994.

Darby SC Doll R, Gill SK, et al. ''Long-term mortality after a single treatment course with x rays in patients treated for ankylosing spondylitis.'' Br J Cancer 55:179–190, 1987.

International Agency for Research on Cancer (IARC). *IARC Monographs on the Evaluation of Carcinogenic Risks to Humans. Vol. 78. Ionizing Radiation, Part 2: Some Internally Deposited Radionuclides.* Lyon, France: IARC press. 595 p, 2001.

Muirhead CR, Goodill AA, Haylock RGE et al. ''Occupational radiation exposure and mortality second analysis of the National Registry for Radiation Workers.'' J Radiol Prot 19:3–26, 1999.

Preston DL, Kusumi S, Tomonaga M, et al. ''Cancer incidence in atomic bomb survivors. Part III: Leukemia, lymphoma and multiple myeloma, 1950–1987.'' Radiat Res 137:S68–S97, 1994.

B. Relationship With NCI–CDC Update of Radioepidemiological Tables

Within HHS, NIOSH and NCI have worked closely together to adapt the NCI–CDC update of the radioepidemiological tables, developed as IREP, to meet as many of the needs of employees covered by EEOICPA as possible. Some potential changes could not be accomplished before initial implementation of the compensation program under EEOICPA. NIOSH and NCI will continue collaborating to address these needs. Other changes uniquely useful for employees covered by EEOICPA, as discussed in this Preamble, will be incorporated into the version of IREP designed specifically for employees covered by EEOICPA.

C. Technical Review by the Advisory Board on Radiation and Worker Health

NIOSH anticipates that the guidelines in this proposed rule will be reviewed by the Advisory Board on Radiation and Worker Health, which is required by Section 3623(c) of EEOICPA. HHS will consider any findings of this review in promulgating the final regulation.

D. Consultation With Experts and Interested Parties

HHS has consulted individually with a wide variety of experts and interested parties to help ensure the quality and practicality of these guidelines. Reports on these consultations are available in the regulatory docket for public review.

V. Summary of Proposed Rule

Congress, in enacting EEOICPA, created a new Energy Employees Occupational Illness Compensation Program to ensure an efficient, uniform, and adequate compensation system for certain employees. Through Executive Order 13179, the President assigned primary responsibility for administering the program to DOL. The President assigned various technical responsibilities for policymaking and assistance to HHS. Included among these is promulgation of this proposed rule to establish guidelines DOL will apply to adjudicate cancer claims for covered employees seeking compensation for cancer, other than as members of the *Special Exposure Cohort* seeking compensation for a *specified cancer.* Sections 81.20–81.25 and 81.30 provide guidelines for determining the probability of causation with respect to all known cancers.

Introduction

Sections 81.0 and 81.1 briefly describe how this proposed rule relates to DOL authorities under EEOICPA and the assignment of authority for this rule to HHS. Section 81.2 summarizes the specific provisions of EEOICPA directing HHS in the development of this proposed rule.

Definitions

This section of the regulation proposes definitions for the principal terms used in this part. It includes terms specifically defined in EEOICPA that, for the convenience of the reader of this part, are repeated in this section.

Data Required To Estimate Probability of Causation

Sections 81.5 and 81.6 propose the sources and types of personal, medical, and radiation dose information that would be required by this regulation. Claimants will provide personal and medical information to DOL under DOL regulations 20 CFR part 30. NIOSH will provide radiation dose information pursuant to 20 CFR part 30. NIOSH will develop the dose information required pursuant to the HHS regulation under 42 CFR part 82 (published in this issue of the **Federal Register**), which is being promulgated concurrently with this proposed rule. The application of this personal, medical, and radiation dose information to estimate probability of causation is described generally under §§ 81.22–81.25.

Requirements for Risk Models Used To Estimate Probability of Causation

Sections 81.10 and 81.11 describe the use of the risk models and uncertainty analysis underlying the NIH Radioepidemiological Tables in their current, updated form, which is a software program named the ''Interactive RadioEpidemiological Program'' (IREP). IREP is discussed extensively above. These sections also propose criteria by which these risk models may be changed to ensure that probability of causation estimates calculated by EEOICPA represent the unique exposure and disease experiences of employees covered by EEOICPA. HHS seeks comments on these criteria.

Guidelines To Estimate Probability of Causation

Sections 81.20 and 81.21 propose requiring DOL to use NIOSH–IREP to estimate probability of causation for cancers for which probability of causation estimates can be calculated using available cancer risk models. Section 81.21 also proposes requiring DOL to assume carcinoma in situ (ICD–9 [15] codes 230–234), neoplasms of uncertain behavior (ICD–9 codes 235–238), and neoplasms of unspecified nature (ICD–9 code 239) are malignant, for purposes of estimating probability of causation. HHS seeks comment on these assumptions and any conditions or limitations that should be considered with regard to these assumptions.

Sections 81.22–81.25 propose general guidelines for the use of NIOSH–IREP and specific applications to accommodate special circumstances anticipated. The special circumstances include claims in which: (1) The primary site of a metastasized cancer is unknown; (2) the subtype of leukemia presented lacks a single, optimal risk model in NIOSH–IREP; and (3) two or more primary cancers are presented, requiring further statistical adjustment of probability of causation estimates calculated using NIOSH–IREP.

The procedure concerning subtypes of leukemia (2) is needed because of a limitation of the data on Japanese atomic bomb survivors, as discussed previously in this proposal. The general leukemia model in IREP allows for adjustment for age at exposure, which is an important modifier of leukemia risk. The data are too sparse, however, to allow for such an adjustment with respect to specific types of leukemia, with the exception of chronic myeloid leukemia. Since it is not possible to determine which factor, age at exposure or leukemia subtype, is more important to determining probability of causation for most specific types of leukemia, the guidelines would require use of both the general model and the specific model. The guidelines propose requiring DOL to use the findings of whichever model produces the higher probability of causation estimate.

HHS seeks comments on the strategies adopted in this proposed rule to address each of these special circumstances, and on other needs not identified in this proposal.

Section 81.30 proposes non-radiogenic cancers for which DOL would assign a value of zero to the probability of causation. Chronic Lymphocytic Leukemia (ICD–9 Code: 204.1) is the only cancer specified. HHS is seeking comments on this section. The public should be aware that the addition of cancers to this section would require broadly established

[15] ICD–9 is a version of the standard system of classifying diseases that will be used by IREP. The most recent version of this system, ICD–10, will not be used because the cancer risk models have been constructed using ICD–9.

See: The International Classification of Diseases Clinical Modification (9th Revision) Volume I&II. [1991] Department of Health and Human Services Publication No. (PHS) 91–1260, U.S. Government Printing Office, Washington D.C.

consensus of non-radiogenicity among the medical and scientific communities.

VI. Significant Regulatory Action (Executive Order 12866)

This rule is a ''significant regulatory action,'' within the meaning of Executive Order 12866, because it raises novel or legal policy issues arising out of the legal mandate established under EEOICPA. The rule is designed to establish objective guidelines, grounded in current science, to support DOL in the adjudication of applicable claims seeking compensation for cancer under EEOICPA. The guidelines will be applied by DOL to calculate a reasonable, scientifically supported determination of the probability that a cancer for which a claimant is seeking compensation was as likely as not caused by radiation doses incurred in the performance of duty by the covered employee. The financial cost to the federal government of applying these guidelines is covered under administrative expenses estimated by DOL under its rule (see FR 28948, May 25, 2001).

The proposed rule carefully explains the manner in which the regulatory action is consistent with the mandate for this action under section 3623(c) of EEOICPA and implements the detailed requirements concerning this action under this section of EEOICPA. The proposed rule does not interfere with State, local, and tribal governments in the exercise of their governmental functions.

The proposed rule is not considered economically significant, as defined in section 3(f)(1) of the Executive Order 12866. This proposal has a subordinate role in the adjudication of claims under EEOICPA, serving as one element of an adjudication process administered by DOL under 20 CFR parts 1 and 30. DOL has determined that its rule fulfills the requirements of Executive Order 12866 and provides estimates of the aggregate cost of benefits and administrative expenses of implementing EEOICPA under its rule (see FR 28948, May 25, 2001).

VII. Regulatory Flexibility Act

The Regulatory Flexibility Act (RFA), 5 U.S.C. 601 *et seq.*, requires each agency to consider the potential impact of its regulations on small entities including small businesses, small governmental units, and small not-for-profit organizations. We certify that this proposed rule will not have a significant economic impact on a substantial number of small entities within the meaning of the RFA. This proposal affects only DOL, HHS, and some individuals filing compensation claims under EEOICPA. Therefore, a regulatory flexibility analysis as provided for under RFA is not required.

VIII. Paperwork Reduction Act

The Paperwork Reduction Act (PRA), 44 U.S.C. 3501 *et seq.*, requires an agency to invite public comment on and to obtain OMB approval of any regulation that requires ten or more people to report information to the agency or to keep certain records. This proposed rule does not contain any information collection requirements. It provides guidelines only to the U.S. Department of Labor (DOL) for adjudicating compensation claims and thus requires no reporting or recordkeeping. Information required by DOL to apply these guidelines is being provided by HHS and by individual claimants to DOL under DOL regulations 20 CFR part 30 (see 66 FR 28948, May 25, 2001). Thus, HHS has determined that the PRA does not apply to this proposed rule.

IX. Small Business Regulatory Enforcement Fairness Act

As required by Congress under the Small Business Regulatory Enforcement Fairness Act of 1996 (5 U.S.C. 801 *et seq.*), the Department will report to Congress promulgation of this proposed rule prior to its effective date. The report will state that the Department has concluded that this proposed rule is not a ''major rule'' because it is not likely to result in an annual effect on the economy of $100 million or more. However, this proposed rule has a subordinate role in the adjudication of claims under EEOICPA, serving as one element of an adjudication process administered by DOL under 20 CFR parts 1 and 30. DOL has determined that its rule is a ''major rule'' because it will likely result in an annual effect on the economy of $100 million or more.

X. Unfunded Mandates Reform Act of 1995

Title II of the Unfunded Mandates Reform Act of 1995 (2 U.S.C. 1531 *et seq.*) directs agencies to assess the effects of Federal regulatory actions on State, local, and tribal governments, and the private sector, ''other than to the extent that such regulations incorporate requirements specifically set forth in law.'' For purposes of the Unfunded Mandates Reform Act, this proposed rule does not include any Federal mandate that may result in increased annual expenditures in excess of $100 million by State, local or tribal governments in the aggregate, or by the private sector.

XI. Executive Order 12988 (Civil Justice)

This proposed rule has been drafted and reviewed in accordance with Executive Order 12988, Civil Justice Reform and will not unduly burden the Federal court system. Probability of causation may be an element in reviews of DOL adverse decisions in the United States District Courts pursuant to the Administrative Procedure Act. However, DOL has attempted to minimize that burden by providing claimants an opportunity to seek administrative review of adverse decisions, including those involving probability of causation. HHS has provided a clear legal standard for DOL to apply regarding probability of causation. This proposal has been reviewed carefully to eliminate drafting errors and ambiguities.

XII. Executive Order 13132 (Federalism)

The Department has reviewed this proposed rule in accordance with Executive Order 13132 regarding federalism, and has determined that it does not have ''federalism implications.'' The proposed rule does not ''have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.''

XIII. Executive Order 13045 (Protection of Children From Environmental, Health Risks and Safety Risks)

In accordance with Executive Order 13045, HHS has evaluated the environmental health and safety effects of this proposed rule on children. The agency has determined that the rule would have no effect on children.

XIV. Executive Order 13211 (Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use)

In accordance with Executive Order 13211, HHS has evaluated the effects of this proposed rule on energy supply, distribution or use, and has determined that the rule is not likely to have a significant adverse effect on them.

List of Subjects in 42 CFR Part 81

Cancer, Government Employees, Radiation protection, Radioactive materials, Workers' compensation.

Text of the Rule

For the reasons discussed in the preamble, the Department of Health and Human Services proposes to amend 42 CFR to add part 81 to read as follows:

PART 81—GUIDELINES FOR DETERMINING PROBABILITY OF CAUSATION UNDER THE ENERGY EMPLOYEES OCCUPATIONAL ILLNESS COMPENSATION PROGRAM ACT OF 2000

Subpart A—Introduction

Subpart B—Definitions

Subpart C—Data Required To Estimate Probability of Causation

Subpart D—Requirements for Risk Models Used To Estimate Probability of Causation

Subpart E—Guidelines To Estimate Probability of Causation

Authority: 42 U.S.C. 7384n; E.O. 13179, 65 FR 77487.

Subpart A—Introduction

§ 81.0 Background.

The Energy Employees Occupational Illness Compensation Program Act (EEOICPA), Pub. L. 106–398, provides for the payment of compensation benefits to covered employees and, where applicable, survivors of such employees, of the United States Department of Energy, its predecessor agencies and certain of its contractors and subcontractors. Among the types of illnesses for which compensation may be provided are cancers. There are two categories of covered employees with cancer under EEOICPA for whom compensation may be provided. The regulations that follow under this part apply only to the category of employees described under paragraph (a) of this section.

(a) One category is employees with cancer for whom probability of causation must be estimated or determined, as required under 20 CFR 30.115.

(b) The second category is members of the *Special Exposure Cohort* seeking compensation for a *specified cancer*, as defined under EEOICPA. The U.S. Department of Labor (DOL) which has primary authority for implementing EEOICPA, has promulgated regulations at 20 CFR 30.210 and 30.213 that identify current members of the *Special Exposure Cohort* and requirements for compensation. Pursuant to section 3626 of EEOICPA, the Secretary of HHS is authorized to add additional classes of employees to the *Special Exposure Cohort*.

§ 81.1 Purpose and authority.

(a) The purpose of this regulation is to establish guidelines DOL will apply to adjudicate cancer claims for covered employees seeking compensation for cancer, other than as members of the Special Exposure Cohort seeking compensation for a specified cancer. To award a claim, DOL must first determine that it is at least as likely as not that the cancer of the employee was related to radiation doses incurred by the employee in the performance of duty. These guidelines provide the procedures DOL must apply and identify the information DOL will use.

(b) Section 3623(b) of EEOICPA requires the President to promulgate these guidelines. Executive Order 13179 assigned responsibility for promulgating these guidelines to the Secretary of Health and Human Services.

§ 81.2 Provisions of EEOICPA concerning this rule.

EEOICPA imposes several general requirements concerning the development of these guidelines. It requires that the guidelines produce a determination as to whether it is at least as likely as not (a 50% or greater probability) that the cancer of the covered employee was related to radiation doses incurred by the employee in the performance of duty. It requires the guidelines be based on the radiation dose received by the employee, incorporating the methods of dose reconstruction to be established by HHS. It requires determinations be based on the upper 99 percent confidence interval (credibility limit) of the probability of causation in the radioepidemiological tables published under section 7(b) of the Orphan Drug Act (42 U.S.C. 241 note), as such tables may be updated. EEOICPA also requires HHS consider the type of cancer, past health-related activities, the risk of developing a radiation-related cancer from workplace exposure, and other relevant factors. Finally, it is important to note EEOICPA does not include a requirement limiting the types of cancers to be considered radiogenic for these guidelines.

Subpart B—Definitions

§ 81.4 Definition of terms used in this rule.

(a) *Covered employee:* For purposes of this rule, an individual who is or was an employee of DOE, a DOE contractor or subcontractor, or an atomic weapons employer, and for whom DOL has requested HHS to perform a dose reconstruction.

(b) *Dose and dose rate effectiveness factor (DDREF):* A factor applied to a risk model to modify the dose-risk relationship estimated by the model to account for the level of the dose and the rate at which the dose is incurred. As used in IREP, a DDREF value of greater than one implies that chronic or low doses are less carcinogenic per unit of dose than acute or higher doses.

(c) *Dose-response relationship:* A mathematical expression of the way that the risk of a biological effect (for example, cancer) changes with increased exposure to a potential health hazard (for example, ionizing radiation).

(d) *EEOICPA:* The Energy Employees Occupational Illness Compensation Program Act of 2000, Public Law 106–398, as amended.

(e) *Equivalent dose:* The absorbed dose in a tissue or organ multiplied by a radiation weighting factor to account for differences in the effectiveness of the radiation in inducing cancer.

(f) *External dose:* The portion of the equivalent dose that is received from radiation sources outside of the body.

(g) *Interactive RadioEpidemiological Program (IREP):* A computer software program that uses information on the dose-response relationship, and specific factors such as a claimant's radiation exposure, gender, age at diagnosis, and age at exposure to calculate the probability of causation for a given pattern and level of radiation exposure.

(h) *Internal dose:* The portion of the equivalent dose that is received from radioactive materials taken into the body.

(i) *Inverse dose rate effect:* A phenomenon in which the protraction of an exposure to a potential health hazard leads to greater biological effect per unit of dose than the delivery of the same total amount in a single dose. An inverse dose rate effect implies that the

dose and dose rate effectiveness factor (DDREF) is less than one for chronic or low doses.

(j) *Linear energy transfer (LET):* The average amount of energy transferred to surrounding body tissues per unit of distance the radiation travels through body tissues (track length). Low LET radiation is typified by gamma and x rays, which have high penetrating capabilities through various tissues, but transfer a relatively small amount of energy to surrounding tissue per unit of track length. High LET radiation includes alpha particles and neutrons, which have weaker penetrating capability but transfer a larger amount of energy per unit of track length.

(k) *NIOSH:* The National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention, United States Department of Health and Human Services.

(l) *Non-radiogenic cancer:* A type of cancer that HHS has found not to be caused by radiation, for the purposes of this regulation.

(m) *Primary cancer:* A cancer defined by the original body site at which the cancer was incurred, prior to any spread (metastasis) to other sites in the body.

(n) *Probability of causation:* The probability or likelihood that a cancer was caused by radiation exposure incurred by a covered employee in the performance of duty. In statistical terms, it is the cancer risk attributable to radiation exposure divided by the sum of the baseline cancer risk (the risk to the general population) plus the cancer risk attributable to the radiation exposure.

(o) *Radioepidemiological tables:* Tables that allow computation of the probability of causation for various cancers associated with a defined exposure to radiation, after accounting for factors such as age at exposure, age at diagnosis, and time since exposure.

(p) *Relative biological effectiveness (RBE):* A factor applied to a risk model to account for differences between the amount of cancer effect produced by different forms of radiation. For purposes of EEOICPA, the RBE is considered equivalent to the radiation weighting factor.

(q) *Risk model:* A mathematical model used under EEOICPA to estimate a specific probability of causation using information on radiation dose, cancer type, and personal data (e.g., gender, smoking history).

(r) *Secondary site:* A body site to which a primary cancer has spread (metastasized).

(s) *Specified cancer:* A term defined in section 3621(17) of EEOICPA and 20 CFR § 30.5(dd) that specifies types of cancer that, pursuant to 20 CFR part 30, may qualify a member of the *Special Exposure Cohort* for compensation. It includes leukemia (other than chronic lymphocytic leukemia), multiple myeloma, non-Hodgkin's lymphoma, and cancers of the lung (other than carcinoma in situ diagnosed at autopsy), thyroid, male breast, female breast, esophagus, stomach, pharynx, small intestine, pancreas, bile ducts, gall bladder, salivary gland, urinary bladder, brain, colon, ovary, liver (not associated with cirrhosis or hepatitis), and bone. Pursuant to section 2403 of Pub. L. 107–20, this definition will include renal cancer effective October 1, 2001.

(t) *Uncertainty:* A term used in this rule to describe the lack of precision of a given estimate, the extent of which depends upon the amount and quality of the evidence or data available.

(u) *Uncertainty distribution:* A statistical term meaning a range of discrete or continuous values arrayed around a central estimate, where each value is assigned a probability of being correct.

(v) *Upper 99 percent confidence interval:* A term used in EEOICPA to mean credibility limit, the probability of causation estimate determined at the 99th percentile of the range of uncertainty around the central estimate of probability of causation.

Subpart C—Data Required To Estimate Probability of Causation

§ 81.5 Use of personal and medical information

Determining probability of causation may require the use of the following personal and medical information provided to DOL by claimants under DOL regulations 20 CFR part 30:

(a) Year of birth.

(b) Cancer diagnosis (by ICD–9 code) for primary and secondary cancers.

(c) Date of cancer diagnosis.

(d) Gender.

(e) Race/ethnicity (if the claim is for skin cancer or a secondary cancer for which skin cancer is a likely primary cancer).

(f) Smoking history (if the claim is for lung cancer or a secondary cancer for which lung cancer is a likely primary cancer).

§ 81.6 Use of radiation dose information.

Determining probability of causation will require the use of radiation dose information provided to DOL by the National Institute for Occupational Safety and Health (NIOSH) under HHS regulations 42 CFR part 82. This information will include annual dose estimates for each year in which a dose was incurred, together with uncertainty distributions associated with each dose estimate. Dose estimates will be distinguished by type of radiation (low linear energy transfer (LET), protons, neutrons, alpha, low-energy x-ray) and by dose rate (acute or chronic) for external and internal radiation dose.

Subpart D—Requirements for Risk Models Used To Estimate Probability of Causation

§ 81.10 Use of cancer risk assessment models in NIOSH IREP.

(a) The risk models used to estimate probability of causation for covered employees under EEOICPA will be based on risk models updated from the 1985 NIH radioepidemiological tables. These 1985 tables were developed from analyses of cancer mortality risk among the Japanese atomic bomb survivor cohort. The National Cancer Institute (NCI) and Centers for Disease Control and Prevention (CDC) are updating the tables, replacing them with a sophisticated analytic software program. This program, the *Interactive RadioEpidemiological Program* (IREP), models the *dose-response relationship* between ionizing radiation and 33 cancers using morbidity data from the same Japanese atomic bomb survivor cohort. In the case of thyroid cancer, radiation risk models are based on a pooled analysis of several international cohorts.[1]

(b) NIOSH will change the risk models in IREP, as needed, to reflect the radiation exposure and disease experiences of employees covered under EEOICPA, which differ from the experiences of the Japanese atomic bomb survivor cohort. Changes will be incorporated in a version of IREP named NIOSH–IREP, specifically designed for adjudication of claims under EEOICPA. Possible changes in IREP risk models include the following:

(1) Addition of risk models to IREP as needed for claims under EEOICPA (*e.g.,* bone cancer, malignant melanoma and other skin cancers).

(2) Modification of IREP risk models to incorporate radiation exposures unique to employees covered by EEOICPA (e.g., radon and low energy x rays from employer-required medical screening programs, adjustment of *relative biological effectiveness* distributions based on neutron energy).

(3) Modification of IREP risk models to incorporate new understanding of radiation-related cancer effects relevant

[1] Ron E, Lubin JH, Shore RE, et al. ''Thyroid cancer after exposure to external radiation: a pooled analysis of seven studies.'' Radiat. Res. 141:259–277, 1995.

to employees covered by EEOICPA (e.g., incorporation of inverse dose-rate relationship between high LET radiation exposures and cancer; removal of the low-dose effect reduction factor for acute exposures).

(4) Modification of IREP risk models to incorporate temporal, race and ethnicity-related differences in the frequency of certain cancers occurring generally among the U.S. population.

(5) Modifications of IREP to facilitate improved evaluation of the uncertainty distribution for the probability of causation for claims based on two or more primary cancers.

§ 81.11 Use of uncertainty analysis in NIOSH–IREP.

(a) EEOICPA requires use of the uncertainty associated with the probability of causation calculation, specifically requiring the use of the upper 99% confidence interval estimate of the probability of causation estimate. As described in the NCI document [2], uncertainty from several sources is incorporated into the probability of causation calculation performed by IREP. These sources include uncertainties in estimating: Radiation dose incurred by the covered employee; the radiation dose-cancer relationship (statistical uncertainty in the specific cancer risk model); the extrapolation of risk (risk transfer) from the Japanese to the U.S. population; differences in the amount of cancer effect caused by different radiation types (relative biological effectiveness or RBE); the relationship between the rate at which a radiation dose is incurred and the level of cancer risk produced (dose and dose rate effectiveness factor or DDREF); and, the role of non-radiation risk factors (such as smoking history).

(b) NIOSH–IREP will operate according to the same general protocol as IREP for the analysis of uncertainty. It will address the same possible sources of uncertainty affecting probability of causation estimates, and in most cases will apply the same assumptions incorporated in IREP risk models. Different procedures and assumptions will be incorporated into NIOSH–IREP as needed, according to the criteria outlined under § 81.10.

Subpart E—Guidelines To Estimate Probability of Causation

§ 81.20 Required use of NIOSH–IREP.

(a) NIOSH–IREP is an online interactive software program for estimating probability of causation for covered employees seeking compensation for cancer under EEOICPA, other than as members of the *Special Exposure Cohort* seeking compensation for a *specified cancer*.

(b) DOL is required to use NIOSH–IREP to estimate probability of causation for all cancers, as identified under §§ 81.21 and 81.23.

§ 81.21 Cancers requiring the use of NIOSH–IREP.

(a) DOL will calculate probability of causation for all cancers, except Chronic Lymphocytic Leukemia as provided under § 81.30, using NIOSH–IREP.

(b) Carcinoma in situ (ICD–9 codes 230–234), neoplasms of uncertain behavior (ICD–9 codes 235–238), and neoplasms of unspecified nature (ICD–9 code 239) are assumed to be malignant, for purposes of estimating probability of causation.

(c) All secondary and unspecified cancers of the lymph node (ICD–9 code 196) shall be considered secondary cancers (cancers resulting from metastasis of cancer from a primary site). For claims identifying cancers of the lymph node, Table 1 in § 81.23 provides guidance for assigning a primary site and calculating probability of causation using NIOSH–IREP.

§ 81.22 General guidelines for use of NIOSH–IREP.

DOL will use procedures specified in the NIOSH–IREP *Operating Guide* to calculate probability of causation estimates under EEOICPA. The guide provides current, step-by-step instructions for the operation of IREP. The procedures include entering personal, diagnostic, and exposure data; setting/confirming appropriate values for variables used in calculations; conducting the calculation; and, obtaining, evaluating, and reporting results.

§ 81.23 Guidelines for cancers for which primary site is unknown.

(a) In claims for which the primary cancer site cannot be determined, but a site of metastasis is known, DOL will calculate probability of causation estimates for various likely primary sites. Table 1 of this section indicates the primary cancer site(s) DOL will use in NIOSH–IREP when the primary cancer site is unknown:

Table 1—Primary Cancer Sites

Primary cancers (ICD–9 codes [3]) for which probability of causation is to be calculated, if only a secondary cancer site is known. ''M'' indicates cancer site should be used for males only, and ''F'' indicates cancer site should be used for females only. A glossary of cancer descriptions for each ICD–9 code is provided in appendix A to this part.

Secondary cancer (ICD–9 code)	ICD–9 code of likely primary cancers
Lymph nodes of head, face and neck (196.0)	141, 142 (M), 146 (M), 149 (F), 161 (M), 162, 172, 173, 174 (F), 193 (F)
Intrathoracic lymph nodes (196.1)	150 (M), 162, 174 (F)
Intra-abdominal lymph nodes (196.2)	150 (M), 151 (M), 153, 157 (F), 162, 174 (F), 180 (F), 185 (M), 189, 202 (F)
Lymph nodes of axilla and upper limb, (196.3)	162, 172, 174 (F)
Inguinal and lower, limb lymph nodes, (196.5)	154 (M), 162, 172, 173 (F), 187 (M)
Intrapelvic lymph nodes (196.6)	153 (M), 154 (F), 162 (M), 180 (F), 182 (F), 185 (M), 188
Lymph nodes of multiple sites, (196.8)	150 (M), 151 (M), 153 (M), 162, 174 (F)
Lymph nodes, site unspecified (196.9)	150 (M), 151, 153, 162, 172, 174 (F), 185 (M)
Lung (197.0)	153, 162, 172 (M), 174 (F), 185 (M), 188 (M), 189
Mediastinum (197.1)	150 (M), 162, 174 (F)
Pleura (197.2)	150 (M), 153 (M), 162, 174 (F), 183 (F), 185 (M), 189 (M)
Other respiratory Organs (197.3)	150, 153 (M), 161, 162, 173 (M), 174 (F), 185 (M), 193
Small intestine, including duodenum (197.4)	152, 153, 157, 162, 171, 172 (M), 174 (F), 183 (F), (f), 183 (f), 189 (M)
Large intestine and rectum (197.5)	153, 154, 162, 174 (F), 183 (F), 185 (M)
Retroperitoneum and peritoneum (197.6)	151, 153, 154 (M), 157, 162 (M), 171, 174 (F), 182 (F), 183 (F)

[2] Draft Report of the NCI–CDC Working Group to Revise the 1985 NIH Radioepidemiological Tables, May 31, 2000, p. 17–18, p. 22–23.

[3] The International Classification of Diseases Clinical Modification (9th Revision) Volume I&II. [1991] Department of Health and Human Services Publication No. (PHS) 91–1260, U.S. Government Printing Office, Washington, D.C.

Secondary cancer (ICD–9 code)	ICD–9 code of likely primary cancers
Liver, specified as secondary (197.7)	151 (M), 153, 154 (M), 157, 162, 174 (F)
Other digestive organs (197.8)	150 (M), 151, 153, 157, 162, 174 (F), 185 (M)
Kidney (198.0)	153, 162, 174 (F), 180 (F), 185 (M), 188, 189, 202 (F)
Other urinary organs (198.1)	153, 174 (F), 180 (F), 183 (F), 185 (M), 188, 189 (F)
Skin (198.2)	153, 162, 171 (M), 172, 173 (M), 174 (F), 189 (M)
Brain and spinal cord (198.3)	162, 172 (M), 174 (F)
Other parts of nervous system, (198.4)	162, 172 (M), 174 (F), 185 (M), 202
Bone and bone marrow (198.5)	162, 174 (F), 185 (M)
Ovary (198.6)	153 (F), 174 (F), 183 (F)
Suprarenal gland (198.7)	153 (F), 162, 174 (F)
Other specified sites (198.8)	153, 162, 172 (M), 174 (F), 183 (F), 185 (M), 188 (M)

(b) DOL will select the site producing the highest estimate for probability of causation to adjudicate the claim.

§ 81.24 Guidelines for leukemia.

(a) For claims involving leukemia, DOL will calculate one or more probability of causation estimates from among three of the four alternate leukemia risk models included in NIOSH–IREP, as specified in the *NIOSH–IREP Operating Guide.* These include: ''Leukemia, all types except CLL'' (IDC–9 codes: 204–208, except 204.1), ''acute lymphocytic leukemia'' (ICD–9 code: 204.0), and ''acute myelogenous leukemia'' (ICD–9 code: 205.0).

(b) For leukemia claims in which DOL calculates multiple probability of causation estimates, as specified in the *NIOSH–IREP Operating Guide,* the probability of causation estimate DOL assigns to the claim will be based on the leukemia risk model producing the highest estimate for probability of causation.

§ 81.25 Guidelines for claims including two or more primary cancers.

(a) For claims including two or more primary cancers, DOL will use NIOSH-IREP to calculate the estimated probability of causation for each cancer individually. Then DOL will perform the following calculation using the probability of causation estimates produced by NIOSH–IREP:

Equation 1

Calculate: $1 - [\{1 - PC_1\} \times \{1 - PC_2\} \times * * * \times \{1 - PC_n\} = PC_{total,}$

Where PC_1 is the probability of causation for one of the primary cancers identified in the claim, PC_2 is the probability of causation for a second primary cancer identified in the claim, and PC_n is the probability of causation for the nth primary cancer identified in the claim. PC_{total} is the probability that at least one of the primary cancers (cancers 1 through ''n'') was caused by the radiation dose estimated for the claim when Equation 1 is evaluated based on the joint distribution of PC_1, * * *, PC_n.[4]

§ 81.30 Non-radiogenic cancers.

The following cancers are considered non-radiogenic for the purposes of EEOICPA and this part. DOL will assign a probability of causation of zero to the following cancers: Chronic lymphocytic leukemia (ICD–9 code: 204.1).

Appendix A to Part 81—Glossary of ICD–9 Codes and Their Cancer Descriptions

ICD–9 code	Cancer description
140	Malignant neoplasm of lip.
141	Malignant neoplasm of tongue.
142	Malignant neoplasm of major salivary glands.
143	Malignant neoplasm of gum.
144	Malignant neoplasm of floor of mouth.
145	Malignant neoplasm of other and unspecified parts of mouth.
146	Malignant neoplasm of oropharynx.
147	Malignant neoplasm of nasopharynx.
148	Malignant neoplasm of hypopharynx.
149	Malignant neoplasm of other and ill-defined sites within the lip, oral cavity, and pharynx.
150	Malignant neoplasm of esophagus.
151	Malignant neoplasm of stomach.
152	Malignant neoplasm of small intestine, including duodenum.
153	Malignant neoplasm of colon.
154	Malignant neoplasm of rectum, rectosigmoid junction, and anus.
155	Malignant neoplasm of liver and intrahepatic bile ducts.
156	Malignant neoplasm of gall bladder and extrahepatic bile ducts.
157	Malignant neoplasm of pancreas.
158	Malignant neoplasm of retroperitoneum and peritoneum.
159	Malignant neoplasm of other and ill-defined sites within the digestive organs and peritoneum.
160	Malignant neoplasm of nasal cavities, middle ear, and accessory sinuses.
161	Malignant neoplasm of larynx.
162	Malignant neoplasm of trachea, bronchus and lung.
163	Malignant neoplasm of pleura.
164	Malignant neoplasm of thymus, heart, and mediastinum.
165	Malignant neoplasm of other and ill-defined sites within the respiratory system and intrathoracic organs.
170	Malignant neoplasm of bone and articular cartilage.
171	Malignant neoplasm of connective and other soft tissue.
172	Malignant melanoma of skin.
173	Other malignant neoplasms of skin.
174	Malignant neoplasm of female breast.
175	Malignant neoplasm of male breast.
179	Malignant neoplasm of uterus, part unspecified.
180	Malignant neoplasm of cervix uteri.
181	Malignant neoplasm of placenta.
182	Malignant neoplasm of body of uterus.
183	Malignant neoplasm of ovary and other uterine adnexa.
184	Malignant neoplasm of other and unspecified female genital organs.
185	Malignant neoplasm of prostate.
186	Malignant neoplasm of testis.
187	Malignant neoplasm of penis and other male genital organs.
188	Malignant neoplasm of urinary bladder.

[4] Evaluating Equation 1 based on the individual upper 99th percentiles of PC_1, * * *, PC_n approximates the upper 99th percentile of PC_{total} whenever PC_1, * * *, PC_n are highly related, e.g., when a common dose-reconstruction is the only non-negligible source of uncertainty in the individual PC_i's. However, this approximation can overestimate it if other sources of uncertainty contribute independently to the PC_1, * * *, PC_n, whereas treating the joint distribution as fully independent could substantially underestimate the upper 99th percentile of PC_{total} whenever the individual PC_i's are positively correlated.

ICD–9 code	Cancer description
189	Malignant neoplasm of kidney and other and unspecified urinary organs.
190	Malignant neoplasm of eye.
191	Malignant neoplasm of brain.
192	Malignant neoplasm of other and unspecified parts of nervous system.
193	Malignant neoplasm of thyroid gland.
194	Malignant neoplasm of other endocrine glands and related structures.
195	Malignant neoplasm of other and ill-defined sites.
196	Secondary and unspecified malignant neoplasm of the lymph nodes.
197	Secondary malignant neoplasm of the respiratory and digestive organs.
198	Secondary malignant neoplasm of other tissue and organs.
199	Malignant neoplasm without specification of site.
200	Lymphosarcoma and reticulosarcoma.
201	Hodgkin's disease.
202	Other malignant neoplasms of lymphoid and histiocytic tissue.
203	Multiple myeloma and other immunoproliferative neoplasms.
204	Lymphoid leukemia.
205	Myeloid leukemia.
206	Monocytic leukemia.
207	Other specified leukemia.
208	Leukemia of unspecified cell type.

[1] The International Classification of Diseases Clinical Modification (9th Revision) Volume I&II. [1991] Department of Health and Human Services Publication No. (PHS) 91–1260, U.S. Government Printing Office, Washington, DC.

Dated: September 21, 2001.

Tommy G. Thompson,

Secretary, Department of Health and Human Services.

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DEPARTMENT OF HEALTH AND HUMAN SERVICES

42 CFR Part 82

RIN 0920–ZA00

Methods for Radiation Dose Reconstruction Under the Energy Employees Occupational Illness Compensation Program Act of 2000; Interim Final Rule With Request for Comments

AGENCY: Department of Health and Human Services.

ACTION: Interim final rule with request for comments.

SUMMARY: This rule implements select provisions of the Energy Employees Occupational Illness Compensation Program Act of 2000 (''EEOICPA'' or ''Act''). The Act requires the promulgation of methods, in the form of regulations, for estimating the dose levels of ionizing radiation incurred by workers in the performance of duty for nuclear weapons production programs of the Department of Energy and its predecessor agencies. These ''dose reconstruction'' methods will be applied by the National Institute for Occupational Safety and Health, which is responsible for producing the radiation dose estimates that the U.S. Department of Labor will use in adjudicating certain cancer claims under the Act.

DATES: *Effective Date:* This interim final rule is effective October 5, 2001. *Compliance Dates:* Affected parties are not required to comply with the information collection requirements in § 82.10 until the Department of Health and Human Services publishes in the **Federal Register** the control numbers assigned by the Office of Management and Budget (OMB) to these information collection requirements. Publication of the control numbers notifies the public that OMB has approved these information collection requirements under the Paperwork Reduction Act of 1995.

Comments: The Department invites written comments on the interim final rule from interested parties. Comments on the rule must be received by November 5, 2001. Comments on the collection of information requirements should be received by October 22, 2001.

ADDRESSES: Address written comments on the interim final rule to the NIOSH Docket Officer. Submit comments electronically by e-mail to NIOCINDOCKET@CDC.GOV. See **SUPPLEMENTARY INFORMATION** for file formats and other information about electronic filing. Alternatively, submit printed comments to the following address: NIOSH Docket Office, Robert A. Taft Laboratories; M/S C34, 4676 Columbia Parkway, Cincinnati, OH 45226.

Written comments on the collection of information requirements should be sent to Anne O'Connor, CDC Assistant Reports Clearance Officer, 1600 Clifton Road, MS–D24, Atlanta, GA 30333.

FOR FURTHER INFORMATION CONTACT: Larry Elliott, Director, Office of Compensation Analysis and Support, National Institute for Occupational Safety and Health, 4676 Columbia Parkway, MS–R45, Cincinnati, OH 45226, Telephone 513–841–4498 (this is not a toll-free number). Information requests may also be submitted by e-mail to OCAS@CDC.GOV.

SUPPLEMENTARY INFORMATION:

I. Comments Invited

Interested persons or organizations are invited to participate in this rulemaking by submitting written views, arguments, recommendations, and data. Comments are invited on any topic related to this rulemaking. Some generic topics for comment include the following questions:

(1) Does the interim rule make appropriate use of current science for conducting dose reconstructions to be used in an occupational illness compensation program?

(2) Does the interim rule appropriately balance the potential precision of dose reconstructions and the necessary efficiency of the dose reconstruction process?

(3) Does the interim rule implement an appropriate process for involving the claimant in the dose reconstruction?

Comments should identify the author(s), return address, and phone number, in case clarification is needed. Comments can be submitted by e-mail to: NIOCINDOCKET@CDC.GOV. If submitting comments by e-mail, they should be provided as a Microsoft Word or Word Perfect file attachment. Printed comments can be submitted to the NIOSH Docket Office at the address above. The Secretary will consider all communications received on or before the closing date for comments before taking action on the interim final rule. All comments submitted will be available for examination in the Rule Docket both before and after the closing date for comments. A report summarizing each substantive public contact with personnel involved in this rulemaking will be filed in the docket. An electronic docket containing all comments submitted by e-mail will be available over the Internet from the National Institute for Occupational Safety and Health (NIOSH) homepage at www.cdc.gov/niosh.

II. Final Rule

The Department of Health and Human Services (''HHS'') expects to issue a final rule within six months of publication of this interim final rule. Upon publication of the final rule, dose reconstructions completed under this interim final rule will be reviewed and revised, as necessary, to conform with any substantive changes that might be included in the final rule.