Results from Surveys sent to A, B, and Former B Readers - Summary

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Introduction:
The Federal Coal Mine Safety and Health Act of 1969, as amended by the Federal Mine Safety and Health Act of 1977, PL-95-164, directs the National Institute for Occupational Safety and Health (NIOSH) to study the causes and consequences of coal-related respiratory disease, and in cooperation with the Mine Safety and Health Administration (MSHA), to carry out a program for early detection and prevention of Coal Workers' Pneumoconiosis (CWP), also called Black Lung. The 1977 Act mandates that all underground coal miners be offered a chest x-ray examination, at no cost to the miner. The x-rays must be taken at approved facilities and interpreted using a standardized classification system by certified physician readers. The presence of definite evidence of CWP on the x-ray determines a miner's eligibility for specified rights to work in a mining job with a reduced dust exposure. NIOSH administers these mandates through the Coal Workers' Health Surveillance Program (CWHSP) as outlined in 42 CFR Part 37, "Specifications for Medical Examinations of Underground Coal Miners," at the Appalachian Laboratory for Occupational Safety and Health (ALOSH) in Morgantown, West Virginia.

The CWHSP carries out the following activities related to the administration of chest x-ray examinations specified in the 1977 Act: 1) Testing and certification of physicians as B Readers qualified to interpret and classify x-rays using the International Labour Office (ILO) International Classification of Radiographs for Pneumoconioses; 2) Evaluation and certification of x-ray facilities; 3) Approval of coal mine operator plans for providing chest x-rays to miners; 4) Arrangement and reimbursement for requisite B Reader interpretation of chest x-rays; 5) Notifying participating miners of the results of chest x-rays interpreted for the presence or absence of CWP; 6) Notifying miners of the results of chest x-ray interpretations where abnormal findings other than CWP are identified; and 7) Maintaining a database of information related to all aspects of the CWHSP for purposes of assessing effectiveness, identifying disease trends, and assessing the value of dust exposure limits for the mining industry.

NIOSH developed and currently administers the B Reader Certification Program - a unique quality assurance program for training and certifying physicians who classify chest radiographs for the pneumoconioses. Physicians who wish to obtain B Reader certification must successfully complete an extensive initial examination. To demonstrate ongoing competence and maintain certification, a recertification examination is required every four years. Prior to sitting for the examination, candidate B Readers are strongly encouraged to adequately prepare by completing the NIOSH Self-Study Syllabus and/or attending the American College of Radiology (ACR) Symposium on Radiology of the Pneumoconioses. The Self-Study Syllabus was developed by NIOSH in 1980 under a contract with the ACR and includes 80 example chest radiographs with associated explanatory text. The ACR Symposium on Radiology of the Pneumoconioses, developed jointly with NIOSH in the 1970s, is held every 2-3 years. As part of the CWHSP, NIOSH obtains and processes B Reader interpretations regarding the presence and degree of dust-related changes on the screening chest radiographs. These radiographs are provided to underground coal miners approximately every five years.

The ILO, with NIOSH involvement and support, has recently completed a revision of its radiograph classification system (ILO 2000). With the publication of these revisions, NIOSH had the opportunity and obligation to improve and update the B Reader Program. Input from physicians having practical experience interpreting x-rays for findings consistent with occupational illnesses was sought. A survey was designed and distributed in May 2003, to

solicit and document input from physicians regarding program revisions. Three survey instruments were developed appropriate for soliciting input from current B Readers, former B Readers, and A Readers. A Readers are those physicians who have completed a training course or otherwise demonstrated competence in use of the ILO Classification, but who are not currently certified as B Readers.

Purpose:
These surveys address the goal of enabling NIOSH to retain and enhance its national and international leadership by maintaining the B Reader Program as a unique, contemporary, relevant, and effective quality assurance program for the classification of chest radiographs for occupational lung disease screening, surveillance, research, and prevention.

Two specific aims were addressed by conducting the surveys: 1) to evaluate the overall strengths and weakness of the current B Reader Program in ensuring and extending the utility of occupational chest radiographic imaging for occupational lung disease research and surveillance; and 2) to evaluate NIOSH publications, electronic and print communications, forms, and related materials (including the Self-Study Syllabus/Film Set for candidate B Readers and the examination images) for consistency and adherence to the revised ILO system and overall program goals.

To ensure that revisions to the B Reader Program are guided by input from stakeholders, surveys were sent to all currently certified B Readers, A Readers, and former B Readers. Respondents were asked to describe the current use of their B Reader certification in their practice. They were asked to comment on specific proposed revisions to the B Reader Program, and opinions were solicited regarding quality assurance activities and digital radiography.

Logistics:
Paper-based survey instruments were initially mailed along with a pre-addressed, postage-paid return envelope. Instructions included an option for web-based electronic submission. Only one completed survey was accepted per reader, and in the event that an individual completed both the paper-based and the electronic survey, the first survey received was used for analysis.

Surveys were mailed to 471 current B Readers, 318 former B Readers, and 1417 A Readers. Responses were received from 215 current B Readers, 58 former B Readers, and 154 A Readers, for an overall response rate of 19%. The individual response rates were: current B Readers = 46%; former B Readers = 18%; and A Readers = 11%.

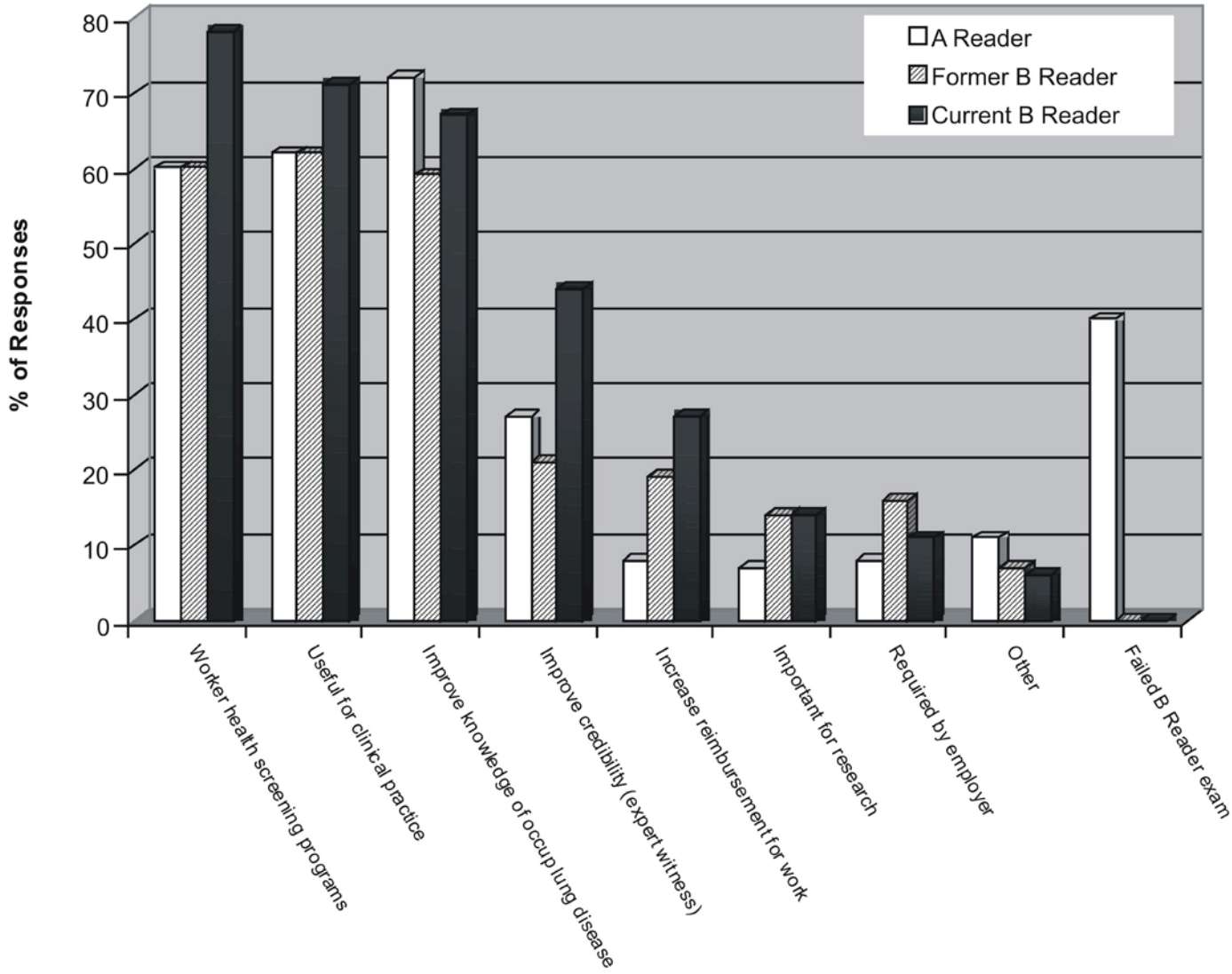
Results:
Reasons for Becoming/Remaining an A/B Reader
Q: What are/were your reasons for becoming a B Reader/A Reader? (check all that apply)

Possible answers included:

- To improve knowledge of occupational lung disease
- Useful for clinical practice
- To aid in reading films for worker health screening/surveillance programs
- To improve my credibility as an expert witness in medical-legal cases
- Important for research
- Required by my employer
- To increase reimbursement for work
- Failed B Reader exam
- Other

Of the responding current B Readers, 78% (168/215) chose the answer "to aid in reading films for worker health screening/surveillance programs." Of the responding former B Readers, 62% (36/58) chose, "useful for clinical practice." Of the responding A Readers, 72% (111/154) chose "to improve knowledge of occupational lung disease," and 40% (61/154) reported that they became A Readers because they "failed B Reader exam." Some of the "other" responses included: for teaching; to provide a needed service; as a convenience to local industries; for professional status; and as requested by clients. (See Figure 1)

Figure 1:
What are/were your reasons for becoming a B Reader/A Reader?



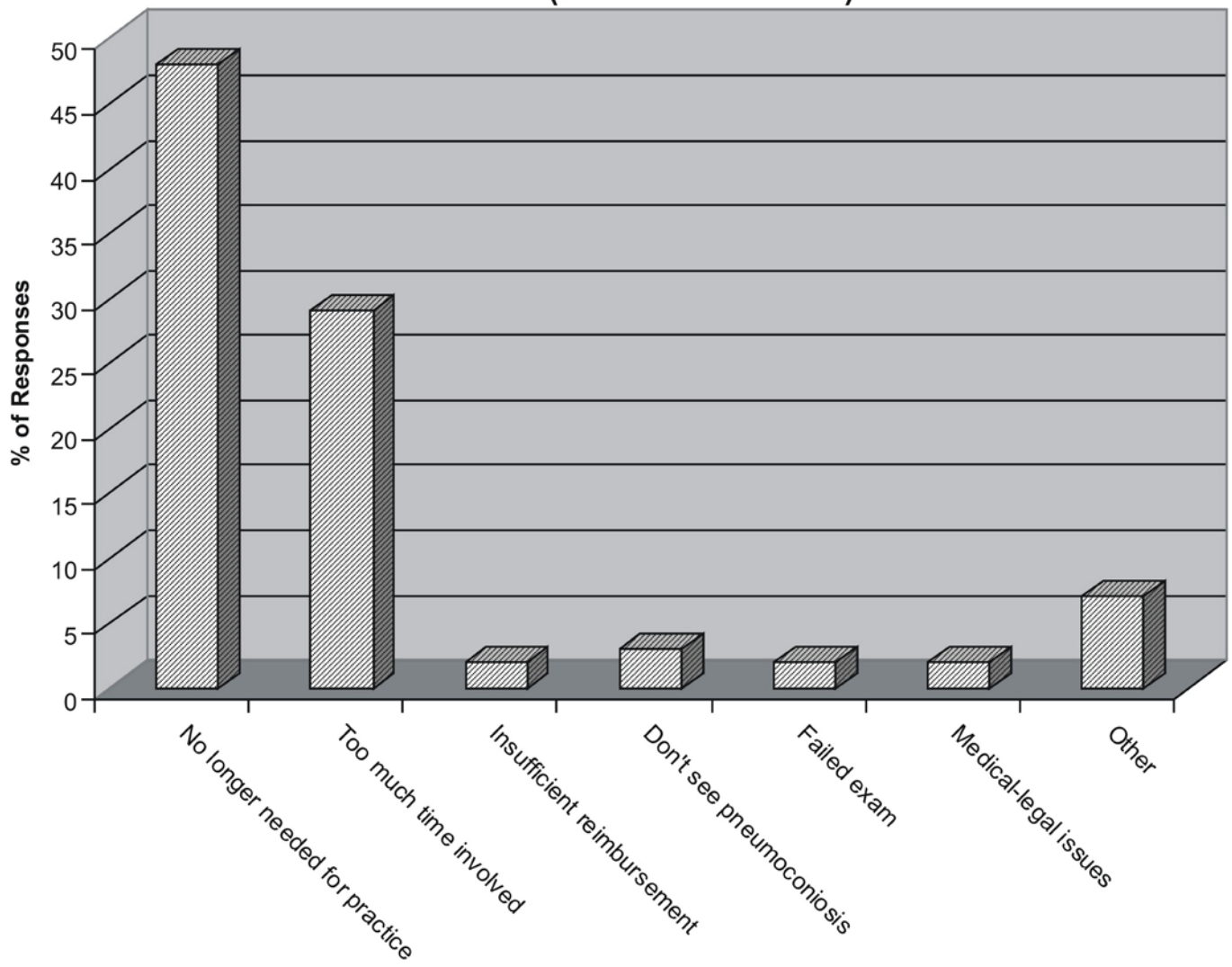
Q: What were your reasons for letting your B Reader certification expire?

Possible answers included:

- No longer needed for my practice
- Too much time required to study/and or travel
- Insufficient reimbursement
- Don't see enough pneumoconiosis
- Failed the exam
- Medical-legal issues
- Other

Almost half, 48% (28/58), of former B Readers who responded reported that B Reader certification was "no longer needed for my practice" as their reason for not recertifying. (See Figure 2)

Figure 2:
What were your reasons for letting your B Reader certification expire? (Former B Readers)



Digital Issues:

As outlined in the Introduction Section, in order to become a NIOSH-certified B Reader, the physician must pass a test that includes correctly classifying a set of 125 traditional film-screen x-rays in accordance with the guidelines for the ILO classification system. These guidelines currently prescribe side-by-side viewing of subject and standard radiographs and state that the standard (traditional film-screen) comparison films take precedence in defining profusion categories. The CWHSP requires that x-rays must be taken in accordance with the requirements of federal regulations (42 CFR Part 37). These regulations specify the use of film no less than 14 x 17 inches in size, as well as other requirements associated with traditional film-screen techniques. Therefore, NIOSH does not currently accept radiographic images obtained using digital techniques for this program. However, increasing numbers of x-ray facilities are adopting digital technology, a question related to digital chest imaging was included in the survey.

Q: Do you currently read films at facilities that: (check all that apply)

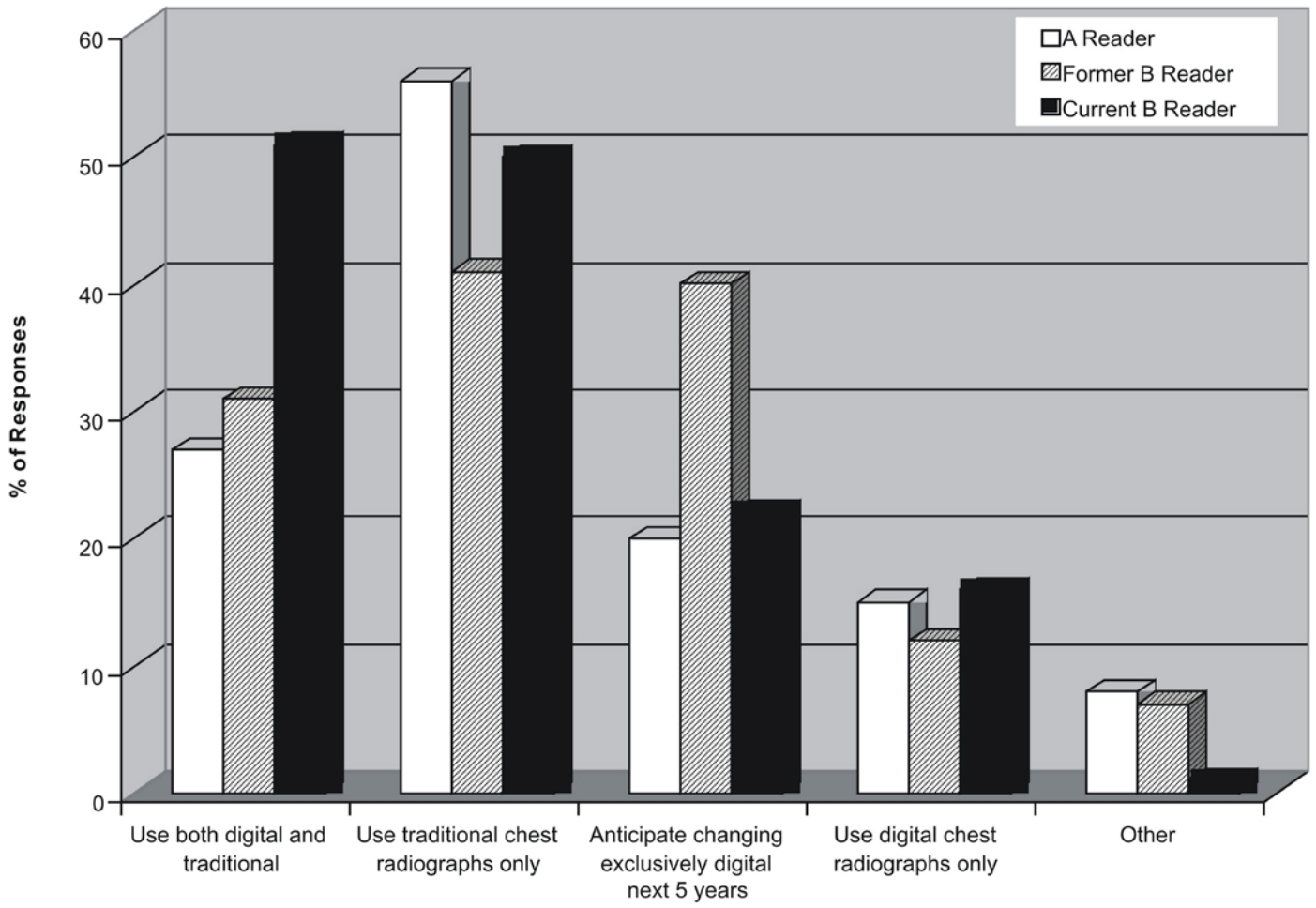
Possible answers to choose from included:

- Use digital chest radiographs only
- Use traditional chest radiographs only
- Use both digital and traditional chest radiographs

• Anticipate changing to an exclusively digital system within the next 5 years
• Other

Of the responding current B Readers, 51% (110/215) responded "use both digital and traditional chest radiographs." Both former B Readers and A Readers most often indicated "use traditional chest radiographs only" at 41% (24/58) and 57% (87/154), respectively. Former B Readers also reported that they "anticipate changing to an exclusively digital system within the next 5 years" with 40% (23/58). Most of the "other" responses involved comments such as: retired or no longer classifying films. (See Figure 3)

Figure 3:
Do you currently read films at facilities that:



Quality Assurance Alternatives

The next several questions were prompted by the goal of maintaining the B Reader Program as a unique, contemporary, relevant, and effective quality assurance program for the classification of chest radiographs for occupational lung disease research and prevention.

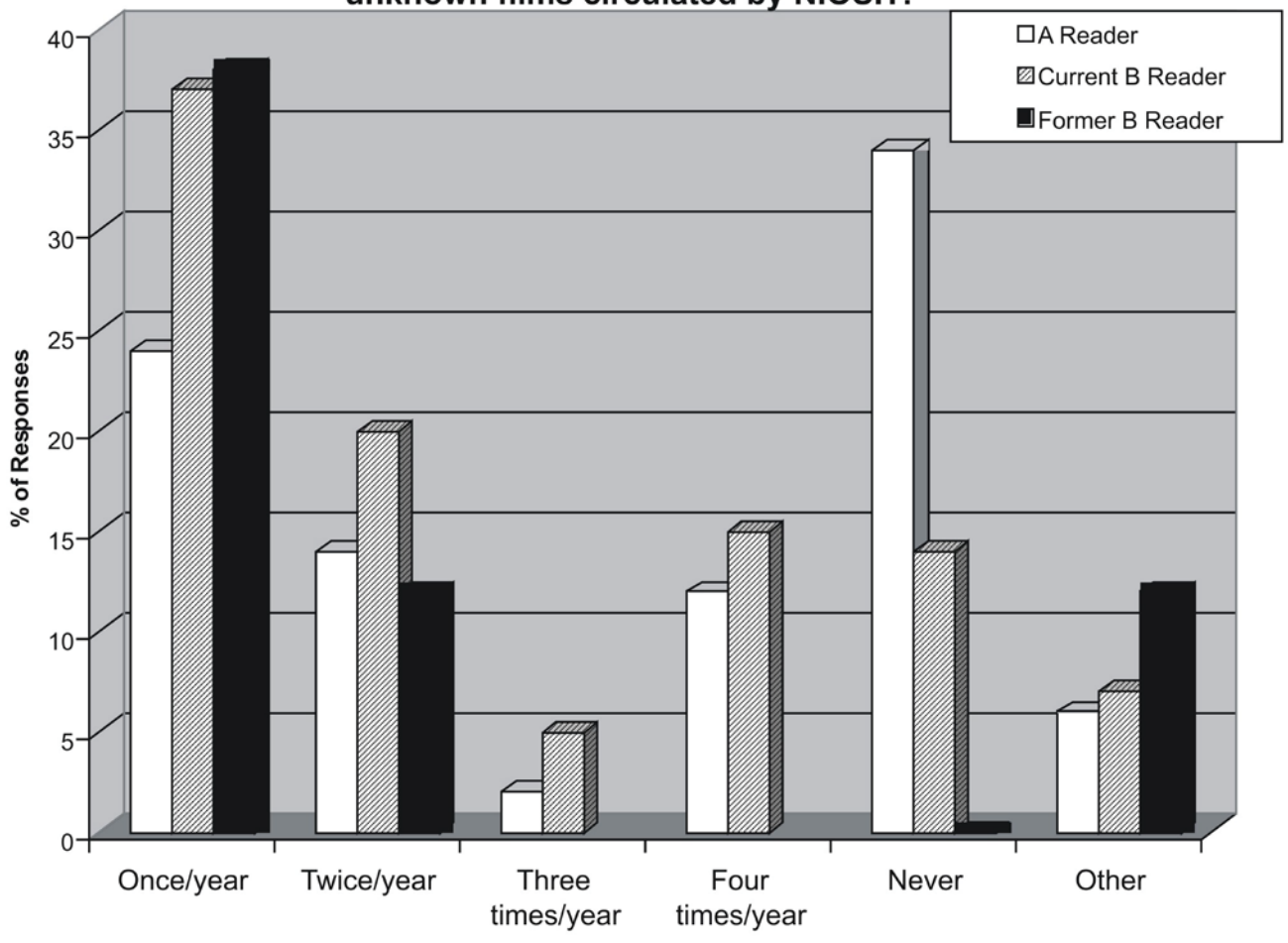
Q: Would you be willing to participate in (do you think a quality assurance program would be beneficial requiring) reading of unknown films circulated by NIOSH? If yes, or undecided, how often?

Q: Would you be willing to participate in (do you think a quality assurance program would be beneficial in which you) voluntarily submit a certain number of films per year to a core group of expert readers for comparison of readings?

Q: Would you be willing to participate in (do you think a quality assurance program would be beneficial in which) your reading patterns are compared with other readers and you are supplied with the results of a statistical analysis?

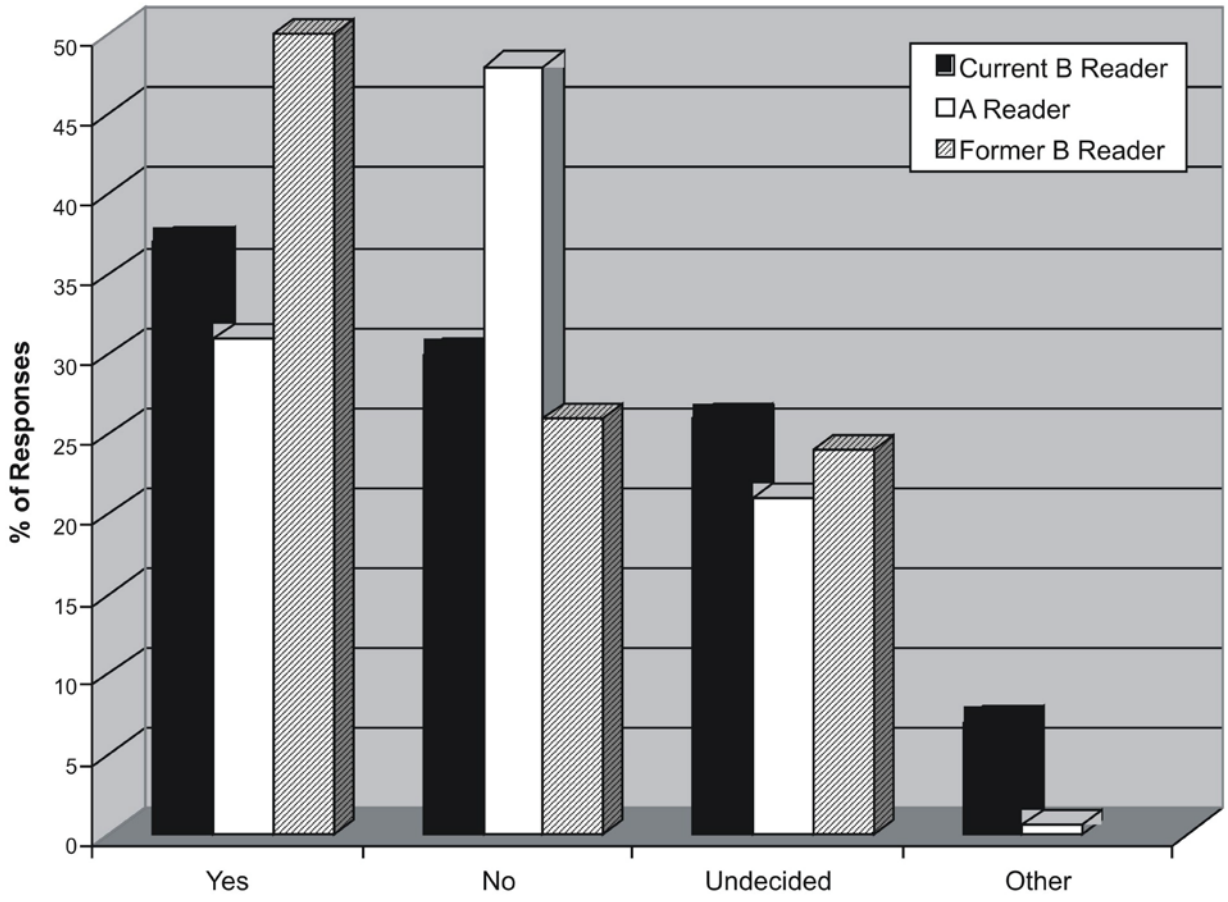
For the first quality assurance question, 37% (80/215) of the responding current B Readers answered "yes," that they would be willing to participate in a yearly program requiring reading of unknown films. However, 34%, (52/154) of responding A Readers reported that they were "never" willing to participate in this type of reading program. Former B Readers were asked an alternate question, "do you think a quality assurance program would be beneficial…," and 38% (22/58) responded "yes" this type of program would be beneficial on a yearly basis. (See Figure 4)

Figure 4: Would you be willing to participate in/do you think a quality assurance program would be beneficial requiring reading unknown films circulated by NIOSH?



For the second quality assurance question, 37% (79/215) of responding current B Readers reported that "yes" they would be willing to participate in a quality assurance program in which there was voluntary submission of a certain number of films per year to a core group of expert readers for comparison of readings. Again, among the A Readers, the highest response was "no," (46%, 71/154) they would not be willing to participate. When the former B Readers were asked "do you think … would be beneficial," 50% (29/58) responded "yes." (See Figure 5)

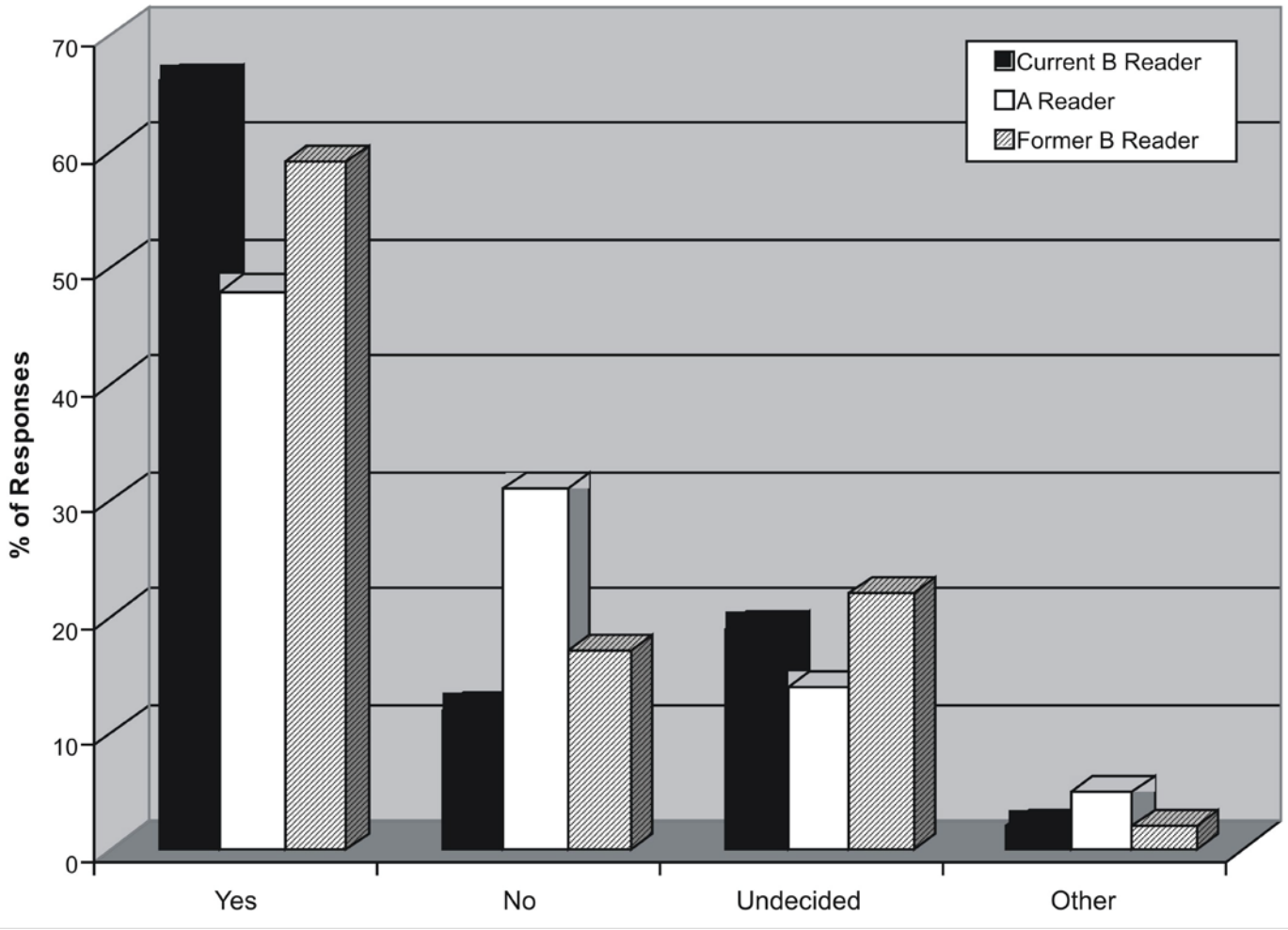
Figure 5: Would you be willing to participate in/do you think a quality assurance program would be beneficial in which there was voluntary submission of a certain number of films per year to a core group of expert readers for comparison of readings?



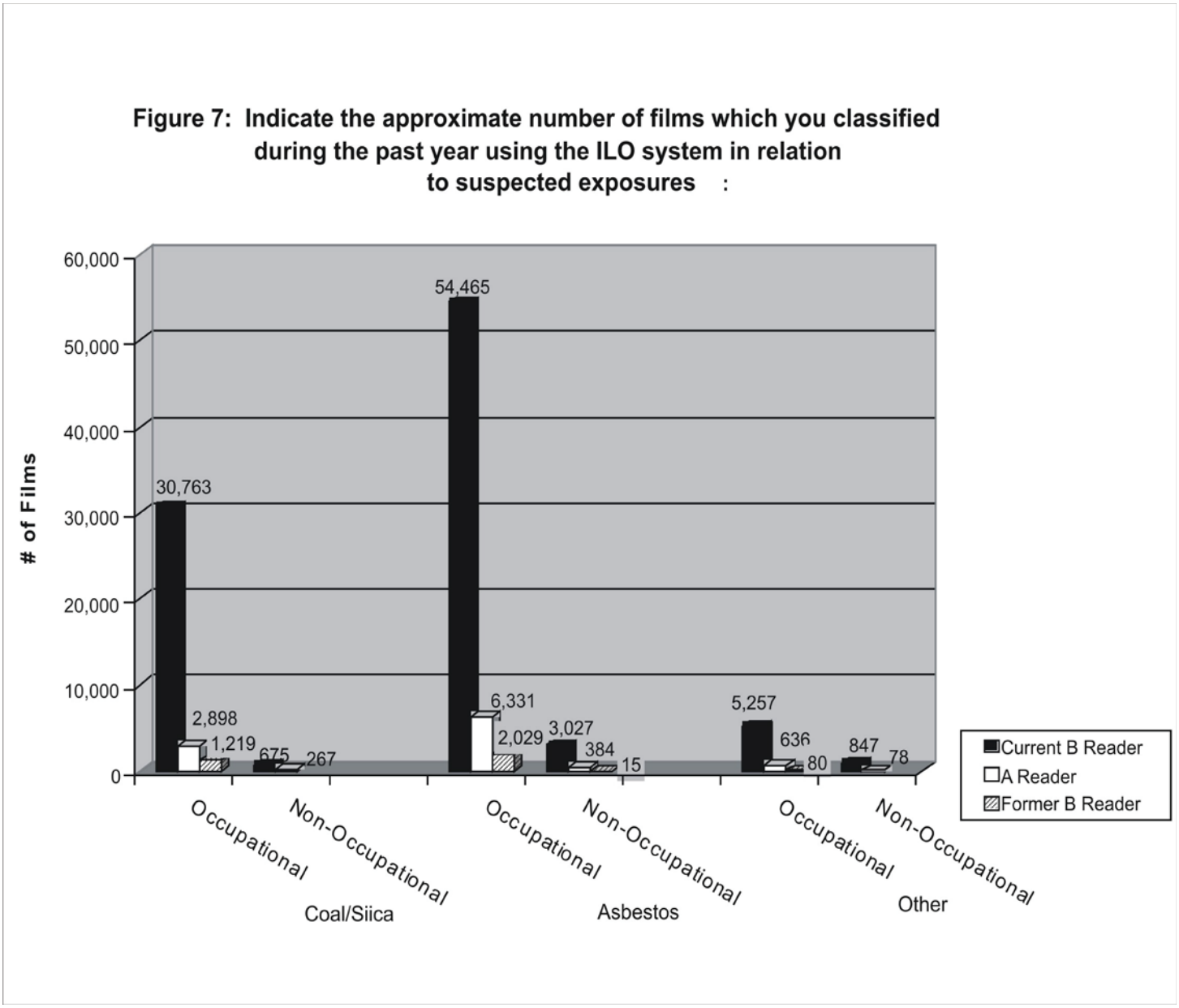
The last question concerning quality assurance issues, dealt with comparison of reading patterns between readers and then those readers being supplied with the statistical analysis. The majority of responding current B Readers (66%, 142/215) replied, "yes." 48% (74/154) responding A Readers also replied "yes." When asked if this sort of quality assurance program would be beneficial, 59% (34/58) of the responding former B Readers answered "yes" as well.

This type of quality assurance program was the one most favored by all three groups. (See Figure 6)

Figure 6: Would you be willing to participate in/do you think a quality assurance program would be beneficial in which your reading patterns were compared and the results of a statistical analysis were provided to you?

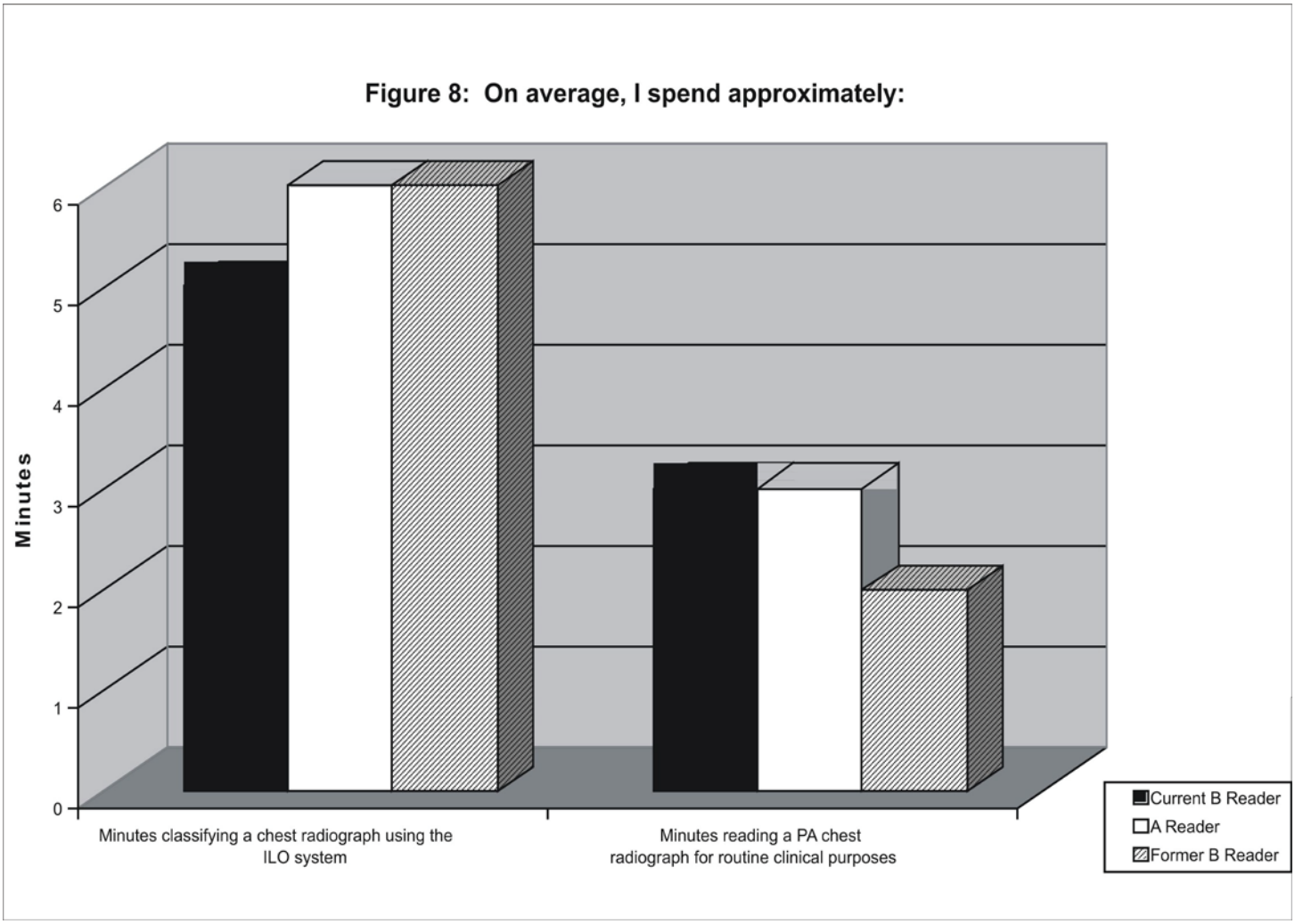


Types of Exposures for Readings:
The next question on the surveys asked about the number of films classified during the past year using the ILO system in relation to coal or silica, asbestos, or other exposures, and whether these exposures were occupational or non-occupational. Occupational asbestos cases accounted for the majority of classifications (62,825), while occupational coal/silica cases accounted for 34,880 cases. Most classifications were occupational (103,678 versus 5,293). (See Figure 7)



Time Spent on Readings:
The respondents were asked to indicate how many minutes they spent classifying a chest radiograph using the ILO system for pneumoconiosis and how many minutes they spent reading a posteroanterior (PA) chest radiograph for routine clinical purposes. Across all three groups, the time spent classifying films using the ILO system was greater than the time spent reading for routine clinical purposes. A Readers and Former B Readers both reported an average of 6 minutes with the ILO system (with a range from 1-30 minutes), while Current B Readers averaged 5 minutes (with a range of 1-30 minutes). For routine clinical readings, both A Readers and Current B Readers averaged 3 minutes per film (with a range of 1-60 minutes), while Former B Readers averaged 2 minutes per film (with a range of 1-10 minutes). (See Figure 8)

Figure 8: On average, I spend approximately:



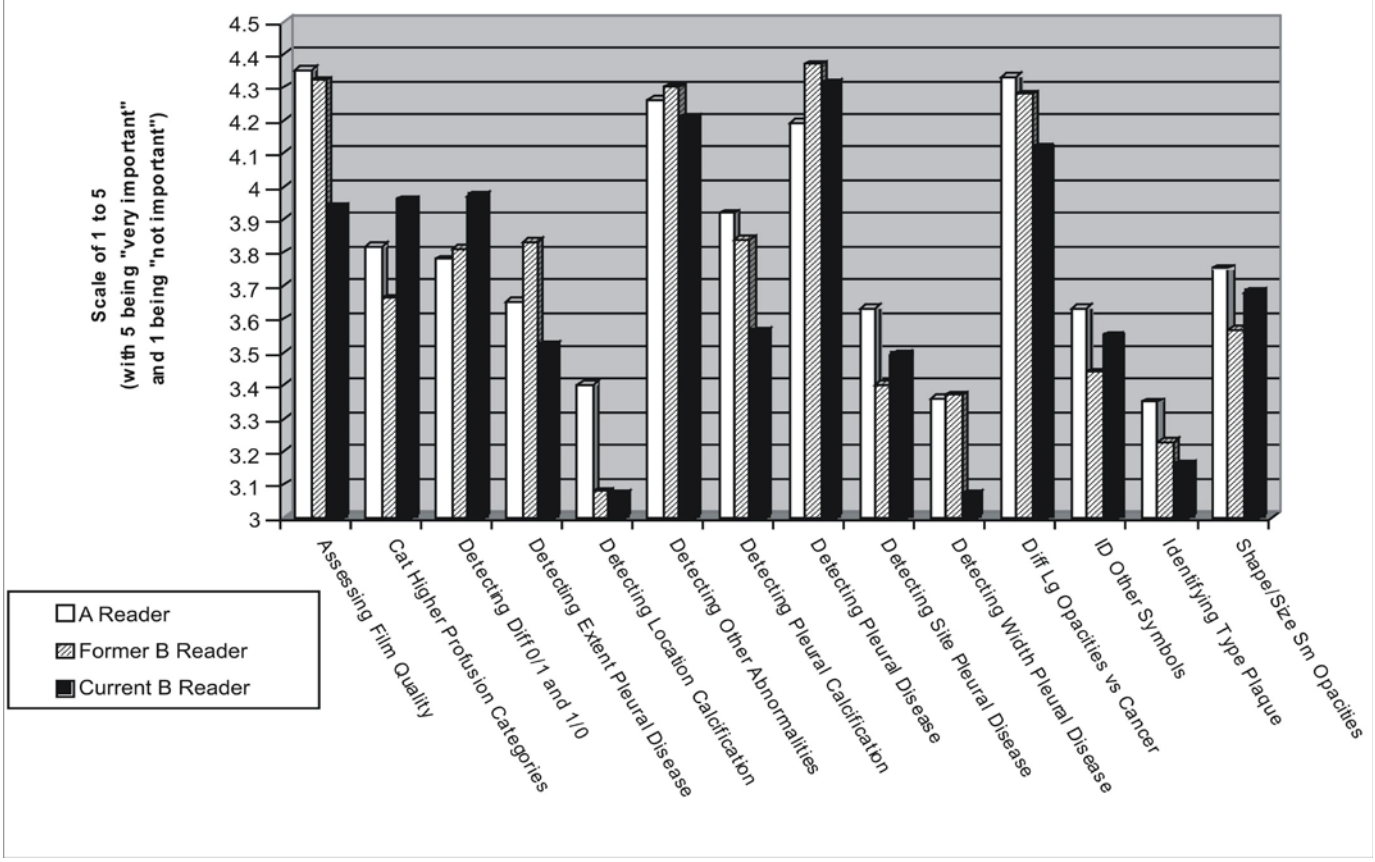
Important Areas to Assist in Recognition of Pneumoconiosis:

The NIOSH home study syllabus and the B Reader examination and recertification examination should reflect the important issues and difficulties encountered by readers in classifying films for pneumoconiosis. Survey respondents were asked to rate various issues regarding their importance in assisting in the recognition of these patterns. The areas they were asked to rate on a scale of 1 to 5 (with 5 being the most important) were:

- Assessing film quality
- Detecting differences between categories 0/1 and 1/0
- Shape/size of small opacities
- Accurately categorizing higher profusion categories (i.e. > 1/0)
- Differentiating large opacities vs. cancer
- Detecting pleural disease
- Detecting size of pleural disease
- Identifying type of plaque (inprofile vs. en face)
- Detecting extent of pleural disease
- Detecting width of pleural disease
- Detecting pleural calcification
- Detecting location of calcification
- Detecting presence of other abnormalities
- Identification of other symbols

Both Current B Readers and Former B Readers ranked detecting pleural disease as the most important with average scores of 4.31 and 4.37 respectively. A Readers ranked assessing film quality as most important, with an average score of 4.35. Figure 9 shows the ranking of these categories.

Figure 9: NIOSH home study materials and B Reader examinations should reflect the current distribution and patterns of pneumoconiosis. To assist in recognition of these patterns, based upon your use of the ILO system, rate the following:



The ILO 2000 revision requires the following list of symbols. Survey respondents were asked to identify those symbols which they felt should be included on the B Reader Examination.

- aa - atherosclerotic aorta
- at - significant apical pleural thickening
- ax - coalescence of small opacities
- bu - bulla(e)
- ca - cancer
- cg - calcified non-pneumoconiotic nodules
- cn - calcification in small pneumoconiotic opacities
- co - abnormality of cardiac size or shape
- cp - cor pulmonale
- cv - cavity
- di - marked distortion of an intrathoracic structure
- ef - pleural effusion
- em - emphysema
- es - eggshell calcification
- fr - fractureded rib(s) (acute or healed)
- ho - honeycomb lung
- id - ill-defined diaphragm border
- ih - ill-defined heart
- kl - septal (Kerley) lines
- me - mesothelioma
- od - other diseases
- pa - plate atelectasis
- pb - parenchymal bands
- pi - pleural thickening of an interlobar fissure
- px - pneumothorax
- ra - rounded atelectasis
- rp - rheumatoid pneumoconiosis
- tb - tuberculosis
- hi - enlargement of non-calcified hilar mediastinal lymph nodes

All three groups chose ca - cancer as the most important finding to be included, with ef - pleural effusion and hi - enlargement of non-calcified hilar mediastinal lymph nodes to follow. Figure 10 shows each symbol and the percentage of respondents who indicated the finding should be included on the examination.

Figure 10: Symbols and % of Respondents Indicating the Finding Should be Included on the Examination			
	Current B Reader	A Reader	Former B Reader
aa	14	23	19
at	31	45	52
ax	64	53	72
bu	61	53	66
ca	85	67	81
cg	38	46	47
cn	34	45	57
co	62	48	57
cp	35	38	48
cv	62	57	71
di	49	42	55
ef	71	60	78
em	66	50	64
es	52	54	60
fr	42	25	38
hi	68	60	72
ho	68	54	67
id	52	39	50
ih	51	37	47
kl	49	49	55
me	64	60	60
od	39	38	41
pa	30	30	38
pb	21	26	33
pi	38	42	41
px	60	56	69
ra	44	36	53
rp	20	29	43
tb	65	59	71

Improvement in the Examination process:
Current B Readers and A Readers were queried on how the B Reader examination could be improved. The options they were given included:

- allow more time
- allow less time
- include fewer films
- include more films
- include better quality films
- provide more view boxes
- provide a better study syllabus
- provide better exam instructions
- have less frequent exams
- have more frequent exams
- provide different locations for exams
- other

Both groups chose "provide different locations for exams" as the top choice (Current B Readers = 55% and A Readers = 38%). Using the same options, we asked Former B Readers how the B Reader recertification examination could be improved. Again, "provide different locations for exams," was the top choice with 55% of respondents choosing that option. Figures 11 and 12 show these options and the percentage of respondents that chose each option.

Figure 11: How could the B Reader examination process be improved?

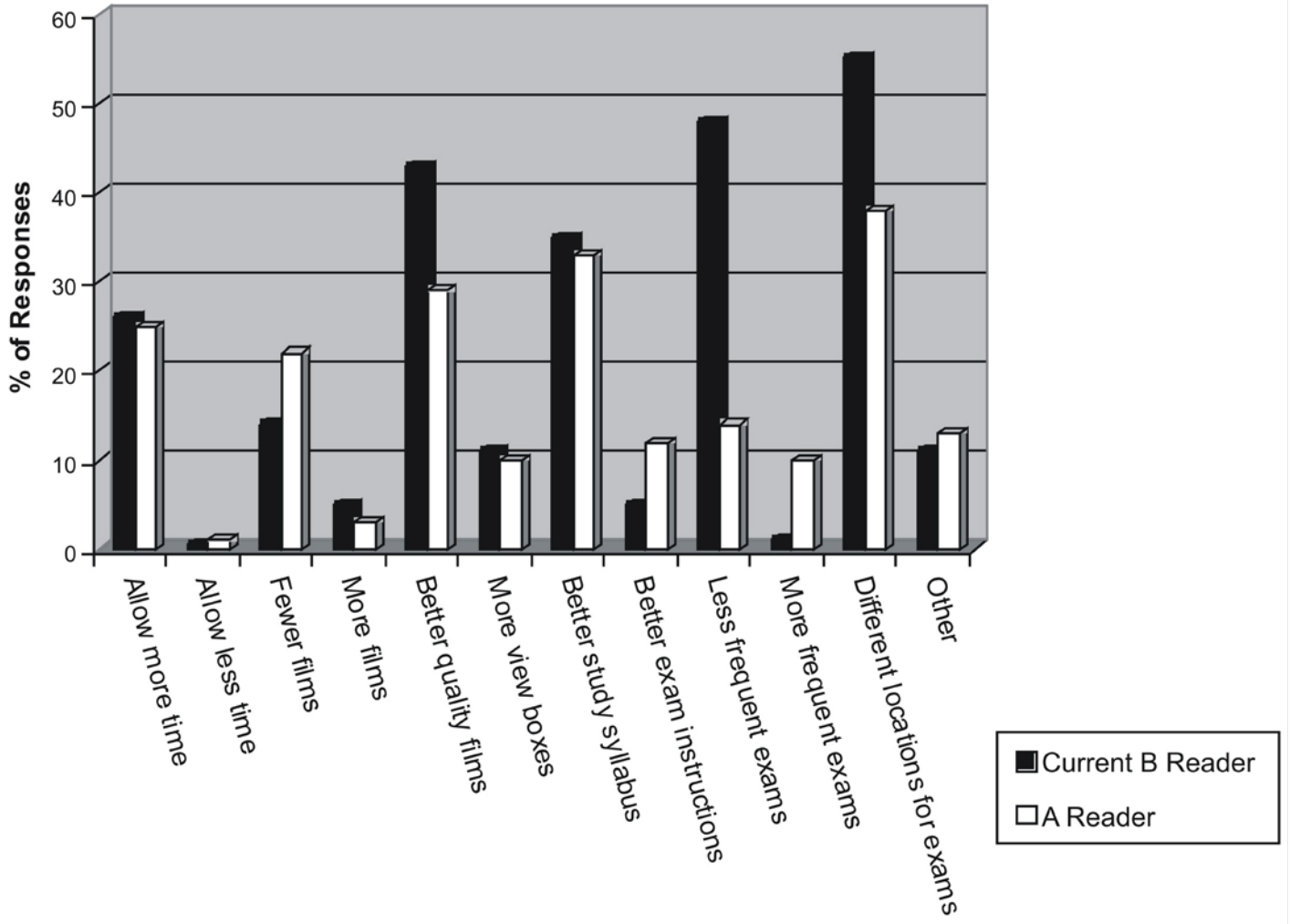
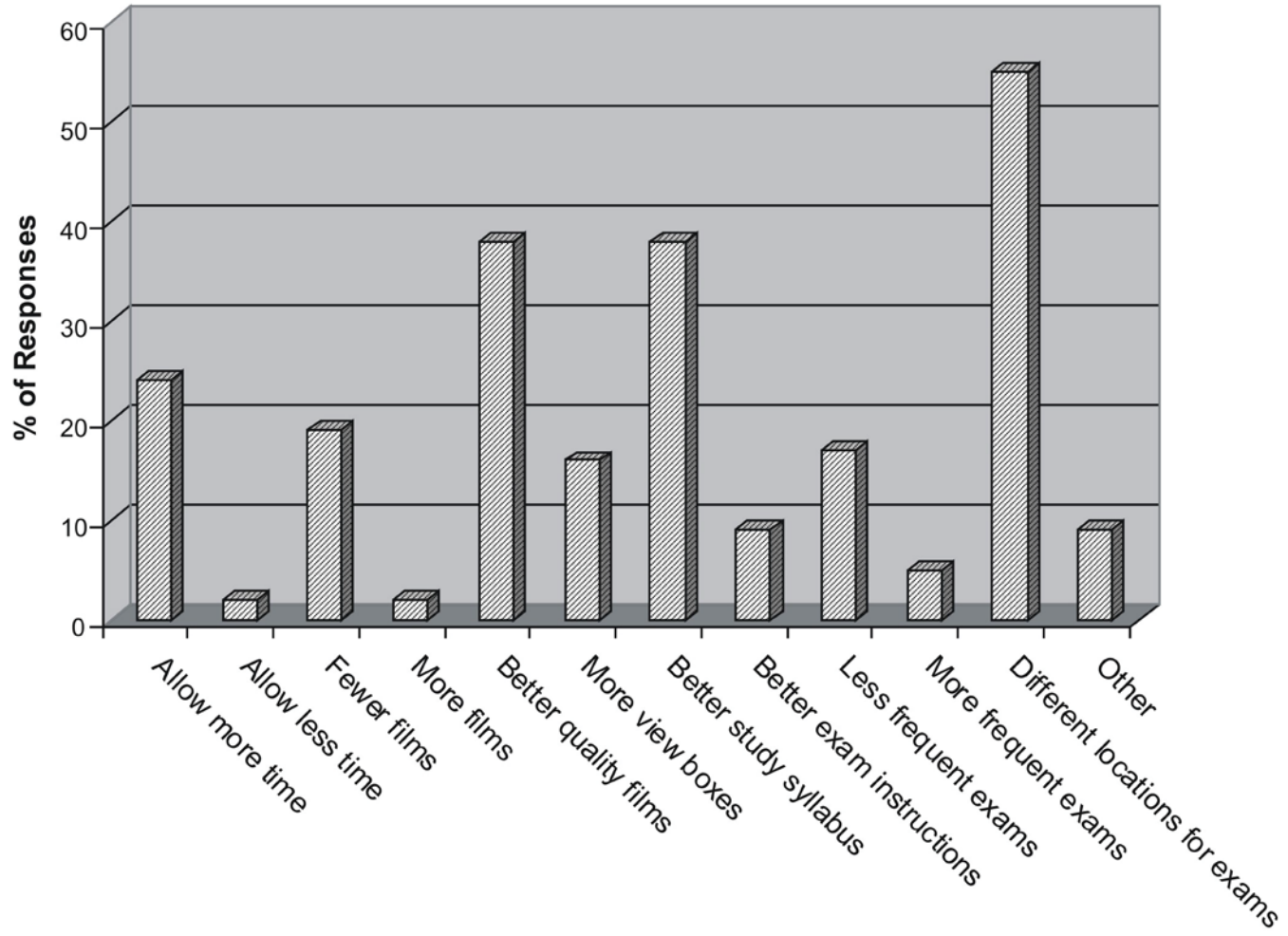
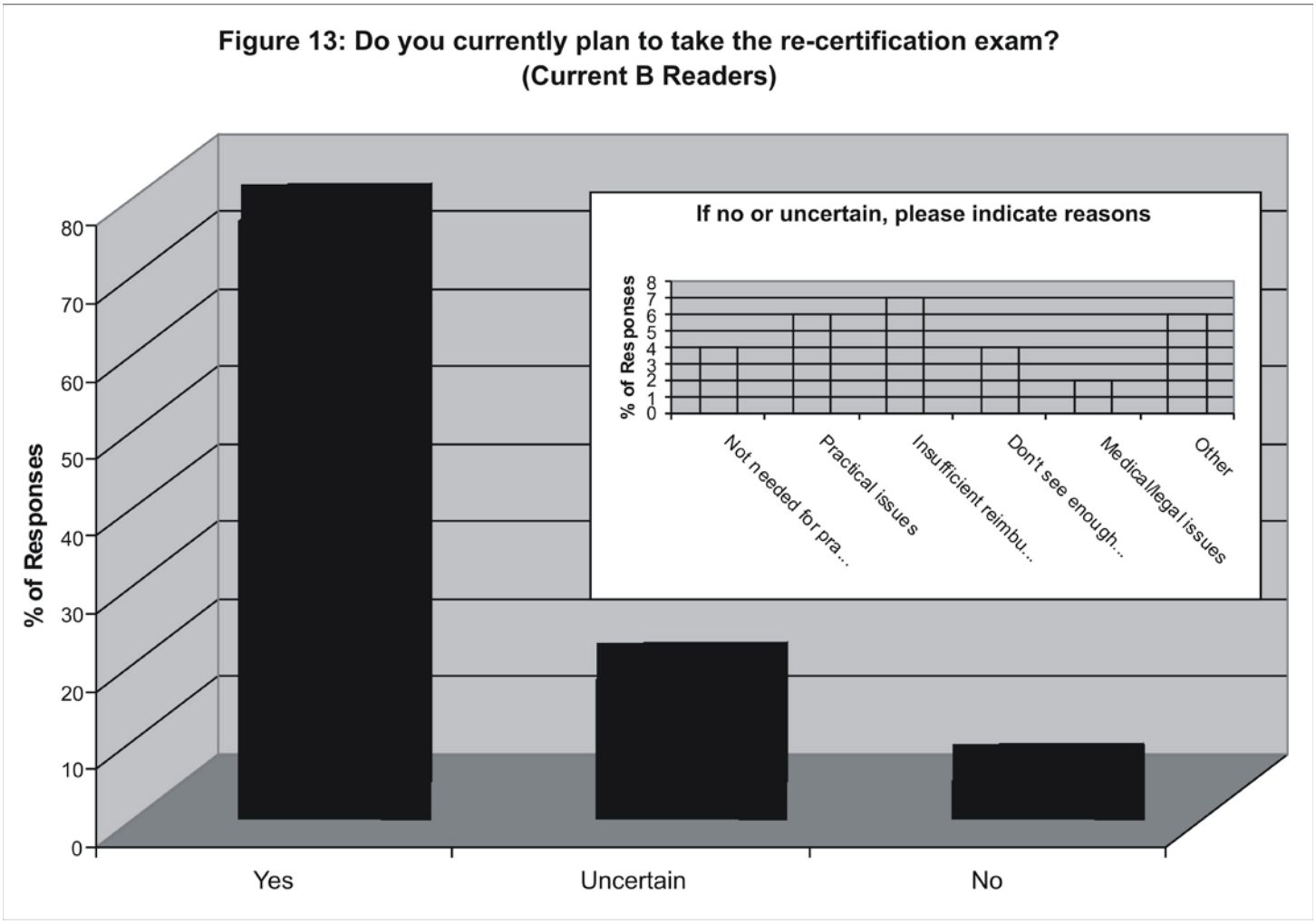


Figure 12: How could the B Reader recertification process be improved? (Former B Readers)



When Current B Readers were asked about their intent to recertify, 77% of the respondents reported that "Yes" they did plan to take the recertification exam. "Insufficient reimbursement" was the highest response (7%) for the remaining 23% who were "uncertain" or who responded "No." (See Figure 13)

Figure 13: Do you currently plan to take the re-certification exam? (Current B Readers)



In conclusion, these surveys highlight key issues that are being reviewed and considered in updating the NIOSH B Reader Program.

The NIOSH B Reader Certification Program:

Looking into the Future

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National Institute for Occupational Safety and Health

CDC Workplace Safety and Health

National Institute for Occupational Safety and Health NIOSH

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