

The B-Reader Program

Introduction

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Outline

- Brief History of B-reader Program
- B-reader Certification
- B-reader Code of Ethics
- Appropriate image collection and viewing
- Proper B reading methods

History

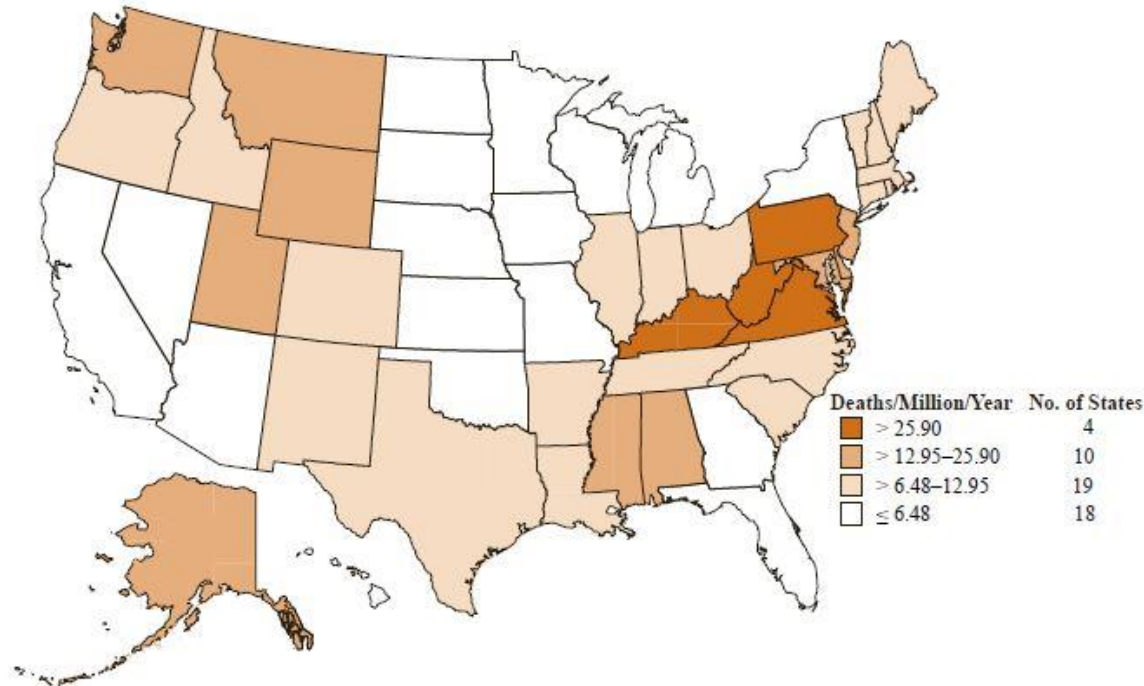
- Federal Coal Mine and Health and Safety Act of 1969 (US Public Law 91-173) known as the *Coal Act*
- Mine Enforcement Safety Administration
- Addressed underground and surface mining of coal
- Mandatory health and safety standards including the right to a free CXR
- Provided for disability compensation for coal workers' pneumoconiosis (“black lung”)

History

- Updated Federal Mine and Health and Safety Act of 1977 (US Public Law 95-164) known as the *Mine Act*
- Mine Safety and Health Administration
- Addressed coal, metal and non-metal mines
- Mandatory health and safety standards
- Provided for disability compensation for coal workers' pneumoconiosis (“black lung”)

All Pneumoconioses: Mortality

Figure 6-2. All pneumoconioses: Age-adjusted death rates by state, U.S. residents age 15 and over, 1995–2004



NOTE: See selected limitations for general cautions regarding inferences based on small numbers of deaths, and see appendices for source description, methods, and ICD codes.

SOURCE: National Center for Health Statistics multiple cause-of-death data. Population estimates from U.S. Census Bureau.

The Work-Related Lung Disease Surveillance Report, 2007.
DHHS (NIOSH) Publication Number 2008-143.

<https://www.cdc.gov/niosh/docs/2008-143/default.html>

*All Pneumoconioses: Mortality***Table 6-7. All pneumoconioses: Most frequently recorded industries on death certificate, U.S. residents age 15 and over, selected states and years, 1990–1999**

CIC	Industry	Number of Deaths	Percent
041	Coal mining	4,623	46.2
060	Construction	1,078	10.8
270	Blast furnaces, steelworks, rolling and finishing mills	203	2.0
360	Ship and boat building and repairing	176	1.8
392	Not specified manufacturing industries	170	1.7
192	Industrial and miscellaneous chemicals	159	1.6
400	Railroads	146	1.5
040	Metal mining	131	1.3
262	Miscellaneous nonmetallic mineral and stone products	127	1.3
901	General government, n.e.c.	105	1.1
	All other industries	2,742	27.4
	Industry not reported	354	3.5
TOTAL		10,014	100.0

CIC - Census Industry Code n.e.c. - not elsewhere classified

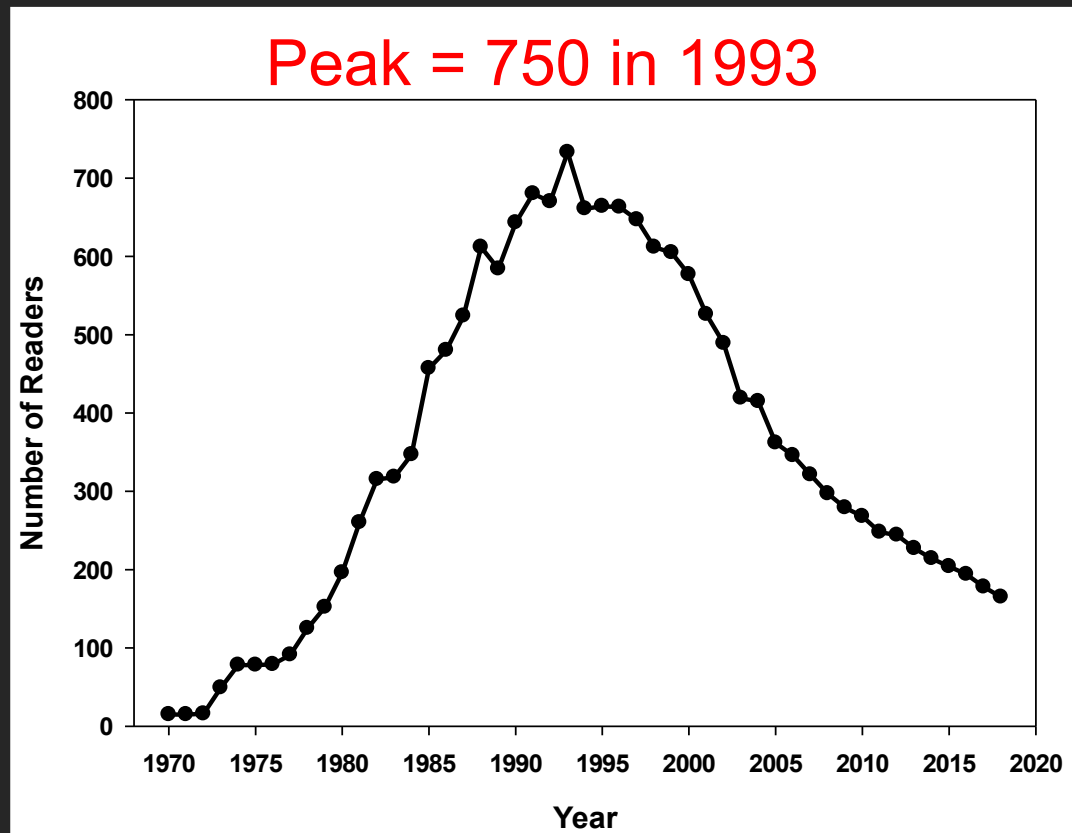
NOTE: The comparable number of all pneumoconioses deaths in the entire United States for this same time period was 31,455. Percentages may not total to 100% due to rounding. See selected limitations for general cautions regarding inferences based on small numbers of deaths, and see appendices for source description, methods, ICD codes, industry and occupation codes, and list of selected states and years.

SOURCE: National Center for Health Statistics multiple cause-of-death data.

B-reader Program

- ABC system devised by NIOSH
- Readers:
 - A - physicians who qualified by taking a 2-day seminar by ACR for NIOSH
 - B - readers who have recorded interpretations qualified by agreement with experts
 - C – experienced pneumoconiosis radiologists (7) who served on a panel of USPHS Panel of Radiology Consultants to NIOSH
 - F - a physician who has been determined to be qualified to interpret chest radiographs by a licensed clinical health care facility
- High rate of discordance between the groups.
- NIOSH B Reader Program began in 1974

Certified B-readers

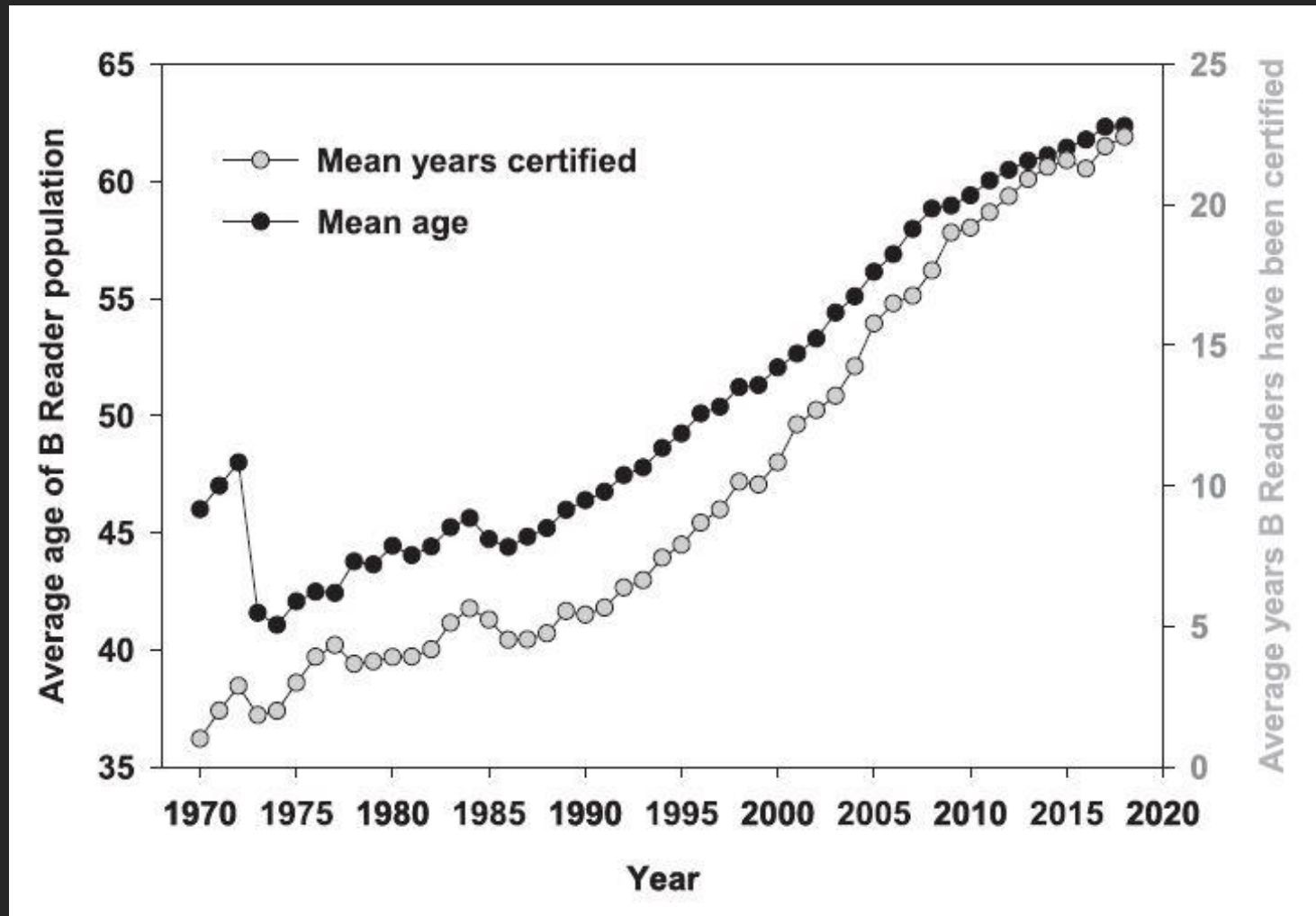


- Since 1974, over 1000 physicians have been certified.
- In 2017, 181 U.S. B-readers and 58 international readers
- In 2019, NIOSH increased the certification cycle to 5 years.
- In 2025, 162 U.S. B-readers

Certified B-Readers by Specialty 2018

Specialty	n	%
Radiology	109	66.1
Pulmonology	27	16.4
Internal Medicine	13	7.9
Other	9	5.5
Occupational Medicine	7	4.2

Mean Age of Certified B Readers 1970-2018





**U.S. NEEDS
MORE B
READERS !**

OSHA Silica Standards

- Lower PEL to 50 mcg/8 hr
- Engineer controls to limit exposures
- Medical exams for highly exposed workers

Sources of B Reading Requests

- Patient care
- Medical – legal activities
- Industry programs
- Government programs
- Research

NIOSH B-reader Code of Ethics

1. The B Reader's primary commitment is to serve the welfare and best interests of patients, workers, and society by striving to classify chest radiographs as accurately as possible.
2. B Readers shall uphold the standards of professionalism, be honest and objective in all professional interactions, and strive to report individuals or enterprises that they know to be deficient in character or competence, or engaging in fraud or deception, to appropriate entities.
3. B Readers shall recognize the limitations of chest radiograph classifications, and shall not make clinical diagnoses about the pneumoconioses based on chest radiograph classification alone.
4. When a contemporary chest radiograph is classified, the B Reader shall either take responsibility for assuring to the extent feasible that the examined individual is promptly notified of all clinically important findings or must be assured that another appropriate party is taking that responsibility.
5. B Readers shall respect the law; the rights of patients, other health professionals, and clients; and shall safeguard medical information and other confidences within the constraints of the law.

NIOSH B-reader Code of Ethics

1. Accurate
2. Professional, honest, objective
3. Recognize limitations of CXR
4. Notify unexpected findings
5. HIPAA compliant

NIOSH B-reader Code of Ethics

6. B Readers shall continue to study and apply advances or changes to the International Labour Office Classification of Radiographs of Pneumoconioses as specified by the NIOSH B Reader Program
7. In providing expert medical testimony, B Readers shall ensure that the testimony provided is unbiased, medically and scientifically correct, and clinically accurate.
8. B Readers shall recognize and disclose any conflicts of interest in the outcome of a chest radiograph classification. B Readers shall not accept compensation that is contingent upon the findings of their chest radiograph classifications or the outcome of compensation proceedings or litigation for which they undertake readings.
9. B Readers shall not advertise or publicize themselves through any medium or forum of public communication in an untruthful, misleading, or deceptive manner.
10. B Readers shall promptly report to the NIOSH B Reader Program any revocation or suspension of a medical license, voluntary relinquishment of a medical license or conversion to inactive status, or the voluntary surrender of a of a medical license while under investigation.

NIOSH B-reader Code of Ethics

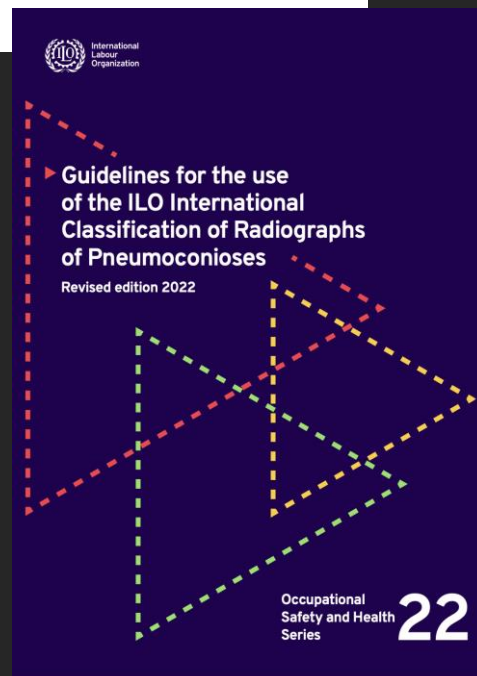
- 6. Keep current
- 7. Unbiased medical expert testimony
- 8. Disclose conflicts of interest
- 9. B-readers avoid deceptive advertising
- 10. Notify NIOSH of licensure changes

► 2. General instructions

No radiographic features are pathognomonic of dust exposure. Some radiographic features that are unrelated to inhaled dust may mimic those caused by dust. Readers may differ about the differential diagnosis of potential causes of such appearances.

In epidemiological studies, therefore, the study protocol will usually require that all appearances described in these *Guidelines* and seen on the standard radiographs are to be classified. Symbols must always be used and appropriate comments must be reported.¹

When the Classification is used for some clinical purposes, the protocol may require that medical readers classify only those appearances which the reader believes or suspects to be pneumoconiotic in origin. In this case, symbols must always be used and appropriate comments detailing appearances described in these *Guidelines* and the rationale for not classifying them must be reported.



Acquisition, Display and Storage

- Adhere to recent version of Digital Imaging and Communication in Medicine (DICOM) standards
- Storage phosphor (CR) or direct digital radiography (DR) are both acceptable
- Image acquisition and processing should have a program for continual quality assurance that is compliant with national practices and standards. Specific concerns have been raised regarding edge-enhancement post processing.
- Image display monitors should be maintained and assessed periodically as recommended by manufacturers, professional organizations and government agencies.
- Archive and transfer of images per national practices and standards. Avoid image compression.

Viewing Principles: Analog

- Analog ILO standards for comparison
- Illuminated viewbox
 - Minimum number of viewing spaces - 2
 - Side by side viewing of subject and ILO analog standard image
 - Surface clean with uniform illumination
- Viewing distance
 - “close enough to see opacities only 1 mm in diameter, that is, a distance of about 250 mm (about 10 inches)
- Environment
 - Low light, no direct daylight
 - Quiet, comfortable, no distractions



Viewing Principles: Digital

- Digital ILO standards
 - Use of analog standards not acceptable
- Two screen workstation minimum
 - Capable of side-by-side display subject image and digital ILO standards
- Radiographic Workstation:
 - Medical grade flat panel monitors
 - Monochrome display capable
 - DICOM Grayscale Standard Display Function compliant
 - 3 MP at 10-bit depth (5 MP at 12-bit preferred)
 - Display system luminance (maximum and ratio), relative noise, linearity, modulation transfer function, frequency, and glare should meet or exceed applicable professional recommendations.



NIOSH Guideline

Application of Digital Radiography for the Detection and Classification of Pneumoconiosis

DEPARTMENT OF HEALTH AND HUMAN SERVICES
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health



<https://www.cdc.gov/niosh/docs/2011-198/>

Not Recommended for Soft Copy Viewing

- Display on personal computer rather than medical grade flat-panel monitor designed for diagnostic radiology
- Comparison of subject digital image to ILO (2000) standard radiographs displayed on a view box. (ILO digital standards are available for free download)
- Viewing the subject image or the digital standards in formats reduced to less than 2/3 of full size
- Using images printed on paper

How Do I Classify a Chest CT?

- No “official” classification for chest CT
- Proposed classification: Kusaka J, Hering GK, Parker JE eds. International Classification of HRCT for Occupational and Environmental Respiratory Diseases 2005, Springer Japan.
ISBN:9784431275121, 4431275126
- Closely parallels the ILO form for CXR.

Why is Chest CT NOT Standard of Care?

- Dose
- Cost
- Portability
- No “official” standard
- The “I” in ILO is “International.” Lack of access in developing world
- In U.S. a body of case law exists for CXR in pneumoconiosis but not for CT

Important Reference Material

- <https://www.cdc.gov/niosh/topics/chestradiography/breader.html>
- Felson B, Morgan WKC, Bristol LJ, Pendergrass EP, Dessen EL, Linton OW, Regere\ RB. Observations on the Results of Multiple Readings of Chest Films in Coal Miners' Pneumoconiosis. Radiology 1973; 109: 19-23.
- Morgan RH. Proficiency Examination of Physicians for Classifying Pneumoconiosis Chest Films. AJR 1979; 132: 803-808.
- <https://www.ilo.org/resource/ilo-international-classification-radiographs-pneumoconioses-1>