Advisory Board on Toxic Substances and Worker Health
Recommendations – Adopted at April 18-20, 2017 Meeting

Recommendations

Recommendation #1

Presumptions for Asbestos-related Diseases

1. All DOE workers who worked as a maintenance or construction worker at a DOE site for 250 days or more prior to January 1, 2005 and who are diagnosed 15 years or more after the initiation of such work with 1 of 5 asbestos-associated conditions will be presumed to have had sufficient asbestos exposure that it was at least as likely as not that asbestos exposure was a significant factor in aggravating, contributing to, or causing such asbestos-associated conditions. The five asbestos-associated conditions are asbestosis, asbestos-related pleural disease, lung cancer, and cancer of ovary and larynx.
2. All DOE workers who worked as a maintenance or construction worker at a DOE site for 30 days or more and who are diagnosed 15 years or more after the onset of such work with malignant mesothelioma of any bodily site will be presumed to have had sufficient asbestos exposure that it was at least as likely as not that asbestos exposure was a significant factor in aggravating, contributing to or causing the malignant mesothelioma.
3. All claims for one of the six asbestos-associated conditions named above that do not meet the exposure criteria described in items #1 and #2 above will be referred to an industrial hygienist for exposure assessment and to a CMC for evaluation of medical documentation and causation. These six conditions are asbestosis, asbestos-related pleural disease, malignant mesothelioma, lung cancer, and cancer of ovary and larynx.
4. Chronic obstructive pulmonary disease may have a contribution from asbestos exposure. However, claims for this disease should be evaluated as part of a broader set of presumptions for chronic obstructive pulmonary disease.

Exposure criteria	**Asbestos-specific Diseases** Mesothelioma	**Asbestos-specific diseases** Asbestosis, Asbestos-related pleural disease	**Other Asbestos-related Cancers** Lung cancer, Cancer of ovary and larynx
Duration	≥ 30 days	≥ 250 days	≥ 250 days
Job titles	Maintenance Construction	Maintenance Construction	Maintenance Construction
Calendar years	Pre-2005	Pre-2005	Pre-2005
Latency (minimum)	15 years	15 years	15 years

Rationale

The Departments of Labor and Energy recognize that asbestos was used extensively throughout the Departments of Energy (DOE) complex. The DOE Former Worker Program has documented that 11.9% of 78,894 DOE workers screened between 1998 and 2016 had chest x-ray evidence of non-malignant asbestos-related lung disease, including asbestosis and asbestos-related pleural disease (DOE Former Worker Program Annual Report, 2016). The prevalence of non-malignant asbestos-related lung disease varied considerably, as low as 4% to 5% at some DOE sites or up to one-quarter to one-third of production and construction workers, respectively, at other sites (DOE FWP Report). Recent published studies showed excess lung cancer, malignant mesothelioma (an asbestos-specific cancer), and asbestosis among DOE construction workers (Dement 2009; Ringen 2015). Additional published studies at DOE sites show excess lung cancer among sub-populations of the work force (Frome 1997; Richardson 1999; Silver 2013; Figgs 2013).

Asbestos was used in over 3,000 products during the period when it was commonly manufactured in the United States, 1940's to 1980's. Some of its uses are well-recognized, including thermal insulation products, boards, textiles, friction products and cement. Other uses are less obvious, including laboratory counter tops, protective pads, filters, and others. Due to its frequency and sometimes occult nature of its use, proper investigation of a claim for any of the asbestos-related diseases, if consensus exposure presumptions are not met, requires a detailed occupational history and evaluation by occupational health professionals with substantial knowledge of the asbestos exposure and related diseases.

There is a well-established medical literature documenting non-malignant and malignant asbestos-related diseases among construction workers and industrial and commercial maintenance workers in the United States. The asbestos-related disease experience among such workers at Department of Energy sites, thus, matches a much more comprehensive experience with general industry, which provides confidence in setting the recommended exposure presumptions based on the broad occupational groups (i.e., maintenance and construction) elaborated above.

Asbestos-related diseases generally increase in frequency with increasing exposure to asbestos (Algrante 2016; Markowitz 2016). As such, setting a specific period of exposure (e.g., 250 days) is approximate but reasonable for the purpose of setting an exposure presumption. It should not be construed as representing a precise limit separating those with risk from those without risk. It accords with the underlying scientific knowledge and represents a practical element for application of a set of presumptions to claims evaluation. Recommending such a time limit should not be construed as signifying that asbestos exposure for less than the specified time period is without risk. For claims with asbestos exposure less than the recommended period, evaluation of a history of asbestos exposure by an industrial hygienist will yield information about frequency and intensity of exposure, in addition to exposure duration, and allow a more informed decision about the claim.

Malignant mesothelioma is known to occur following relatively brief exposure to asbestos, thus permitting the setting of a shorter period of exposure as a presumption of significant exposures (i.e., 30 days) (Helsinki 1997; Welch 2007; Markowitz 2015). A minimum latency of 15 years for all asbestos-related diseases is supported as a presumption by extant medical literature; claims asserting a latency period less than 15 years can be evaluated on an individual basis.

Setting a calendar year as representative of a specific time demarcation when exposure was categorically lowered is inherently problematic. It is highly attractive for assessing exposure in claims evaluation but fails to recognize that exposure reduction occurs over time, usually a number of years. However, entirely disregarding calendar years in assessing exposure for the purpose of establishing presumptions fails to recognize that exposure to asbestos has, for many workers, diminished over time. A feasible and knowledge-based compromise is to build in a safety margin in setting a calendar time element in exposure presumptions. In 1994, OSHA lowered the permissible exposure level of asbestos in the workplace. In 1995, DOE issued a new order regarding occupational health and safety in the DOE complex. It is reasonable to posit that it required a decade of dissemination and diffusion of knowledge, attitudes and practice with regard to asbestos use such that exposure to asbestos was decisively diminished across the vast majority of workers at DOE facilities. Thus, we recommend 2005 as a year to demarcate likely significant asbestos exposure, recognizing that exposures after 2005 might be significant and will be evaluated by occupational health professionals as part of the individual claims evaluation.

Chronic obstructive pulmonary disease may have a contribution from asbestos exposure but is better evaluated in the claims process in accordance with a broader policy that addresses the large number of exposures that can aggravate, contribute to, or cause chronic obstructive pulmonary disease.

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Recommendation #2

Presumptions for Work-Related Asthma

1. DOL should use the generally accepted unifying term, work-related asthma (WRA) for claims evaluation and decision-making. Work-related asthma includes: a) occupational asthma (OA), or new onset asthma that is initiated by an occupational agent, and b) work-exacerbated asthma (WEA), which is established asthma that is worsened by workplace exposures. The recognition of both forms of work-related asthma should be communicated to claimants, their physicians and consulting IH's and CMC's.

2. Medical criteria for the diagnosis of asthma: The diagnosis of asthma by a treating or evaluating physician should be sufficient for the recognition that the claimant has asthma. Bronchodilator reversibility of FEV_1 and/or a positive methacholine challenge test may be helpful but should not be required to accept the diagnosis of asthma, which is made by a health care provider.

3. Work-related asthma, whether OA or WEA, is defined as the presence of medically-diagnosed asthma that is associated with worsening of any one or more of the following in relation to work: asthma-related symptoms, asthma medication usage or asthma-related health care utilization temporally related to work, or change in peak expiratory flows associated with work. Such a history should be documented by a treating or evaluating health care provider, or addressed by a CMC if consulted in a claim evaluation.

4. The same criteria for WRA should be used in evaluating asthma claims whether the claim is made contemporaneous with the period of DOE employment or after the end of that period of employment. A specific triggering event causing onset of WRA may occur but is not typical or necessary. Inciting exposures such as dusts, fumes, heat or cold or others should be specifically identified when possible, but should not be required for the diagnosis of WRA.

Rationale

Work-related asthma induced or exacerbated by inhaled toxicants in the workplace is common in the United States, associated with up to 25% of adult asthma (Tarlo 2008; Henneberger, 2011). Occupational asthma in previously health workers is known to be caused by over 400 specific workplace agents with additional agents being reported annually (Friedman-Jimenez 2015). Dusts, gases, vapors, and fumes in general can worsen pre-existing asthma or asthma that otherwise has developed among workers (Henneberger, 2011).

Due to variation in diagnostic criteria, clinical management, and terminology, the chief professional organizations of pulmonary physicians in the United States, the American Thoracic Society and the American College of Chest Physicians, periodically issue consensus statements to promote clarity, uniformity, and quality in the recognition and care of workers with work-related asthma (Tarlo 2008; Henneberger, 2011). The criteria contained in the above recommendation reflect the most recent statements. Specifically, the American Thoracic Society wrote in 2011 that work-exacerbated asthmas is "pre-existing or concurrent asthma" in which "the exacerbation of asthma was temporally associated with work, based either on self-reports of symptoms or medication use relative to work, or on more objective indicators like work-related patterns of serial PEFR" and when "conditions exist at work that can exacerbate asthma" (Henneberger, 2011). Occupational asthma is asthma induced by airborne sensitizers or irritants at work (Tarlo 2008; Henneberger, 2011).

Asthma, which is marked by chronic airway inflammation, is defined by the "history of respiratory symptoms such as wheeze, shortness of breath, chest tightness and cough that vary over time and in intensity, together with variable expiratory airflow limitation" (Global Initiative for Asthma 2016). The diagnosis of asthma is complicated by the fact that the patient is often already on asthma medications when an evaluating, treating, or consulting physician first sees the patient. The disease is also variable, so that negative tests cannot rule out the disease when it is inactive. Objective pulmonary function tests may not provide typical patterns that reflect asthma, since physicians (and patients) are often reluctant to stop asthma treatment prior to testing. Therefore, the clinical history and presentation may effectively become the sole basis for diagnosis and represents a fully accepted method in clinical medicine.

Likewise, objective pulmonary function testing that demonstrates airway reversibility in relation to workplace agents, though helpful, is not an absolute requirement for the diagnosis of work-related asthma (Tarlo 2008). Key to the diagnosis of work-related asthma is the temporal relation between workplace exposures and asthma activity, whether identified by symptoms, medication usage, or visits to health care providers. Any of these measures may suffice as demonstration of the work-elatedness of asthma. Notably, there are patients in whom even these measures are not definitive, as work-related asthma can have delayed symptoms that may not be easily related to exposures at work.

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Recommendation #3

Presumptions for Chronic Obstructive Pulmonary Disease

The Advisory Board recommends that the Energy Employees Occupational Illness Compensation Program (EEOICP) revise its exposure presumptions that are used to adjudicate claims for chronic obstructive pulmonary disease (COPD). We recommend that EEOICP replace the presumptions it has established in DEEOIC Bulletin 16-02 with the following alternative presumptions:

1. Any claimant with a physician's diagnosis of COPD who worked in any covered facility either:

   (a) In any of the labor categories in Attachment 1 (which should be expanded to include all construction and maintenance job titles),

   Or

   (b) Who reported exposure to vapors, gases, dusts, and fumes (VGDF) with relevant tasks on the Occupational History Questionnaire for a period, which, in aggregate, totals at least five years,

   is presumed to have experienced sufficient exposure to toxic agents to aggravate, contribute to, or cause COPD.

2. In addition, claims examiners should not deny claims for COPD if the worker had fewer than 5 years of exposure; for example, a claimant who has experienced high intensity exposures to VGDFs for a period < 5 years during work in a covered facility would have an equivalent exposure. Claims that do not meet the requirements set forth here but do have reported exposure to VGDF should be sent for industrial hygienist and/or CMC review under the policy established in Bulletin 16-03.

Rationale

Scientific Background

Substantial medical literature has investigated the etiology of COPD among general populations in the U.S., Italy, New Zealand, Poland, Australia, Spain, and elsewhere (reviewed in ATS Statement, 2003; ATS Statement, 2010 [1,2]).

In 2003 the American Thoracic Society, which is the preeminent respiratory disease organization in the United States, published a consensus statement that concluded that occupational exposures were responsible for a substantial fraction of COPD in the United States. Another review from the American Thoracic Society published in 2010, "An Official American Thoracic Society Public Policy Statement: Novel Risk Factors and The Global Burden of Chronic Obstructive Pulmonary Disease," further concluded that there is a very strong and well accepted causal relationship between occupational exposures to vapors, gases, dusts and fumes (VGDF) and COPD (ATS Statement, 2010, page 704).

This document also identified some specific agents that are part of the overall occupational exposures to vapors gases dust and fumes. Table 5 in this paper lists some studies that have identified specific agents, including asbestos and quartz (i.e., crystalline silica).

Other primary research studies have defined the causative occupational exposures as a combined exposure VGDF. These large studies of varying study designs have consistently shown that occupational exposures defined as "gases, dusts, vapors, and fumes" increase the risk of COPD. A dose-response relationship has been seen (7,8), and the effect is observed among both smokers and non-smokers (4,5). The effect of smoking and occupational exposures appears to be additive. Two recent studies by Dement et al evaluated COPD and occupational risks in DOE facilities specifically and found that VGDF significantly increased the risk for COPD (9), and that VGDF exposure predicted accelerated loss of lung function over time (10).

There is a strong biological basis for causation of COPD by VDGF, as described by Eisner (2010) (1). Exposure of mice to particulates leads to an inflammatory response in the airways within 24 hours of exposure. Particulate exposure increases activity of fibroblasts with deposition of fibronectin, and chronic exposure in rats led to clear fibrosis. Human epithelial cells exposed to particulates express inflammatory cytokines, and alveolar macrophages release TNF alpha and IL-1 after exposure, as well as releasing reactive oxygen species; all these agents are known to cause inflammation. Long-term exposure to particulates leads to airway remodeling and chronic inflammation, both hallmarks of COPD.

COPD is caused by cumulative exposure, as demonstrated by the presence of a dose-response in population-based studies. This fact means that any and all exposures to VGDF contribute and aggravate dust-induced COPD. Therefore, it is reasonable that exposures outside the DOE complex could be considered when determining if a minimal length of exposure has occurred to meet a presumption as part of an individualized industrial hygiene review (see #2 above).

Attributes of Exposure

Covered exposures: The following specific exposures should be presumptive, because they impose a risk for COPD that is as great as the risk found by DEEOIC in Bulletin 16-02 to be presumptive for asbestos: Asbestos; silica; cement dust; engine exhausts; acids and caustics; welding, thermal cutting, soldering, brazing; metal cutting and grinding; machining aerosols; isocyanates, organic solvents, wood dust, molds and spores; and particulates not otherwise regulated (PNOR[1]). In addition, the scientific evidence supports the conclusion that exposures to vapors, gases, dusts, and fumes (VGDF) as a broad category increases the risk of COPD.

[1]PNOR includes all mineral and inorganic "inert or nuisance dusts" without specific individual U.S. Occupational Safety and Health Administration Permissible Exposure Limits (PEL). See OSHA. *Chemical Sampling Information: Particulates Not Otherwise Regulated (Total Dust)* Washington, DC. 2015; *NIOSH Pocket Guide to Chemical Hazards: Particulates not Otherwise Regulated.* Atlanta, GA, 2015.

Relevant Job Categories: Research supports the presumptions that the labor categories listed in Attachment 1 have had significant exposure to VGDF. In Dement's study at DOE facilities published in 2015, which includes these labor categories, only 1.4% of COPD cases and 2.5% of controls reported no VGDF exposures (see Supplemental Materials, Table IV-S.) However, Attachment 1 is not inclusive, for there are many other labor categories in the DOL atomic weapons complex that have had significant exposure to VGDF as well. The committee recommends that Attachment 1 be expanded by adding "all construction and maintenance workers." In addition, the Advisory Board separately recommends changes to the occupational history questionnaire to better assess each individual worker's exposure to VGDF. If a worker reports exposure to VGDF on the OHQ that is substantiated with description of relevant tasks, and additionally meets other requirements recommended in this presumption, his/her exposure should be considered to aggravate, contribute to, or cause COPD.

Timing of exposure: Because VGDF exposures continue to take place at DOE sites and many of them are unregulated, it should be presumed that reported exposures to toxic substances that cause, contribute to or aggravate COPD at any period of employment covered by EEOICPA, up to the present time, are contributory exposures.

Duration of exposure: Based on the evidence presented in the Dement 2015 study, a duration of 5 years of reported exposures to VGDF can be presumed to aggravate, contribute to, or cause COPD.

Time since last exposure: The committee does not recommend specifying any time limit between last exposure and clinical recognition of COPD. COPD is a slowly progressive disease, and individuals are often not diagnosed until the disease is advanced, or an intervening infection makes the diagnosis more apparent. Since it would not be possible to determine in retrospect when a case of COPD could have been first diagnosed, and since VDGF is a contributory cause to COPD, it is reasonable to assume that VGDF contributed to any diagnosed case of COPD even if the disease is diagnosed after the worker has left employment.

References

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Recommendation #4

Revisions of Occupational History Questionnaire

A. The Advisory Board recommends expanding the current list of hazards, exposures, and materials on the current Occupational History Questionnaire (OHQ) to include the list of hazards and/or materials used by the Building Trades National Medical Screening Program (BTMed).

1. For each exposure reported, the worker should be asked to describe how he/she was exposed to each material with an emphasis on describing the tasks associated with the exposure; this would be captured using free text. The worker would also be asked to rate the frequency of exposure to each hazard, using the scale from BTMed. In addition, we suggest adding a box next to each exposure on the list, asking if the worker used the material directly or was exposed as a bystander.

   The current version of the OHQ asks about specific exposures that could be expanded with the text box and assessment of exposure frequency.

2. The list of hazards should include asbestos; silica; cement dust; engine exhausts; acids and caustics; welding, thermal cutting, soldering, brazing; metal cutting and grinding; machining aerosols; isocyanates, organic solvents, wood dust, molds and spores. Each of these has been shown to cause chronic obstructive pulmonary disease (COPD) and other health conditions.

The Advisory Board also recommends adding to the OHQ the list of tasks that is currently used in the exposure assessment by BTMed.

Rationale

The goal of this recommendation is to expand the amount of information on specific hazards and materials available to the claims examiner, the consulting industrial hygienist, and the medical consultant. To determine if a disease is related to exposures one generally need to know whether an exposure occurred and to be able to assess duration and intensity in a qualitative way. The worker's description of hazards and associated tasks is widely considered the most important part of any occupational medicine consultation, and needs to be included in the OHQ.

A primary goal of the OHQ is to identify hazardous exposures for a specific worker, so that information can be used in a causation determination. A worker may not know the names of all the materials he/she used, but will know the tasks she/he performed. Task alone, even without the names of the associated hazards can give the industrial hygienist a good sense of what exposures occurred, and what additional questions need to be asked in the document acquisition request or directly from the worker.

EEOICP Bulletin 16 – 03 describes a new process, the direct disease link work process (DDLWP), to link medical conditions to specific tasks. The guidance document states that "Data supplied by an employee or survivor in an occupational history or other personal statements can be accepted as reliable when sufficient detail or other information is provided that documents the scope and type of work performed." The subcommittee believes that the OHQ, if revised as recommended, would meet this standard.

As additional support for these recommendations, the Board notes that Bulletin 16 – 03 states "the CE needs to carefully compare what job tasks the employee actually performed" when using the DDLWP. It also states "To obtain a causation opinion, the CE prepares a summary of the employment that specifically references how much time the employee spent working on one or more DDLWP and describes the work." Given that the current OHQ does not collect information on tasks, nor on length of time performing any specific task or operation, it is important to revise the OHQ to allow the claims examiner to effectively utilize the DDLWP.

The Board discussed the feasibility of creating a list of tasks for production workers similar to what BTMed uses for construction workers but felt that would be almost impossible given the wide range of tasks over the years in the DOE complex. The alternative, of getting a more detailed occupational history from each worker, will provide the comparable information.

B. The Advisory Board recommends adding a specific question to the OHQ regarding vapors, gases, dusts and fumes (VGDF). We suggest adding:

1. The question: "Have you been exposed to vapors, gases, dusts and fumes in your work at DOE?"

2. If the answer to (a) is "yes", the worker should be asked about frequency of exposure to VGDF overall using the scale above.

3. If the answer to (a) is "yes" the worker is then asked "Have you already reported all exposures to vapors, gases, dust and fumes in your answers above?" If not, he/she should be asked to describe additional tasks and materials associated with exposure, to VGDF, the frequency using the scale recommended above under recommendation (1), the assessment whether the exposure was through direct use or as a bystander, and an assessment of the number of years of exposure.

<u>Rationale</u>

Substantial medical literature has investigated the etiology of COPD among general populations in the U.S., Italy, New Zealand, Poland, Australia, Spain, and elsewhere (see reviews in ATS Statement, 2003; ATS Statement, 2010 [1;2]).

In 2003 the American Thoracic Society, which is the preeminent respiratory disease organization in the United States, published the enclosed paper concluding that occupational exposures were responsible for a substantial fraction of COPD in the United States. Another paper from the American Thoracic Society published in 2010, with

Eisner as the lead author and the title "An Official American Thoracic Society Public Policy Statement: Novel Risk Factors and The Global Burden of Chronic Obstructive Pulmonary Disease," describes that there is a very strong and well accepted relationship between occupational exposures and COPD; see the section starting on page 704. This document describes that it is a strong causal relationship and describes other literature that has identified some specific agents that are part of the overall occupational exposures to vapors gases dust and fumes. Table 5 in this paper lists some studies that have identified specific agents, including asbestos and quartz; quartz is another name for as crystalline silica.

Other primary research studies have defined the causative occupational exposures as a combined exposure to vapors, gases, dusts and fumes (VGDF). These large studies of varying study designs have consistently shown that occupational exposures defined as "gases, dusts, vapors, and fumes" increase the risk of COPD. A dose-response relationship has been seen [(7;8)], and the effect is observed among both smokers and non-smokers [(4;5)]. The effect of smoking and occupational exposures appears to be additive. A recent study published looked at COPD and occupational risks in DOE facilities specifically, and found that VGDF significantly increased the risk for COPD [(9)].

Therefore, it is essential to assess workers' exposures to VGDF. As noted above, research has shown that the question "Have you been exposed to vapors, gases, dusts and fumes?" predicts COPD in population-based studies.

COPD is caused by cumulative exposure, as demonstrated by the presence of a dose-response in population-based studies. This fact means that all on-going exposures to VGDF contribute and aggravate dust-induced COPD.

C. The Board recommends that the version of the OHQ developed in response to these recommendations be tested multiple times to determine if it is user friendly and has face validity.

<u>Rationale</u>

The Board understands that these changes would make for a longer questionnaire, but we believe adding the worker's description of how they were exposed to materials is essential for development of the claim. We understand the Department's concern that workers, when presented with a list of hazards, might check off all hazards. Adding a narrative description of how the worker was exposed to that hazard would provide validation of the exposure, since such a narrative requires knowledge and understanding of tasks. When the questionnaire is reviewed by the industrial hygienist, the hygienist will be able to see if the narrative is consistent with general IH knowledge about that occupation or specific knowledge about the site, and can determine if the OHQ can be used as the basis for exposure assessment.

References

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Recommendation #5

Science and Technical Capacity in EEOICP

The Board recommends that the DEEOICP enhance its scientific and technical capabilities to support the development of program policies and procedures, to enhance decision-making on individual claims, and to inform its assessment of the merit of the work of its consulting physicians and industrial hygienists.

Rationale

> The Institute of Medicine's Review of the DOL Site Exposure Matrices (SEM) in 2013 made numerous recommendations to improve the SEM. These include 1) making sure that the SEM incorporate readily available supplemental data sources into the SEM to provide a more complete picture of known exposure-disease links, and 2) forming an expert advisory panel to establish explicit causal criteria for use by the EEOICP, design and implement a method for reviewing possible exposure-disease links, and identify and peer review new exposure-disease links for use in the SEM.
>
> The Board notes that the EEOICP has ended its contract with the National Library of Medicine for the continued updating of the Haz-Map database that is integral to SEM.
>
> The Board has been asked by EEOICP to provide input into numerous possible exposure-disease links. While the Board will assist in this request to the extent possible, it is noted that the Board members have limitations in time to devote to Board activities and has, at present, as a Board, no scientific staff or contracted resources to address this request. Moreover, evaluating exposure-disease links is an ongoing task for which the EEOICP needs permanent capacity to complete.
>
> The Board has observed that numerous current EEOICP policies involving important diseases and exposure-disease links, including chronic obstructive lung disease, asbestos-related diseases, asthma, and others, are not based fully on state-of-the-art scientific knowledge.
>
> The Board is willing to assist the Department of Labor in implementing this recommendation.

Recommendation #6

Interpretation of the Beryllium Lymphocyte Proliferation Test (BeLPT)

The Advisory Board recommends that the finding of two borderline BeLPT tests shall be considered the equivalent of one positive BeLPT for the purposes of claims adjudication under subpart B and subpart E of EEOICPA.

Rationale

> Beryllium sensitization is defined by EEOICPA as a single abnormal BeLPT, which most commonly is performed on fresh peripheral blood cells. The BeLPT result is occasionally reported as "borderline." Two "borderline" BeLPT tests have been shown to give about the same predictive value for beryllium sensitization as one abnormal (positive) BeLPT test (1-2). Thus a person with two 'borderline" BeLPT tests should be considered sensitized to beryllium (BeS), and further BeLPT testing is not indicated. The BeLPT is not a perfect test for BeS. False negative and positive BeLPT results can occur for several reasons (3).

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Recommendation #7

Quality Assessment of Contract Medical Consultants

We request that the DOL provide the Board with resources to conduct a quality assessment of a sample of 50 contract medical consultant (CMC) evaluations that have been associated with claim denials. The quality review will assess the nature of the medical information reviewed by the CMC, the use of standards of causation, the reasoning of the CMC, the scientific basis for the CMC conclusions, among other items. The assessment will likely required contracted services of worker-centered occupational physicians who are not associated with the current CMC contract. The review may lead to recommendations, including the development of guidance materials.

Rationale

> Occupational physician board members reviewed a number of CMC reports together with entire claimant records to assess the quality of the medical determinations and identified a number of problems, despite the strong credentials of each of the CMCs reviewed. These included failure to examine the entire medical record, resulting in instances in which critical information was overlooked that would have substantiated the claim; selective reading and citing of the medical literature to challenge the exposure-outcome relationship despite the preponderance of the medical evidence supporting the relationship; and a general misunderstanding of the level of certainty required for this program. Most concerning, the approach in several cases appeared to be more adversarial than objective. A more thorough exploration of CMC reports and the complete claimant records is needed to establish how widespread the problems may be and to assess the quality, objectivity, and consistency of CMC determinations. This work is very intensive, since the records themselves may run from many hundreds to several thousands of pages, and it needs to be conducted by occupational medicine physicians who have a worker-oriented perspective in line with the overall goal of the EEOICP. The scope of the task requires contractor support, and we would recommend explicitly identifying physicians who are not engaged with the current contractor to ensure independence of the assessment. The Association of Occupational and Environmental Clinics is a non-profit organization that includes a worker focus and would be able to identify appropriate experts for this task.

Attachment 1

Significant VGDF Exposure: Associated Labor Categories and Job Tasks [2]

Automotive mechanic; Vehicle mechanic; Vehicle maintenance mechanic

Boilermaker

Carpenter; Drywaller; Plasterer

Demolition technician; Laborer

Electrical mechanic; Electrician; Floor covering worker

Furnace & saw operator; Furnace builder; Furnace operator; Furnace puller; Furnace technician; Furnace tender; Furnace unloader

Glazier; Glass installer; Glazer

Grinder operator; Mason (concrete grinding); Tool grinder; Maintenance mechanic (general grinding); Welder (general grinding); Machinist (machine grinding)

Insulation worker; Insulation trade worker; Insulator

Ironworker; Ironworker-rigger

Maintenance mechanic; Electrician; Insulator;

Mason; Brick & tile mason; Concrete and terrazzo worker; Bricklayer, Tilesetter

Millwright

Heavy equipment operator; Operating Engineer

Painter

Pipefitter, Plumber steamfitter; Plumber/pipefitter; Plumbing & pipefitting mechanic; Plumbing technician, Steamfitter

Roofer

Sheet metal mechanic; Sheet metal fabricator/installer

Welder; Welder burner; Welder mechanic

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[2] Derived from ATSDR document on asbestos exposure, Case Studies in Environmental Medicine, Asbestos Toxicity, January 29, 2014.

Attachment 2

Excerpted from:

Dement J, Welch L, Ringen K, Quinn P, Chen A, Haas, S. A case-control study of airways obstruction among construction workers. Am J Ind Med 2015 58:1083-1097.

A Case-Control Study of Airways Obstruction among Construction Workers
Supplemental Material

Exposure Assessment Details

Occupational and Exposure History Questionnaire

Based on our experience in the BTMED program telephone interviews have been found to be an effective approach to collecting exposure history data. This is consistent with studies that have found telephone interviews to be superior to postal surveys for respiratory symptoms and risk factors [Brogger et al., 2002]. The telephone questionnaire obtained a lifetime occupational and exposure history through the date of the qualifying BTMED examination. Data domains included:

1. Industry and jobs held for at least six months with start and stop dates (month and year). Jobs within the same industry and occupation were treated as one job. For each job, workers were asked to list the products or services produced, job title/position, and usual work hours per week.

2. For all construction-related jobs, a qualitative assessment of frequency (none to daily) of doing 90 specific construction tasks known to generate VGDF exposures (e.g. cutting concrete, insulation installation, wood sanding, etc.). Open-ended questions were included to allow workers to report other construction-related tasks that created VGDF exposures but were not included in the listed tasks in the questionnaire.

3. For non-construction jobs, workers were asked "Does/did this job expose you to vapors, gases, dusts, and fumes" as this single survey item has been shown to delineate exposures associated with COPD risk [Blanc et al., 2005; Quinlan et al., 2009]. For any job with a positive response concerning VGDF exposure, workers provided a description of tasks resulting in exposures, materials exposed to, and frequency of exposure.

4. A qualitative assessment of exposure frequency (none to daily) for an *a priori* list of other materials associated with respiratory disease in the literature (e.g. coal dust; formaldehyde; beryllium; mercury; polyvinyl chloride fumes (heating or cutting PVC); isocyanates; pesticides, insecticides, or herbicides; diesel or gasoline engine exhaust; grain dusts; and animal feed or fodder). These data were collected for control of potential confounding exposures.

5. Use of respiratory protection (always, sometimes, rarely, or never) and engineering controls such as wet methods or local exhaust ventilation (always, sometimes, rarely, or never) for reported tasks.

6. An assessment of the frequency of bystander exposures to asbestos, man-made fibers, abrasive cutting or grinding of concrete, drywall/plaster dusts, spray painting, sandblasting, welding/cutting, and wood dusts.

7. Service in a branch of the military and if their military jobs resulted in exposures to VGDF. For any military job with a positive response concerning VGDF exposure, workers provided a description of tasks resulting in exposures, materials exposed to, and frequency of exposure.

8. Exposures to passive tobacco smoke at home and at work, having a blood relative with COPD [Weinmann et al., 2008], and history of pneumonia as a child [Tager et al., 1988]. Respiratory history and smoking history were determined using data from each worker's BTMED exam and any missing data from the BTMED exam was collected during the interviews.

The telephone questionnaire was developed and pilot tested in several ways. First, we assembled two separate focus groups of 10-15 experienced construction workers from DOE's Savannah River and Oak Ridge sites to review the draft questionnaire for ease of understanding (language level), question syntax, and overall questionnaire flow. We also asked focus group participants to identify any common VGDF exposures experienced by construction workers not adequately addressed in the draft questionnaire. Secondly, the draft questionnaire was pilot tested via telephone administration to approximately 25 construction workers identified by BTMED to represent the approximate age and experience range of the COPD cases and controls.

The final telephone questionnaire was administered by four trained interviewers without knowledge of case or control status. Cases and controls were randomly assigned to interviewers. Study subjects were first sent an invitation letter describing the study followed by telephone contact by the assigned interviewer to obtain informed consent and administer the questionnaire. A minimum of two telephone contact attempts were made before a second reminder letter was sent. Following the second reminder letter at least two additional telephone contact attempts were made. Study subjects were classified as 'failed to contact' due to bad addresses or telephone numbers and 'failed to respond' after no response following two letters and at least four phone calls. Information about the study was also provided on the BTMED web site and included in the BTMED Newsletter.

Cumulative Exposure Indices

Qualitative cumulative exposure indices were assessed for an *a priori* list of 15 common construction-related exposures shown in Table I. The category 'particulates not otherwise regulated' (PNOR) includes all mineral and inorganic 'inert or nuisance dusts' without specific individual U.S. Occupational Safety and Health Administration Permissible Exposure Limits (PEL) [NIOSH, 2015; OSHA, 2015]. A PNOR exposure index was included to allow generation of an overall index for VGDF exposures comparable to those in the published literature. All indices were based on task frequency by job, job duration, and usual work schedule from the interviews in combination with task exposure intensity scoring by industrial hygienists.

The telephone interviews collected information concerning the frequency of performing a specified set of 90 construction-related tasks resulting in exposures to ‘vapors, gases, dusts, and fumes’ (VGDF). Task frequency from the questionnaire and assigned exposure days per month were as follows:

Worker Reported Task Frequency Description	**Assigned Days of Exposure Per Month**
None: Did not perform the task	0
Rarely: Performed the task less than once per month	1
Monthly: Performed task 1-2 times per month	2
Weekly: Performed task weekly or most weeks	10
Daily: Performed task daily or almost every day	20

In addition to collecting information about the frequency of performing tasks, exposure intensity for each task reported by workers for jobs held more than six months was scored by three senior American Board of Industrial Hygiene (ABIH) certified industrial hygienists, each with 40 or more years of experience. Hygienists performed intensity scoring for the 15 *a priori* agents and 90 construction tasks in the questionnaire prior to data collection following guidelines proposed by Rice and Heineman [2003]. For each agent, exposure intensities were ‘calibrated’ relative to NIOSH Recommended Exposure Levels (RELs), ACGIH Threshold Limit Values (TLV), or OSHA Permissible Exposure Levels (PELs) (Table 1). Intensity of exposure for each agent/task combination was recorded on a four-level ordinal scale. These ordinal categories and assigned exposure intensities relative to the reference concentration were as follows:

Exposure Intensity Category and Description	**Assigned Exposure Intensity Weight Relative to Reference Concentration**
None: Not exposed	0
Low: Less than half the reference concentration	0.5
Moderate: More than half but generally not greater than the reference concentration	1.0
High: Generally higher to much higher than the reference concentration	2.0

Explicit standardization rules on exposure intensity have been shown to improve exposure ratings [McGuire et al., 1998]. In addition to recording exposure intensity, experience and familiarity of the reviewer with the task was ranked on a three-level scale (direct experience, indirect experience, or literature reference only) [Rice and Heineman, 2003].

For derivation of exposure intensity score consensus among the industrial hygienists, three rounds of scoring were used. Any differences among the three hygienists of more than one exposure intensity category were noted and hygienists were asked to further document the rational for their choice of exposure scale based on direct personal experience or published literature. This documentation and rationale was shared among the three hygienists, who were allowed to modify their score if they felt appropriate. For tasks where full consensus was not achieved, the final intensity score used a weighted average of the industrial hygienists' scores, with greater weight being given to raters most knowledgeable concerning the specific exposure and task (i.e. direct experience) [Ramachandran and Vincent, 1999]. Multi-rater kappa statistics were used to assess rater agreement [Chen et al., 2005; Fleiss et al., 2003].

Cases and controls reported a small number of tasks resulting in VGDF exposures in non-construction work and during military service. Many of these tasks were the same or similar to already scored construction tasks and were matched to construction tasks for exposure intensity assignment where appropriate. All remaining unscored tasks were scored for exposure intensity applying the same procedures used for construction tasks by one of the study industrial hygienists (JD). Workers also recorded frequency of exposure to a list of agents associated with bystander exposures in construction and non-construction work. Bystander exposures are typically much less than breathing zone exposures experienced by workers preforming tasks [Donovan et al., 2011]; therefore, bystander intensity was assigned a value of 10% (intensity weight=0.1) of the reference concentration.

Workers also were asked about the normal or usual number of hours worked each week for all jobs held 6 months or more. Cumulative exposure indices were calculated for each exposure scenario (i.e. construction, non-construction, military, and bystander) and these were summed to arrive at an overall cumulative exposure index for each agent. The following relationship was used to generate the cumulative exposure indices by exposure scenario:

$$Agent\ Cumulative\ Exposure\ Index = \sum_{All\ Jobs\ \&\ Tasks}^{N} D * ((H)/40) * ((F) * 12)/240) * (I)$$

Where:

D = Duration of the job in years
H = Average hours of work per week for each job
F = Frequency (days per month) of performing the task or experiencing the exposure (bystander)
I = Assigned exposure intensity relative to the agent reference concentration (0 to 2.0)
N = Number of jobs and tasks contributing to the exposure index for the agent of concern

For presentation of exposure distributions for cases and controls the cumulative exposure indices were categorized using tertile break points for the exposed controls [Hsieh et al., 1991], with unexposed subjects placed in a separate category. For regression modeling cumulative exposure indices were retained as continuous variables and standardized by dividing each worker's cumulative exposure by a value representing an exposure at the upper 95th percentile of the range for all workers. Exposures were thus expressed as a fraction of the upper 95th percentile of the exposure distribution which allowed more directed comparison of exposure-response patterns across the exposures of a priori interest. Acids and caustics were grouped together as these exposures occurred with low frequency and their mode of action (e.g. respiratory irritation) is likely similar.

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Table I-S: COPD Cases and Controls by DOE Site

DOE Site Description[1]	Cases (n=834)	Controls (n=1243)	Total (n=2077)
Brookhaven National Laboratory	19	29	48
Fernald Feed Materials Production Center (FMPC)	137	183	320
General Electric Company, Cincinnati	23	39	62
Hanford	167	224	391
Idaho National Engineering and Environmental Laboratory	55	66	121
Kansas City Plant	37	53	90
Mallinckrodt Chemical/Weldon Spring	10	14	24
Oak Ridge (All Sites)	114	195	309
Paducah Gaseous Diffusion Plant	44	58	102
Portsmouth Gaseous Diffusion Plant	54	92	146
Rocky Flats Plant	62	101	163
Savannah River Site	112	189	301

[1] Case and control distribution by site not significantly different, Chi-Square=7.47, p=0.76

Table II-S: COPD Cases and Controls by Trade or Job Category

Trade Group or Job[1]	Cases (n=834)	Controls (n=1243)	Total (n=2077)
Asbestos Worker or Insulator	25	37	62
Boilermaker	16	27	43
Carpenter	55	77	132
Cement Mason/Brick Mason/Plasterer	23	12	35
Electrician	128	226	354
Ironworker	50	64	114
Laborer	115	152	267
Mechanical Trades	7	8	15
Millwright	14	19	33
Operating Engineer	53	81	134
Painter	29	30	59
Plumber, Steamfitters, Pipefitter	130	200	330
Roofer	13	9	22
Sheet Metal Worker	45	82	127
Sprinkler Fitter	8	8	16
Teamster	32	34	66
All Other Construction and Non-Construction	91	177	268

[1] Case and control distribution by trade significantly different, Chi-Square= 33.09, p=0.033

Table III-S: Exposure Intensity Scoring Results

Agent or Exposure	Multi-Rater Kappa
Asbestos	0.71
Silica	0.66
Cement Dust	0.82
Man-Made-Mineral-Fibers	0.67
Engine Exhausts (Diesel or Gasoline)	0.71
Acids	0.49
Caustics	0.58
Welding, Thermal Cutting, Soldering, or Brazing	0.80
Metal Cutting, Grinding, and Machining Aerosol	0.80
Paint-Related Aerosol	0.78
Isocyanates	0.66
Organic Solvents	0.69
Wood Dust	0.70
Molds and Spores	0.78
Particulates not otherwise regulated (PNOR)	0.41

Table IV-S: Cumulative Exposure Index Distributions for COPD Cases and Controls

Cumulative Exposure Index		Cases or Controls	Mean (Std Err)	No Reported Exposure[1]	Number (%) of Workers by Tertile[2]		
					Tertile #1 Low	Tertile #2 Medium	Tertile #3 High
Asbestos	Cases	39.3(1.3)	41 (4.9)	240 (28.8)	222 (26.2)	331 (39.7)	
	Controls	31.1 (1.0)	81 (6.5)	383 (30.8)	395 (31.8)	384 (30.9)	
Silica	Cases	45.7 (1.4)	35 (4.2)	236 (28.3)	240 (28.3)	323 (38.7)	
	Controls	38.1 (1.0)	71 (5.7)	388 (31.2)	396 (31.9)	388 (31.2)	
Cement Dust	Cases	32.1 (1.1)	48 (5.8)	261 (31.3)	226 (27.1)	299 (35.9)	
	Controls	27.9 (0.8)	103 (8.3)	398 (32.0)	365 (29.4)	377 (30.3)	
Man-Made-Mineral-Fibers	Cases	17.9 (0.7)	68 (8.2)	233 (27.9)	232 (27.8)	301 (36.1)	
	Controls	16.4 (0.6)	115 (9.3)	374 (30.1)	382 (30.7)	372 (29.9)	
Engine Exhausts (Diesel or Gasoline)	Cases	10.5 (0.5)	136 (16.3)	171 (20.5)	239 (28.7)	288 (34.5)	
	Controls	8.1 (0.4)	236 (19.0)	331 (26.6)	343 (27.6)	333 (26.8)	
Acids and Caustics	Cases	0.9 (0.1)	689 (82.6)	46 (5.5)	43 (5.2)	56 (6.7)	
	Controls	0.7 (0.1)	1082 (87.1)	53 (4.3)	53 (4.3)	55 (4.4)	
Welding, Thermal Cutting, Soldering, or Brazing	Cases	17.3 (0.8)	42 (5.0)	259 (31.1)	247 (29.6)	286 (34.3)	
	Controls	15.5 (0.6)	78 (6.3)	384 (30.9)	396 (31.9)	385 (31.0)	
Metal Cutting, Grinding, and Machining Aerosol	Cases	39.9 (1.7)	103 (12.4)	227 (27.2)	225 (27.0)	279 (33.5)	
	Controls	36.3 (1.4)	165 (13.3)	357 (28.7)	364 (29.3)	357 (28.7)	
Paint-Related Aerosols	Cases	6.0 (0.3)	128 (15.4)	229 (27.4)	225 (27.0)	252 (30.2)	
	Controls	5.6 (0.2)	209 (16.8)	340 (27.4)	352 (28.3)	342 (27.5)	
Isocyanates	Cases	1.3 (0.1)	625 (74.9)	57 (6.8)	64 (7.7)	88 (10.6)	
	Controls	1.0 (0.1)	985 (79.2)	85 (6.8)	87 (7.0)	86 (6.9)	
Organic Solvents	Cases	28.1 (1.0)	38 (4.6)	249 (29.9)	219 (26.3)	328 (39.3)	
	Controls	23.4 (0.8)	84 (6.8)	382 (30.7)	394 (31.7)	383 (30.8)	
Wood Dust	Cases	5.0 (0.2)	74 (8.9)	224 (26.9)	240 (28.8)	296 (35.5)	
	Controls	4.4 (0.2)	129 (10.4)	363 (29.2)	383 (30.8)	368 (29.6)	
Molds and Spores	Cases	14.2 (0.6)	137 (16.4)	193 (23.1)	222 (26.6)	282 (33.8)	
	Controls	12.1 (0.4)	237 (19.1)	332 (26.7)	338 (27.2)	336 (27.0)	
Particulates not otherwise regulated (PNOR)	Cases	89.4 (2.7)	28 (3.4)	232 (27.8)	237 (28.4)	337 (40.4)	
	Controls	74.2 (2.0)	67 (5.4)	389 (31.3)	398 (32.0)	389 (31.3)	
ALL VGDF	Cases	367.0 (11.2)	12 (1.4)	237 (28.4)	249 (29.9)	336 (40.3)	
	Controls	310.4 (8.3)	31 (2.5)	398 (32.0)	410 (33.0)	404 (32.5)	

[1] Number and percent of workers not reporting exposures included in the cumulative index.

[2] Tertile cut points were based on the distribution of exposures for exposed controls. The percent ( ) represents the percent of the total distribution of exposures, including workers with no reported exposure.

Table V-S: Assessment of Cigarette Smoking and Exposure Interactions

Cumulative Exposure Index	RERI[1] (95% CI)
Asbestos	1.03 (0.95-1.11)
Silica	1.03 (0.95-1.12)
Cement Dust	1.01 (0.95-1.09)
Man-Made-Mineral-Fibers	1.00 (0.94-1.08)
Engine Exhausts	1.01 (0.92-1.10)
Acids and Caustics	1.06 (0.99-1.16)
Welding, Thermal Cutting, Soldering, Brazing	1.01 (0.95-1.09)
Metal Cutting, Grinding, and Machining Aerosol	0.99 (0.93-1.06)
Paint-Related Aerosols	1.02 (0.96-1.09)
Isocyanates	1.01 (0.95-1.10)
Organic Solvents	1.02 (0.95-1.10)
Wood Dust	1.05 (0.98-1.13)
Molds and Spores	1.07 (1.00-1.16)
Particulates not otherwise regulated (PNOR)	1.03 (0.96-1.12)
All VGDF	1.03 (0.95-1.12)

[1] Relative excess risk due to interaction (RERI) based on a linear odds-ratio model. RERI represents the increased risk for a 10% increase in cumulative VGDF exposure and 10 pack-years of smoking compared to the sum of risks for smoking and VGDF exposure. Likelihood-based 95% confidence estimates for each RERI are shown.