Final Report

PART E of the Energy Employee Occupational Illness Compensation Program Act

Contract No.: GS10F0269K

Order No.: DOLB059E21146

Project No.: C-011.014

Submitted To:

U.S. Department of Labor

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August 4, 2005

ECONOMETRICA, INC.

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(Project No.: C-011.014).

Dear Mr. Vance:

We are pleased to submit our Final Report for "PART E of the Energy Employee Occupational Illness Compensation Program Act." This report is being submitted in accordance with the requirements of the above-referenced contract.

If you wish to discuss any aspect of the attached report, please feel free to contact me at (240) 333-4806.

Sincerely,

Econometrica, Inc.

Warren J. Prunella
Project Director

Table of Contents

Table of Contents
(Continued)

I. Introduction

Background

Public Law 106-398, the Energy Employees Occupational Illness Compensation Program Act (EEOICPA) of 2000, as amended, established a program to compensate nuclear weapons program workers who suffered adverse health effects from exposure to beryllium, ionizing radiation, and other hazards in the course of their nuclear weapons program-related work. The President, in an Executive Order dated December 7, 2000, assigned program implementation responsibilities to various executive departments, including administration of Part B by the U.S. Department of Labor (DOL). The Fiscal Year 2005 National Defense Authorization Act, signed by President Bush on October 28, 2004, abolished Part D of the EEOICPA, administered by the U.S. Department of Energy (DOE), and replaced it with a new system of federal payments called Part E, to be administered by the DOL.

The DOE had a large backlog of cases that have since been turned over to DOL and require immediate processing. There is a need to understand covered illnesses that are a result of exposure to toxic substances at DOE facilities; how to provide compensation for wage loss to those qualified employees; and the best methodology for accomplishing impairment ratings.

Summary

Econometrica and its subcontractors, National Jewish Research Center and Occupational HealthLink, have completed a project to provide a list of the most prevalent diseases and toxins identified by the DOE Former Worker program, Current Worker program, and other DOE medical screening programs. The completed project also provides a matrix for use by DOL claims examiners to assist in the claims for compensation made under Part E. The matrix is a cross-correlation of disease to chemicals and the level of exposure required to cause the disease. Research identified the medical evidence required for diagnosis, identified options for obtaining impairment ratings, and provides recommendations for implementing the process.

This final report is organized by work done to date on performance objectives spelled out in the DOL statement of objectives for the project under Work Areas A and B. This final report incorporates comments and suggestions from DOL staff members in response to the interim report.

II. Work Area A—Identification of Occupational Diseases and Illnesses

Performance Objective 1

The contractor shall identify the most common toxins used in the performance of duty at DOE facilities, and specific occupational disease caused by exposure to these chemicals. The contactor will provide options for a commercial product or develop an updateable source to identify the links. The deliverable will provide for simple extractions into a matrix type format that allows easy interpretation of the data.

Performance Measure 1

The contractor shall research on-line tools, interview DOE staff, DOL national office employees, NIOSH employees, Former Worker Program employees, consult occupational illness physicians and others as required to produce a matrix of common toxins used at DOE facilities and the resulting occupational diseases.

Objective 1 Research Results

We utilized a variety of resources to identify common toxic substances used in the performance of job duties at DOE facilities. The Phase I Needs Assessment reports submitted in support of Former Worker Programs specifically addressed major exposures at each DOE facility. We derived additional information from discussions with DOL national office employees, and physicians and investigators affiliated with Former Worker Programs.

From these sources we obtained information regarding toxic substances that were either 1) present at a large number of DOE facilities to which large numbers of workers were likely to have been exposed, 2) present at a large number of facilities to which only a limited number of workers would have been exposed, or 3) present at only certain DOE facilities creating unique but common risk for workers at those specific sites. We compiled a list of illnesses known to be associated with those toxic substances that have been identified to date. We listed illnesses commonly reported by the Former Worker Programs and those identified by DOL to be associated with the greatest number of recent claims into a Priority List, and the remainder was put into a second list. These will be detailed under Objective 3. Additionally, evidence of causation between a toxic substance exposure and each of the priority illnesses was established through review of published statements of the following public health authorities: National Library of Medicine (NLM) Haz-Map database, American Conference of Governmental Industrial Hygienists (ACGIH) Documentation of the TLVs (Threshold Limit Values), Agency for Toxic Substances and Disease Registry (ATSDR) Toxicological Profiles, Environmental Protection Agency (EPA) Integrated Risk Information System (IRIS), National Institute for Occupational Safety and Health (NIOSH), Occupational Health Guidelines for

Chemical Hazards, and the World Health Organization (WHO) International Programme on Chemical Safety (IPCS) Environmental Health Criteria (EHC). A table of identified DOE-related toxic substance exposures recognized by at least one of the public health authorities to have a causal relationship with one or more of our priority illnesses is presented in Appendix A.

We explored the U.S. Department of Labor's EEOICP Site Exposure Matrices (also known as the "DOL exposure database") and the National Library of Medicine Haz-Map database. The DOL exposure database is a relational database that links, for many of the DOE sites, data on job/labor categories, buildings, and job processes/activities with information on the toxic substances used in these jobs, buildings, or processes. In turn, the toxic substances are linked, via data from the Haz-Map database, with lists of the health effects (illnesses) associated with these toxic substances. The database also contains information on atypical exposures that might have been associated with specific historical incidents at some of the sites. Apart from these incidents, the dates associated with the use of specific chemicals in specific jobs and processes at each of the sites are not listed. The database is in the process of being populated.

In principle, a fully operational relational database of this nature would facilitate initial screening of a disability claim by (or on behalf of) an employee. For example, it might be expected that a claim would specify the illness for which the claim is being made, the site and job category of the employee, the dates employed, and possibly the buildings and/or processes in which the applicant worked. Once these data were entered into an appropriate interface, an algorithm associated relational database could determine whether the employee had *potential contact* with toxic substances associated with causation of the claimed illness. If the existence of such potential contact were confirmed, the claim could be assigned a priority for further evaluation, based on this higher level of evidence to support the claim. Conversely, if it were lacking, the claim could be assigned a lower priority. For example, if a machinist working at building 707 in Rocky Flats entered a claim for chronic solvent encephalopathy, the relational database might assess that the claim should be assigned a higher priority, because toxic substances capable of causing chronic toxic encephalopathy (specifically the organic solvents trichloroethane and carbon tetrachloride) were used by machinists in this building. If that same machinist entered a claim for diabetes mellitus, the relational database might assign the claim lower priority, because no relationship in the matrices links a toxic substance with diabetes mellitus. The purpose of the so-called "priority" is to help claims examiners identify the more straightforward, more easily adjudicated cases for which there is a higher degree of evidence of an exposure/disease relationship, thus moving those cases more quickly to impairment rating and completion, while referring the cases with lesser evidence for additional medical advice and input.

Although potentially helpful in facilitating this preliminary, dichotomous assessment of a claim, the matrices, as currently formulated, have several significant limitations with respect to further assessment. Although a claim might be assigned a higher priority on the basis that the job category and building associated with the claim might have entailed exposure to a toxic substance capable of causing the claimant's illness, the matrices offer

no guidance on whether the magnitude of the exposure (or more importantly, the absorbed dose) might have been sufficient to cause the illness. The current absence of information on the dates that a toxic substance was utilized at particular DOE sites constitutes another important limitation. The matrices cannot currently account for the fact that certain site-specific job category–disease relationships might be time dependent, based on the fact that certain chemicals were used at each site for only a limited number of years.

The absence of temporal data on toxic substance usage also limits assessment of the plausibility of a claim based on consideration of the time of employment, the date of diagnosis, and the latency associated with certain illnesses. Further refinement of the matrices, to include information on the dose and temporal pattern associated with certain job-exposure relationships, would considerably improve their value in the claim assessment process. Additionally, the DOL will need to give strong consideration to ways of improving this database application so that it has improved usability for claims examiners, and so that claims examiners are familiar with the major limitations of this tool—including a) extremely deep and unnecessarily detailed information regarding some sites and jobs, b) significant gaps in the available data with which to populate the database, and c) the absence of an ability to relate the exposure levels to jobs, buildings, and sites described in this database to the frequency of illnesses among former workers who held those jobs.

Performance Objective 2

The contractor shall identify the level of exposure required by industry experts to cause the occupational disease.

Performance Measure 2

The contractor shall research industry data to determine the most commonly accepted levels of exposure required to diagnose an occupational disease.

Objective 2 Research Results

a. *Quantitative exposure—disease relationships derived from peer-reviewed studies or government reports.*

As a preliminary step, we identified peer-reviewed studies or government reports that examined quantitative levels of exposure associated with the development of priority illnesses in humans. Our focus was on the lowest level of exposure associated with an observable adverse effect, akin to what has sometimes been designated a "LOAEL." This information exists for some, but not all of the exposures encountered at DOE facilities. Illustrative preliminary findings are detailed in Table 2.1. From this a level of exposure generally accepted to be as likely as not a significant factor in the causation or acceleration of disease will be defined.

Table 2.1. Levels of Exposure Associated with Priority Illnesses

Illness	Occupational Exposure	Level of Exposure	Source (Citation)
Asbestosis (mortality)	Asbestos (crocidolite)	10 f •yrs/cc (cumulative exposure)	Armstrong et al, 1988
Asbestosis	Asbestos (amphibole)	2 – 5 f•yrs/cc (cumulative exposure)	Sluis-Cramer, 1991
Asbestosis	Asbestos	5 – 20 f/cc (chronic exposure)	ATSDR, 2001
Asthma (obstructive patterns on spirometry)	Chromium	0.002 – 0.020 mg/m3	Lindberg & Hedenstierna, 1983
Asthma (obstructive patterns on spirometry; respiratory symptoms)	Formaldehyde	1.13 ppm (mean)	Malaka & Kodama, 1990
Asthma (obstructive patterns on spirometry)	Formaldehyde	0.4 ppm (mean)	Alexandersson & Hedenstierna, 1989
Asthma (obstructive patterns on spirometry)	Formaldehyde	0.69 ppm (mean)	Horvath et al, 1988
Asthma	Nickel	0.004 – 0.025 mg/m3	Shirakawa et al, 1990
CNS/neurobehavioral symptoms and deficits	Carbon Tetrachloride	20 – 124 ppm	Heimann & Ford, 1941; Elkins, 1942; Kazantzis & Bomford, 1960
CNS/neurobehavioral symptoms and deficits	Perchloroethylene	12 – 100 ppm	Stewart et al, 1977; Seeber, 1989
CNS/neurobehavioral symptoms and deficits	Trichloroethylene	200 – 420 ppm	Stewart et al, 1970; Rasmussen et al, 1993

Note: A bibliography of sources cited in Table 2.1 is provided in Appendix B.

b. Qualitative exposure—disease relationships derived from peer-reviewed studies and government reports.

Our review of Phase I Needs Assessments reports prepared for DOE facilities by several Former Worker Programs, notes and presentations made by the Former Worker Programs to DOL, and discussions with investigators conducting medical surveillance on former workers at several DOE facilities, indicated that in most cases the nature of the chemical (non-radiation) exposure data at these facilities would permit qualitative, but not quantitative, estimation of a claimant's peak, average, or cumulative exposure. As such, quantitative information on exposure-disease relationships, such as that shown in the Table 2.1 above, would be of limited help in determining the sufficiency of a claimant's exposure. Indeed, it appeared that for many potential claimants, particularly construction workers, exposure data would be limited to job description, DOE worksite, and dates of employment. For production workers, particularly living retirees capable of providing a detailed occupational history, it might often be possible to associate their former DOE employment with building-specific or task-specific qualitative exposures.

This limitation suggests two major approaches that might be undertaken to assess whether a claimant's exposure was likely to have been of sufficient magnitude to result in an occupational illness. The first approach would utilize data gathered from medical surveillance programs of former DOE workers to determine the job titles and tenure associated with a significantly increased risk of particular health endpoints. For example, a recent study of respiratory endpoints among former construction and trade workers at DOE facilities (Dement et al, 2003) found that 20 or more years of employment at the Hanford or Savannah River facilities was associated with a more than two-fold risk of having parenchymal chest x-ray changes consistent with asbestosis.

Although the data on risk presented in that particular report combined the experience of workers in multiple trades, it might be possible, upon further analysis of the data set, to identify the risk of asbestosis (or other studied health endpoints) associated with a defined period of employment in a specific trade or task. Using a standard convention in workers compensation and occupational medicine, if a claimant's work history matched a job category and duration associated with a more than two-fold elevation in a risk of a given illness, it could be concluded, on an "at least as likely as not" basis, that the claimant's DOE employment was the cause of that illness. The utilization of actual medical surveillance data from former workers programs at DOE facilities to assess these job-category related risks of specific illnesses would be appealing, because the claimant pool would be roughly comparable to the study population, even if data from only a few sites were analyzed. In order to proceed with this approach, our team would have to work with selected former worker programs to obtain and analyze their medical surveillance data.

A second approach to the use of qualitative exposure data to assess whether a claimant's exposure was likely to have been of sufficient magnitude to result in an occupational illness would look to job-related morbidity experiences described in the published medical literature. For example, a recent cross-sectional study of New Zealand welders found that greater than 10 years of exposure to welding fumes was associated with an odds ratio for chronic bronchitis of 9.5 (95% C.I. 1.3 – 71.9) (Bradshaw et al, 1998). Studies such as this, assessed via a formal or informal meta-analysis, could be used to estimate the risk of specific illnesses associated with job tasks of a given duration. A table of illustrative work histories (characterized by job title and duration) associated in the medical literature with a more than doubling of the risk of specific illnesses could be used by claims examiners to assess the sufficiency of a claimant's exposure history. (*This is a labor intensive process that the DOL agreed was not the preferred approach and that it would have been out of scope for us to complete at this time. However, our team could produce such a table in consultation with investigators responsible for medical surveillance at former worker programs, in order to select illustrative histories most relevant to common DOE claimant job histories. The shortcoming of such an approach is that it would have limited direct applicability to the exposure circumstances encountered by workers at DOE sites, however if other approaches were not available, this approach remains an option that has been used in other such circumstances.)*

Recognizing that DOL claims examiners will need to have the ability to link claimed illnesses to particular types of exposures that are known to cause those illnesses, as a first step in assessing the merit of a claim, we have prepared a table that summarizes the major illnesses, the exposures that are thought to be able to *cause* those illnesses, and the major agencies, organizations, and authoritative sources that have reviewed the strength of evidence for causation. (See Appendix A.) Note that certain exposure x disease causative relationships have not been reviewed by some of the public health authorities. Some of these relationships have been reviewed by many authorities, sometimes drawing seemingly different conclusions. These differences result from factors such as a) date of review, b) available data at time of review, and c) purpose of review. Therefore, the number of authorities reporting a causal relationship between a particular toxic substance exposure and disease should not be construed as indication of the strength of that causal relationship. We would recommend that if at least one of these public health authorities has identified a probable causative relationship between a covered illness and an exposure on the list, claims examiners for DOL should consider that to be a valid relationship.

In addition to exposures being able to cause disease, exposures at DOE sites may have potential for significantly aggravating underlying health conditions, even if the exposures did not specifically cause the underlying illness. Our review of the *causative* exposure x disease relationships expressed in this report (Appendix A) did not address exposure x aggravation. For example, respiratory irritant exposure can trigger symptoms of cough, wheeze, and shortness of breath. If the triggering of these symptoms prompted an individual to seek medical evaluation during which a lung cancer was diagnosed, he or she might submit a claim for lung cancer. There is no known casual association between respiratory irritant exposure and lung cancer. However, continued symptoms beyond those reasonably expected due to the lung cancer could constitute a worsening or *aggravation* of the underlying disease. This information will be important to assemble and is suggested as an important next element of work (beyond the present contract's timeframe).

Performance Objective 3

The contractor shall provide a list of diagnostic tests, medical findings, and other medical evidence that would establish causation between the chemical exposures and the occupational diseases.

Performance Measure 3

The contractor shall research and determine the types of medical evidence necessary to establish causation of the common occupational diseases found in Performance Measure 1.

Objective 3 Research Results

As discussed under Performance Objective 1, we compiled a list of illnesses identified to date to be associated with toxic substances known to have been present at DOE sites. Some of these illnesses were placed on a priority list according to our perception of DOL needs based on the substances and illnesses most commonly identified through our resource contacts, including DOL staff. Appendix C lists our identified priority illnesses and associated toxic substances present at DOE sites.

We explored a number of commercially available databases linking toxic substance and health information. The focus of many of these databases with linked health information is on health effects rather than specific diagnosed illnesses. While these possible health effects are very important for health care providers, the listed health effects are not specific enough to be a helpful tool for a claims examiner trying to gain additional information on a specific diagnosed disease or illness. The National Institute of Health's (NIH's) National Library of Medicine (NLM) TOXNET is a compilation of a number of databases for information on toxicology, hazardous substances, and their health effects. This very comprehensive compendium of toxic substances far exceeds the toxic substances to which workers would have been exposed on DOE sites. Much of the information is fairly technical in nature, making it an excellent resource for additional information, but not for use as a primary tool for the claims examiners.

The NIH's NLM Haz-Map database is the most appropriate resource we have found. It is searchable and contains a list of 189 specific diseases associated with occupational exposures. However, many are infectious diseases which are not relevant for DOE purposes. The Haz-Map database also contains a secondary searchable list of symptoms and findings related to toxic substance exposures. There was not a perfect match between the specific name of the disease or illness used in our original list of priority illnesses and the Haz-Map database. In addition, not all of our priority illnesses had a corresponding disease in the Haz-Map database. For those priority illnesses, we identified the corresponding symptom(s) and/or finding(s) from the database. However, some priority illnesses required a text search in order to find a link in the database. For some of our priority diseases, there are multiple corresponding Haz-Map diseases. Table 3.1 shows a summary of the link between our original list of priority illnesses and the corresponding disease or symptom/finding from the Haz-Map database.

Table 3.1. List of Priority Illnesses and Corresponding Disease or Symptom/Finding from the Haz-Map Database

Disease	Haz-Map Disease	HAZ-MAP Symptom/finding	Problem
Chronic silicosis	Silicosis, simple		
	Silicosis, complicated		
Acute silicosis	Silicosis, acute		
Accelerated silicosis	Silicosis, simple		
	Silicosis, complicated		
Beryllium sensitization	.		
Chronic beryllium disease	Chronic beryllium disease		
Asbestosis	Asbestosis		
Asbestos related disorders	Asbestos related disorders	Pleural plaques	
		Pleural effusions	
Lung fibrosis	.		Text search needed for:
			Interstitial pulmonary
			Fibrosis and it links to
			many diseases
Pneumoconiosis	Benign pneumoconiosis		They are not all benign
COPD	Bronchitis, chronic	Obstructive defect	Text search needed for:
			COPD
			Emphysema
Diabetes	.		
Chronic renal insufficiency		Kidney function test, abnormal	
	Cadmium, chronic toxic effect		
	lead, subacute toxic effect		
	Mercury, elemental chronic		
Mesothelioma	Mesothelioma, pleural		
	Mesothelioma, peritoneal		
Lung Cancer	Lung cancer		
Peripheral neuropathy	Neuropathy, toxic		List of 27 agents
		Neuropathy	List of 4 agents
Cardiac	.	arrhythmia, bradycardia, tachycardia	Acute: 6 agents; no nitrates
			Text search needed for:
			Sudden death, heart attack
			Several agents, no nitrates
CNS	Parkinsonism		
	Carbon disulfide, chronic toxic effect		
	Manganese chronic toxic effect		
	Solvent, acute toxic effect		List of 152 agents
	Encephalopathy, chronic solvent		CNS solvent syndrome
	Encephalopathy, acute		List of 25 agents for acute
		Many symptoms and findings	
Asthma	Asthma, occupational		List of 256 agents
	Asthma, irritant induced		Medscape link

As seen in the table, silicosis, chronic beryllium disease, asbestosis, asbestos-related disorders, toxic neuropathy, mesothelioma, and asthma have a clear corresponding disease(s) in the Haz-Map database. For our other diseases, the Haz-Map link is less clear. For example, a Haz-Map test search for lung fibrosis links to interstitial pulmonary fibrosis, but this is used as a general term for a variety of diseases that can cause fibrosis. Pneumoconiosis is subsumed under benign pneumoconiosis, but it should be noted that most of the agents listed can produce clinical disease symptoms and lung function abnormalities in addition to radiographic changes. Chronic obstructive pulmonary disease (COPD) is an umbrella diagnosis that includes the diagnoses of emphysema and chronic bronchitis. Chronic bronchitis is listed as a Haz-Map disease, but COPD and emphysema require a text search.

Some problems with the linkage between the diseases and the listed associated toxic substances were identified from a toxicological perspective as well. For example, a nonspecific term such as "Respiratory irritants" is not listed as a cause of asthma, and a search under respiratory irritants does not yield "asthma" as a result. However, there is a disease field named "asthma, irritant induced." Care will be needed in entering the terms for the chemical and occupation fields so that synonyms for various diseases and jobs are also active. "Formaldehyde" is not listed as a cause of asthma on Haz-Map, although it is on our working list for DOE. The role of formaldehyde in causing respiratory sensitization is subject to some uncertainty and debate. [To quote the ACGIH 2001 TLV documentation: "Reported asthmatic attacks may, in some cases, be due specifically to formaldehyde sensitization or allergy; however the evidence for this was less than certain."] Vanadium is on our list of agents causing asthma, but is not listed as a cause of asthma in Haz-Map. This might be a consequence of the fact that the literature supporting this relationship is still emerging and not extensive. The only exposure link to COPD, which again includes the diagnosis of chronic bronchitis, is grain dust. However, there are 59 agents linked in Haz-Map to "bronchitis, chronic" and 19 associated job tasks. It is important to note that "Diesel exhaust" and "Respiratory irritants" are on the DOE working list, but not listed in Haz-Map. Cadmium and mixed dust were tentatively suggested for our list but are not in Haz-Map for this condition.

For claims examiners' ease of use, we have changed the names of the priority illnesses to more closely correspond with a Haz-Map disease, symptom/finding, shown in Table 3.2. We have excluded cross-referenced information that we felt might serve to confuse rather than clarify questions about the priority illnesses.

Table 3.2. List of Priority Illnesses and Corresponding Disease or Symptom/Finding from the Haz-Map Database

Disease	Haz-Map Disease	Haz-Map Symptom/Finding
Silicosis, chronic	Silicosis, simple	
Silicosis, acute	Silicosis, acute	
Silicosis, accelerated	Silicosis, simple	
Silicosis, complicated	Silicosis, complicated	
Beryllium sensitization	.	
Chronic beryllium disease	Chronic beryllium disease	
Asbestosis	Asbestosis	
Asbestos related disorders	Asbestos related disorders	Pleural plaques
		Pleural effusions
Lung fibrosis	.	
Pneumoconiosis	Benign pneumoconiosis	
Chronic Obstructive Pulmonary Disease	Bronchitis, chronic	
Diabetes	.	
Kidney disease		Kidney function test, abnormal
Mesothelioma	Mesothelioma, pleural	
	Mesothelioma, peritoneal	
Lung Cancer	Lung cancer	
Neuropathy, toxic	Neuropathy, toxic	
Heart attack	.	
Encephalopathy, chronic toxic	Encephalopathy, chronic solvent effect	
Asthma, occupational	Asthma, occupational	
Asthma, irritant induced	Asthma, irritant induced	
Asthma, irritant aggravated	Asthma, irritant induced	

Criteria to Establish Sufficient Evidence of a Covered Illness

We recognize that in order for DOL to determine that sufficient evidence of a covered illness exists, four separate lines of evidence will need to be established. These are:

1. Evidence of exposure.
2. Evidence of the expected period of disease latency.
3. Medical evidence of an illness.
4. Medical evidence for causation of the illness by the exposure.

Evidence of Exposure

Evidence of exposure to a sufficient amount of one or more specific toxic substance(s) known to cause or aggravate disease is a necessary part of establishing medical evidence of disease and causation. The details for establishing evidence of exposure are outside of the scope of this objective.

Evidence of Expected Period of Disease Latency

The latency period is defined as the time between first exposure and the first manifestations of the disease. For DOL purposes, it will be defined as the time between the first DOE-related exposure and the first manifestations of the disease. We have provided reasonably expected disease latency periods for the priority illnesses. The minimum latency period is a function not only of the specific causative toxic substance, but also the intensity and duration of the exposure. Therefore, the latency periods given can be rather broad, i.e. day, months, or years for some substances. Further delineation of the expected latency periods could be further refined, given sufficient time, and would be recommended.

Medical Evidence of an Illness

For each Priority Illness we reviewed the medical literature to compile a list of diagnostic tests, medical findings, and other medical evidence to identify diagnostic testing criteria by which to establish evidence that the claimed illness is present. When possible, we utilized criteria from published consensus statements. We anticipate the claims examiner will be able to place each worker's claim into one of the three following categories:

- *Sufficient Evidence of Illness*
  Sufficient evidence exists to support that the claimed illness is present if there is both a written diagnosis of that illness made by a medical doctor and copies of the results of the required diagnostic testing listed for each illness.

- *Sufficient Evidence of Possible Illness*
  Sufficient evidence of possible illness can be established by any one of the following means:

  1) Some, but not all, of the criteria necessary to establish the illness are present in the claim record. Missing diagnostic criteria elements should be identified and the worker allowed the opportunity to obtain this testing, if medically appropriate and/or possible. If this additional medical evidence now allows for a determination of sufficient evidence of illness, then physician review will no longer be required.

  2) Additional criteria listed for each specific illness are met. Again, missing diagnostic criteria elements should be identified, and the worker allowed the opportunity to obtain this testing, if medically appropriate and/or possible.

  3) Physician review of the record is required for determination that there is sufficient evidence of the illness.

- *Insufficient Evidence of Illness*
  All claims not fitting into one of the above two categories will be considered to have insufficient evidence of illness. Note: Missing diagnostic criteria elements should be identified, and the worker allowed the opportunity to obtain this testing, if medically appropriate and/or possible. If this additional information now allows

for a determination of sufficient evidence of illness or possible illness, the claim should be processed as such. Only those claims for which there remains insufficient evidence should be determined to have insufficient evidence of illness.

Medical Evidence for Causation of the Illness by the Exposure

Causation can mean that an illness was caused by a toxic substance exposure or that an underlying disease process was accelerated due to the toxic substance exposure. In this initial phase we have focused only on the primary causation of disease due to toxic substance exposure.

Some illnesses are uniquely occupational illnesses, i.e., there are no other known causes of the illness other than toxic substance exposure, such as silicosis. For those illnesses, copies of the results of the required diagnostic testing listed for each illness will provide the necessary evidence of causation.

Other illnesses can be caused by either toxic substance exposure or non-occupational factors, such as other disease processes, personal factors, and genetics, such as COPD. In cases where there are no medically established means by which to distinguish illness caused by exposure to toxic substances in the workplace from illness due to other causes, physician review of the record will be necessary to establish causation. We recommend the reviewing physician be a specialist, meaning one who has achieved board certification in the relevant area of medicine and has evidence of continuing medical education in impairment evaluations, as detailed for rating physicians under Performance Objective 4. Note, this would allow the same physician to determine that sufficient evidence of covered illness exists to perform the final impairment rating as well. We again emphasize that exposure to toxic substances can accelerate underlying diseases. If all criteria are otherwise met, individuals with underlying diseases, including genetic, may be considered to have a covered illness.

The three possible outcomes for an initial claim review are 1) there is sufficient evidence of a covered illness, 2) there is sufficient evidence of a possible covered illness, and that physician review is required, or 3) there is insufficient evidence to support a covered illness. The means by which these outcomes are determined are presented in Table 3.3. This table presents a summary of covered illness determination based on the possible result combinations of the three lines of evidence needed to establish a covered illness: evidence of exposure, evidence of illness, and if evidence of causation is needed.

Table 3.3. Summary of Covered Illness Determination

Covered Illness	Exposure	Illness	Causation
Established	Established	Established	None needed
Physician review needed	Established	Established	Needed
	Established	Possible*	Does not matter
	Possible*	Established	Does not matter
	Possible*	Possible*	Does not matter
Insufficient evidence to support	Does not matter	IE*	Does not matter
	IE*	Does not matter	Does not matter

IE= Insufficient evidence of exposure and/or illness is present.
* Missing exposure or medical elements causing a claim to be determined not to establish sufficient evidence of exposure or illness should trigger a request for more information from the worker as detailed above.

For each priority illness, we prepared a table to allow DOL to easily evaluate each claim for sufficient evidence of exposure and sufficient evidence of illness, as well as if there is the additional requirement for physician review to establish causation. An example is shown below in Table 3.4.

Table 3.4. Example of Matrix to be Produced for Each Covered Illness

Criteria	Sufficient evidence of covered illness	Sufficient Evidence of Possible Covered Illness; Requires Physician Review
DOE exposure criteria	DOE Facilities Specific job titles/ processes Applicable dates	DOE Facilities Specific job titles/ processes Applicable dates And Additional information is needed**
Latency	Days, months, or years	Days, months, or years
Medical evidence for illness and diagnostic testing criteria	1. A written diagnosis of silicosis made by a medical doctor And 2. List of the required diagnostic tests	Some, but not all criteria to establish the illness are met** Or Other criteria
Additional considerations for causation	None needed or physician review required.	Physician review required.

** Triggers DOL request for additional information from the worker for exposure and/or diagnostic testing criteria elements, in addition to when insufficient evidence is found.

The tables prepared for the Priority Illnesses are shown in Appendix C. The matrix structure does not identify a means by which to prevent a claim for a second illness in the same organ system from becoming established, as some of the covered illnesses have some of the same diagnostic testing criteria. For example, in addition to a written diagnosis of the illness by a medical doctor, sufficient evidence for chronic silicosis, asbestosis, and pneumoconiosis can be established by "a chest radiograph interpreted by

a NIOSH-certified B reader classifying the existence of pneumoconioses of category 1/0 or higher." Thus, if a worker with one illness and one chest x-ray submitted three different written diagnoses from three different medical doctors, that worker could theoretically have sufficient evidence for each of those three different illnesses. In such an example, even if the patient carries a medical diagnosis of all three diseases, the individual should have his or her whole person impairment due to respiratory disease evaluated in a manner that combines the three together, and does not provide compensation as though the individual had three non-overlapping conditions. We caution DOL to ensure that appropriate evaluation for each separate claim be obtained in such a manner as to safeguard against this, and to simplify the impairment rating process in combining such overlapping diagnoses.

Claims Requiring Physician Review

Once the need for a physician review is established, we recommend DOL consider the following steps:

1. Selection of an appropriate physician specialist, meaning one who has achieved board certification in the relevant area of medicine and has evidence of continuing medical education in impairment evaluations, as detailed for rating physicians under Performance Objective 4.

2. Based on our experience with review of claims for other programs, we recognize that additional staff and/or physician time is required to trim the records of duplicate reports, blank pages and completely illegible reports, as well as possibly organizing the medical record. We recommend DOL explore the feasibility of some or all of this approach to decrease the amount of time required for physician reviewers to review the records. It is recommended that the record be organized in the following manner with each section separated by a tab or marker. The contents of each section should be ordered chronologically from most recent to earliest.

    a. Physician histories, reports, and summaries, including both office and hospital records.

    b. Results of laboratory testing: all blood and urine testing.

    c. Results of radiologic testing, including x-rays, CT, MRI, and nuclear medicine.

    d. Results of specialty testing, including pulmonary function and/or spirometry testing.

    To facilitate this process of culling through medical records and identifying what information is relevant to the claim, it will be advisable for the DOL to:

    a. Use algorithms, based on the claimed illness(es), to create a list for the claims examiners of what information they are to be looking for.

b. Train claims examiners or individuals with medical knowledge (MA, LPN, RN, etc.) in how to recognize the appropriate medical information being sought.

c. Limit requests for medical records and for additional medical testing to those tests, reports, and other data that are specifically needed to address the claimed illness. In this way, less copious medical records would be received for review. For example, if a claim were received for "asbestosis," medical records requests could be confined to physician reports, chest imaging reports, pulmonary function and spirometry, measures of oxygenation (diffusing capacity, arterial blood gases), exercise capacity tests, and lung pathology reports. While still extensive, this more selective records request would eliminate the need to review irrelevant data such as hospital admissions for knee surgery.

3. DOL will review the opinion of the reviewing physician that the claim is more likely than not to be either a) medically consistent with a covered illness, or b) not medically consistent with a covered illness. The DOL will review the report and determine the final decision as to whether or not sufficient evidence of a covered illness has been established.

4. The claim would then be processed for impairment rating as detailed under Work Area B, Objectives 4-6.

Additional Considerations

1. Aggravation of disease

According to Paragraph 30.230 of Part 30, the criteria necessary to establish that an employee contracted a covered illness under Part E of EEOICPA, includes a finding "That it is at least as likely as not that exposure to a toxic substance at a Department of Energy facility or at a RECA section 5 facility, as appropriate, was a significant factor in *aggravating, contributing to, or causing* the illness…." [emphasis added]. It has been a standard convention in occupational medicine, and in workers compensation and related jurisprudence, to conclude that a claimant's exposure was a "cause" of an illness if that exposure were associated, in the epidemiological literature, with a more than two-fold elevation in the relative risk of contracting the illness.[1] The basis for establishing whether an exposure has been a "significant factor" in "aggravating" or "contributing to" an illness is less clear. In some situations, such as asbestos exposure resulting in asbestosis, the relevant dosage to consider when assessing the risk of disease is an individual's long-term cumulative exposure to the toxic substance. In such situations, any exposure episode, however minimal the duration or intensity, might be viewed as "contributing" to a cumulative exposure that, in aggregate, was as likely or not to have caused the claimant's illness.

[1] Green MD, Freedman DM, Gordis L et al., "Reference Guide on Epidemiology," *Federal Judicial Center Reference Manual on Scientific Evidence* (2nd edition), Federal Judicial Center: Washington, DC (2000).

Apportionment of the impairment resulting from that illness (cf. §30.626) to a specific period of employment might be accomplished by considering the pro-rata portion of the exposure sustained during that period to the individual's overall cumulative exposure.

For other situations (such as carbon tetrachloride exposure resulting in renal injury), a short-term threshold of exposure might need to be exceeded before workplace exposure could be considered to have been injurious to the target organ system. Periods of low dose exposure should not be considered to have "contributed" to renal insufficiency; rather, only periods of time when exposure exceeded an injurious threshold should be considered to have contributed to the illness. Apportionment of impairment should consider the pro-rata portion of periods of exposure when the level of exposure was sufficiently intense to be injurious.

The matter is further complicated by the realization that for some toxic substances, the extent of exposure needed to "aggravate" a pre-existing illness may be less than the amount necessary to cause the injury de novo. For example, a patient with pre-existing asthma might have had his or her condition aggravated by a period of relatively low-level exposure to a respiratory irritant. That same exposure might have had a negligible impact on a person without pre-existing asthma.

For each exposure-disease relationship, it might be possible to determine the appropriate dose metric (e.g. cumulative exposure versus short-term suprathreshold exposure) to apply when determining whether, and to what extent, an exposure might have "contributed" to a claimant's illness. Issues of "aggravation" are likely to be highly case-specific, as they will require assessment of the extent of a particular claimant's pre-existing illness.

2. *Delineation of more precise expected latency periods based on specific causative toxic substance and the intensity and duration of exposure*

The minimum latency period is a function not only of the specific causative toxic substance, but also the intensity and duration of the exposure. The more intense the exposure, the shorter the latency period. For example, in most cases, mesothelioma classically has a latency period of at least 30 years, but with very intense exposure, the latency may be as short as 20-25 years. Conversely, lower level exposures may be associated with latencies greater than 50 years. The latency period for an illness can also vary depending on the specific causative toxic substance.

3. *Review of medical criteria*

When available, the medical evidence for illness, diagnostic testing criteria, and evidence for causation were taken from published consensus statements, such as the American Thoracic Society. Such consensus statements were not available for all of our priority illnesses, such as kidney disease, asthma, and toxic neuropathy. We recommend broader review of the medical criteria by physicians with expertise in the

relevant area(s) of medicine than was achievable in the given time period, except where derived from published consensus statements.

4. *Expansion of operational definitions*

In the time available for the completion of this initial phase, we provided an outline of the criteria for medical evidence of covered illnesses, diagnostic testing criteria, and evidence for causation. We recommend review and expansion of operational definitions to provide more detailed explanations to facilitate their use by the claims examiners. An example for chronic silicosis is shown on the next page in Table 3.5.

Table 3.5. Chronic Silicosis Matrix Example with Expanded Definitions

Criteria	Sufficient evidence of covered illness	Sufficient evidence of possible covered illness, requires physician review
DOE exposure criteria*	DOE Facilities Specific job titles/ processes Applicable dates	DOE Facilities Specific job titles/ processes Applicable dates **And** Additional information is needed**
Latency*	10 years or more	5- 9 years
Medical Evidence for illness and diagnostic testing criteria	1. A written diagnosis of silicosis or chronic silicosis made by a medical doctor • Pneumoconiosis due to silica or silicates • ICD9 502 or analogous condition **And** 2. Any <u>one</u> of the following four criteria a. A chest radiograph, interpreted by NIOSH certified B reader classifying the existence of pneumoconioses of category 1/0 or higher; • ILO classification system: round opacities p,q,r b. Results from a chest x-ray or other imaging technique that are consistent with silicosis • An upper and middle lobe predominance of the following • Silicotic nodules • Small round opacities (with or without calcification) • Associated "eggshell" calcification of lymph nodes c. Results from a computer assisted tomography (CT) or other imaging technique that are consistent with silicosis • Micronodules, macronodules, and/or nodules d. Lung biopsy findings consistent with silicosis • Silicotic nodules • Peribronchial fibrosis may be seen	Some, but not all criteria to establish the illness are met** **Or** Medical record (includes any provider report, results of imaging studies, surgical or pathology reports, or other acceptable record) mention of silicosis, possible silicosis, restrictive lung disease, fibrosis, or pneumoconiosis <u>Or</u> Death certificate mention of silicosis, possible silicosis, restrictive lung disease, fibrosis or pneumoconiosis **Or** A chest radiograph, interpreted by NIOSH certified B reader classifying the existence of pneumoconioses of category 0/1 **Or** Lung biopsy findings suggestive of silicosis
Additional considerations for causation	**None needed**	**None needed**

5. Consideration of additional diseases

A brief outline of additional diseases and some DOE-related causative exposures are listed in Table 3.6 on the next page.

Table 3.6. List of Some Additional Diseases and DOE-Related Exposures to be Considered

Disease	Exposure
Liver	carbon tetrachloride
	Hydrazine
Thyroid disease	Radioactive I >20 REM
Ear, nose, and throat disorders	
Cataracts	
Aplastic anemia	Benzene
Dermatitis/skin diseases	formaldehyde, chromium , epoxy resins
	beryllium, dioxin, MWFs , nickel
HP	Isocyanates, MWFs
Cancers	
Bladder	
Breast	
Bone	
colon	
Brain	
Thyroid	
Erythroleukemia	
lymphoma	
Esophagus	
Mouth	
Kidney	
Throat	
Laryngeal	
Liver	
Leukemia, acute lymphocytic	
CML	
Leukemia, acute myelogenous	
Pancreatic	
Lung	
Prostate	
nasal sinus	
ovarian	
nasopharynx	
uterine	
scrotal	
stomach	

6. Consideration of consequences of covered illnesses

Note that our matrix does not include claims that include claimed consequences of the covered illness. All of those claims would need to undergo physician review to establish sufficient evidence that the consequence is due to the covered illness, unless a separate matrix were developed to identify common, anticipated consequences of each covered illness and/or its treatment. The consequences of this problem for established covered illnesses are shown in Table 3.7, and the solution a matrix for consequences could provide is shown in Table 3.8.

Table 3.7. Example of How Claims Established Without Consideration of Consequences of the Covered Illness May Change if a Consequence is Claimed

Evidence of Covered Illness Established Without Consideration of Consequences	Presence of a Claimed Consequence	Evidence of Covered Illness With and Without Associated Consequence
Established	No	Established
Established	Yes	Physician review needed

Table 3.8. Example of How Claims Established With the Use of a Consequence Matrix Could Decrease the Number of Claims Requiring Physician Review

Evidence of Covered Illness Established Without Consideration of Consequences	Consequence of Covered Illness Present in Claim With a Matrix for Consequences	Evidence of Covered Illness With Associated Consequence
Established	Established consequence	Established
Established	Other consequence claim	Physician review needed

The DOL may wish to consider the preparation of a similar type of matrix if certain consequences of covered illnesses are claimed frequently.

III. Work Area B—Impairment Ratings

Performance Objective 4

The contractor shall provide recommendations for the criteria to determine if the physician is qualified to perform impairment ratings. These criteria must consider the geographical locations of the significant claimant populations.

Performance Measure 4

The contractor shall research options including AMA Guidelines, researching online physician networks, contacting physicians, etc., for identifying physicians qualified to perform impairment ratings.

Performance Objective 6

The contractor shall identify when a referral shall be sent to a physician for an impairment rating, providing methodology for how to process the referral.

Performance Measure 6A

The contractor shall research industry standards to determine when the office shall refer a claimant for an impairment rating and provide options for the acceptable formats for referrals.

Performance Measure 6B

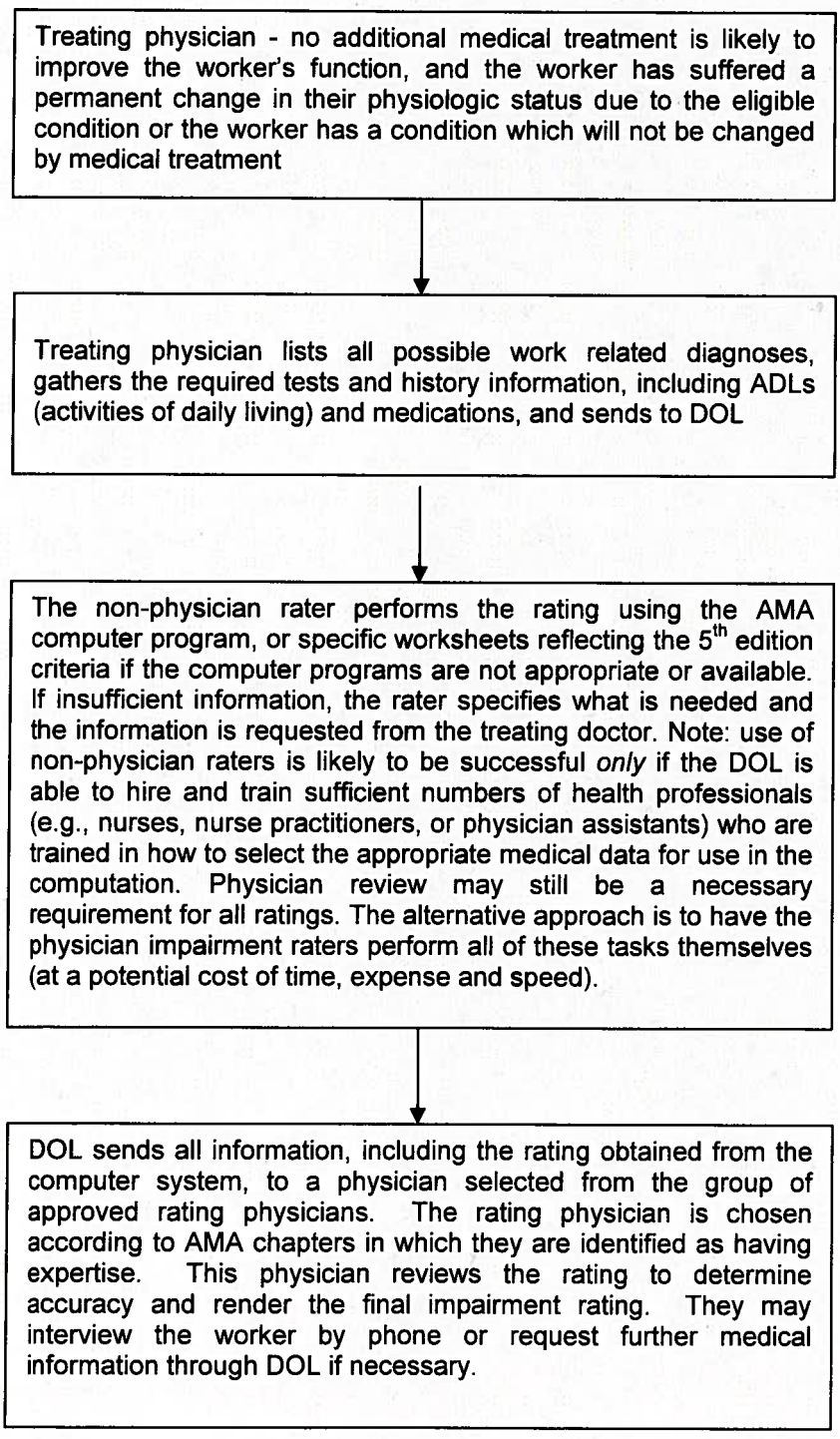
The contractor shall review methodologies and/or processes for referral of claimants for impairment rating examinations.

Recommendations for the Process of Referring Workers for an Impairment Rating

We considered multiple options before providing our process recommendations. Most impairment rating systems require the client to be physically seen by the physician performing the impairment rating. In consideration of the diverse geographical distribution for this injured worker population, as well as the cost and time commitment that would be entailed in arranging such examinations, we are recommending a different model. A flow chart showing this model is found in Figure 1 on the following page. There are four basic steps to this model. The first step requires the treating physician to determine that no further medical treatment will substantially improve the worker's condition, and that the worker has suffered a permanent physiologic change due to the

work-related condition. These first criteria meet the 5th Edition of the "AMA Guides the Evaluation of Permanent Impairment" (Guides) definition of maximum medical improvement and the 30.911 (a) definition that the covered illness is "well-stabilized and unlikely to change substantially with or without medical treatment."

Figure 1. Schematic of Rating Process



We urge the DOL to consider a worker to have reached maximal medical improvement (MMI) when a physician has determined that *no additional medical treatment is likely to improve* the worker's function, as shown in Step 1. Although the AMA Guides mention, as an additional criterion, that a physician conclude "that the condition is not likely to deteriorate over time," we do not recommend that this criterion be used in determining when to conduct the impairment rating. If this further requirement were added as a criterion for maximum medical improvement, many workers would not receive any impairment rating, as their conditions are known to worsen over time. This would potentially preclude the workers from getting compensated for the impairment that they have currently at the time that they applied, and would leave many people with open, unresolved cases. In some cases the end point for these conditions will be death, and if we applied the standard of not seeking an impairment rating until the person had reached the lowest level of impairment that he or she would achieve, workers would not get their impairment rating until they were deceased. Instead, we would suggest that claimants receive compensation based on the level of impairment at the time they apply, and that they later apply for additional compensation once the treating physician has determined there has been a significant deterioration resulting in additional impairment. These recommendations are consistent with 30.911(a) and (b) and 30.912.

In order to avoid unnecessary cases going forward, we added the second requirement that the treating physician determine the presence of a permanent physiologic change in the patient. This system is common to the systems used in many other workers' compensation states, including Colorado. In Colorado, treating physicians are not required to be trained or accredited by the Division of Workers' Compensation; however, any physician performing an impairment rating is required to complete a training course on impairment rating that is given by the Division of Workers' Compensation. In this system, treating physicians make the determination of maximum medical improvement and the presence of a permanent change in the patient's condition as a prerequisite to referring them to accredited physicians for impairment rating. Essentially similar processes exist in most workers' compensation systems, although in some workers' compensation systems there is not a requirement for training regarding the impairment rating process. In cases in which no treatment will change the condition of the patient, such as terminal cancer, no treating physician's statement will be required. This conforms to 30.911.

The second step is for the DOL to inform the treating physician of the information needed from the treating physician in order to formulate the impairment rating. This information will include specific physiologic tests depending on the diagnosis given. Tables can be developed related to the diagnostic categories encountered by workers, which can clearly spell out to the treating physician what test results are needed. These are well detailed in the 5th Edition Guides and can usually be taken from worksheets that already exist in the 5th Edition Guides. The treating physician can complete the tables by filling in just the test results. In addition to the required diagnostic testing, however, it is absolutely essential that the physician include a description of problems with daily living activities. Please refer to page 599 from the AMA 5th Edition included in Appendix E. It may be advisable for the DOL to decide to endorse one of the disability questionnaires

that a patient could complete. This questionnaire could then be reviewed by the treating physician to either agree with the patient's self reported disability problems or at least comment on the reported impairment in light of their assessment of the patient's ability to perform daily living activities. On pages 6 and 7 in chapter 1 of the Guides, there is a list of some of the most common functional evaluation tools used in Table 1.3 in Appendix E. The appropriate questionnaire could be selected based on the type of covered illness. This additional documentation should be submitted along with the diagnostic test findings and the physician's impression of the injured worker's ability to perform activities of daily living.

The third step in the rating process would be for the information supplied by the treating physician to be applied to the AMA Guides rating system. The AMA has produced a CD-ROM-based software program that allows one to enter the physiologic data required for a rating, and the program will calculate a rating. (We do acknowledge that there are other computer systems available, and they may be equally as reliable; however, it may be preferable to use the AMA system, as there would be less argument by parties as to whether the computer system being used accurately would reflect the AMA Guides.) This AMA program "Guides Impairment Calculator CD-ROM" has only just been released. In our preliminary testing of the software in a hypothetical case of respiratory illness, the calculator "froze" and in a trial of a case of asthma, it miscalculated. We will continue to test this AMA product, but it may be advisable to wait for later versions of this software to be produced before adopting it. It must be remembered that in many areas there is a range available for a rating. If a non-physician rater system is used by DOL, we would suggest the non-physician rater who is entering this data merely use the number to which the system defaults. This number is the lowest number in each range. Unfortunately we do not believe that the non-physician rater will be able to complete the rating in a manner that necessarily meets the quality standards expected nor would this process alone follow the recommendations of the Guides. The AMA Guides are clear that a physician is required in order to formulate the final impairment rating. See pages 18 and 19 of the Guides.

We recognize that the DOL may choose not to create a non-physician rater or the AMA Guides Impairment Calculator may not be fully available or adequately field tested at the time the DOL compensation program is started. In the case that either of these are possibilities, we would suggest that the full information as outlined above be forwarded to the physician impairment rater, who will then perform the complete operation of the rating. The major negative to this would be that there might be more mathematical errors or unintentional errors in the rating than would occur if the information were entered into a computer process. Even if it is determined that the process of having a non–physician rater enter the information initially and provide a first version of the rating, perhaps it will be possible for the physician impairment raters to have access to a computerized system to decrease mathematical errors.

The fourth and final step for obtaining the impairment rating is for the impairment rating physician, who has been qualified by the DOL, to receive all of the available medical records, as well as the impairment rating generated by the non-physician rater using the

AMA Guides' computerized system. The impairment-rating physician would review the medical records and the preliminary rating obtained using the AMA Guides Impairment Calculator (with same caveats as above). The impairment-rating physician then would make a final decision regarding the appropriate impairment rating. The types of things that this physician would need to consider are 1) was the diagnosis accepted by the DOL clearly reflected in the impairment rating? 2) Is there any evidence that the initial impairment rating used incorrect categories for the rating process or did not fully consider the extent of the diagnostic testing or impairment of activities of daily living when calculating the rating? 3) Taking into consideration the impairment reported by the treating physician and the patient, is the number chosen from the Guides appropriate for this patient? This physician would then create a final impairment rating. In some circumstances the physician may feel the need to interview the patient over the phone in order to obtain further information that may not be apparent in the record. It would be recommended that the impairment-rating physician be allowed to perform this activity. Also, the impairment-rating physician may determine that further test results or medical record information are necessary. If this is the case, the physician should notify DOL, which should then obtain this information from the treating physician and forward it to the impairment-rating physician. Disadvantages of this approach are that it requires a greater amount of documentation and time for this type of phone-clarification.

Selection of Impairment Rating Physicians

It is nationally recognized that there are few physicians who, based solely on board certification, have been taught the impairment rating process sufficiently to perform it accurately on a regular basis. The Guides, on page 18 (also found in Appendix E), refers to the need for education in these areas for the majority of physicians. In addition, there are several organizations that certify physicians as having expertise in impairment rating of the 5th Edition of the Guides. These include the American Association of Disability Evaluating Physicians (AADEP) and the American Board of Independent Medical Examiners (ABIME). There are also courses available for physicians, which are well recognized nationally for teaching impairment rating processes of the 5th Edition of the Guides. These include courses offered by the AMA as well as courses offered by the American College of Occupational Environment Medicine (ACOEM.) We recommend that impairment rating physicians be chosen based on their board certification and evidence of continuing medical education (CME), such as CME certificates from AMA or ACOEM courses addressing the AMA 5th Edition of the Guides to the Evaluation of Permanent Impairment, or that they be certified by AADEP or ABIME as having expertise in the impairment rating process.

Appendix D contains lists of board certified physicians who are certified by AADEP and ABIME. There appear to be a sufficient number of physicians in these areas with a variety of board certifications to meet the DOL's needs. After the physician impairment rater is selected based on board certification and additional education in impairment rating, the physician shall complete a form indicating which chapters of the Guides they are familiar with and competent in using. We recommend that such qualified individuals be given an initial accreditation by DOL to serve as both physician reviewers and

impairment raters. Recommendations for the DOL to establish an expert committee that would advise the Department and serve as oversight for a quality assessment program is described under Objective 5 below. One of the functions of this committee could be annual or biannual reaccredidation of reviewing/rating physicians based on report quality, timely completion of reports, and other measures to be determined. Alternatively, this committee could also serve to establish the initial accreditation as well.

Another valuable resource for physicians with expertise in occupational diseases may be found among those affiliated with the Association of Occupational and Environmental Clinics (AOEC). These clinics work closely with other federal agencies, including the NIOSH and ATSDR. There are more than 60 clinics nationwide. Additional information on AOEC may be found on their website, www.aoec.org, or by telephone at (888) 347-AOEC (2632).

In light of the large number of cases that are respiratory-disease related, the DOL should also consider the Environmental and Occupational Health (EOH) Section of the American Thoracic Society as a potential source of qualified physicians. Similarly, qualified physicians can be found through the American College of Medical Toxicologists.

If the DOL is able to follow our suggested process as outlined above, the cost for these reports should be significantly less than the costs that would be incurred if workers directly saw the physicians, and thus took up additional time with the personal history-taking and physical exam process in a clinical setting. All of this would incur greater time from the impairment rating physician as well as additional clinical costs.

We are also aware of at least one physician network that is private and would be able to perform the services needed by the DOL. If this network, or other private networks are used, we would emphasize that the criteria for the physicians performing the rating should be the same. In other words, they must be board certified and have demonstrated training in the area of impairment rating, which is nationally recognized as we described above.

We think it is likely that a number of physicians would be interested in working with the DOL on this process. Physicians could be recruited through the most common specialty journals of an organization. For instance, the *Journal of Occupational and Environmental Medicine* is the journal published by American College of Occupational and Environmental Medicine. Other specialties have their own specialty journals, and this may be the best way to advertise these positions. It is also possible to go to specialty societies, and they may be willing to put notices on their websites or in their newsletters of the openings for physicians in this area. If the process we have recommended is used, there may be even more physicians interested in performing the ratings, as it can be done outside of clinical time. Clearly the amount of fees paid for performing the service will determine the number of physicians who apply. If payment for services falls below customary fee structures for independent medical examinations, participation levels and

speed of service could be adversely impacted, as most of these qualified physicians are presently in high demand for services.

Performance Objective 5

The contractor shall identify how to determine a quality impairment rating determination.

Performance Measure 5A

The contractor shall research industry standards to determine acceptable impairment rating reviews.

Quality Report Measures

Appendix F includes multiple examples from different organizations of required report sections for impairment rating evaluations. This includes the first example, which is directly from the 5th Edition of the Guides, and reasonably delineates all of the areas that should be recorded in a narrative, complete impairment rating examination. If the DOL does not use the system we recommended, with the non-physician impairment raters, impairment rating physicians would clearly need to record all of the information in detail as outlined in the AMA report example and others attached in Appendix G. This would increase the complexity of determining a quality report, as standards included would be whether the physical examination was thorough and appropriate for that particular patient, whether the medical review of the records was complete and accurate, and whether the history taken from the patient included all of the necessary items.

If we view the physician impairment raters as being reviewers of the materials submitted and certifiers of the final rating, the examination reports will not need to be as detailed, and thus will be easier to evaluate for quality. The following areas would need to be assessed for physician impairment raters who do not directly examine a patient:

- Accuracy of the diagnoses: The diagnoses listed and accepted as covered illnesses by the impairment rating physician should match those identified and accepted by the DOL.

- The accepted diagnoses must all be clearly reflected in the final impairment rating and must be rated using the chapter that most appropriately reflects the origin of the physiologic change.

- The ratings should not show any evidence of "double dipping." This occurs when physicians rate the same physiological deficit using two different systems in the Guides. A simple example of double dipping can occur when rating the motor deficit caused by a nerve-related condition. It is possible to rate motor strength using grip strength of the upper extremity and also to rate motor strength using the specific deficit of the nerve involved. The latter method is the correct method to

use when a specific nerve is involved. Grip strength should rarely be used in rating upper extremity problems and should never be used when there is an alternative method. Furthermore, it should not be used in combination with a nerve-related motor deficit. The impairment rater should have sufficient knowledge from the educational experience required by DOL to avoid making these mistakes.

- Ranges for rating are frequently available in the Guides, and whenever a range is available the physician must discuss the reasoning for the number chosen within the available range. This reasoning must be related to actual functional results on physical or diagnostic testing or clear reproducible deficits in activities of daily living.

Because a physician impairment rater has a more limited duty in the system, it should be easier to rate the quality of reports and determine when physicians are not compliant with rating policies in the Guides.

Impairment Rating Issues with the "Guides"

There are other issues that would need to be considered when using the 5th Edition and that would require quality oversight. We recommend the DOL establish an expert advisory committee that would advise the Department on certain issues, and would also serve as oversight for a quality assessment program. This committee should consist of three to five members whose board certification and areas of expertise in rating cover the most common medical diagnoses in this set of injured workers. All of the following specialties should be considered as eligible for impairment rating: pulmonary, neurology, toxicology, occupational medicine, internal medicine, family practice, oncology, hematology and hematology-oncology. These expert committee members would need to have a documented background of extensive experience in the area of impairment rating, which should usually include instruction of other physicians on methods for impairment rating and/or oversight of physicians performing impairment rating on a regular basis.

- One purpose of the expert advisory committee would be to advise the DOL, and thus the physician impairment raters, on how to approach areas in the AMA Guides 5th Edition that are gray or appear to provide more than one manner for creating an impairment rating. These areas should be considered before impairment ratings are performed, and some criteria should be developed through the DOL to guide physicians as to the acceptable ratings in these areas.

- The advisory committee should provide oversight for the quality-rating program discussed below.

- The advisory committee should provide the DOL information regarding any need for further training of physician impairment raters based on the quality assessment program discussed below.

Specific areas of concern in the AMA Guides, which may require direction through the DOL, include:

1. Lung cancer and skin cancer are the only cancers that actually have a rating process delineated in the Guides. The lung cancer rating process is dependent on whether at reevaluation after one year from diagnosis a person is free of tumor recurrence. If that is the case, they are rated using a classification table reflecting their functional impairment. However, if there is still evidence of tumor present, they are considered severely impaired and are generally rated in the 100 percent category. There will probably need to be advice to the impairment rating physicians regarding how to rate cancer in areas other than skin and lung. There are probably charts and methods available in the Guides that could be adopted for this; however, they are not specifically delineated, as methods to rate cancer and thus this area will need to be addressed. We do not think this issue is the same as the reference to areas that have no quantifiable rating process in the Guides. Clearly the Guides would intend to rate all cancers, and there are methods in most chapters that can be used to do this.

2. In many areas of the Guides, it is necessary for the physician to know how much medication is continuously required for a patient, as well as the side effects of the medication. In some chapters it is necessary to know the ability of the patient to maintain appropriate weight and/or the need to eat a limited and specified diet. It may be necessary to add this to the list of information that a treating physician should report in certain cases. In any case, the need for this information should be noted so that the impairment-rating physician would have this available in order to make decisions about the final rating. This information could be provided when DOL communicated with the treating physician regarding the need for specific findings in order to create an impairment rating.

3. The lower extremity chapter and the spine chapter create rating issues: Under the lower extremity chapter, there are multiple ways to rate any specific injury. Although most experienced rating physicians follow a particular pattern in rating common injuries, this is not actually specified in the 5th Edition of the AMA Guides. If it would appear that there would be cases requiring lower extremity ratings, the expert advisory committee should create recommendations for the physician impairment raters in this area. In the spinal chapter, there are two separate models and the AMA Guides is not as specific as it should be regarding when the range of motion model should be used versus the diagnostic rating estimate model. Again, specific guidance should be given to the physician impairment raters if these ratings are likely to be rendered in the system.

4. The 5th Edition of the Guides allows an additional one-to-three percent impairment rating for pain. Again, physicians would need to know how to use this rating and what amount of rating could be applied, as well as when they could use it. In general, most impairment rating courses teach that this additional one-to-three percent should rarely be given, as the rest of the Guides generally

compensate the patient for their physiologic changes. However, this chapter is included in the Guides and it is assumed that under the current recommendations from the DOL, this chapter would be available to physicians. If so, they would need specific guidance on how to determine the one to three percent. This chapter also includes an extremely extensive process for evaluating pain, although it is not required that any physician follow this process in order to give the one to three percent. We would therefore recommend that physicians not be compensated for going through this quite laborious process when it would largely not help determine the one-to-three percent rating. Also, according to the DOL regulations, no further rating should be given beyond 3 percent, and there is no quantitative system for determining a higher rating.

5. It is clear that no psychiatric rating can be rendered, as there is no quantifiable rating system in the Guides to determine this. If a psychiatric problem is directly due to a central neurological disorder, which is a covered illness, then it will be a rating under the brain section.

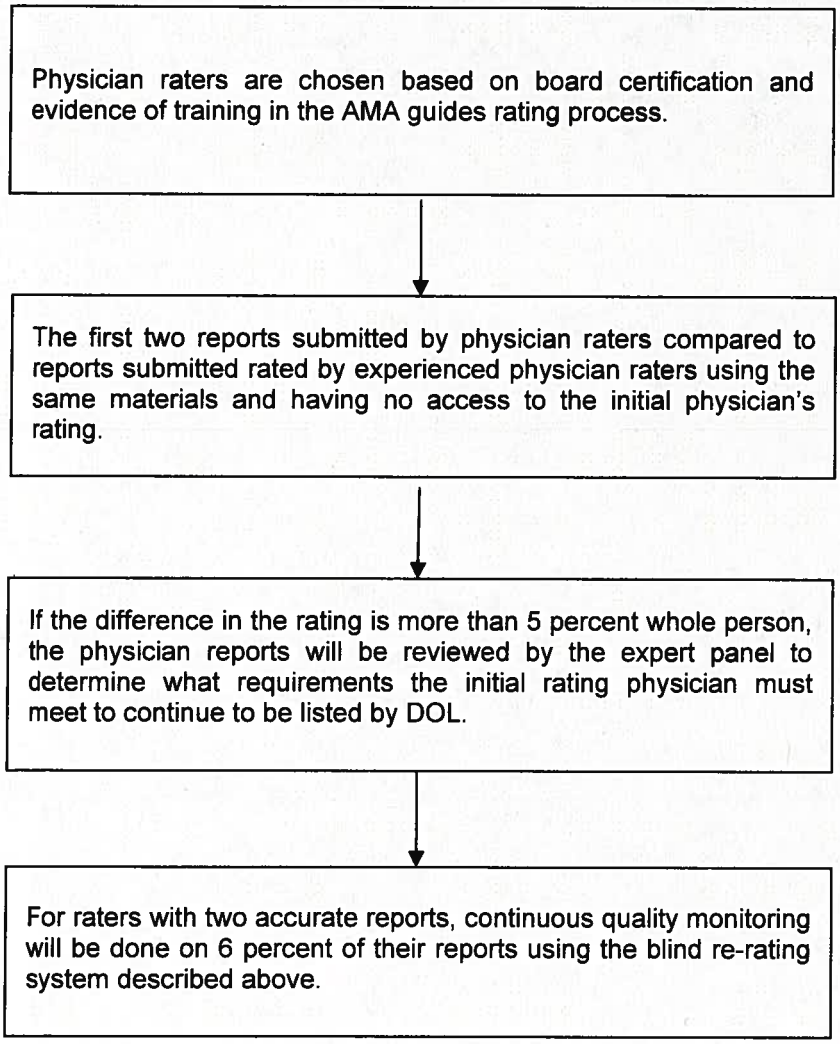
6. Apportionment policies should also be clearly explained. The most accepted method for determining an apportioned rating is to have the rater rate the person as they are currently, and then create a separate rating for the disease or injury that can appropriately be related to the covered illness impairment rating and subtract that. Unfortunately, in all of the covered illnesses we have considered to date, apportionment of impairment due to one disease versus another is not possible given current medical technology and knowledge. If a validated or generally accepted method is identified for a covered illness, it should be included in the matrix for that covered illness. Additionally, we have set the level of evidence to establish an illness or possible illness at a level generally accepted to be as likely as not a significant factor in the causation of that illness, but have not addressed acceleration/substantial contributor to aggravation of that illness. Thus, we would anticipate that the majority, if not all of the impairment of that system, would be due to the covered illness for those in which the exposure was deemed to be causative. Further examination of the issue of exposure levels that may result in substantial aggravation of preexisting illnesses merits further examination by DOL.

Quality Oversight Process

The details of this are found in Figure 2 on the following page. In order to assure that initially physician impairment raters are qualified, we suggest that an expert or already-approved physician impairment rater blindly rate the first two ratings of the new raters. (This may be the Advisory Committee members initially.) The ratings for the patient should be within five percent between the two physicians. If this level of accuracy is not achieved, the ratings should be forwarded to the expert advisory committee for a decision regarding whether the physician should remain on the physician impairment raters list or if remedial measures might be taken. An additional two reports could then be reviewed to determine if the physician's performance had improved.

In order to assure continuing quality, we would suggest that six percent of the impairment ratings be blindly reviewed by an experienced or expert physician impairment rater. Again, the two ratings should be compared, and if there is a greater than five percent difference, further investigation should occur by the expert advisory committee to determine whether any measures need to be taken to further educate the physician whose report was reviewed. This quality process would also allow the expert advisory committee to identify other areas in which additional commentary by DOL would help assure that the physician's impairment ratings were reliable and consistent.

Figure 2. Schematic Quality Rating Determination



IV. Conclusion

We have presented the impairment-rating plan and quality assessment procedures that we believe would be necessary to reliably operate this system. We understand that there are a variety of choices that may be made at different levels in order to have this system practically work for all parties. It certainly is possible to revert to a system in which all workers are sent to an impairment-rating-qualified physician for an impairment rating. This is the more traditional model; however, it is likely that the cost-time commitment in geographical traveling required would be higher than the system we are suggesting. However, if the traditional system is chosen, we believe that the quality assessment process we have presented would still be operable.

Note: The six-percent figure mentioned in the quality oversight process above is somewhat arbitrary; however, we did review numbers in Colorado where all physicians who perform impairment ratings are certified by the state and take a continuing education class in the impairment rating process. We determined that approximately 180 reports out of 3,130 received IME reports per year were returned to physicians for corrections. These corrections are usually not merely numerical but, in fact, reflect issues with the larger process such as using a wrong category, double dipping, or having problems with the range of motion spinal model, which is not used as extensively in the 5th Edition. In the Colorado system all reports are reviewed for quality by an initial screening process and if minor errors are found, these reports are returned and corrected. We do not have the number of reports that fall into this category. The reports that fall into the category we mentioned are those that cannot be corrected easily or those in which there are larger categorical problems that need to be addressed by the medical director. Given this information we were hopeful that a review of six percent of the reports would at least catch a fair number of physicians who were having impairment rating difficulties or categorical problems that need to be corrected through direction of the Department of Labor to impairment rating physicians. In the system we have approved there are likely to be fewer minor errors, as the computer rating system will have corrected mathematical errors or minor combination errors that are similar to the errors identified in Colorado's first screening process, for which we do not have numbers. The Department could also consider the process of responding to any complaints by having the impairment rating blindly re-read by another impairment rater. The Colorado system responds to all complaints with a review by knowledgeable staff.

Appendix A—Selected "Disease Causation–Exposure Relationships" Recognized by Public Health Authorities

Table A.1. Selected "Disease Causation – Exposure Relationships" Recognized by Public Health Authorities

Disease	Exposure	Agency or Authority Document						
		NLM Hazmap	ACGIH Doc. of TLV	ATSDR Tox Profile	EPA IRIS	NIOSH Occ. Health Guidelines	WHO/IPCS (EHC)	Comment
Silicosis (all subtypes)	Silica	+	+	ND	ND	+	ND	
Beryllium sensitization/CBD	Beryllium	+	+	+	+	+	+	
Asbestosis	Asbestos	+	+	+	ND	+	+	
Lung fibrosis	Plutonium	+[2]	ND	+[3]	ND	ND	ND	
	Uranium/ U mining	-	+	+[4]	ND	+[2]	ND	
	Welding fumes	-	ND	ND	ND	+[5]	ND	
	Cobalt/Hard Metal	+	+	+	ND	+[6]	ND	
	Yttrium (rare earth metal)	-	+[7]	ND	ND	-	ND	
COPD	Welding fumes	+	ND	ND	ND	+[4]	ND	

ND = no specific agency document on this exposure.
+ = relationship is recognized/acknowledged by the agency document.
- = this disease is not mentioned, recognized, or acknowledged in the agency document that summarizes or lists toxic effects of the exposure.
Note: a – sign does not necessarily mean that the agency found "no association."
Sources: NLM Hazmap: http://hazmap.nlm.nih.gov/ ; ACGIH Documentation of Threshold Limit Values 2005; ATSDR ToxProfiles 2004; EPA Integrated Risk Information System (IRIS) database www.epa.gov/iriswebp/iris/ ; NIOSH Occupational Health Guidelines for Chemical Hazards http://www.cdc.gov/niosh/chem-inx.html ; World Health Organization/International Program in Chemical Safety Environmental Health Criteria http://www.inchem.org/pages/ehc.html.

[2] Plutonium listed as "fibrogenic."
[3] Noted in animal studies.
[4] Fibrosis in U miners noted, but attributed in narrative to concurrent exposure to other inorganic dusts.
[5] NIOSH Criteria for a Recommended Standard: Welding, Brazing and Thermal Cutting. DHHS (NIOSH) Publication No. 88-110.
[6] Cobalt linked to chronic interstitial pneumonitis.
[7] Based on animal data.

Table A.1. Selected "Disease Causation – Exposure Relationships" Recognized by Public Health Authorities *(Continued)*

Disease	Exposure	Agency or Authority						
		NLM Hazmap	ACGIH Doc. of TLV	ATSDR Tox Profile	EPA IRIS	NIOSH Occ. Health Guidelines	WHO/IPCS (EHC)	Comment
COPD	Diesel exhaust	-	ND	ND	ND	-	-	
	Vanadium	+	+	-	-[8]	+		
	Respiratory irritants (other)	+[9]	ND	ND	ND	ND	ND	
Diabetes		-						None established[10]
Chronic renal insufficiency	Cadmium	+	+	+	+	+	+	
	Chromium	+	+[11]	+[11]	-	-	+[12]	
	Lead	+	+	+	-	+	+	
	Mercury	+	+	+	+	-	+	
	CCl_4	+[13]	+	+	-	+	+	
	Stoddard solvent	-	+[14]	-	ND	+/-[15]	+[16]	

[8] Not reviewed in IRIS.
[9] Ammonia, Nitrogen dioxide, sulfur dioxide, silica, ozone, grinding (stone, tile, concrete); rock, concrete or brick dust.
[10] *Possible* chemical risks include ingestion of the rodenticide Vacor; chronic arsenic ingestion; dioxin (TCDD).
[11] Recognizes possible kidney damage from hexavalent chromium compounds.
[12] Recognizes reports of subclinical low molecular weight proteinuria.
[13] Recognizes acute renal injury, but not chronic renal insufficiency.
[14] Recognizes damage in high dose animal studies.
[15] Notes "kidneys may be affected."
[16] Recognizes possible but unestablished association.

Table A.1. Selected "Disease Causation – Exposure Relationships" Recognized by Public Health Authorities *(Continued)*

Disease	Exposure	Agency or Authority						
		NLM Hazmap	ACGIH Doc. of TLV	ATSDR Tox Profile	EPA IRIS	NIOSH Occ. Health Guidelines	WHO/IPCS (EHC)	Comment
Mesothelioma	Asbestos	+	+	+	+	+	+	
Lung Cancer	Asbestos	+	+	+	+	+	+	
	Nickel (insoluble)	+	+	+	+[17]	+	+	
	Beryllium	+	+	+	+	+	+	
	Silica	+	+	ND	ND	+[18]	+[19]	
	Diesel exhaust	+	ND	ND	+	+[20]	+[21]	
	Chromium VI	+	+	+	+	+[22]	+[23]	
Peripheral neuropathy	n-Hexane	+	+	+	+	+[24]	+	
	Lead	+	+	+	-[25]	+	+	
	Mercury	+	+	+	+	-	+	

[17] Nickel subsulfide.
[18] NIOSH Hazard Review: Health Effects of Occupational Exposure to Respirable Crystalline Silica, (2002).
[19] IARC, Group 1A, (1997) [IARC index: http://www.inchem.org/pages/iarc.html].
[20] NIOSH Current Intelligence Bulletin 50, (1988).
[21] IARC, Group 2A, (1989).
[22] NIOSH list of "potential human carcinogens."
[23] IARC, Group 1 (1990).
[24] NIOSH Current Intelligence Bulletin 48 (1987).
[25] Not reviewed in IRIS.

Table A.1. Selected "Disease Causation – Exposure Relationships" Recognized by Public Health Authorities *(Continued)*

Disease	Exposure	Agency or Authority						
		NLM Hazmap	ACGIH Doc. of TLV	ATSDR Tox Profile	EPA IRIS	NIOSH Occ. Health Guidelines	WHO/IPCS (EHC)	Comment
CNS (Chronic encephalopathy)	Organic solvents	+	ND	ND	ND	+	+[26]	
	Lead	+	+[27]	+	-[28]	+	+	
	Mercury	+	+	+	+	+	+	
Asthma	Isocyanates	+	+[29]	ND	+[30]	+[28]	+[28]	
	Chromium	+	-	+	-	+	+	
	Welding fumes	+[31]	ND	ND	ND	-[3]	ND	
	Metal working fluids	+[32]	ND	ND	ND	+[33]	ND	
	Nickel	+	+	+	-[26]	+	+	
	Formaldehyde	-	+[34]	-	-[26]	+[35]	+[31]	
	Respiratory irritants	+	ND	ND	ND	ND	ND	
	Diesel exhaust	+	ND	ND	-	+[36]	+	
Asthma	Platinum	+	+	ND	ND	+	+	
	Vanadium	-	+[37]	-	-[38]	+[39]	+	
	Epoxy resins	+	ND	ND	ND	ND	ND	

[26] Stoddard solvent as a representative class.
[27] Recognizes acute encephalopathy.
[28] Not reviewed in IRIS.
[29] Toluene isocyanates as a representative class.
[30] Toluene isocyanates.
[31] Irritant-induced asthma.
[32] Oil mists, mineral.
[33] NIOSH Criteria for a Recommended Standard: Occupational Exposure to Metalworking Fluids (1998).
[34] Recognizes possible relationship.
[35] Recognizes sensitization of the respiratory tract.
[36] NIOSH Current Intelligence Bulletin 50, (1988).
[37] Recognizes possible association.
[38] Not reviewed in IRIS.
[39] Bronchitis with rhonchi resembling asthma.

Appendix B—References Cited in Table 2.1

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Appendix C—Proposed Matrix for Priority Illnesses with Sufficient Information (Table 3.1)

SILICOSIS, CHRONIC

Criteria	Sufficient evidence of covered illness	Sufficient evidence of possible covered illness, requires physician review
DOE exposure criteria*	DOE Facilities Specific job titles/ processes Applicable dates	DOE Facilities Specific job titles/ processes Applicable dates **And** Additional information is needed**
Latency*	10 years or more	5-10 years
Medical Evidence for illness and diagnostic testing criteria	1. A written diagnosis of silicosis made by a medical doctor **And** 2. Any <u>one</u> of the following three criteria a. A chest radiograph, interpreted by NIOSH certified B reader classifying the existence of pneumoconioses of category 1/0 or higher; <u>or</u> b. Results from a chest x-ray or computer assisted tomography (CT) or other imaging technique that are consistent with silicosis • Such as nodules, or fibrosis usually with upper lung zone predominance c. Lung biopsy findings consistent with silicosis • Such as silicotic nodules	Some, but not all criteria to establish the illness are met** **Or** Medical record (includes any provider report, results of imaging studies, surgical or pathology reports, or other acceptable record) mention of silicosis, possible silicosis, restrictive lung disease, fibrosis, or pneumoconiosis <u>Or</u> Death certificate mention of silicosis, possible silicosis, restrictive lung disease, fibrosis or pneumoconiosis **Or** A chest radiograph, interpreted by NIOSH certified B reader classifying the existence of pneumoconioses of category 0/1 **Or** Lung biopsy findings suggestive of silicosis
Additional considerations for causation	**None needed**	**None needed**

* The actual latency period for the development of this disease is a function of the duration and intensity of exposure.

** Triggers DOL request for additional information from the worker for exposure and/or diagnostic testing criteria elements. A request for additional information should also be made if there is insufficient information present to establish a possible exposure or illness.

*** References utilized include American Thoracic Society consensus statement.

SILICOSIS, ACUTE

Criteria	Sufficient evidence to establish a covered illness	Sufficient evidence to establish a possible illness requiring physician review.
DOE exposure criteria*	DOE Facilities Specific job titles/ processes Applicable dates	DOE Facilities Specific job titles/ processes Applicable dates **And** Additional information is needed**
Latency*	Weeks to months	Weeks to months
Medical Evidence for illness and diagnostic testing criteria	1. Any one of the following two criteria; and a. A written diagnosis of acute silicosis made by a medical doctor; or **b. Death certificate or other acceptable documentation of death due to acute silicosis** **And** 2. The medical record contains no other diagnoses, such that would otherwise account for the acute sudden severe lung illness, such as other infection or ARDS	Some, but not all criteria to establish the illness are met** **Or** Written evidence of sudden lung illness causing death or severe, overwhelming lung illness, even if attributed to tuberculosis or other illness or infection **Or** Results from a chest x-ray or computer assisted tomography (CT) or other imaging technique that are suggestive of acute silicosis • **Such as: air space obliteration, alveolar filling pattern, pulmonary edema, pulmonary hemorrhage, infiltrate, alveolar proteinosis** **Or** Results of lung function testing (PFT or spirometry) showing sudden worsening **Or** Lung biopsy findings suggestive of acute silicosis • Such as alveoli filled with proteinaceous material
Additional considerations for causation	**None needed**	**None needed**

* The actual latency period for the development of this disease is a function of the duration and intensity of exposure.
** Triggers DOL request for additional information from the worker for exposure and/or diagnostic testing criteria elements. A request for additional information should also be made if there is insufficient information present to establish a possible exposure or illness.
*** References utilized include American Thoracic Society consensus statement.

SILICOSIS, ACCELERATED

Criteria	Sufficient evidence to establish a covered illness	Sufficient evidence to establish a possible illness requiring physician review
DOE exposure criteria*	DOE Facilities Specific job titles/ processes Applicable dates	DOE Facilities Specific job titles/ processes Applicable dates **And** Additional information is needed**
Latency*	2-5 years	< 2years or > 5 years
Medical Evidence for illness and diagnostic testing criteria	1. A written diagnosis of accelerated silicosis made by a medical doctor **And** 2. Any one of the following three criteria a. A chest radiograph, interpreted by NIOSH certified B reader classifying the existence of pneumoconioses of category 1/0 or higher; or b. Results from a chest x-ray or computer assisted tomography (CT) or other imaging technique that are consistent with silicosis • Such as nodules or fibrosis usually with upper lung zone predominance c. Lung biopsy findings consistent with silicosis • Such as silicotic nodules	Some, but not all criteria to establish the illness are met** **Or** Medical record (includes any provider report, results of imaging studies, surgical or pathology reports, or other acceptable record) mention of accelerated silicosis, silicosis, possible silicosis, restrictive lung disease, fibrosis, or pneumoconiosis Or Death certificate mention of silicosis, possible silicosis, restrictive lung disease, fibrosis or pneumoconiosis **Or** A chest radiograph, interpreted by NIOSH certified B reader classifying the existence of pneumoconioses of category 0/1 **Or** Lung biopsy findings suggestive of silicosis
Additional considerations for causation	**None needed**	**None needed**

* The actual latency period for the development of this disease is a function of the duration and intensity of exposure.

** Triggers DOL request for additional information from the worker for exposure and/or diagnostic testing criteria elements. A request for additional information should also be made if there is insufficient information present to establish a possible exposure or illness.

*** References utilized include American Thoracic Society consensus statement.

SILICOSIS, COMPLICATED

Criteria	Sufficient evidence to establish a covered illness	Sufficient evidence to establish a possible illness requiring physician review.
DOE exposure criteria*	DOE Facilities Specific job titles/ processes Applicable dates	DOE Facilities Specific job titles/ processes Applicable dates **And** Additional information is needed**
Latency*	Years to decades	Years to decades
Medical Evidence for illness and diagnostic testing criteria	1. A written diagnosis of progressive massive fibrosis (PMF) or complicated silicosis made by a medical doctor **And** 2. Results from a chest x-ray or computer assisted tomography (CT) or other imaging technique that are consistent with PMF • Progression and coalescence of the upper lung zone nodules to form masses (conglomerate lesions) • When they cause contraction of the lobes, an "angel wing pattern" can be seen	Some, but not all criteria to establish the illness are met**
Additional considerations for causation	**None needed**	**None needed**

* The actual latency period for the development of this disease is a function of the duration and intensity of exposure.
** Triggers DOL request for additional information from the worker for exposure and/or diagnostic testing criteria elements. A request for additional information should also be made if there is insufficient information present to establish a possible exposure or illness.
*** References utilized include American Thoracic Society consensus statement.

BERYLLIUM SENSITIZATION

Criteria	Sufficient evidence to establish a covered illness	Sufficient evidence to establish a possible illness requiring physician review
DOE exposure criteria*	Verification that an employee worked in a facility where beryllium was present	Verification that an employee worked in a facility where beryllium was present
Latency*	First DOE exposure must have preceded first abnormal test for beryllium sensitization	First DOE exposure must have preceded first abnormal test for beryllium sensitization
Medical Evidence for illness and diagnostic testing criteria	1. Medical documentation one of following two criteria* a. Beryllium sensitivity or sensitization established by an abnormal BeLPT performed on either blood or lung lavage cells; or b. Positive reaction to beryllium patch testing **And** 2. No signs, or symptoms, or any medical evaluation evidence of abnormalities suggestive of possible chronic beryllium disease	If BeLPT was borderline or uninterpretable, it is recommended that the test be repeated. After two borderline LPTs, it is recommended that the employee be counseled to pursue appropriate medical follow-up for additional beryllium testing options and/or disease evaluation After third uninterpretable BeLPT, it is recommended the employee undergo patch testing for beryllium sensitization, if not still working with beryllium
Additional considerations for causation	**None needed**	**None needed**

* Other tests of beryllium-specific immune response that are currently promising and anticipated to soon become additional diagnostic criteria include a flow cytometry based assay, beryllium-stimulated neopterin test, and a measure of beryllium stimulated cytokine production.

CHRONIC BERYLLIUM DISEASE

Criteria	Sufficient evidence to establish a covered illness	Sufficient evidence to establish a possible illness requiring physician review
DOE exposure criteria*	Verification that an employee worked in a facility where beryllium was present	Verification that an employee worked in a facility where beryllium was present
Latency*	First DOE exposure must have preceded first abnormal test for beryllium sensitization	First DOE exposure must have preceded first abnormal test for beryllium sensitization
Medical Evidence for illness and diagnostic testing criteria	For diagnoses on or after January 1, 1993, beryllium sensitivity (as established in accordance with paragraph (b) of this section), together with lung pathology consistent with chronic beryllium disease, including the following: Medical documentation of either: Beryllium sensitivity or sensitization established by an abnormal LPT performed on either blood or lung lavage cells Or Positive reaction to beryllium patch testing And (i) A lung biopsy showing granulomas or a lymphocytic process consistent with chronic beryllium disease; (ii) A computerized axial tomography scan showing changes consistent with chronic beryllium disease; or (iii) Pulmonary function or exercise testing showing pulmonary deficits consistent with chronic beryllium disease. Or For diagnoses before January 1, 1993, the presence of the following: (i) Occupational or environmental history, or epidemiologic evidence of beryllium exposure; and (ii) Any three of the following criteria: (A) Characteristic chest radiographic (or computed tomography (CT)) abnormalities. (B) Restrictive or obstructive lung physiology testing or diffusing lung capacity defect. (C) Lung pathology consistent with chronic beryllium disease. (D) Clinical course consistent with a chronic respiratory disorder. (E) Immunologic tests showing beryllium sensitivity (skin patch test or beryllium blood test preferred).	Some, but not all criteria to establish the illness are met**
Additional considerations for causation	**None needed**	**None needed**

* The actual latency period for the development of this disease is a function of the duration and intensity of exposure.

** Triggers DOL request for additional information from the worker for exposure and/or diagnostic testing criteria elements. A request for additional information should also be made if there is insufficient information present to establish a possible exposure or illness.

ASBESTOSIS

Criteria	Sufficient evidence to establish a covered illness	Sufficient evidence to establish a possible illness requiring physician review
DOE exposure criteria*	DOE Facilities Specific job titles/ processes Applicable dates	DOE Facilities Specific job titles/ processes Applicable dates **And** Additional information is needed**
Latency*	20 or more years	< 20 years
Medical Evidence for illness and diagnostic testing criteria	1. Written evidence of one of the following two criteria a. A written diagnosis of asbestosis made by a medical doctor; or b. Results of breathing tests (PFTs or spirometry) showing a restrictive lung pattern FVC < 80% predicted **And** 2. Any one of the following four criteria a. A chest radiograph, interpreted by NIOSH certified B reader classifying the existence of pneumoconioses of category 1/0 or higher; or b. Results from a chest x-ray or computer assisted tomography (CT) or other imaging technique that are consistent with asbestosis and/or findings of pleural plaques or rounded atelectasis; or c. Lung biopsy findings consistent with asbestosis, such as asbestos bodies identified or meeting grade II-IV asbestosis histologic criteria; or d. Bronchoalveolar lavage showing ≥ 1 asbestos body per cc of fluid	Some, but not all criteria to establish the illness are met** **Or** Medical record (includes any provider report, results of imaging studies, surgical or pathology reports, or other acceptable record) of silicosis, possible asbestosis, restrictive lung disease, fibrosis, or pneumoconiosis Or Death certificate mention of silicosis, possible asbestosis, restrictive lung disease, fibrosis, or pneumoconiosis Or A chest radiograph, interpreted by NIOSH certified B reader classifying the existence of pneumoconioses of category 0/1 Or Results from a chest x-ray or computer assisted tomography (CT) or other imaging technique that are suggestive of asbestosis Or Lung biopsy findings suggestive of asbestosis Or Bronchoalveolar lavage showing ≥ 1 asbestos body per cc of fluid
Additional considerations for causation	**None needed**	**None needed**

* The actual latency period for the development of this disease is a function of the duration and intensity of exposure.

** Triggers DOL request for additional information from the worker for exposure and/or diagnostic testing criteria elements. A request for additional information should also be made if there is insufficient information present to establish a possible exposure or illness.

*** References utilized include American Thoracic Society consensus statement.

ASBESTOS RELATED DISORDERS

Criteria	Sufficient evidence to establish a covered illness	Sufficient evidence to establish a possible illness requiring physician review
DOE exposure criteria*	DOE Facilities Specific job titles/ processes Applicable dates	DOE Facilities Specific job titles/ processes Applicable dates **And** Additional information is needed**
Latency*	Pleural plaques: 20 or more years Pleural effusions: 5-30 years	Pleural plaques: < 20 years Pleural effusions: <5 or > 30 years
Medical Evidence for illness and diagnostic testing criteria	Results from a chest x-ray or computer assisted tomography (CT) or other imaging technique that are consistent with these disorders • Pleural plaques • Pleural thickening, not associated with an area of prior surgery or trauma • Rounded atelectasis • Bilateral pleural effusions, also called benign asbestos related pleural effusion	Results from a chest x-ray or computer assisted tomography (CT) or other imaging technique that are consistent with these disorders • Pleural thickening in an area of prior surgery or trauma • Pleural effusion, if the record does not indicate that there is another disease process that would otherwise account for the effusion, such as congestive heart failure (CHF), cancer, or other lung disease
Additional considerations for causation	**None needed**	**None needed**

* The actual latency period for the development of this disease is a function of the duration and intensity of exposure.

** Triggers DOL request for additional information from the worker for exposure and/or diagnostic testing criteria elements. A request for additional information should also be made if there is insufficient information present to establish a possible exposure or illness.

*** References utilized include American Thoracic Society consensus statement.

LUNG FIBROSIS

Criteria	Sufficient evidence to establish a covered illness	Sufficient evidence to establish a possible illness requiring physician review.
DOE exposure criteria*	DOE Facilities Specific job titles/ processes Applicable dates	DOE Facilities Specific job titles/ processes Applicable dates **And** Additional information is needed**
Latency*	Years	Years
Medical Evidence for illness and diagnostic testing criteria	1. A written diagnosis of lung fibrosis made by a medical doctor **And** 2. Any one of the following three criteria a. Results from a chest x-ray or computer assisted tomography (CT) or other imaging technique that are consistent with fibrosis • Such as small lung fields or volumes, minimal ground glass opacities, and/or bibasilar reticular abnormalities b. Results of breathing tests (PFTs or spirometry) showing a restrictive or mixed pattern • Such as FVC <80% predicted c. Lung biopsy findings consistent with fibrosis And 3. There is no evidence in the medical record that the lung fibrosis is present due to another disease process.	Some, but not all criteria to establish the illness are met** **Or** Medical record (includes any provider report, results of imaging studies, surgical or pathology reports, or other acceptable record) of lung fibrosis Or Death certificate mention of fibrosis Or Results from a chest x-ray or computer assisted tomography (CT) or other imaging technique that are suggestive of fibrosis
Additional considerations for causation	**None needed**	**None needed**

* The actual latency period for the development of this disease is a function of the specific causative toxic substance as well as the duration and intensity of exposure.

** Triggers DOL request for additional information from the worker for exposure and/or diagnostic testing criteria elements. A request for additional information should also be made if there is insufficient information present to establish a possible exposure or illness.

PNEUMOCONIOSIS

Criteria	Sufficient evidence to establish a covered illness	Sufficient evidence to establish a possible illness requiring physician review.
DOE exposure criteria*	DOE Facilities Specific job titles/ processes Applicable dates	DOE Facilities Specific job titles/ processes Applicable dates **And** Additional information is needed**
Latency*	Years	Years
Medical Evidence for illness and diagnostic testing criteria	1. Written evidence of one of the following two criteria a. A written diagnosis of pneumoconiosis made by a medical doctor; or b. Results of breathing tests (PFTs or spirometry) showing a restrictive lung pattern FVC < 80% predicted **And** 2. Any one of the following three criteria a. A chest radiograph, interpreted by NIOSH certified B reader classifying the existence of pneumoconiosis of category 1/0 or higher; or b. Results from a chest x-ray or computer assisted tomography (CT) or other imaging technique that are consistent with asbestosis and/or findings of pleural plaques or rounded atelectasis; or c. Lung biopsy findings consistent with pneumoconiosis	Some, but not all criteria to establish the illness are met** **Or** Medical record (includes any provider report, results of imaging studies, surgical or pathology reports, or other acceptable record) of silicosis, possible asbestosis, restrictive lung disease, or pneumoconiosis Or Death certificate mention of silicosis, possible asbestosis, restrictive lung disease, or pneumoconiosis Or A chest radiograph, interpreted by NIOSH certified B reader classifying the existence of pneumoconiosis of category 0/1 Or Results from a chest x-ray or computer assisted tomography (CT) or other imaging technique that are suggestive of pneumoconiosis.
Additional considerations for causation	**None needed**	**None needed**

* The actual latency period for the development of this disease is a function of the specific causative toxic substance as well as the duration and intensity of exposure.

** Triggers DOL request for additional information from the worker for exposure and/or diagnostic testing criteria elements. A request for additional information should also be made if there is insufficient information present to establish a possible exposure or illness.

CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)

Criteria	Sufficient evidence to establish a covered illness	Sufficient evidence to establish a possible illness requiring physician review.
DOE exposure criteria*	DOE Facilities Specific job titles/ processes Applicable dates	DOE Facilities Specific job titles/ processes Applicable dates **And** Additional information is needed**
Latency*	Years	Months or years
Medical Evidence for illness and diagnostic testing criteria	1. Any one of the following three criteria a. A written diagnosis of COPD or chronic bronchitis made by a medical doctor • Chronic bronchitis is defined as the presence of chronic productive cough for 3 months in each of two successive years and other causes of cough have been excluded b. Results of PFTs or spirometry showing an obstructive or mixed pattern • $FEV_1/FVC < 70\%$ and $FEV_1 < 80\%$ predicted. c. Results from a chest x-ray or other imaging technique that are consistent with COPD • Such as air trapping, flattening of diaphragms, enlarged lung fields. **And** 2. The employee has a history of being a never smoker*** **And** 3. There is no other lung disease present that would account for the findings	Some, but not all criteria to establish the illness are met** Emphysema is caused by only a small subset of the toxic substances associated with chronic bronchitis, however it may be aggravated by the others on this list.
Additional considerations for causation	**There is currently no medical testing or means to distinguish COPD due to any of the above toxic substance exposures and COPD due to other causes. Physician review is required.**	**Physician review is required. Also, if all criteria are otherwise met, individuals with Alpha-1 Antitrypsin Deficiency (AAT Deficiency) may be considered to have a covered illness.**

* The actual latency period for the development of this disease is a function of the specific causative toxic substance as well as the duration and intensity of exposure.
** Triggers DOL request for additional information from the worker for exposure and/or diagnostic testing criteria elements. A request for additional information should also be made if there is insufficient information present to establish a possible exposure or illness.
***ATS criterion for a never smoker, or non-smoker, is < 20 packs of cigarettes in a lifetime, but this piece of information may not be found in most medical records.

DIABETES

Criteria	Sufficient evidence to establish a covered illness	Sufficient evidence to establish a possible illness requiring physician review.
DOE exposure criteria	The are no generally accepted toxic substance known to cause or accelerate diabetes.	However, diabetes can be a consequence of the treatment of some covered illnesses.
Latency	N/A	N/A
Medical Evidence for illness and diagnostic testing criteria	N/A	N/A
Additional considerations for causation	N/A	N/A

MESOTHELIOMA

Criteria	Sufficient evidence to establish a covered illness. If some but not all criteria are met, physician review recommended	Evidence that suggests a covered illness exists and that physician review is recommended
DOE exposure criteria*	DOE Facilities Specific job titles/ processes Applicable dates	DOE Facilities Specific job titles/ processes Applicable dates **And** Additional information is needed**
Latency*	30-50 years	20-29 or > 50 years
Medical Evidence for illness and diagnostic testing criteria	1. A written diagnosis of mesothelioma made by a medical doctor **And** 2. Pathology report consistent with mesothelioma from surgical or biopsy specimen	Some, but not all criteria to establish the illness are met** **Or** Medical record (includes any provider report, results of imaging studies, surgical or pathology reports, or other acceptable record) or death certificate mention of mesothelioma or pleural malignancy **Or** Results from a chest x-ray or computer assisted tomography (CT) or other imaging technique that are suggestive of mesothelioma • Such as large, unilateral pleural effusion, pleural mass, pleural rind, or diffuse pleural thickening
Additional considerations for causation	**None needed**	**None needed**

* The actual latency period for the development of this disease is a function of the specific causative toxic substance as well as the duration and intensity of exposure.
** Triggers DOL request for additional information from the worker for exposure and/or diagnostic testing criteria elements. A request for additional information should also be made if there is insufficient information present to establish a possible exposure or illness.
*** References utilized include American Thoracic Society consensus statement.

LUNG CANCER

Criteria	Sufficient evidence to establish a covered illness. If some but not all criteria are met, physician review recommended	Evidence that suggests a covered illness exists and that physician review is recommended
DOE exposure criteria*	DOE Facilities Specific job titles/ processes Applicable dates	DOE Facilities Specific job titles/ processes Applicable dates **And** Additional information is needed**
Latency*	10-20 years	>20 years
Medical Evidence for illness and diagnostic testing criteria	1. Any one of the following two criteria a. A written diagnosis of lung cancer (malignancy) made by a medical doctor; or **b. Pathology report consistent with lung cancer (small cell, oat cell, large cell, squamous cell, adenocarcinoma) from surgical or biopsy specimen** **And** 2. The employee has a history of being a never smoker***	Some, but not all criteria to establish the illness are met** **Or** Medical record (includes any provider report, results of imaging studies, surgical or pathology reports, or other acceptable record) or death certificate mention of lung cancer (malignancy) *Or* Results from a chest x-ray or computer assisted tomography (CT) or other imaging technique that are suggestive of lung cancer • Such as lung mass
Additional considerations for causation	**There is currently no medical testing or means to distinguish cancer due to any of the above toxic substance exposures and cancer due to other causes. Physician review is required.**	Physician review is required.

* The actual latency period for the development of this disease is a function of the specific causative toxic substance as well as the duration and intensity of exposure.

** Triggers DOL request for additional information from the worker for exposure and/or diagnostic testing criteria elements. A request for additional information should also be made if there is insufficient information present to establish a possible exposure or illness.

***ATS criterion for a never smoker, or non-smoker, is < 20 packs of cigarettes in a lifetime, but this piece of information may not be found in most medical records.

KIDNEY DISEASE

Criteria	Sufficient evidence to establish a covered illness. If some but not all criteria are met, physician review recommended	Evidence that suggests a covered illness exists and that physician review is recommended
DOE exposure criteria*	DOE Facilities Specific job titles/ processes Applicable dates	DOE Facilities Specific job titles/ processes Applicable dates **And** Additional information is needed**
Latency*	Months or years	Days, months, or years
Medical Evidence for illness and diagnostic testing criteria	1. Any one of the following two criteria a. A written diagnosis of kidney disease made by a medical doctor • Other terms are chronic renal disease, chronic renal failure, renal insufficiency b. The worker required dialysis **And** 2. The worker does not have high blood pressure or diabetes **And** 3. The type of kidney disease diagnosed is consistent with one known to be caused by the identified toxic substance.	Some, but not all criteria to establish the illness are met**
Additional considerations for causation	Additional testing may be required to help establish a causal link between a toxic substance and a specific kidney disease. This may include additional urine testing, such as β_2-microglobulin or retinol binding protein and/or biological tests to detect residual evidence of the toxic substance in the body. The need for this additional testing should be determined by the reviewing physician. **Physician review is required.**	**Physician review is required.**

* The actual latency period for the development of this disease is a function of the specific causative toxic substance as well as the duration and intensity of exposure.

** Triggers DOL request for additional information from the worker for exposure and/or diagnostic testing criteria elements. A request for additional information should also be made if there is insufficient information present to establish a possible exposure or illness.

ASTHMA, OCCUPATIONAL

Criteria	Sufficient evidence to establish a covered illness	Sufficient evidence to establish a possible illness requiring physician review.
DOE exposure criteria*	DOE Facilities Specific job titles/ processes Applicable dates	DOE Facilities Specific job titles/ processes Applicable dates **And** Additional information is needed**
Latency*	Weeks, months, or years	Weeks, months, or years
Medical Evidence for illness and diagnostic testing criteria	1. The following three criteria: i. Onset of asthma occurring after first DOE exposure (except resolved asthma childhood) **And** ii. A written diagnosis of occupational asthma or asthma caused by toxic substance made by a medical doctor **And** iii. The diagnosis of asthma was made based on any one of the following criteria a. Methacholine challenge test results showing a $PC_{20} \leq 8$ mg/ml; or b. Post-bronchocodialator reversibility of $FEV_1 \geq 12\%$ and 200 ml; or c. Post-bronchocodialator reversibility of $FEV_1 \geq 12\%$, but <20 ml, with subsequent improvement in $FEV_1 \geq 20\%$ after steroid trial **And**	Some, but not all criteria to establish the illness are met** Occupational asthma via sensitization to a new agent in the workplace can occur in workers with pre-existing asthma. Additional testing that can be consistent with the diagnosis, but does not establish the diagnosis. 1. Positive skin prick testing or serologic IgE (RAST) testing to the toxic substance
Additional considerations for causation	1. An association between symptoms of asthma and work, including wheeze and/or shortness of breath that are better on days away from work, especially on holiday or vacation. **And** 2. One or more of the following criteria: a. work-related change in FEV_1 or PEF rate; or b. work-related change in bronchial hyperresponsiveness; or c. positive response to specific inhalation challenge test (note this is not recommended if not already performed)	**None needed**

* The actual latency period for the development of this disease is a function of the specific causative toxic substance as well as the duration and intensity of exposure.

** Triggers DOL request for additional information from the worker for exposure and/or diagnostic testing criteria elements. A request for additional information should also be made if there is insufficient information present to establish a possible exposure or illness.

ASTHMA, IRRITANT INDUCED

Criteria	Sufficient evidence to establish a covered illness	Sufficient evidence to establish a possible illness requiring physician review.
DOE exposure criteria*	DOE Facilities Specific job titles/ processes Applicable dates	DOE Facilities Specific job titles/ processes Applicable dates **And** Additional information is needed**
Latency*	Days, months, or years	Days, months, or years
Medical Evidence for illness and diagnostic testing criteria	1. The three following criteria: a. Onset of asthma occurring after first DOE exposure (except resolved asthma childhood) **And** b. A written diagnosis of occupational asthma, irritant induced asthma, or asthma caused by toxic substance made by a medical doctor **And**	Some, but not all criteria to establish the illness are met**
Additional considerations for causation	1. An association between symptoms of asthma and work, including wheeze and/or shortness of breath are better on days away from work, especially on holiday or vacation. **And** 2. One or more of the following criteria: a. work-related change in FEV_1 or PEF rate; or b. positive response to specific inhalation challenge test (note this is not recommended if not already performed); or c. Onset of asthma in clear association with a symptomatic exposure to an irritant agent in the workplace. This includes RADS, occurring after a single exposure to a substance with irritant properties present in a very high concentration, if other disease processes have been ruled out.	**None needed**

* The actual latency period for the development of this disease is a function of the specific causative toxic substance as well as the duration and intensity of exposure.

** Triggers DOL request for additional information from the worker for exposure and/or diagnostic testing criteria elements. A request for additional information should also be made if there is insufficient information present to establish a possible exposure or illness.

ASTHMA, IRRITANT AGGRAVATED

Criteria	Sufficient evidence to establish a covered illness	Sufficient evidence to establish a possible illness requiring physician review.
DOE exposure criteria*	DOE Facilities Specific job titles/ processes Applicable dates	DOE Facilities Specific job titles/ processes Applicable dates **And** Additional information is needed**
Latency*	Days or months	Days or months
Medical Evidence for illness and diagnostic testing criteria	1. History of asthma as an adult prior to DOE exposure **And**	Some, but not all criteria to establish the illness are met**
Additional considerations for causation	1. The two following criteria a. An association between symptoms of asthma and work, including wheeze and/or shortness of breath are better on days away from work, especially on holiday or vacation. **And** 2. The worker was symptomatic or required medication before and had increase in symptoms or medication requirement after beginning to work with the above substance.	**None needed**

* The actual latency period for the development of this disease is a function of the specific causative toxic substance as well as the duration and intensity of exposure.

** Triggers DOL request for additional information from the worker for exposure and/or diagnostic testing criteria elements. A request for additional information should also be made if there is insufficient information present to establish a possible exposure or illness.

HEART ATTACK

Criteria	Sufficient evidence to establish a covered illness	Sufficient evidence to establish a possible illness requiring physician review.
DOE exposure criteria*	DOE Facilities Specific job titles/ processes Applicable dates	DOE Facilities Specific job titles/ processes Applicable dates **And** Additional information is needed**
Latency*	Weeks, months, or years	Weeks, months, or years
Medical Evidence for illness and diagnostic testing criteria	1. A written diagnosis of heart attack or sudden death due to heart disease by a medical doctor **And** 2. The heart attack or sudden death occurred after being away from nitrate exposure for a couple of days following a number of days of regular nitrate exposure (classically on a Monday morning).	Some, but not all criteria to establish the illness are met** This is strongly supported by a history of recurrent headaches following a similar pattern
Additional considerations for causation	Due to high prevalence of heart disease and heart attacks, physician review is recommended for determination of causation.	**Physician review recommended**

* The actual latency period for the development of this disease is a function of the specific causative toxic substance as well as the duration and intensity of exposure.
** Triggers DOL request for additional information from the worker for exposure and/or diagnostic testing criteria elements. A request for additional information should also be made if there is insufficient information present to establish a possible exposure or illness.

For nitrates only.

NEUROPATHY, TOXIC

Criteria	Sufficient evidence to establish a covered illness	Sufficient evidence to establish a possible illness requiring physician review.
DOE exposure criteria*	DOE Facilities Specific job titles/ processes Applicable dates	DOE Facilities Specific job titles/ processes Applicable dates **And** Additional information is needed**
Latency*	Days, months, or years	Days, months, or years
Medical Evidence for illness and diagnostic testing criteria	1. A written diagnosis of peripheral neuropathy, toxic neuropathy, or neuropathy due to a toxic substance made by a medical doctor **And** 2. The diagnosis was made by all three of the following criteria. Note: the definition of the classic syndrome will vary among the different toxic substances. a. Symptoms consistent with the classic syndrome caused by the specific toxic substance • Sensory; or • Motor; or • Sensorimotor b. Signs consistent with the classic syndrome caused by the specific toxic substance • Decreased or abnormal distal sensation a. Such as stocking-glove numbness, allodynia, and/or hyperalgesia • Decreased or absent distal reflexes • Distal muscle weakness and/or atrophy c. Results of electrodiagnostic studies consistent with a neuropathy caused by the specific toxic substance. • Should include both needle EMG and nerve conduction studies (NCS)	Some, but not all criteria to establish the illness are met**
Additional considerations for causation	Electrodiagnostic testing can distinguish some but not all toxic neuropathies from those due to other causes. There are many medical causes of peripheral neuropathy, especially sensorimotor neuropathies. **Physician review is required.**	**Physician review is required.**

* The actual latency period for the development of this disease is a function of the specific causative toxic substance as well as the duration and intensity of exposure.
** Triggers DOL request for additional information from the worker for exposure and/or diagnostic testing criteria elements. A request for additional information should also be made if there is insufficient information present to establish a possible exposure or illness.

ENCEPHALOPATHY, CHRONIC TOXIC

Criteria	Sufficient evidence to establish a covered illness	Sufficient evidence to establish a possible illness requiring physician review.
DOE exposure criteria*	DOE Facilities Specific job titles/ processes Applicable dates	DOE Facilities Specific job titles/ processes Applicable dates **And** Additional information is needed**
Latency*	Years	Days, months, or years
Medical Evidence for illness and diagnostic testing criteria	1. A written diagnosis of chronic toxic encephalopathy (ICD9 code 349.82 or analogous conditions) made by a medical doctor **And** 2. A formal neuropsychological assessment that included a battery of neurobehavioral tests is consistent with the diagnosis. 3. Appropriate neuroimaging studies (e.g. brain MRI, head CT) have been performed to investigate findings consistent with the diagnosis, or suggestive of unrelated causes.	
Additional considerations for causation	Some patterns on the history and neurobehavioral test profile may be more consistent with chronic toxic encephalopathy than with unrelated causes (e.g. greater decrements in performance vs. verbal IQ). **Physician review is required.**	**Physician review is required.**

* The actual latency period for the development of this disease is a function of the specific causative toxic substance as well as the duration and intensity of exposure.

** Triggers DOL request for additional information from the worker for exposure and/or diagnostic testing criteria elements. A request for additional information should also be made if there is insufficient information present to establish a possible exposure or illness.

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Appendix D—Lists of Board Certified, Impairment Rating Trained Physicians & Organizations Providing Continuing Medical Education in the Evaluation of Impairment

List of Organizations Providing Continuing Medical Education in the Evaluation of Impairment:

American Academy of Disability Evaluating Physicians
Postal address: 150 North Wacker Drive, Chicago, IL 60606
Telephone: (800) 456-6095
Website: www.aadep.org

American Board of Independent Medical Examiners (ABIME)
Postal address: 111 Lions Drive, Suite 217, Barrington, IL 60010
Telephone: (800) 234-3490
Website: www.abime.org

American College of Occupational and Environmental Medicine
Postal address: 25 Northwest Point Blvd. Suite 700, Elk Grove Village, IL 60007-1030
Telephone: (847) 818-1800
Website: www.acoem.org

American Medical Association
Postal address: 515 N. State St. Chicago, IL 60610
Telephone: (312) 464-5000
Website: www. ama-assn.org

Appendix E—Reference Pages from the AMA Guides 5th Edition

Appendix F—Model Reports

Appendix G—Miscellaneous Reports

- *AADEP Fellowship Case Report Reviewer's Analysis*
- *The Comprehensive IME System: Essential Resources for an Efficient and Successful IME Practice*
- *The Independent Medical Evaluation Report: A Step-by-Step Guide with Models*
- *State of California, Department of Industrial Relations: Adoption of Regulations*

AADEP Fellowship Case Report Reviewer's Analysis

The Comprehensive IME System: Essential Resources for an Efficient and Successful IME Practice

The Independent Medical Evaluation Report: A Step-by-Step Guide with Models

State of California, Department of Industrial Relations: Adoption of Regulations