

1st Solicitation for Single Investigator Research Grants (AFC113)

ALPHA FOUNDATION FOR THE IMPROVEMENT OF MINE SAFETY
AND HEALTH

Final Technical Report

1.0 Cover Page

Project Title: The Mining Healthy Worksite Program (MHWP)

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Table of Contents

1.0 Cover Sheet	1
2.0 Executive Summary	3
3.0 Problem Statement and Innovation Objective	
3.1 Problem Statement	4
3.2 Innovation Objective	5
4.0 Research Approach	
4.1 Overview	6
4.2 Process and Results	7
5.0 Dissemination Efforts	18
6.0 Conclusion and Impact Assessment	19
7.0 Recommendations for Future Work	21
8.0 References	22
9.0 Appendix	23

List of Acronyms

BMI	Body Mass Index
CVD	Cardiovascular Disease
CDC	Center for Disease Control and Prevention
CPH-NEW	Center for the Promotion of Health in the New England Workplace
HSC	CDC Workplace Health Scorecard
INPUTS™	INPUTS™ Health and Safety Climate Survey
MHWP	Mining Healthy Worksite Program
MSD	Musculoskeletal Disease
NHWP	National Healthy Worksite Program
OSH	Occupational Health and Safety
PAR	Participatory Action Research
VHM	Viridian Health Management
WHP	Worksite Health Promotion
WVU-MIE	West Virginia University-Mining and Industrial Extension

2.0 Executive Summary

The Mining Healthy Worksite Program (MHWP) was designed to address the elevated rates of chronic disease in miners and the current gaps in health safety training directed to multiple, interacting risk factors. There was, therefore, a dual focus on training and intervention demonstration. There were four Objectives in the original proposal.

1. Enhanced training: Develop, pilot test, and evaluate expanded health components of the 80 and 40 hour mandatory health and safety curricula for prospective underground and surface miners, and introduce an enhanced health curriculum for the annual recertification of incumbent miners.
2. Intervention development: Adapt the integrated and participatory Occupational Safety and Health (OSH) and Workplace Health Promotion (WHP) intervention programs of the National Healthy Worksite Program (NHWP) to the coal mining industry and include personal coaching and a regional inventory of resources paralleling the county-wide directories established by NHWP.
3. Intervention piloting: Introduce yearlong health improvement interventions at 4 selected mining sites, measuring baseline and follow-up health status of participants, and introducing an integrated, participatory onsite OSH/WHP program that includes personalized health coaching (Objective 2). Compare this with control mining sites receiving the enhanced health education and certification renewal program (Objective 1).
4. Intervention evaluation: Compare the relative costs and effectiveness of the two programs.

The MHWP was met with acceptance by the mining companies in West Virginia as they acknowledged concerns about mining workforce health. However, coal mining in West Virginia and nationally was undergoing unprecedented negative pressures, economic and political, that were coincident with the inauguration of MHWP. These pressures placed severe financial strains

on the companies leading to mine shutdowns and company bankruptcies. In West Virginia, coal production dropped from 158 million short tons in 2008 to 104 million in 2015 and is expected to decrease to 98 million short tons in 2016 ⁽¹⁾. In 2015 and early 2016, 3 of the top five coal producers declared bankruptcy including the top two companies. This environment ultimately prohibited the development, piloting and evaluation of integrated OSH and WHP interventions. The severe weakness in the industry also forced changes in the enhanced training component of the project. The planned evaluations of the Safety Training Program for Prospective Underground and Surface Coal Miners to be held at the West Virginia University-Mining and Industrial Extension (WVU-MIE) did not materialize due to the complete disappearance of an applicant pool of apprentice miners for the training course. As an alternative, a state-wide effort to expand the applicant pool was undertaken to secure a sufficient population for evaluation of the expanded health components.

The barriers to completing the initial goals of the MHWP led to a revised project plan and a smaller budget which was submitted to the Alpha Foundation for approval. The new plan refocused MHWP as an educational, resource development and dissemination project consisting of 4 elements.

1. Expansion of the 80 hour and 40 hour courses with participant evaluation beyond the WVU-MIE classroom, by engaging all certified trainers and sites statewide in West Virginia on a voluntary basis.
2. National distribution of training materials to all MSHA surface and underground instructors stripped of West Virginia-specific provisions.
3. Provision of the health component of the 1-day MSHA mandated annual refresher course to instructors within the State of West Virginia and nationally.
4. Extension of the MHWP program through June 30, 2016, in order to provide adequate time for dissemination and completion of evaluation.

The external pressures on the coal industry only increased through 2015 and into 2016. In November 2015, the West Virginia Board of Training, Education and Certification (the Board) approved the revised health and sanitation units for the Prospective Miner Training course. Along with the approval of the units, it mandated the completion of an evaluation and knowledge retention survey by individuals taking the certification exam between January - June 2016. During development of the units the material was well received by surface and underground trainers who advised on unit development. Ninety prospective miners completed the evaluation and knowledge assessment. Overall, apprentices successfully mastered the new curriculum as part of their certification.

3.0 Problem Statement and Innovation Objective

3.1 Problem Statement

The morbidity and mortality risks to Appalachian coal miners exceed those of many other

working populations in the United States ⁽²⁾. There is controversy over etiology, whether risks are specific to coal mining ^(3,4,5), or reflect the general rural population ⁽⁶⁾. A milestone Institute of Medicine Report in 2005 ⁽⁷⁾ clarified what others had noted: there is often no precise division between exposures and risks that occur within and outside of the workplace ^(8,9,10).

Cardiovascular disease (CVD), as an example, has nutritional, stress and sleep quality parameters which are influenced by individual behavior, family and social accommodation, and work organization ⁽¹¹⁾. In the same vein, hearing loss which is a primary consequence of industrial noise is also influenced by blood pressure and blood lipids ⁽¹²⁾. Finally, psychosocial characteristics of the work process itself can affect health and longevity, the most satisfying jobs prolonging life and the most stressful jobs often leading to early disability ⁽¹³⁾.

The health and longevity of miners are affected by a mixture of work, non-work, and personal factors. There is controversy over etiology, whether risks are specific to coal mining ^(3,4,5), or reflect the general rural population ⁽⁶⁾. British coal mines are large and government regulated, and set health standards as a condition of underground work. In a long duration mortality study of 18,000 British coal workers, Miller and McCallan ⁽¹⁴⁾ saw evidence for the selectivity of health screening – a ‘healthy worker effect’. Non-respiratory mortality fell below national averages during work life, but rapidly rose after retirement, with greater than expected mortality rates affected by level of dust inhalation. Similar observations were made on Appalachian coal miners almost 40 years ago: mortality during work life from CVD was almost 30% below national norms, but exceeded those norms early in retirement ⁽¹⁵⁾. While elevated obesity rates in Appalachian coal miners were associated with CVD death, a low body mass index (BMI) is also associated with coal workers pneumoconiosis, presumably due to respiratory disease and low metabolic reserve ⁽¹⁶⁾.

3.2 Innovation Objective

An original objective of MHWP was to translate the integrated approach of the Center for Disease Control and Prevention’s (CDC) National Healthy Worksite Program (NHWP) to mining by conducting a year-long health enhancement intervention at 2 different mine sites. Another objective was to revise the health and safety curriculum that was required for apprentice and experienced miner certification and recertification. The obsolescent incumbent curriculum was in need of periodic revision, but the MHWP offered opportunity for a complete reform of content. The 4 Objectives are listed below:

- 1) Enhanced training: Develop, pilot test, and evaluate expanded health components of the underground and surface mining mandatory health and safety curricula for prospective underground and surface miners, and introduce an enhanced health curriculum for the annual recertification of incumbent miners.
- 2) Intervention development: Adapt the integrated and participatory OSH and WHP intervention programs of the NHWP to the coal mining industry and include personal coaching and a regional inventory of resources paralleling the county-wide directories established by NHWP.

3) Intervention piloting: Introduce yearlong health improvement interventions at 4 selected mining sites, measuring baseline and follow-up health status of participants, and introducing an integrated, participatory onsite OSH/WHP program that includes personalized health coaching (Objective 2). Compare this with control mining sites receiving the enhanced health education and certification renewal program (Objective 1).

4) Intervention evaluation: Compare the relative costs and effectiveness of the two programs. For educational materials and mining health curriculum revision, principles of evaluation research will be used to assess effectiveness and retention of materials. The interventions will be assessed using measures of participation and health outcomes, comparing individuals in a pre and post analysis and comparing aggregate outcomes between study sites.

The unprecedented downturn in the coal industry in West Virginia forced a change in the original objectives. The fiscal instability and miner layoffs prevented mining companies from volunteering their mines as potential research sites, because of shutdowns and court controlled bankruptcy settlements. Given the obstacles to the intervention project which required functioning sites and stable workforces, the MHWP was refocused as an educational, resource development and dissemination project. A revised project plan was submitted to the Alpha Foundation for approval in Spring of 2015. Besides refocusing the project, the project was re-budgeted with a significant decrease in funds. The revised project plan is below:

- 1) Expansion of the underground and surface mining courses with participant evaluation beyond the WVU-MIE classroom, by engaging all certified trainers and sites statewide in West Virginia on a voluntary basis.
- 2) National distribution of training materials to all MSHA surface and underground instructors, stripped of West Virginia-specific provisions.
- 3) Provision of the health component of the 1-day MSHA mandated annual refresher course to instructors within the State of West Virginia and nationally.
- 4) Extension of the MHWP program through April 30, 2016, in order to provide adequate time for dissemination and completion of evaluation.

4.0 Research Approach

4.1 Overview

The focus of MHWP, which was integrated personal health and workplace health and safety training, in fact had distinct and largely non-overlapping facets. They were: 1) revision of health curriculum materials for apprentice and incumbent miners, and 2) introduction of the MHWP by developing associated assessment materials and their implementation for use in an active mining workforce. This second component had two phases: 1) the development of specialized programmatic and assessment materials, and 2) intervention at selected mining sites. The change in the project objectives necessitates segregation of the main project goals into old and new

objectives. As enhanced training became the focus of the new objects, it will be discussed in conjunction with the revised objective following the development of a specialized HWP for mining and its implementation.

MHWP intervention programs were envisioned as the modification and adaption of tools and activities of NHWP specifically for the mining industry and in particular coal mining. The modifications and enhancements were to be developed through Participatory Action Research (PAR) methods. PAR is a recognized strategy for accelerating the translation of effective interventions into practice in which “users” who benefit from the proposed intervention participate in the research and development process^(17,18). In this case, miners and other mine works along with management were to vet the Center for the Promotion of Health in the New England Workplace (CPH-NEW) All Employee Survey and CDC Worksite Health Scorecard to adapt the instruments for mining.

Adaptation of NHWP materials to mining was the central task. This involved both a coaching/prevention program and the development of assessment instruments. The idea was to combine an individualized approach to health behavior change, such as smoking cessation, dietary change and participation in medical surveillance with a broader, workplace-specific approach that addresses dimensions of work life that are accessible to intervention such as work-family stress, impacts of overtime and work schedules, ergonomic load and musculoskeletal disease (MSD), and supports for and barriers to health that are part of the work environment. The integrated onsite MHWP was to follow the NWHP initiation sequence, by being introduced into an expected 4 sites for a 12 month period.

Evaluation of the intervention was to be conducted at the study conclusion. The main outcome measures were cost differentials between intervention and control programs, and reductions (if any) for specific chronic diseases and health care utilization. The failure to secure mine sites prevented this work from being conducted. The original time line appears in Appendix 1.

As mentioned previously, the unprecedented downturn in the coal industry led to a re-envisioning of the project with a new timeline and project plan. The new project plan centered on training and dissemination. For simplicity, Aims will be discussed separately and include the work on the original aims and revised aims, if applicable.

4.2 Process and Results

Aim 1 (Original Aim). Enhanced Training. Develop health programs for underground and surface courses for apprentice underground and surface miners, and for annual recertification of incumbent miners

Aim 1 (Revised Aim). Expansion of the underground and surface courses with participant evaluation beyond the WVU-MIE classroom, by engaging all certified trainers and sites statewide in West Virginia on a voluntary basis. *Aim 1 was revised to expand focus to all trainers in West Virginia as described below.*

4.2.1.i Revision of Training Curriculum/Enhanced Training

The approach of integrating work and non-work elements impact on health was not part of the standard training of mining apprentices, nor of the annual refresher. At the inception of this project, the Health and Sanitation Units of the training curricula for prospective underground and surface miners and the health section of the annual refresher for miners were traditional; focusing on black lung and respirators, hearing protectors, noise induced hearing loss, and sections on dust control devices and sanitation laws. Much of the information had not been updated in many years leading to outdated and inadequate knowledge being transferred to apprentice miners. The training units lacked information on drugs and intoxicants which were becoming a major concern in the industry to the point of new state regulations coming into effect during the project time period.

The production of new training materials and review and vetting by certified training instructors was foreseen at baseline as a set of activities occurring at WVU-MIE in Morgantown, WV, using their instructors. Apprentice miners taking the course at WVU-MIE would complete an evaluation after the unit had been taught with a follow-up survey assessing course knowledge retention 3, 6, 12 months later. Based on pre-2012 patterns, approximately 600 apprentice miners per year were expected to complete the course at WVU-MIE in 2014-2015, providing sufficient projected numbers to satisfy necessary study power. The goal was to follow-up apprentices after completion of the course in order to determine whether learning goals were met and retained. The experience of the study team in implementing an active and participatory learning approach called problem-based learning had been central to developing the current NHWP Worksite Health 101 health promotion curriculum. The formative idea was to develop a Worksite Health 101 for mining.

Prior to project planning, distinct limitations of the Health and Safety component of the apprenticeship courses were identified. They included the interaction between personal health risks and occupational exposures, the significance of aging and chronic diseases and performance, familiarization with community health resources, and control of mining-specific risks for stress. More conventional topic areas, such as hearing loss, lung disease, and MSD and injury were to be approached in new ways in terms of prevention and risk lifespan risk reduction.

A precondition of the training revisions involved future interaction with the West Virginia Office of Miners Health and Safety Training. The Office has responsibility for the training of apprentice miners and had participated in the original Alpha application. Their involvement in Aim 1 entailed a commitment to adopt the new health curriculum for apprentice miners. A key project goal was to submit the pilot training program at WVU-MIE to the West Virginia Office of Miners Health and Safety Training pending to be certified for statewide use.

During the lifetime of the program, the State of West Virginia enacted its Drug and Alcohol program for mining, and this became a subsequent programmatic inclusion. This module was particular to West Virginia, with relevance to instructors in adjacent states. Its inclusion was not foreseen at baseline, but the materials represented a substantial component of the revised curriculum. It was also presented in a modular format that allowed for its exclusion or modification in settings outside of West Virginia and for MSHA required recertification. The revised underground and surface courses were also composed to serve as the basis for the health component of the 8 hour MSHA-required annual refresher required of all miners. The

reduced material would concentrate on the integrated work and non-work elements of health experienced by miners. The WVU-MIE also provides safety training for the MSHA-required annual mineworker recertification. This developed training would also be used in the intervention part of the project serving as the comparison to the integrated MHWP program to be developed. In this activity, the curriculum and intervention aims were expected to be combined with WVU-MIE staff presenting the materials to study site workforces for purposes of feedback, evaluation, and refinement.

Curriculum development design began with a review of the current health sections of training courses. In addition, both national and West Virginia regulations pertaining to training requirements were researched to identify required health topics and changes that had evolved since the submission of the proposal. Drs. Cherniack and Dussetschleger of UConn Health and Drs. Dean and Winn of WVU-MIE began attending the monthly meeting of the West Virginia Board of Miner, Training, Education and Certification to review project plans and proposals for the development of the new health sections. Preliminary and revised course outlines were submitted to the Board.

Six areas were identified in this design phase: Lung disease and prevention; Injury and MSD; Alcohol, drug and intoxicants; Hearing loss and protection; Lifestyle factors; and Cardiovascular disease. There was preliminary planning to incorporate New State regulations on substance abuse and testing will be added as they are promulgated in 2014.

During 2014, the demand for apprentice miner training state-wide and at WVU-MIE decreased (Table 1). To pilot the first iteration of the underground course, WVU-MIE offered the course at no cost to participants and garnered only 4 enrollees. This diminished response required two major revisions. First, it was clear that the WVU-MIE would be unable to meet class size expectations. Second, since we were obligated to go outside of the WVU-MIE system and its designated instructors, it was clear that voluntary convenience follow-up would vitiate a reliable response ratio. This meant that the ambitious evaluation scheme would necessarily be limited to a single post-course in situ evaluation.

Table 1. Number of Apprentice Exams Passed			
	Surface	Underground	Total
2011	5348	8244	13592
2012	2699	3650	6349
2013	1635	2166	3801
2014	1105	1845	2950
2015	607	459	1066
2016 (Jan-June)	78	19	97

With the assistance of the Board, the newly developed underground course was distributed to all certified instructors with the request of the Director of the Office of Miners' Safety and Health for instructors to voluntarily have their students complete the evaluation and return them to WVU-MIE. Between March and May of 2015, a total of 17 evaluations were returned.

The precipitous declines in mining and individuals certifying as apprentice miners in West Virginia forced the revision of this goal and project. In May of 2015 a revised project plan was submitted and approved by the Alpha Foundation. Aim 1, Enhanced Training, was expanded. There were changes to the other Aims that will be discussed in the next sections. The new project plan and timeline extending the project to June 30, 2016 is presented in Appendix 2.

Given the low numbers of apprentices, the Alpha Foundation had recommended that the project be suspended in November 2015, since it had seemed unlikely that even the downgraded target of ≥ 100 respondents would be reached.

Despite the dramatic decline in mining and the very limited success of the voluntary program, there were still apprentices being trained in West Virginia and in surrounding states for certification in West Virginia mines. As Table 2 shows, apprentice miners seeking certification had declined compared with previous years, but even if November totals were not replicated through May 2015 (project end) there would be a large enough pool to satisfy minimum study power.

Table 2		
Apprentice Certification Examinations 2015		
	Monthly Average	November 2015 Monthly Total
Underground	101	61
Surface	55	28
Total Monthly	156	89

In order to support the project, the Office took several extraordinary measures. Based on the feedback received new versions of the surface and underground mining training course were developed by the study team for review and vetting by the Board.

The Board's input was incorporated into the new units which were approved in November 2015 for mandatory usage in all prospective miner training programs as of January 2016. Table 3 shows the domains included in the new training. The study team provided hard copy and USB thumb drives containing the newly mandated Units (Appendix 3a, 3b) and evaluation forms (Appendix 4a, 4b) to all certified trainers and to the West Virginia Board of Training, Education and Certification. Evaluation and knowledge retention surveys were also mandated for all individuals taking the certification exam between January 1, 2016 and June 30, 2016. The state of the industry greatly affected the number people certifying as apprentice miners only 97 people took the exam.

Table 3		
Domain	Underground Mining Course	Surface Mining Course
Lung Disease	√	√
Injury & Musculoskeletal Diseases	√	√
Drugs Intoxicants and Alcohol	√	√
Hearing Loss & Hearing Protection	√	√
Lifestyle Factors & Cardiovascular Disease	√	√
Sanitation Laws	√	
Miners' & Operators' Rights & Responsibilities		√
Outdoor Risks		√

The assessment of knowledge was based on 3-6 true/false or multiple-choice questions for surface mining apprentices (Appendix 4a) and underground mining apprentices (Appendix 4b). The questions only address points that were highlighted in the course presentation. Questions were vetted by the study team, by the West Virginia Board of Training, Education and Certification, and by the professional trainers working at the WVU-MIE. A request for comments was also forwarded to all trainers receiving course material during the voluntary period of apprentice certification.

The mandating of the course material and evaluations enlarged the instructor pool that was provided with training materials. This included 182 mining instructors in West Virginia and the adjacent States. The group consisted of 143 combined surface and underground instructors, 23 surface only instructors, and 16 underground only instructors.

Table 4 presents the number of apprentices taking certification examination in West Virginia and completing evaluation between January - June 2016.

Table 4						
Monthly Apprentices Completing Test and Evaluation						
Month	January	February	March	April	May	June
	3	14	42	24	13	1

Between January and June 2016, prospective mine apprentices completed one of two modified Health and Sanitation training courses for underground and surface mining certification. Following completion of the training courses, prospective mine apprentices filled out an evaluation survey. A total of 97 evaluation surveys were received from miners who completed one of these courses:

- 78 miners completed the surface mining training course
- 19 miners completed the underground mining training course

For the modules included in the revised surface and underground mining training Health and Sanitation courses (with the exception of the Sanitation Laws and the Miners and Operators Rights & Responsibilities modules), the training evaluation survey assessed:

- The quality of each module presentation
- Prospective miners' perceptions of how effective the training was in enhancing their understanding of the topic addressed by each module
- Brief knowledge test on the material covered in each module
- An assessment of whether prospective miners expect to use the information presented in each module in their daily lives

4.2.1.ii. Overall Findings

Overall, across all modules (including responses from both surface and underground mining trainees):

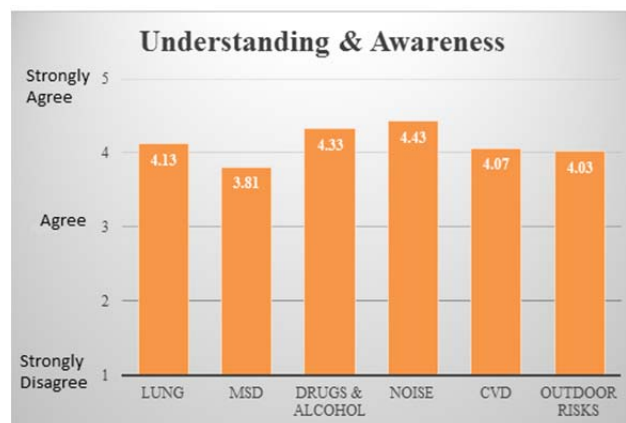
- 99% of respondents felt that the presentations were of good quality (Presentation)
- 83% of respondents moderately or strongly agreed that the modules presented increased their understanding of the topics (Understanding)
- 74% of the knowledge questions were answered correctly (Knowledge)
- 85% of respondents moderately or strongly agreed that they could use the information from the modules in their daily lives to improve their health and safety (Training Transfer)

Assessment of Presentation

Quality of presentation was assessed with a single 3-point rating scale for each module (1= poor, 2= needs improvement, 3= good quality of presentation). Ratings of presentation quality were uniformly high across the six modules, ranging from 2.95 for Lung and CVD, 2.97 for Noise and Drugs/Alcohol, 2.98 for Outdoor Risks and 2.99 for MSD. Overall mean presentation rating averaged for the six modules was 2.97 on a 3-point scale. A comparison of responses for surface mining trainees and underground mining trainees for the five modules that were presented to both groups revealed that surface mining trainees rated the quality of the presentation for the MSD module significantly higher than ratings for that module for underground mining trainees (3.00 vs 2.95 respectively, $p < .05$), but the consensus for both groups was that the quality of the presentations was high for all modules.

Assessment of Understanding & Awareness

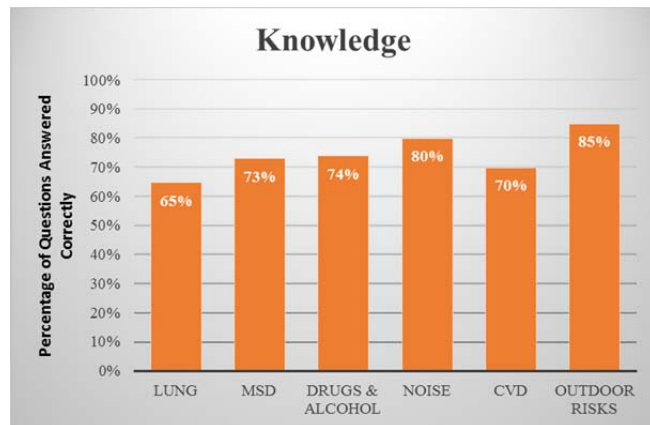
Prospective miners' self-assessment of learning acquired during training was measured with questions that queried whether the training module increased their understanding and awareness of the topics addressed in the module, asked separately for each module. These were assessed with 5-point Likert-type scales. Responses ranged from *Strongly Disagree* (1) to *Strongly Agree* (5) that the training in a module increased their understanding and awareness of the topic presented. The number of topics on which increased understanding and awareness was assessed ranged from 3 topics (Lung, Noise, CVD, Outdoor Risks) to 4 topics (MSD) and 9 topics (Drugs & Alcohol). Evaluations of increased understanding and awareness were averaged for all topics addressed in each module. Topics evaluated for understanding and awareness for each module are shown in items 1a, 2a, 3a, 4a, 5a, and 6a (surface mining trainees only) of the Mining Training Evaluation surveys (see Appendices 4a and 4b).



As can be seen in the “Understanding & Awareness” graph, respondents generally agreed that the training in each module increased their understanding and awareness of the topic for five of the six modules (mean levels of agreement ranged from 4.03 to 4.43 on a 5 point scale, where a 4 on the scale represents Agree). They were somewhat more neutral on the training around musculoskeletal issues increasing their understanding and awareness of this topic (mean agreement of 3.81 on a 5 point scale). When trainees’ evaluations of increased understanding and awareness are averaged across the six modules (five modules for underground mining trainees), the mean overall rating of increased understanding and awareness of intended training topics was 4.25 on a 5 point scale. A comparison of responses for surface mining trainees and underground mining trainees revealed that surface mining trainees rated their increased understanding and awareness of topics in the MSD module significantly higher than underground mining trainees did (4.50 for surface trainees and 4.14 for underground trainees, $p < .05$). There

were no statistically significant differences between the two groups for any of the other modules or for overall increased understanding and awareness.

Assessment of Knowledge



The training evaluation survey included a total of three (Noise) to six (Drugs & Alcohol) True/False and/or multiple choice knowledge questions pertinent to the content of each module. (See items 1b, 2b, 3b, 3c, 3d, 4b, 5b, 5c, and for surface mining trainees, 6b, 6c of the Mining Training Evaluation surveys in Appendices 4a and 4b.) Each set of questions acted as a brief learning test that assessed knowledge of content that had been presented during the training. Knowledge was measured as the

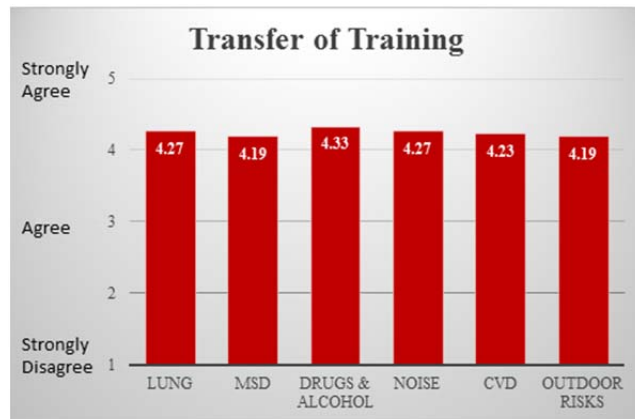
percentage of questions answered correctly for each module. The percentage of correctly answered questions ranged from 0-100% for Lung, 25-100% for MSD, 33-100% for Drugs & Alcohol, 0-100% for Noise, 25-100% for CVD, 50-100% for Outdoor Risks, and 49-100% for all knowledge questions combined. When module knowledge scores are averaged for all modules completed (five modules for the 19 underground mining trainees, six modules for the 78 surface mining trainees), the overall percentage of items answered correctly was 74%. Average overall knowledge scores were significantly higher ($p < .01$) for underground mining trainees (79%) than they were for surface mining trainees (70%).

As seen in the “Knowledge” graph, performance on the knowledge questions for individual modules was generally modest, with the average percentage correct ranging from 65% (Lung) to 85% (Outdoor Risks, surface mining trainees only). Knowledge scores were also compared for participants in the surface mining training and the underground mining training for the five modules that both groups completed and there were statistically significant differences in their performance for two of the five modules: Drugs & Alcohol and CVD. In both cases, underground mining trainees answered a significantly higher proportion of the knowledge items correctly. Underground mining trainees answered 90% of the Drugs & Alcohol knowledge questions correctly, compared to surface mining trainees who, on average, answered 70% of those questions correctly ($p < .01$). For CVD, underground mining trainees answered 80% of the questions correctly on average, compared to surface miners, who only answered 67% of the questions correctly for that module ($p < .05$). There were no statistically significant differences in the knowledge performance of underground and surface mining trainees on the remaining modules.

Anticipated Transfer of Training to Personal Behaviors

For each module, anticipated transfer of training was measured by asking respondents whether they expected to apply what they had learned in the training to prevent health and safety issues pertinent to that module (1= *Strongly Disagree*; 5= *Strongly Agree*). (See items 7a and 6a in

Appendices 4a and 4b, respectively.) Across the board, trainees agreed that they can use what they have learned in the training modules to prevent lung disease, injury and MSD, drug and alcohol consequences, hearing loss, heart disease, and exposure from outdoor risks from happening to them, with mean agreement levels ranging from 4.19 (MSD) to 4.33 (Drugs & Alcohol). Mean overall level of agreement that trainees expected to apply what they learned was 4.24 across the six (or five, for underground mining trainees) modules. There were no statistically significant differences between surface and underground mining trainees in their expectation that they would apply what they had learned to better protect their health and safety.



Relationships of Acquired Knowledge with Anticipated Use of Knowledge

To further interpret the training survey data in terms of the likely utility of the training outside the confines of the training experience, we examined correlations between learning test scores (i.e., external assessment of **knowledge**) and anticipated application of learning (i.e., assessment of anticipated **transfer of training** to personal behaviors). Because the sample size for underground mining trainees was so small, this analysis was carried out for the combined sample of surface mining and underground mining trainees only; no between-sample comparisons were conducted. Significant positive relationships between knowledge and transfer of training provide evidence that those who have acquired and retained relevant knowledge see it as useful, and serves as a positive indicator that the training module is likely to have a positive impact on trainee behaviors. In contrast, significant negative correlations between knowledge and transfer of training suggest that those who exhibit the highest levels of relevant knowledge are least likely to act on it.

These findings are summarized below (* indicates that the correlation is statistically significant, $p < .05$). A significant relationship between Knowledge and Transfer of Training was observed for the Noise module only; it was a positive relationship. On the other hand, significant negative correlations between Knowledge and Transfer of Training were not observed for any of the training modules being evaluated. Thus, with the exception of the Noise module, there is no reliable evidence that the expectation of using what is learned during training is demonstrably higher among those trainees who displayed better knowledge of the pertinent subject matter.

Lung Disease	
	Transfer of Training
Knowledge	0.04 ns

Musculoskeletal Disease & Injury	
	Transfer of Training
Knowledge	-0.02 ns

Drugs & Alcohol	
	Transfer of Training
Knowledge	0.05ns

Noise	
	Transfer of Training
Knowledge	0.23*

Cardiovascular Disease	
	Transfer of Training
Knowledge	0.08 ns

Outdoor Exposures (surface miners only)	
	Transfer of Training
Knowledge	0.02 ns

Overall (all modules completed)	
	Transfer of Training
Knowledge	0.17 ns

In summary, the vast majority of trainees reported that the training improved their understanding and awareness of important health and safety topics covered by the training and were likewise optimistic that they would use what they learned in their daily work and personal lives. Nonetheless, we are mindful that the modest mean Knowledge scores and fairly broad distributions of individual Knowledge scores observed for several modules, suggest that there is room for improvement in terms of how much of the material conveyed in the training sessions is successfully acquired by participants in the training sessions.

The revised project plan included national dissemination of the training units sans West Virginia specific materials for use in new miner training and annual refresher course material. The material has been forwarded to MHSA for their review.

Aim 2 (Original Aim). Conversion of survey and assessment materials used in general industry into a format compatible with mining

Aim 2 (Revised Aim). Revisions to the Inputs, Capture, and HSC components were completed in the first 6 months of NHWP and underwent no further significant modifications

4.2.2 Integrated Program Development

In anticipation of the execution of the Aim 3 interventions the aim was to prepare materials for site intervention. Adaptation of NHWP materials to mining was the central theme. This involved both a coaching/prevention program and the assessment instruments. The idea was to combine an individualized approach to health behavior change, such as smoking cessation, dietary change and participation in medical surveillance with a broader, workplace-specific approach that addresses dimensions of work life that are accessible to intervention such as work-family stress, impacts of overtime and work schedules, ergonomic load and MSD, and supports for and barriers to health that are part of the work environment. Survey modification principally involved the INPUTS™ Health and Safety Climate Survey and the CDC Workplace Health and Safety Scorecard (HSC). Because of the importance of national comparison using validated instruments, NHWP materials and algorithms were not to be replaced but, instead, enlarged with additional elements specific to mining. These instruments were introduced and vetted in the first weeks of MWHP when intervention sites were under consideration.

The satisfaction of this aim was based on preparation of materials, because no standard training health survey was available. There were also no formal health coaching and preventive materials for the mining sector. There were no standardized and validated health and work organizational surveys in the mining sector. In order to perform interventions, both required development and pre-testing. The 1 hour health and safety sequence in the annual refresher course was non-standardized and there has been no consistency in content or administration. Furthermore, it was understood that 1 hour of training had not and would not address the significant problems of miner health. The coal operators had attempted various personal health programs and there was growing interest in the prevention and multi-factorial disease, but not clear approaches. In the course of the program, but not at baseline, new drug and alcohol policies were introduced by the State of West Virginia, but the best approaches to dissemination and education were yet to be developed.

At inception, the health coaching program was expected to be revised to reflect mining hazards and risks. The worksite health promotion program involved in the application, Viridian Health Management (VHM) was stipulated with the task of coaching curriculum revision. The plan was to make licensed use of the MAESTRO^R, a proprietary product of VHM, for web based incentive tracking and reporting and for risk stratification and analysis. MAESTRO^R was used in the NHWP as a health coach moderated system to provide data analysis, and identify at-risk members of the workforce, with the emphasis on information accumulated through health coaching. MAESTRO^R was constructed for alignment with goals of the US Preventive Services Task Force (Guide 2012), to identify and offer confidential assistance and recommendations to participants with the following conditions: 1) diabetes, 2) hypertension, 3) hyperlipidemia, 4) MSD, 5) heart disease, and 6) asthma and COPD.

Shortly after the start of MHWP, VHM underwent reorganization and was no longer able to support health coaching and the evaluation. Ms. Sharon Covert, the project lead for the VHM segment of MHWP, left VHM to become the Director of the PEIA Pathways to Wellness Program. PEIA manages the health promotion activities for the West Virginia state workforce and is based out of Marshall University. An agreement was made with the College of Health

Professions at Marshall University in Huntington, WV for the work originally planned to be conducted by VHM. The loss of VHM meant a reworking of the project would be needed as the proprietary products were no longer available.

New materials to revise the HSC and Input surveys were assembled with specific area questions on mining. The planned intervention for a short physical evaluation and biometric testing underwent alteration. While there was no fundamental change in content, the structure of the instruments and the data analytic and processing format required a revision of methods with the departure of VHM. These materials were to be refined through focus groups and discussions with mine management and miners.

2014 marked the start of an unprecedented decline in coal mining in West Virginia. The negative pressure on the industry was greatly felt at the 2 mine companies initially identified in the proposal as willing to participate. They chose not to participate in the MHWP. This led to the delay in survey refinement and intervention development, Aim 3, discussed later.

A potential new coal company was identified in May 2014. Drs. Warren and Dussetschleger from UConn Health along with Ms. Covert and Dr. Prewitt from Marshall University attended a meeting with the new company. During the following months, revisions to the INPUTS survey, now called the All Employee survey, were done in conjunction with company management to increase employee comprehension and acceptance. The final version is in Appendix 5.

With the loss of VHM and their health tracking software a new plan for the intervention short physical evaluation, previously called Capture, and biometric testing needed to be developed. The coal company had traditionally offered a Health Risk Assessment to its employees on a yearly basis, blood assay (lipid analysis, chem panel, PSA, C-reactive protein), blood pressure, body fat percentage, hearing and vision screening. Discussions were entered into with the coal company and the provider of these services to develop a protocol for sharing this information. Study design required reduction of key testing elements, and temporal compatibility with the annual health fair and historic testing regimen. Study power was also recalculated given that the company had a 90+ percent participation rate with their health screens, due to various employer incentives.

By the Fall of 2014, the external pressures on the coal industry forced the participating coal company to withdraw from the project because of great uncertainty of the future activity at the potential mine sites. Discussions with 3 other coal companies were initiated and while there was great interest in improving the health of their workforces the economic pressure and potential layoffs prevent companies from agreeing to participate. As mentioned above, in May 2015, a revised proposal was approved by the Alpha Foundation. In the revised project, the study team would do modest additional refinement based on the responses of instructors and professional organizations to the developed surveys. There was no distinct plan for use of the surveys in the revised the MHWP project.

Aim 3 (Original Aim). Integrated Program Development. Develop an integrated occupational health and health promotion and disease prevention program for the coal mining population at 4 test sites, following the approach of the Center for Disease Control and Prevention (CDC)

National Healthy Worksite Program (NHWP). *This Aim was removed from the revised project plan because of the inability to secure intervention sites.*

In the revised proposal to the Alpha Foundation, Aim 3 was abandoned and that all designated funds for Aim 3 be returned. We also amicably agreed to terminate the contract with Marshall University. Marshall University did not request reimbursement for any of its work.

Aim 4 (Original Aim). Evaluate interventions and training curricula, including conduct of a cost effectiveness analysis (CEA).

4.2.4 Intervention Evaluation

The initial heart of the proposal was oriented to former Aim 3, and involved a sensitivity-type analysis of cost effects on measured health outcomes between coached and non-coached sites. The original concept was to apply Framingham-type risk categories and lifetime morbidity projects from biometric measures. We had proposed a net-cost model, in part because of uncertainty over health coaching acceptability and access. Because the cost of health coaching and data management is a determinant of acceptability and future dissemination a net-cost model will be used to calculate the programmatic and per-participant cost. With the elimination of the intervention program, this type of evaluation could not be determined. We continue to see its utility. However, the breakdown of the coal mining industry in West Virginia makes it unlikely for the foreseeable future that existing operators will be extending additional resources on biometrics and worker evaluation.

5.0 Dissemination Efforts

5.1 Training Materials

The produced training materials have been provided to the West Virginia Board of Miners' Safety and Health. In addition, 183 certified trainers in West Virginia and neighboring states received both hardcopy and electronic versions of the training materials.

5.2 Assessments and Surveys

While not disseminated as part of the study, copies of all materials are attached to an appendix to the final report.

5.3 Presentations

In May of this year, Dr. Dussetschleger presented an overview of the project and the findings from the training evaluations at the Joint Spring Meeting of the West Virginia Coal Mining Institute, the West Virginia Coal Association, and the Central Appalachian Section of SME.

6.0 Conclusion and Impact Assessment

There were several key findings:

- A revised health and safety curriculum, based on contemporary merging of work and non-work risk factors, was well accepted by apprentice miners
- Apprentice miners showed successful cognitive mastery of the course material, sufficient to insure certification
- Apprentice miners were receptive of the course material and indicated intent to incorporate into future practice and behaviors
- Trainers demonstrated acceptance and mastery of the modular course material
- The West Virginia Board of Training, Education and Certification proved to be an effective and active partner that exceeded baseline expectations by mandating the new curriculum statewide for certification
- Survey materials and algorithms used in other occupational health settings proved to be adaptable to mining

Aim 1. Training Impact

Training impact was assessed in terms of cognitive knowledge acquisition/retention and transfer of training to post-training applications. As noted, there was a moderate correlation between these two evaluation components for the Noise Module. The fact that there were no negative correlations is an encouraging indicator of effectiveness. It may also be important that the Noise Module was detailed and explicit in its negative consequences. It was also more particular to workplace exposure than some of the other modules.

MHWP had a direct impact on <100 apprentice miners who took the revised course and the certifying exam. A larger but diffuse impact can be appreciated as more than 200 instructors received the training materials for future use.

The indirect efforts of the training material will depend on other institutions. In West Virginia, the Board lacks authority over the 1-day refresher course, although the materials are available to the major professional organizations in the State. Again, the condition of the industry is likely to influence their distribution. As stated previously, the revised training units sans West Virginia specific materials have been forwarded to MSHA for potential national distribution.

There are also important caveats. First, the certification examination was proximate to the apprentice training program. As a result, long-term recall of course material was not assessed. In the original Alpha proposal, the plan had been to follow-up apprentices to assess retention and utility. This was no longer feasible when the WVU-MIE was unable to accommodate all trainees and deferral to the mining trainers statewide meant that there was no means for active follow-up by the trainer. Repetition is, of course, essential to behavior change. It would be our recommendation that ongoing retention of course information would be abetted by refreshing at the annual follow-up and by incorporating materials into regular health and safety updates at working sites.

The small study size also limits the generalizability of the results. The 97 apprentice participants were considerably short of the more than 600 we had anticipated and the 150-200 that we considered for sub-analyses in the revised study plan. The results are somewhat more skewed than they may appear. In assessing effectiveness, we had assumed the normal ration of

underground to surface ratio following the historic 4:1 ratio. In fact it was reversed, as only 19 (19%) of apprentices took the underground course and completed their assessments. Thus and paradoxically, the above ground participants did meet pre-enrollment power thresholds, but the underground proportion was too small to support an independent analysis and pooling of the two groups was required. Although the assessment questions were overlapping, the Section on Outdoor Risks was not presented to the underground apprentices. In addition, material on positive pressurization in cabs and on MSD risks associated with large vehicles were also particular to surface mine training. There was also more latitude for reduction other health related slides for the surface mining apprentices.

There were limited differences between the two groups of apprentices. As already noted, the single content difference was that surface mining trainees rated the quality of the presentation for the MSD module significantly higher than the underground mining trainees did for their module (3.00 vs 2.95 respectively, $p < .05$). The surface mining presentation was shorter and more pointed in its safety focus, because the risks were vehicular rather than related to repetitive joint loading. However, the absolute score was high for the underground mining course. In all other areas, the consensus for both groups was that the quality of the presentations was high for all modules, and no major inferences can be drawn.

Despite the small sample size, there was no difference in expected transfer of training between surface and underground mining apprentices. However, the sample was too small to support a divided analysis for the impact of transfer of training to activities of daily living and lifestyle change. As noted, although relationships were generally in a positive direction and several bordered on significance, statistical significance of the correlation was only realized for the noise module and was actually negative for the musculoskeletal component. Accordingly, inferences are inevitably limited by the small sample size and the limited dispersion of survey responses. A larger sample and a true before and after comparison will be required to fully assess this issue.

Aim 2. Survey Impact

The Healthy Workplace All Employee Survey developed for Aim 2 has been provided to the Alpha Foundation, and the West Virginia Board of Training, Education and Certification, and the Mine Safety and Health Administration (MSHA). There is no obligation on the part of any of the recipient organizations to distribute these materials, as post-project distribution was not part of AFC 113-09. The study team claims no intellectual property rights and accordingly the survey and checklist can be used by the sponsoring organizations.

It should be noted that the materials are a project deliverable. They include:

1. The 41-item mining survey
2. An example of a baseline report, including tables and graphs
3. A tabular presentation of results for,
 - a. Health self-assessment
 - b. Biometric measurement
 - c. Safety Climate
4. A description of the methods for measurement and report preparation

5. Reference documentation for all survey and assessment items.

Downstream use and effectiveness cannot be projected given that the parameters fall outside of this grant period. However, at CPH-NEW we have found that these domains are significantly more suitable for interventions and for accurate appraisal of health status than conventional commercial Health Risk Assessments (HRAs). Should Alpha or MSHA wish to pursue dissemination, CPH-NEW staff will be available for consultation.

7.0 Recommendation for Future Work

The MHWP had particular resilience and was able to assemble a significant set of partners that include the WVU-MIE, CPH-NEW, Marshall University, and the West Virginia Office of Miners' Health Safety and Training. There was also the initial cooperation of major mining corporations in the State to serve as participating sites. This array of resources and commitments was not sufficient to support the intervention program. In the current climate it is nearly impossible to foresee or to recommend the successful initiation of a similar project.

On the other hand, health and work interventions are vital in distressed communities with specialized workforces. The fate of "steel towns" with their high rates of unemployment, family breakdown, and drug addiction are signals of both necessity and consequences. A community-based intervention using research and training teams, usually academic in origin, has advantages over public agencies or private contractors in terms of innovation and effective intervention, and reducing the risk of bureaucratic rigidity. However, such activities fall beyond the aegis of the Alpha Foundation. They would best be engaged through federal mechanisms as part of a broader initiative to stressed industrial communities.

The value of intervention studies in mining remains strong. Again, the prospects in coal mining are compromised.

The health and safety curriculum is complete and does not require editing or revision. There is, of course, a legitimate study that would compare retention and health outcomes of the new materials, in comparison with older regimens. However, we know that cognitive programs, alone, are not enough. The original idea of apprenticeship training and longer term retraining and follow-up remains a valid and necessary area for future work.

Acknowledgements

Dr. Cherniack and the research team wish to thank Dr. Mike Prewitt and Ms. Sharon Covert for their dedicated work to secure research sites. They also need to acknowledge Mr. Eugene White of the West Virginia Office of Miners' Health Safety and Training for his assistance to make this project a success.

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9.0 Appendix

1. Original Timeline
2. Revised Timeline
3. Health and Sanitation Training Units
 - a. Surface Mining Course
 - b. Underground Mining Course
 - c. Slide by Slide Comparison Surface Course
 - d. Slide by Slide Comparison Underground Course
4. Evaluation Surveys
 - a. Surface Mining Course
 - b. Underground Mining Course
5. All Employee Survey
6. Data Set and Codebook

Appendix 1. Original Timeline

Aim	Task Description	Year 1 Nov 2013- Oct 2014				Year 2 Nov 2015- Oct 2016			
Aim 1. Enhanced Training	1a. Revise health curricula for surface & underground mining training course	x	x						
	1b. Revise health curriculum for annual recertification	x	x						
	1c. Focus groups and finalization of curricula			x					
	1d. <i>Certify new curriculum</i>			x					
	1e. Establishment of integrated health website			x	x	x	x	x	x
	1f. Course presentation and evaluation of the surface & underground mining training			x	x	x	x		
	1g. Follow-up at 6-12 months					x	x	x	x
Aim 2. Integrated Program Development	2a. <i>Final selection of sites</i>	x							
	2b. Kick-off and site assessments by project team			x					
	2c. Focus groups - CAPTURE™, HSC & INPUTS™		x						
	2d. <i>Revisions of CAPTURE™, HSC, and INPUTS™ for mining</i>		x	x					
	2e. Compile community resource Inventory	x	x						
	2f. <i>Generate mock individual and aggregate reports</i>			x					
Aim 3. Intervention Pilot	3a. Training of Health Coach and Coordinator (MHWP sites)			x					
	3b. Recruitment of Healthy Mining Committee (HMC)			x					
	3c. <i>Survey administration and testing - 7-8 sites</i>			x				x	
	3d. Revised refresher training - 3-4 sites			x				x	
	3e. MHWP interventions - 4 sites				x	x	x	x	
	3f. <i>Individual and site specific analyses</i>				x				x
	3g. Site specific analyses training for MHWP sites				x	x			
	3h. HSC administration and review for all 7-8 sites			x					
Aim 4. Intervention Evaluation	4a. Health and knowledge changes - prospective miners				x	x	x	x	
	4b. <i>Participation and use of materials - prospective miners</i>				x	x	x	x	x
	4c. Assess health and knowledge changes – conventional sites								x
	4d. Assess program participation - MHWP sites							x	x
	4e. Assess health and knowledge changes - MHWP sites							x	x
	4f. <i>Cost effectiveness analysis</i>							x	x

Appendix 2. Revised Timeline

New Timeline Through the First 2 Quarters of Year 3							
Aim	Task Description	Year 2 Mar 2015- Oct 2015			Year 3 Nov 2015- May 2016		
Aim 1. Enhanced Training	1a. <i>Finalize surface & underground mining training course for national use</i>		x				
	1b. Revise annual curriculum recertification for WV		x				
	1d. Certify surface mining training course		x				
	1e. Establish website for State and national use			x	x	x	x
	1c. <i>Revise 1-day refresher course for MSHA</i>			x			
	1f. Course presentation & evaluation surface & underground mining training		x	x	x		
	1g. Approach MSHA and CWA for dissemination		x	x			
	1h. National dissemination of surface mining training course			x	x	x	x
	1j. National dissemination refresher course			x	x	x	x
	1g. <i>Follow-up at 6-12 months in WV</i>				x	x	x
	1h. Data analysis and responses to evaluation in WV		x	x	x	x	x
	1i. Data analysis and responses to evaluation national				x	x	x
Aim 2. Integrated Program Development	2a. Revisions of Surveys and Materials in WV		x	x			
	2b. Revisions of Surveys and Materials nationally				x	x	x
Aim 3. Intervention Pilot							
Aim 4. Program Evaluation	4a. Assess surface & underground mining training course for acceptance in WV		x	x	x		
	4b. Assess surface & underground mining training course knowledge gain/WV		x	x	x		
	4c. Assess surface & underground mining training course for acceptance/ national			x	x	x	x
	4d. Assess surface & underground mining training course knowledge gain/national			x	x	x	x
	4e. 3-6 month follow-up in WV					x	x
	4f. Cost effectiveness analysis of curriculum admin						x

Appendix 3a. Surface Mining Course

The following “Health and Sanitation” material of the 40 Hour Surface Miner Pre-Employment Training Program was developed by the University of Connecticut, Division of Occupational and Environmental Medicine, in conjunction with the West Virginia University Mining and Industrial Extension.

The developers wish to acknowledge the Alpha Foundation as the Project Funder.

All findings and conclusions are those of the authors and do not necessarily represent the views of the Foundation and any mention of a company or product does not constitute an endorsement of the Foundation.

Health and Sanitation Unit

40 Hour Course

Topic Areas:

1. Injury and Musculoskeletal Disease
2. Drugs, Intoxicants, and Alcohol
3. Hearing Loss and Hearing Protection
4. Miner's & Operators Rights and Responsibilities
5. Lifestyle Factors and Cardiovascular Disease
6. Outdoor Risks

Section 1 – Lung Disease and Prevention

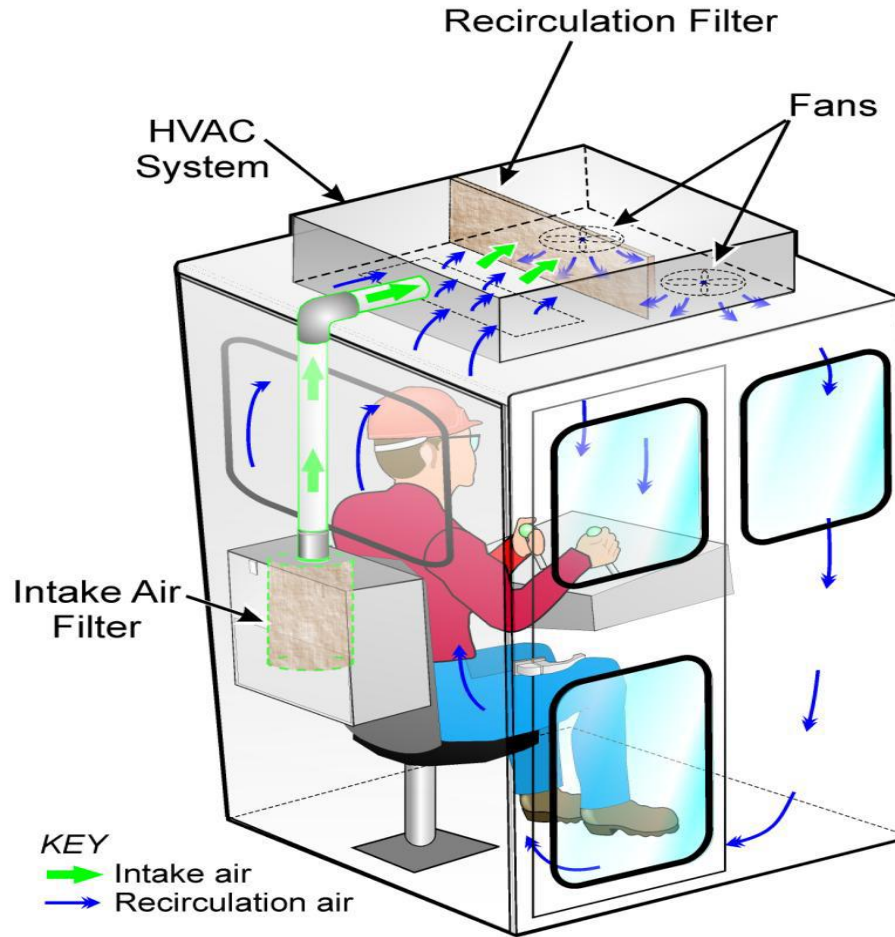
Key Points

- Lifestyle factors contribute more to cardiovascular disease than work activity
- A coal miner can reduce his chance of lung disease by not smoking and minimizing dust exposure
- In order for a respirator to work properly it must be fit tested

Lung Cancer and Coal Mining

- The largest risk factor for cancer is smoking
 - ~ 80-90% of smokers have some lung damage
- Silica dust is a possible carcinogen
- Miners need to follow procedures to control dust:
 - Surface watering
 - Door seal maintenance
 - Positive pressure in vehicle cabs

Positive Pressure Cabs



Playing the Odds

Age at Smoking Cessation	Odds of Dying from Lung Cancer at Specific Age			
	35	45	55	65
Never Started	0	1 in 25,000	1 in 14,000	1 in 5,000
Stopped at 35	0	<1 in 25,000	1 in 3,600	1 in 1,600
Stopped at 45	--	--	1 in 1,800	1 in 950
Stopped at 55	--	--	1 in 800	1 in 400
Never Stopped	1 in 10,000	1 in 2,200	1 in 600	1 in 250

Source:

Halpern, M. T., Gillespie, B. W., & Warner, K. E. (1993). Patterns of absolute risk of lung cancer mortality in former smokers. *Journal of the National Cancer Institute*, 85(6), 457-464.

Coal Workers Pneumoconiosis (CWP)

- *CWP is a medical term for Black Lung*
- CWP is a large factor in respiratory decline but it is preventable
- Normal Lung volume is about 5 liters or 5000 cc
- A miner who smokes and has CWP will lose about 100 cc/year
- A miner who works in a mine with good dust control will lose 5 cc/year

Important Terminology

- Given pictures or verbal descriptions representing the following terms, you will be able to match each term with its picture or description
- The terms are:
 - Personal dust sampler
 - Respirable dust
 - Respirator

Personal Dust Sampler



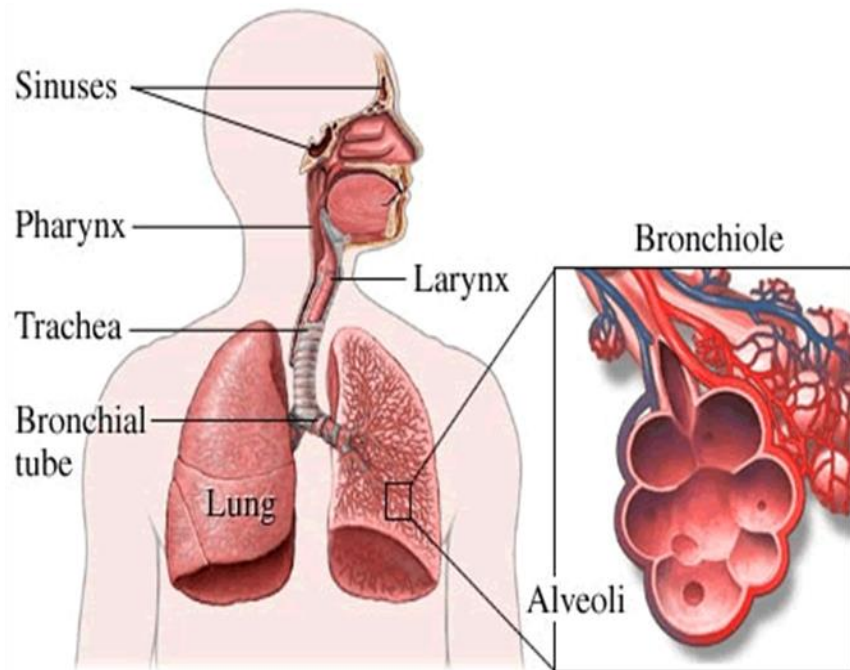
This is a small device, worn on a miner's overalls or placed at a specific location, that is used to measure the amount of dust in the working area. The Mine Safety and Health Administration uses the dust sampler to check the concentration of respirable dust.

New Personal Dust Monitor



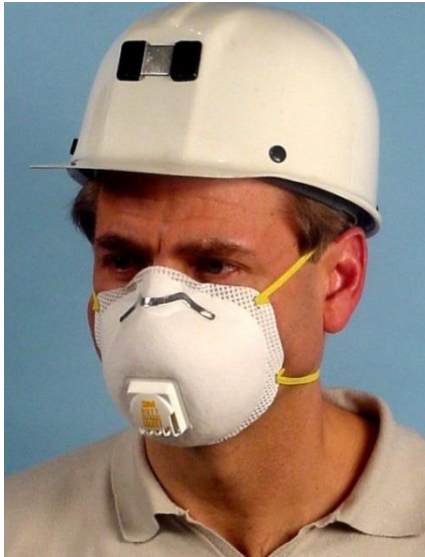
Respirable Dust

This is very fine particles of coal dust that can be carried by air directly into the small air sacs (alveoli) of the lungs. When the dust reaches the air sacs it can be deposited in the lungs. The lungs will then react to these deposits of coal dust. The reaction of the lungs to the deposits of coal dust constitutes the basis of coal workers' pneumoconiosis.



Most coal dust is larger and non-respirable (that is, it cannot reach the air sacs of the lungs)
Respirable dust is too small to be seen by the naked eye.
Respirable coal dust may also cause black lung.

Types of Respiratory Protection



Dust
Filtering
Face
Mask



Air
Helmet



Cartridge
Respirator



Air Stream

Respirators and Protection Factors

TYPE	EXAMPLE	PF
Air Purifying	½ Face	10
	Full Face	50
Powered Air Purifying (PAPR)	Loose Fit (Airstream)	25
	½ Mask	50
	Helmet/Hood	1000
Supplied Air	Continuous Flow	1000
	Pressure Demand	1000
Pressure Demand (Escape)	SCBA	10,000



How to Use a Respirator

- Given pictures or verbal descriptions of correct and incorrect procedures for using a respirator, you will select the correct procedure

Tips for Fitting a Respirator

- Be sure to cover both the nose and mouth with the respirator
- Check to see if the edge of the respirator is flat on your face
- When it's hard to breath, change the filter or throw away a disposable filter

Example of Spirometry (Breathing Test)

Spirometry measures how
fast and how much
air you breathe out



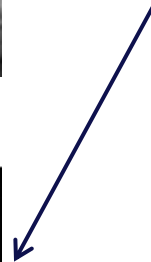
ADAM



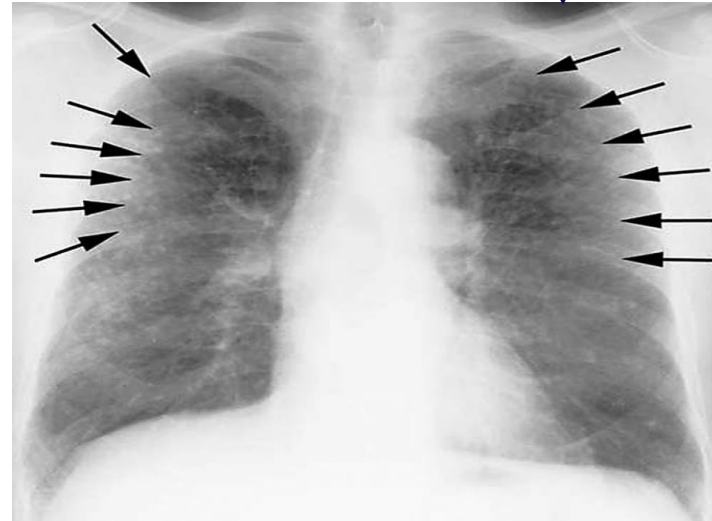
Progressive Massive Fibrosis (PMF)



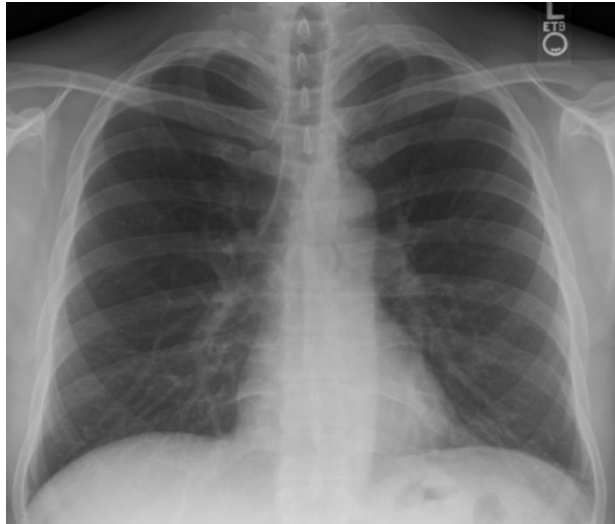
Early Coal Workers
Pneumoconiosis (CWP)



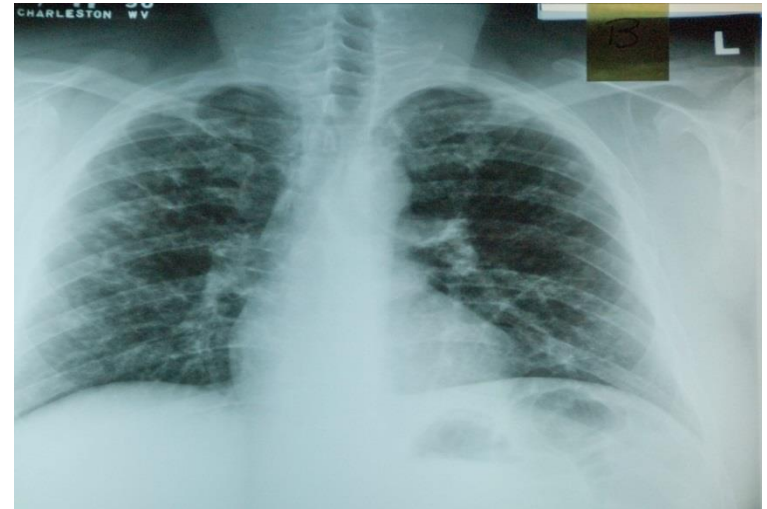
Silicosis



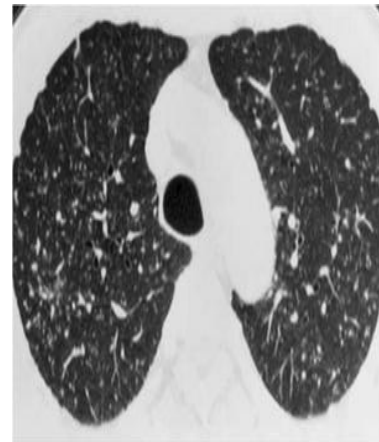
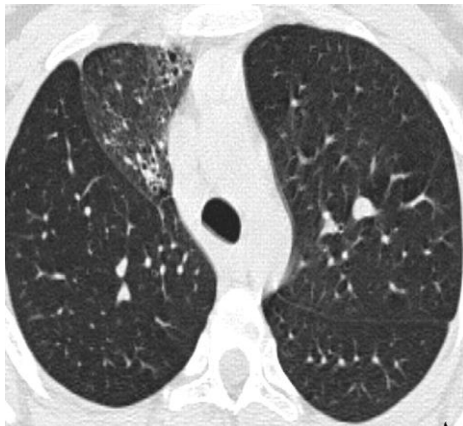
The x-ray presents a small part of the disease



Normal chest x-ray



Simple CWP



Section 2 – Injury and Musculoskeletal Disease

Key Points

- Musculoskeletal diseases are more prevalent in mining than any other occupational group
- Mining equipment is specialized, offering limited space to add interventions

Sources:

Cherry, N. M., Meyer, J. D., Chen, Y., Holt, D. L., & McDonald, J. C. (2001). The reported incidence of work-related musculoskeletal disease in the UK: MOSS 1997–2000. *Occupational Medicine*, 51(7), 450-455.

McMillan, G., & Nichols, L. (2005). Osteoarthritis and meniscus disorders of the knee as occupational diseases of miners. *Occupational and environmental medicine*, 62(8), 567-575.

Common Sources of Knee Pain for Miners

Meniscus disorders and knee arthritis

- Frequency
 - Affects 6-24% of miners
 - 3-6 x higher than comparative light manufacturing workers
- Causes
 - Slips and falls (>50% of knee injuries)
 - Direct pressure from kneeling
 - Shear force (shoveling)
 - Mounting and dismounting equipment is the leading cause of slips and falls on surface mines
- Interventions
 - Non-surgical management (braces, supports and analgesics)

Source:

Cherry, N. M., Meyer, J. D., Chen, Y., Holt, D. L., & McDonald, J. C. (2001). The reported incidence of work-related musculoskeletal disease in the UK: MOSS 1997–2000. *Occupational Medicine*, 51(7), 450-455.

Posture and Joint Loading

*Mining has many awkward postures
Over time, there is wear and tear on joints*



Facts about Knee Pain

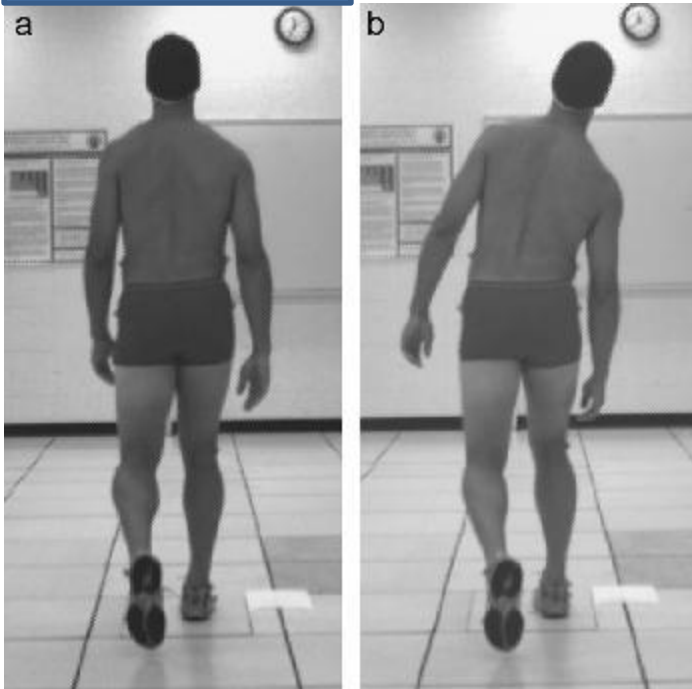
- Most people exhibit few symptoms walking on level ground or at the start of walking from a standing position
- Pain usually occurs when climbing up stairs and standing up from a chair
- Findings on X-rays do not predict disease severity
 - People with abnormal X-rays often have no pain
 - Other times people with minimal findings on X-ray report severe pain

Reducing Force on the Knee

Good posture

Carrying

Movements that push the knee laterally place extra forces on the knee



Source:

Mundermann, A., Asay, J., Mundermann, L., & Andriacchi, T.P. (2008). Implications of increased medio-lateral trunk sway for ambulatory mechanics. *Journal of Biomechanics*, 41(1), 165-170.

Section 3 – Drugs, Intoxicants, and Alcohol

REMEMBER: The currently approved WV Law on the following topics will always take precedence over the slides in this presentation.

Key Points

- Drugs and alcohol are everybody's problem
- Drugs and alcohol use has increased among younger workers
- Help is available through company and community programs

Part A: Drugs and Alcohol Affect Every Miner's Safety

The goal of a drug and alcohol policy is to create a safer, healthier mine for you and for your fellow miners. Its purpose is to protect, not punish.

The idea is to prevent alcohol and drug use and encourage people to voluntarily seek help for alcohol and drug problems BEFORE their behavior becomes a safety hazard.

The science behind these policies is clear

Studies on the effects of alcohol have shown impairment at low Blood Alcohol Concentration(BAC) levels:

- ***All driving-related skills*** showed impairment by .07 BAC
- In studies examining divided attention, vigilance, and simulated piloting, ***73 percent of the tests showed impairment by .039 BAC****

The take-away - Skill and judgment are impaired at very low BAC.

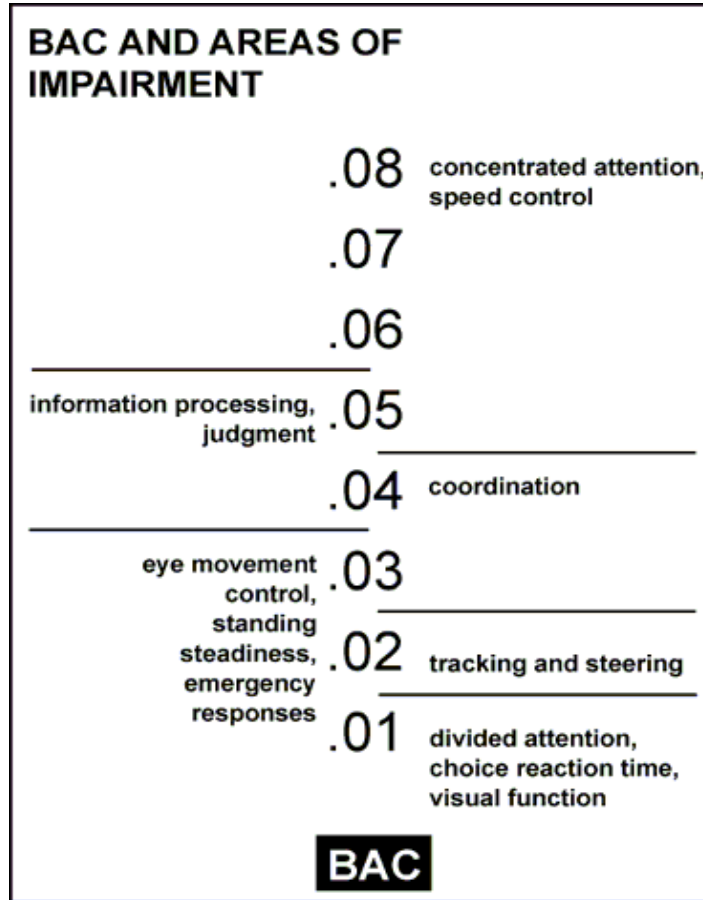
Source:

National Highway Traffic Safety Administration, Traffic Safety Facts Banner, No. 223, May 2000.

Observations on drug and alcohol use and injury at work

- Drug use has increased in the younger work force
- Every year, miners are hurt because their reactions are slowed by drugs or alcohol
- Even two drinks can cause dehydration or fatigue which reduces performance and impairs judgment
- **Worse yet,** *fellow miners are injured or killed by abusers*

Effect of Blood Alcohol Concentration (BAC) on tasks



Source:

www.ct.gov/dmv/cwp/view.aspx?a=813&q=249562

Did you know?

- One drink is defined as:
 - One shot, 1.25 oz., of 80 proof liquor (vodka, scotch)
 - 12 oz. of beer,
 - 5 oz. of wine
- *They all have about the same alcohol content and effect on the body*

Approximate Blood Alcohol Percentage - Males

Drinks in 1 hour	Body Weight in Pounds						
	140	160	180	200	220	240	
0	0	0	0	0	0	0	Only Safe Driving Limit
1	0.03	0.02	0.02	0.02	0.02	0.02	Impairment Begins
2	0.05	0.05	0.04	0.04	0.03	0.03	
3	0.08	0.07	0.06	0.06	0.05	0.05	Driving Skills Affect Possible Criminal Penalties
4	0.11	0.09	0.08	0.08	0.07	0.06	
5	0.13	0.12	0.11	0.09	0.09	0.08	Legally Intoxicated Criminal Penalties

Source:
Pennsylvania Liquor Control Board

Approximate Blood Alcohol Percentage - Females

Drinks in 1 hour	Body Weight in Pounds						
	100	120	140	160	180	200	
0	0	0	0	0	0	0	Only Safe Driving Limit
1	0.05	0.04	0.03	0.03	0.03	0.02	Impairment Begins
2	0.09	0.08	0.07	0.06	0.05	0.05	Driving Skills Affect Possible Criminal Penalties
3	0.14	0.11	0.1	0.09	0.08	0.07	
4	0.18	0.15	0.13	0.11	0.1	0.09	Legally Intoxicated Criminal Penalties
5	0.23	0.19	0.16	0.14	0.13	0.11	

Source:
Pennsylvania Liquor Control Board

Take Note

- For *drivers*, the legal BAC limit is .08
- But for *miners*, the legal BAC limit is .039 for mining
- Most miners will risk decertification after their first drink

How long are alcohol and drugs in your system?

- Alcohol can go through your system in about 24 hours
- Certain drugs will stay in your body for as long as 30 days and they are entirely detectable
- The next 2 slides show how long drugs and alcohol are detectable in your body

Approximate Detection Periods

Substance	Urine	Hair	Blood / Oral Fluid
Alcohol	6–24 hours	up to 2 days	12–24 hours
	Note: Alcohol tests may measure EtG which can stay in urine for up to 80 hours		
Cotinine (a break-down product of nicotine)	2 to 4 days	up to 90 days	2 to 4 days
Amphetamines (except methamphetamine)	1 to 5 days	up to 90 days	12 hours
Methamphetamine	3 to 5 days	up to 90 days	1–3 days
MDMA (Ecstasy)	72 hours	up to 90 days	24 hours
Barbiturates (except phenobarbital)	1 day	up to 90 days	1 to 2 days
Phenobarbital	2 to 3 weeks	up to 90 days	4 to 7 days
Benzodiazepines	Therapeutic use: up to 7 days	up to 90 days	6 to 48 hours
	Chronic use (over one year): 4 to 6 weeks		

Approximate Detection Periods

Substance	Urine	Hair	Blood / Oral Fluid
Cannabis	2 to 7 days, up to >30 days after heavy use and/or in users with high body fat	up to 90 days	2–3 days in blood, up to 2 weeks in blood of heavy users. However, it depends on whether actual THC or THC metabolites are being tested for, the latter having a much longer detection time than the former. THC (found in marijuana) may only be detectable in saliva/oral fluid for 2–24 hours in most cases.
Cocaine	2 to 5 days with exceptions for certain kidney disorders	up to 90 days	2 to 5 days
Codeine	2 to 3 days	90 days	≤1 day
Morphine	2 to 4 days	up to 90 days	1 – 3 days
Heroin	1 to 4 days	up to 90 days	1– 2 days
LSD	12 to 24 hours	Undetectable	2 to 4 days
Methadone	3 days	up to 97 days	24 hours
PCP	3 to 7 days for single use; up to 30 days in chronic users	up to 90 days	1 to 3 days

High Energy Drink (HED) and the Heart

- HEDs
 - are fairly new products and not a lot is known about their long term affects on the body
 - caffeine content varies greatly by brand from 1-3 times as much as an 8oz. cup of coffee
 - they also contain glucose and taurine, an amino acid

But unlike the caffeine in coffee, HEDs additional ingredients, glucose and taurine, can cause increased heart contractibility which places increased stress on the heart.

This means your heart is doing more work than it needs which may cause problems.

Sources:

<http://www.webmd.com/food-recipes/news/20121025/how-much-caffeine-energy-drink>

<http://www.webmd.com/hypertension-high-blood-pressure/news/20131202/energy-drinks-affect-heart-mri-scans-show>

Compounding effects

- A German study conducted by, Dr. Jonas Dörner, pointed out the amount of caffeine in energy drinks is typically up to three times higher than in other drinks like coffee or cola, and high intake of caffeine may trigger rapid heart rate, palpitations, rises in blood pressure and in severe cases, seizures or sudden death
- Effects are compounded by drugs or alcohol

Source:

<http://www.webmd.com/hypertension-high-blood-pressure/news/20131202/energy-drinks-affect-heart-mri-scans-show>

Regulation

- A study by *Consumer Reports* tested 27 popular energy drinks
 - 11 didn't list the amount of caffeine on the label
 - Among the 16 products that did, 5 had more than 20% caffeine than the label claimed
- With little or no regulation, the amounts of caffeine and other ingredients in these drinks are essentially unknown

Source:

<http://www.webmd.com/food-recipes/news/20121025/how-much-caffeine-energy-drink>

How much caffeine am I drinking?

- The average serving of coffee has about 100 mg of caffeine
- The same *Consumer Reports* tests showed 7 HEDs with *more than twice* that amount of caffeine, although the label didn't indicate amounts

HEDs and Insomnia

- HEDs are also linked to insomnia
- Even at work, a tired body will try to get rest
- This means that you may be less likely to detect hazards
- Disruptive sleep causes added stress to the body including decreased mental function, increases in blood pressure, irritability, and decreased work capacity

HED Wrap Up

- HEDs can cause irregularities to your heartbeat (prolonged contractibility)
- HEDs labels don't tell you what's inside, much less how much caffeine is involved
- They are not regulated well
- For sensitive people, they can cause rapid heart rate, palpitations, rises in blood pressure and in severe cases, seizures or sudden death

Source:

<http://www.webmd.com/hypertension-high-blood-pressure/news/20131202/energy-drinks-affect-heart-mri-scans-show>

Part B: What the Apprentice Miner Needs to Know

West Virginia Drug and Alcohol Policies

Substance abuse is not a new topic

- Every year, miners are hurt because their reactions are slowed by drugs or alcohol
- Their ability to predict hazards is reduced
- Worse yet, fellow miners are injured or killed by abusers

West Virginia has problems with substance abuse just like every other state

- But now, the Legislature, the Industry, the Union and the Office of Miners' Health Safety and Training are taking a stronger approach to abuse than in the past. In fact, much stronger
- Miners need to know about these new rules

The State is decertifying miners now

- By the end of 2014, the State will have decertified about 600 miners for violating the state's new drug and alcohol policy
- Protect yourself, protect your career and protect those around you

Know the rules

The policies in everyday language

- **Pre-employment testing** means that all miners will be tested for substance abuse prior to starting work
- New miners should know that they can be called for a drug and alcohol test as soon as a day after passing the 40 or 80 hour certification test

Source: WV Title 56, Series 19. Effective May 10, 2014

Here's what this really means

- A miner might be certified one day, and be called for pre-employment testing on short notice, even the next day
- A miner must be **drug free**

Here are some definitions all miners need to know

These definitions come from the May 10, 2014
“Rules Governing Substance Abuse Screening:
Standards and Procedures”

“Safety-Sensitive Position”

- Means that the person’s job responsibilities include duties and activities that involve the personal safety of the employee or others at the mine
- This is pretty much everyone on the mine site

“Safety-Sensitive” continued

- If you fail a drug or alcohol test, you will lose your “safety sensitive” card
- you lose ALL certifications including your apprentice miners card and...
- you cannot go on mine property

“Serious Accident”

- Means “an accident where bodily injury requires the individual to be admitted to a medical facility overnight for reasons other than strains, sprains or observation as determined by a physician”

In a “Serious Accident”

- If you are in a serious accident, you will be tested
- If you are even involved in the accident, you will be tested

“Random Testing”

- Means that each person has an equal chance of being tested at random and unscheduled times
- Each year, at least 25 percent of miners must be randomly tested for substance abuse
- This occurs at least 4 times per year

“Split Sample”

- Means that part of a urine specimen is sent on to a *second lab* in the event that an *employee requests it* to be tested following a verified positive test of the primary specimen
- *A lab and a doctor* are involved

Something to Know

- If you have an expired prescription, you may not take that medicine until the prescription is renewed
- The law now says that all prescriptions expire after one year
- You can't take your wife's or your friend's prescription, otherwise you risk decertification for taking unlawful medicine(s)

A miner who fails the drug/alcohol test in West Virginia

- Automatically fails in States that have reciprocity with WV
 - For example, Kentucky or other States with reciprocity agreements with West Virginia

Some other things to know

- A refusal to take the test means automatic decertification for a minimum of nine (9) months
- A second refusal (or fail) means permanent decertification; you can never work in West Virginia's mines again and any other state with an agreement with West Virginia

Employers must test urine for at least the following ten substances

- Amphetamines
- Cannabinoids (THC)
- Cocaine
- Opiates
- Phencyclidine (PCP)
- Benzodiazepines
- Propoxyphene
- Methadone
- Barbiturates
- Synthetic narcotics including bath salts and others

There is also a breath test for alcohol

And even though we already said this, it is very important:

- An employer must:
 - Randomly test at least 25% of miners
 - Test at least 4 times per year
 - Test any miner who is “accident-involved”
- The likelihood is that *a user **will get caught***

Miners will face immediate suspension if:

- They test positive for drugs
- They test positive for alcohol
- They possess an adulterated specimen or if they submit an adulterated specimen
- They possess a substituted specimen or if they submit a substituted specimen
- The miner refuses to submit to a drug or alcohol test

Don't forget that an employer can require a test at any time for "reasonable suspicion"

The miner may appeal a suspension

- Within 30 days of the notice of suspension or revocation
- By requesting a hearing by the Board of Appeals
- A miner can then get all of his cards back

A miner under suspension may agree to a treatment plan

The actual legal document that you would sign runs to five pages- - here is part of page 1

**WEST VIRGINIA COAL MINE SAFETY
BOARD OF APPEALS**

IN THE MATTER OF:

WEST VIRGINIA OFFICE OF MINERS'
HEALTH, SAFETY AND TRAINING,
Petitioner,

v.

Respondent.

SUBSTANCE ABUSE TREATMENT AGREEMENT

Comes now the West Virginia Office of Miners' Health, Safety and Training (OMHST), by counsel, Barry L. Koerber, Assistant Attorney General and -----, *pro se*, (hereinafter referred to as the Parties) and set forth the terms and conditions of this Substance Abuse Treatment Agreement (Treatment Agreement) containing the

The treatment agreement says basically this

- The miner must agree and admit that he violated his employer's substance abuse screening policy program
- All certifications are *immediately* suspended
- The miner is *required* to attend substance abuse counseling and treatment
- The miner must comply with applicable laws and rules - violation of the treatment plan results in revocation of certifications for at least three (3) years

There is more to the treatment plan

- The miner will submit samples regularly
- A test failure may result in permanent revocation
- All costs are paid by the miner
- The miner will submit to drug and alcohol testing at least every 30 days, or more often if required by the counselor.
- There will be a permanent record made of all transactions in the treatment plan

To summarize:

- The new rules are designed to protect miners' safety, not to punish them
- The rules are complicated
- The rules are serious
 - A second failure will result in PERMANENT REVOCATION of ALL CERIFICATIONS
- Company policies may exceed the minimum requirements discussed
- Breaking the rules can impact a miner's career and even bar him from future employment

...why take the risk of ruining a career?

Section 4 - Hearing Loss and Hearing Protection

Key Points

- Hearing loss is chronic
- By time you realize you have a hearing loss, it's too late
- Recreation and lifestyle contribute as much to hearing loss as work activities
- As people age their ability to hear diminishes

Hearing Loss in Rural Communities

- 40-50% of males 18-27 years of age in rural communities have some hearing loss
- Nationally, only 12.5% of males in this age group have hearing loss
- Main reasons for increased hearing loss are from lifestyle:
 - Farm machinery/lawn care equipment
 - ATVs/motorcycles
 - Firearms/hunting
 - Personal music devices (iPods)

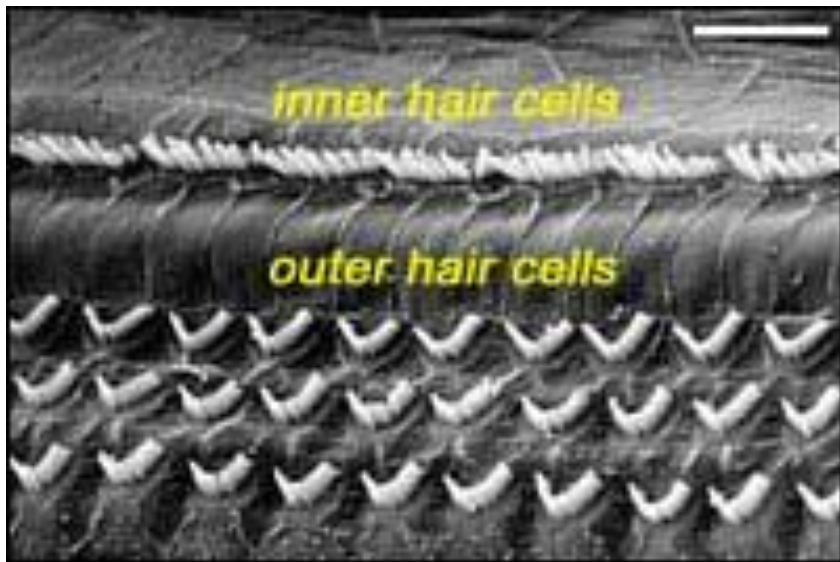
Source:

Humann, M.S., Sanderson, W., Flamme, G., Kelly, K., Moore G., Stromquist, A., & Merchant, J.A. (2011). Noise Exposures of Rural Adolescents. *The Journal of Rural Health* (27), 72-80.

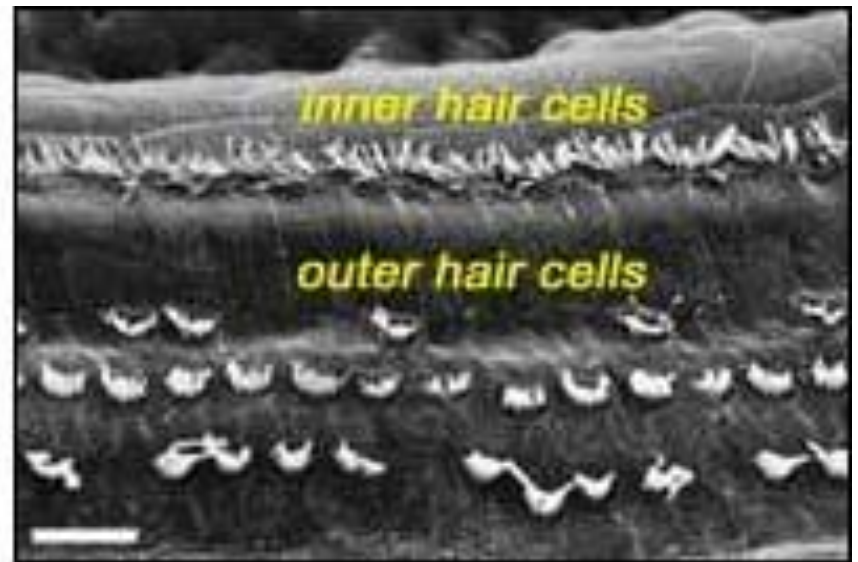
Consequences of Exposure to Noise

- Immediate short-term effects may involve:
 - temporary hearing loss
 - ringing in, or “dullness” of, the ears (tinnitus)
 - difficulty understanding speech
 - difficulty hearing sounds around you (e.g., warnings)
 - stress, and fatigue
- Persistent long-term effects may include:
 - hearing loss & tinnitus
 - reduced ability to understand speech
 - reduced ability to hear all sounds
 - cardiovascular disease

Photomicrographs of normal hairs and hair cells in the inner ear damaged by noise, causing hearing loss (plan views below)

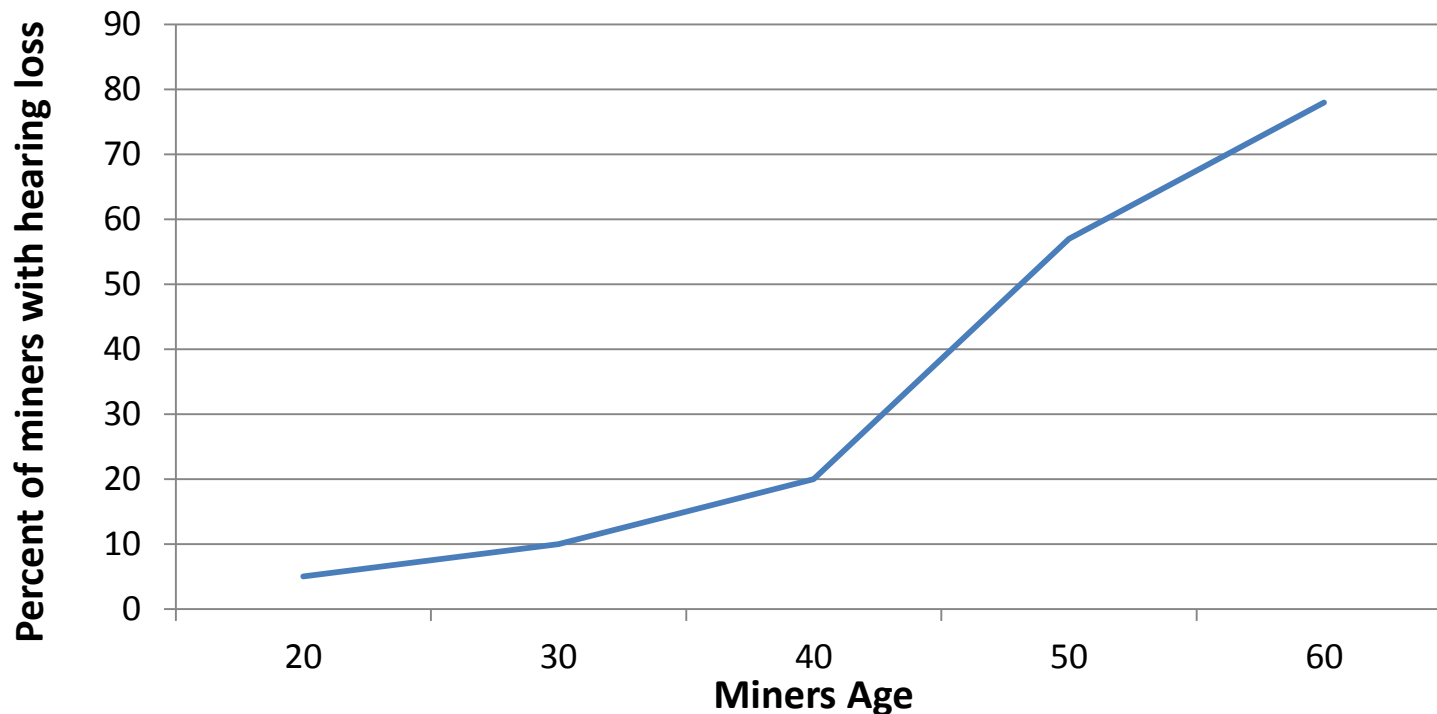


Normal



Damaged

Percentage of US miners with hearing loss as a function of age showing almost 80% have mild hearing loss, >25dB, by age 60



Source:

Bauer, E.R., Spencer, E.R., Smith, A.K., & Hudak, R.L. (2007). Reducing Noise-induced Hearing Loss in Longwall Coal Mine Workers: NIOSH's Approach. *National Institute for Occupational Safety and Health, Pittsburgh Research Laboratory, Hearing Loss Prevention Branch.*

Noise exposure data for mining occupations showing the percentage of samples that exceeded the threshold for affecting hearing (>80 dBA), and the percentage that exceeded the threshold for causing substantial hearing loss (>90 dBA)

Occupation	# of Samples	90-dBA threshold	80-dBA threshold
		% of samples >90 dBA(PEL)	% of samples >80 dBA(PEL)
Scoop Car Operator	94	18.1	74.5
Cleaning Plant Operator	107	36.4	77.6
Bulldozer Operator	225	48.9	94.2
Fron-end-Loader Operator	244	16	76.6
High-wall Drill Operator	83	21.7	77.1
Refuse/Backfill Truck Driver	162	13.6	78.4
Coal Truck Driver	28	17.9	64.3

Source:

Bauer, E. R., & Kohler, J. L. (2000, August). Cross-sectional survey of noise exposure in the mining industry. In *Proceedings of the 31st Annual Institute of Mining Health, Safety and Research*. Blacksburg, VA: Virginia Polytechnic Institute and State University, Department of Mining and Minerals Engineering , 17-31.

How can you tell if your hearing is affected?

- Do you have to turn up the volume on television?
- Do you frequently have to ask others to repeat things?
- Do you have difficulty understanding when you are in groups or in noisy situations?
- Do you have to sit in the front in meetings or in church to understand?
- Do you have difficulty understanding women or young children?
- Do you have trouble knowing where sounds are coming from?
- Are you unable to understand when someone talks to you from another room?
- Have others told you that you don't seem to hear them?
- Do you avoid family meetings or social situations because you 'can't understand'?
- Do you have ringing or other noises (tinnitus) in your ears?

How did you score?

3 or less = no symptoms of hearing loss

3 to 5 = signs of slight hearing loss

5 to 7 = signs of moderate hearing loss

More than 7 = signs of significant hearing loss

What can be done

At work:

- Reduce the noise of machines and machinery
- Change work practices and/or adjust schedules to reduce exposure to noisy situations
- Wear hearing protection (muffs or plugs)

While the first two items may not be within your control as a miner, wearing hearing protection is. (See next slide)

You can decrease your noise exposure by simply moving further away from the source, if possible. For example, standing 5 feet from a 96 dB(A) noise source is hazardous but if you can increase your distance to 20ft the noise drops to 84 dB(A)

Source:

Oregon OSHA's Quick Guide to Hearing Protection <http://www.orosha.org/pdf/pubs/3349.pdf>

What can be done

Away from work:

- Reduce noise exposure (as it adds to the effect of exposure at work)
 - Wear hearing protection when working around your home, e.g., using chainsaws, weed whackers, tractors, or mowing the lawn
 - Wear hearing protection when participating in noisy hobbies such as shooting or hunting, motorcycling, wood working, or attending loud concerts or bars
 - Guns and chain saws produce noise in excess of 100 dB(A), motorcycles and snowmobiles in excess of 90 dB(A), and power tools for garden or woodworking in excess of 80 dB(A)
- Avoid excessive alcohol consumption, or smoking
- Pay attention to heart health to reduce the cardiovascular effects of noise (e.g., diet, exercise)

Hearing Protection

Types:

- Earplugs
 - Fit inside the ear canal
 - To be effective, need to total block the canal and create an airtight seal
 - Dirty or worn-out plugs will not seal the canal and may irritate it



- Earmuffs
 - Fit over the ear
 - Do not fit properly over glasses or long hair



Both types are equally effective. Using them together increases protection against high noise levels, over 105 dB(A). You should chose the hearing protection that is the most convenient, compatible and comfortable for you.

Source:

Oregon OSHA's Quick Guide to Hearing Protection <http://www.oro sha.org/pdf/pubs/3349.pdf>

Section 5 - Miner's and Operator Rights and Responsibilities

Section 6 – Lifestyle Factors and Cardiovascular Disease

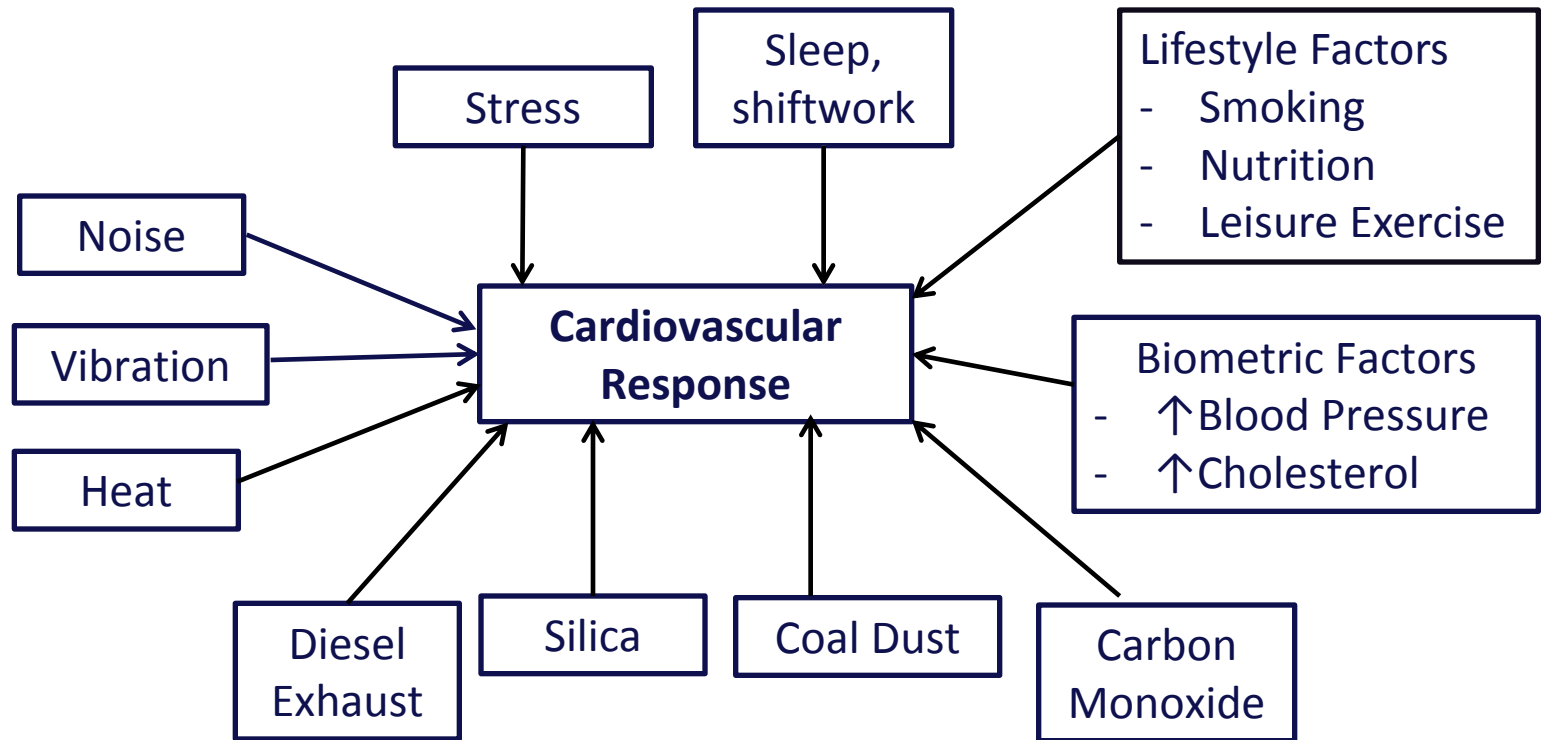
Key Points

- Lifestyle factors contribute more to cardiovascular disease than work activity
- Smoking, diet, and exercise are key factors

Whole Health Considerations

- From ages 25 - 55, the risk of a heart attack or a stroke goes up 10 times
- A 25 year old who smokes, has high blood pressure and high cholesterol has a 1 in 70 chance of having a heart attack or stroke by age 35
- At age 55, his or her odds are 1 in 8 (12.5%). The odds are almost 1 in 2 (50%) if you add in diabetes
- At 55, if you don't smoke, control your blood pressure and your cholesterol and fats and are not diabetic, the odds are no higher than 1 in 50 (<2%)

Health Exposures Contributing to Heart Disease



Sleep

- Sleep provides many benefits:
 - Gives the body a chance to rest and recover
 - Boosts memory
 - Reduces stress
 - Impacts a person's weight
- Sleep deprivation changes brain patterns and interferes with the production of “hunger hormones” causing you crave food even though you are not hungry

Fatigue

- Fatigue is the decline in mental and/or physical performance that results from prolonged exertion, lack of quality sleep, or disruption of the internal body clock
- Fatigue affects work performance and increases likelihood of errors
- The consequences of fatigue include:
 - Reduced alertness
 - Poor and slow perception
 - Sleepiness
 - Long-term health problems (associated with chronic fatigue)

Source:

Health and Safety Executive (2006). *Managing Shift Work*. Suffolk, England: HSE Books.

Sleep Aides

- Sleeping pills are not meant to be long-term solutions for better sleep
 - They become less effective with prolonged use
- They may create dependency issues
- They do not address the root cause of sleep problems
- Over-the-counter sleep aids may cause severe prolonged drowsiness that can carry over to your commute and your work

Stress

- Stress is the brain's response to any demand
- Chronic stress impairs you both mentally and physically
 - Mental signs
 - Anxiety (worry, self-doubt)
 - Depression (sad moods, feelings of hopelessness)
 - Physical signs
 - Stomach and digestive problems
 - High blood pressure
 - Insomnia
 - Frequent colds/illnesses
 - Headaches
 - Fatigue

Exercise is Good for Stress

- Exercise has immediate and long-term psychological benefits, such as:
 - Releasing feel-good chemicals (endorphins), creating a relaxed state
 - Promoting positive mood and well-being
 - Reduces anxiety
 - Reducing depression when performed regularly
 - The total amount of exercise is most important, just doing something on a regular basis

Section 7 – Outdoor Risks

Key Points

- Be aware of the outdoor environment and prepare appropriately
- Snakes and spiders can pose a risk
- Safety and health applies at home and work

Outdoor Environment - Heat



- Heat related conditions:
 - Heat stroke (most serious condition)
 - Heat Exhaustion
 - Heat Syncope (fainting)
 - Heat Cramps
- Symptoms of Heat Overexposure
 - High body temperature
 - Headache
 - Muscle Cramps
 - Dizziness
 - Profuse sweating or no sweating

Source:

CDC <http://www.cdc.gov/niosh/topics/heatstress/>

Outdoor Environment - Heat

- Recommendations for working in the heat:
 - Drink water frequently. Drink enough water that you never become thirsty. Approximately 1 cup every 15-20 minutes – 24-32oz/hour
 - Avoid alcohol
 - Avoid drinks with large amounts of caffeine or sugar
 - Monitor your physical condition and that of your coworkers

Source:

CDC <http://www.cdc.gov/niosh/topics/heatstress/>

Outdoor Environment - Cold

- Cold Related conditions:
 - Hypothermia
 - Frostbite
- Symptoms of cold exposure:
 - Shivering
 - Fatigue
 - Loss of coordination, confusion, disorientation
 - Numbness, tingling or bluish color of hands, feet, ears, nose

Source:
CDC <http://www.cdc.gov/niosh/topics/coldstress/>

Outdoor Environment - Cold

- Recommendations for working in the cold:
 - Wear appropriate clothing
 - Wear several layers of loose clothing. Layering provides better insulation
 - Make sure to protect the ears, face, hands and feet in extremely cold weather
 - Monitor your physical condition and that of your coworkers

Source:

CDC <http://www.cdc.gov/niosh/topics/coldstress/>

Wildlife

- West Virginia has poisonous snakes and spiders



Timber
Rattlesnake



Northern
Copperhead



Black Widow



Brown
Recluse

Source:

Marshall University: https://www.marshall.edu/herp/pages/Snakes_Index.htm

WV Department of Agriculture:

<http://www.agriculture.wv.gov/divisions/comm/Documents/Publications%20PDF%20ONLY/Publications/Spiders.pdf>

Parting Thoughts

- An apprentice miner who has suitable protection against exposures at work and takes preventive health measures outside of work will live as long as the general US population
- Good dust control and selective use of respiratory protection can eliminate loss of lung function later in life
- Abuse of substances are easily detected with existing required screening and can lead to lifetime loss of employment in mining
- Passive routine health and lung checks may not be enough. Miners are expected to be active participants in their own safety and health

Appendix 3b. Underground Mining Course

The following “Health and Sanitation” material of the 80 Hour Underground Miner Pre-Employment Training Program was developed by the University of Connecticut, Division of Occupational and Environmental Medicine, in conjunction with the West Virginia University Mining and Industrial Extension.

The developers wish to acknowledge the Alpha Foundation as the Project Funder.

All findings and conclusions are those of the authors and do not necessarily represent the views of the Foundation and any mention of a company or product does not constitute an endorsement of the Foundation.

Health and Sanitation Unit

80 Hour Course

Topic Areas:

1. Lung Disease and it Prevention
2. Injury and Musculoskeletal Diseases
3. Drugs, Intoxicants, and Alcohol
4. Hearing Loss and Hearing Protection
5. Lifestyle Factors and Cardiovascular Disease
6. Sanitation Laws

Section 1 – Lung Disease and Prevention

Key Points

- Lifestyle factors contribute more to cardiovascular disease than work activity
- A coal miner can reduce his chance of lung disease by not smoking and minimizing dust exposure
- In order for a respirator to work properly it must be fit tested

Health Term Definitions

Given lists of definitions and the following terms, the trainee should be able to correctly match each definition to each term:

1. Black Lung
2. Respirable dust
3. Respirator
4. Personal Dust Sampler/Personal Dust Monitor (PDM)
5. Ear Protection

Respirable Dust and Disease

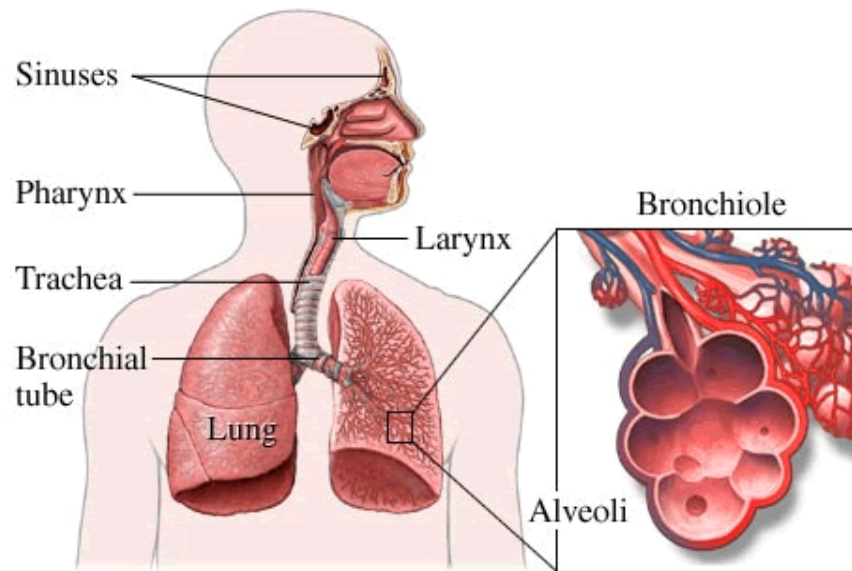
One of the chief health hazards in the coal mining industry is breathing particles of coal dust that can lead to black lung.

The State of West Virginia and the Federal Government have recognized that breathing coal dust can cause black lung. By 1971 both the State and Federal Governments had passed laws providing benefits for miners who had contracted black lung.

It is important for you to learn some basic information about the presence of dust in the coal mine and how it can be controlled.

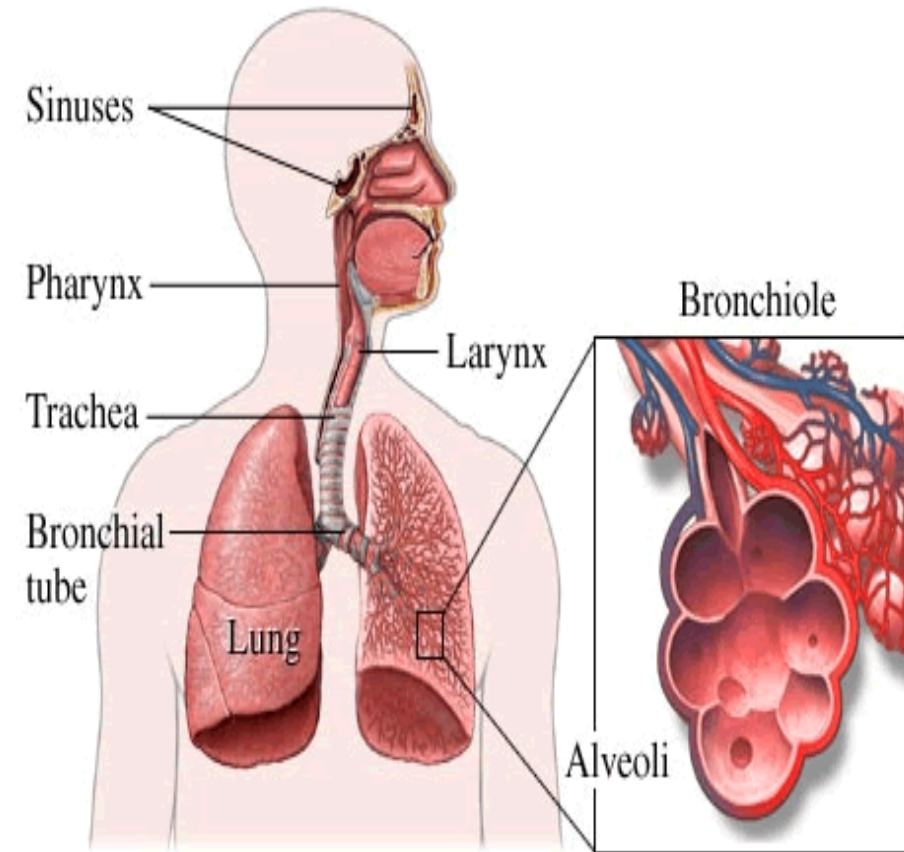
Respirable Dust

Respirable dust is very fine particles of coal dust that can be carried by air directly into the small air sacs (alveoli) of the lungs. When the dust reaches the air sacs it can be deposited in the lungs. The lungs will then react to these deposits of coal dust. The reaction of the lungs to the deposits of coal dust constitutes the basis of coal workers' pneumoconiosis.



Respirable dust is too small to be seen by the naked eye. Most coal dust is larger and non-respirable (that is, it cannot reach the air sacs of the lungs); it may also cause black lung.

Respirable Dust



When the larger particles of non-respirable coal dust collect in the mouth, nose and throat, you will find yourself coughing them up and spitting them out. This is a natural process of the filtering action of your body. It is a good sign to spit out coal dust. Then it is not part of your lungs.

Lung Cancer and Coal Mining

- The largest risk factor for cancer is smoking
 - ~ 80-90% of smokers have some lung damage
- Silica dust is a possible carcinogen
- Miners need to follow procedures to control dust;
 - Surface watering
 - Door seal maintenance
 - Positive pressure in vehicle cabs

Playing the Odds

Age at Smoking Cessation	Odds of Dying from Lung Cancer at Specific Age			
	35	45	55	65
Never Started	0	1 in 25,000	1 in 14,000	1 in 5,000
Stopped at 35	0	<1 in 25,000	1 in 3,600	1 in 1,600
Stopped at 45	--	--	1 in 1,800	1 in 950
Stopped at 55	--	--	1 in 800	1 in 400
Never Stopped	1 in 10,000	1 in 2,200	1 in 600	1 in 250

Source:

Halpern, M. T., Gillespie, B. W., & Warner, K. E. (1993). Patterns of absolute risk of lung cancer mortality in former smokers. *Journal of the National Cancer Institute*, 85(6), 457-464.

Coal Workers Pneumoconiosis (CWP)

- *CWP is a medical term for Black Lung*
- CWP is a large factor in respiratory decline but it is preventable
- Normal Lung volume is about 5 liters or 5000 cc
- A miner who smokes and has CWP will lose about 100 cc/year
- A miner who works in a mine with good dust control will lose 5 cc/year

Coal Workers Pneumoconiosis (CWP)

Coal miners and public health officials have long been concerned about occupational health hazards in coal mining. That concern produced the Federal Coal Mine Health and Safety Act of 1969 with its regulations concerning dust suppression and noise reduction.

One health hazard that has been a continuing concern to many people is black lung. We have learned in another lesson that black lung is caused by breathing in and keeping particles of coal dust in the lungs. These particles of coal dust build up slowly over a long time and gradually interfere with breathing.

Black lung is a complicated disease. In a sense, however, it can simply be thought of as a disease, caused from breathing coal dust, that makes it hard to breathe.

Four Diseases of Black Lung

At least four diseases have been identified under the term black lung:

1. Simple Coal Workers' Pneumoconiosis is caused by breathing in and retaining very small particles of coal dust. It can be detected by X-rays of miners' lungs. The symptom of simple pneumoconiosis is shortness of breath
2. Complicated Pneumoconiosis is a very serious disease caused by long-term breathing of small coal dust particles. If a miner has this disease it will show up as large black areas on his lung X- ray

Four Diseases of Black Lung

3. Emphysema is caused by breathing larger (respirable) dust particles. This disease can be observed by medical tests and the major symptom is shortness of breath
4. Chronic Bronchitis disease is also caused by breathing large dust particles and symptoms are shortness of breath and coughing

Decrease the Chance of CWP

You and the industry should work together to reduce the chance of you getting black lung. The mining company can do its part by providing up-to-date mining equipment and adequate ventilation. You can do your part by maintaining that equipment and ventilation system and by wearing your respirator.

Respirators

The respirator is one of the more useful pieces of equipment the miner takes with him into the mine. If it is worn, it will filter both breathable and non-breathable coal dust from the air. This filtering could help keep you from contracting black lung. The respirator functions much like the air filter of your car. When dust is present in the air of the mine and you breathe it in through the respirator, it will filter the dust out of the air.

Respirators



A device that is worn over the nose and mouth of the miner to filter out both respirable and non-respirable coal dust. Whenever dusty conditions occur in the mine, it is very important for you to wear your respirator.

Respirators

Students will learn the correct procedure for using the respirator.

The basic steps to remember when using a mine respirator are:

1. Be sure to cover both your nose and your mouth with the respirator
2. Check to see if the edge of the respirator is flat on your face
3. If it becomes difficult to breathe, change the filter in the respirator or throw away the respirator if it is a disposable one



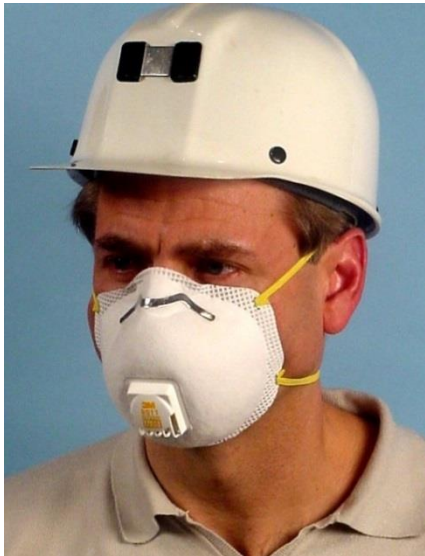
Respirators

It may take you a few minutes to get used to working in the mine wearing a respirator. For example, it may be a little more difficult to breathe with the respirator on even when it is not clogged with dust. This can happen because you must pull air through the filter with it on, and you usually do not have to do that.

Whenever you think that your breathing is labored in the mine, you should check to see if the filter is clogged. Of course, our breathing occasionally requires more effort because we have been working hard.

The instructor will now review the two types of respirators. The disposable type and the replaceable type. Also changing the filter in the renewable type will be demonstrated.

Types of Respiratory Protection



Dust
Filtering
Face
Mask



Air
Helmet



Cartridge
Respirator



Air Stream

Respirators and Protection Factors

TYPE	EXAMPLE	PF
Air Purifying	½ Face	10
	Full Face	50
Powered Air Purifying (PAPR)	Loose Fit (Airstream)	25
	½ Mask	50
	Helmet/Hood	1000
Supplied Air	Continuous Flow	1000
	Pressure Demand	1000
Pressure Demand (Escape)	SCBA	10,000



Example of Spirometry (Breathing Test)

Spirometry measures how fast and how much air you breathe out



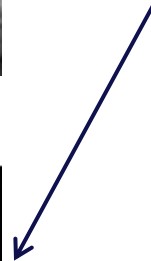
ADAM



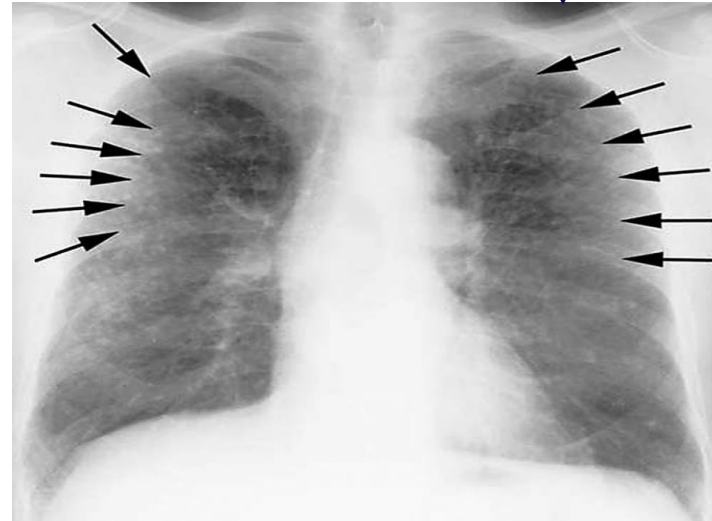
Progressive Massive Fibrosis (PMF)



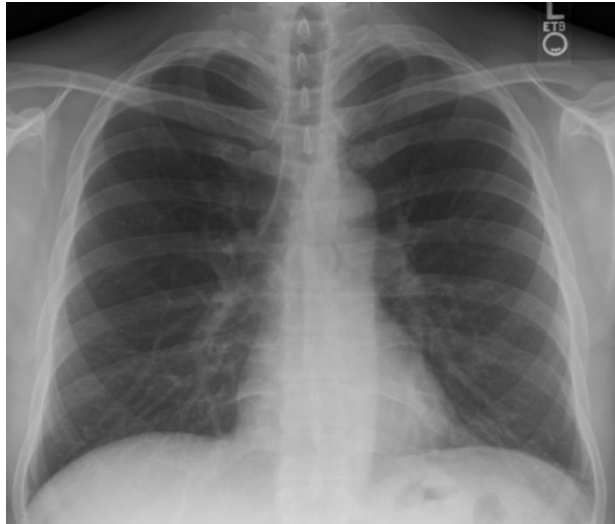
Early Coal Workers
Pneumoconiosis (CWP)



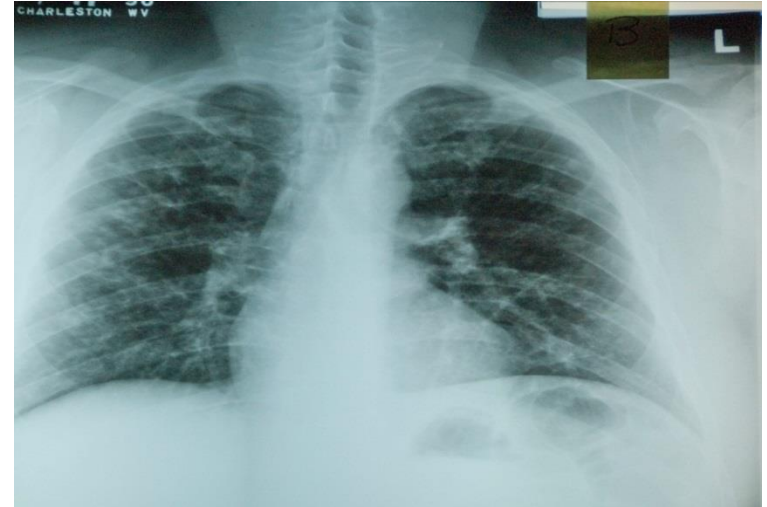
Silicosis



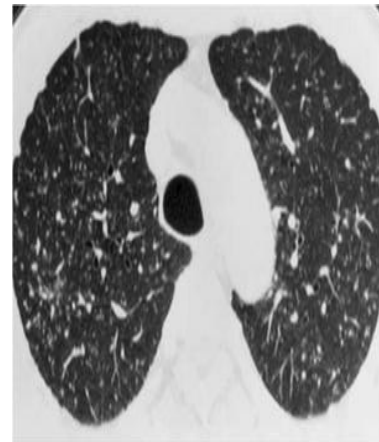
The x-ray presents a small part of the disease



Normal chest x-ray



Simple CWP



Personal Dust Sampler

This is a small device, worn on a miner's overalls or placed at a specific location, that is used to measure the amount of dust in the working area. The Mine Safety and Health Administration uses the dust sampler to check the concentration of respirable dust.



New Personal Dust Monitor



Dust Control Devices

To keep the dust levels in the mine to as low a level as possible, mining machinery is often equipped with dust control devices. These devices include:

1. Water Spray
2. Dust Fans
3. Dust Collectors



Dust Control

For your health and safety in an underground coal mine, it is very important to reduce and control coal dust in the mine air.

It is important to reduce dust because it can cause black lung and also reduce vision in the mine. When your vision is reduced by dust, you can get into an accident because you cannot see dangers around you.



Dust Control

The Federal Coal Mine Health and Safety Act of 1969 requires that you be protected from dangers related to dust in the mine by the use of water sprays, ventilation (fans) and dust collectors.



Dust Control

Cleaning dust box
on roof bolting
machine.



Dust Control

You will find that all of these methods are used in most modern mines.

All of these devices are for your protection. You should never disconnect or dismantle any of these devices!

If any of the dust collection devices become damaged or defective, report it to your foreman so they can be repaired.

Also, if a ventilation curtain is knocked down near the face, it will upset the control of dust in that area. Replace the curtain at once.

Section 2 – Injury and Musculoskeletal Disease

Key Points

- Musculoskeletal diseases are more prevalent in mining than any other occupational group
- Mining equipment is specialized, offering limited space to add interventions

Sources:

Cherry, N. M., Meyer, J. D., Chen, Y., Holt, D. L., & McDonald, J. C. (2001). The reported incidence of work-related musculoskeletal disease in the UK: MOSS 1997–2000. *Occupational Medicine*, 51(7), 450-455.

McMillan, G., & Nichols, L. (2005). Osteoarthritis and meniscus disorders of the knee as occupational diseases of miners. *Occupational and environmental medicine*, 62(8), 567-575.

Common Sources of Knee Pain for Miners

Meniscus disorders and knee arthritis

- Frequency
 - Affects 6-24% of miners
 - 3-6 x higher than comparative light manufacturing workers
- Causes
 - Slips and falls (>50% of knee injuries)
 - Direct pressure from kneeling
 - Shear force (shoveling)
 - Mounting and dismounting equipment is the leading cause of slips and falls on surface mines
- Interventions
 - Non-surgical management (braces, supports and analgesics)

Source:

Cherry, N. M., Meyer, J. D., Chen, Y., Holt, D. L., & McDonald, J. C. (2001). The reported incidence of work-related musculoskeletal disease in the UK: MOSS 1997–2000. *Occupational Medicine*, 51(7), 450-455.

Posture and Joint Loading

*Mining has many awkward postures
Over time, there is wear and tear on joints*



Facts about Knee Pain

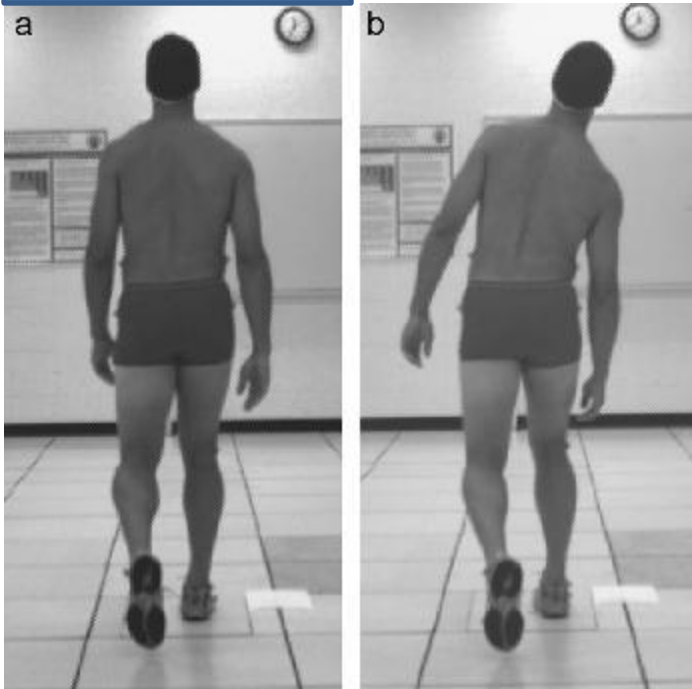
- Most people exhibit few symptoms walking on level ground or at the start of walking from a standing position
- Pain usually occurs when climbing up stairs and standing up from a chair
- Findings on X-rays do not predict disease severity
 - People with abnormal X-rays often have no pain
 - Other times people with minimal findings on X-ray report severe pain

Reducing Force on the Knee

Good posture

Carrying

Movements that push the knee laterally place extra forces on the knee



Source:

Mundermann, A., Asay, J., Mundermann, L., & Andriacchi, T.P. (2008). Implications of increased medio-lateral trunk sway for ambulatory mechanics. *Journal of Biomechanics*, 41(1), 165-170.

Section 3 – Drugs, Intoxicants, and Alcohol

REMEMBER: The currently approved WV Law on the following topics will always take precedence over the slides in this presentation.

Key Points

- Drugs and alcohol are everybody's problem
- Drugs and alcohol use has increased among younger workers
- Help is available through company and community programs

Part A: Drugs and Alcohol Affect Every Miner's Safety

The goal of a drug and alcohol policy is to create a safer, healthier mine for you and for your fellow miners. Its purpose is to protect, not punish.

The idea is to prevent alcohol and drug use and encourage people to voluntarily seek help for alcohol and drug problems BEFORE their behavior becomes a safety hazard.

The science behind these policies is clear

Studies on the effects of alcohol have shown impairment at low Blood Alcohol Concentration(BAC) levels:

- ***All driving-related skills*** showed impairment by .07 BAC
- In studies examining divided attention, vigilance, and simulated piloting, ***73 percent of the tests showed impairment by .039 BAC****

The take-away - Skill and judgment are impaired at very low BAC.

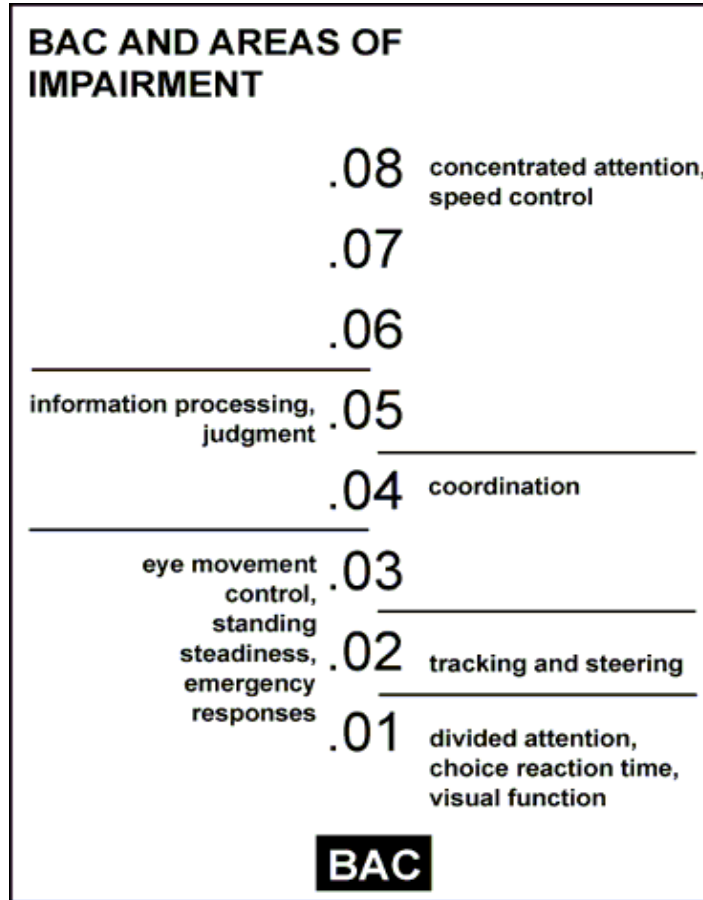
Source:

National Highway Traffic Safety Administration, Traffic Safety Facts Banner, No. 223, May 2000.

Observations on drug and alcohol use and injury at work

- Drug use has increased in the younger work force
- Every year, miners are hurt because their reactions are slowed by drugs or alcohol
- Even two drinks can cause dehydration or fatigue which reduces performance and impairs judgment
- **Worse yet,** *fellow miners are injured or killed by abusers*

Effect of Blood Alcohol Concentration (BAC) on tasks



Source:

www.ct.gov/dmv/cwp/view.aspx?a=813&q=249562

Did you know?

- One drink is defined as:
 - One shot, 1.25 oz., of 80 proof liquor (vodka, scotch)
 - 12 oz. of beer
 - 5 oz. of wine
- *They all have about the same alcohol content and effect on the body*

Approximate Blood Alcohol Percentage - Males

Drinks in 1 hour	Body Weight in Pounds						
	140	160	180	200	220	240	
0	0	0	0	0	0	0	Only Safe Driving Limit
1	0.03	0.02	0.02	0.02	0.02	0.02	Impairment Begins
2	0.05	0.05	0.04	0.04	0.03	0.03	
3	0.08	0.07	0.06	0.06	0.05	0.05	Driving Skills Affect Possible Criminal Penalties
4	0.11	0.09	0.08	0.08	0.07	0.06	
5	0.13	0.12	0.11	0.09	0.09	0.08	Legally Intoxicated Criminal Penalties

Source:
Pennsylvania Liquor Control Board

Approximate Blood Alcohol Percentage - Females

Drinks in 1 hour	Body Weight in Pounds						
	100	120	140	160	180	200	
0	0	0	0	0	0	0	Only Safe Driving Limit
1	0.05	0.04	0.03	0.03	0.03	0.02	Impairment Begins
2	0.09	0.08	0.07	0.06	0.05	0.05	Driving Skills Affect Possible Criminal Penalties
3	0.14	0.11	0.1	0.09	0.08	0.07	
4	0.18	0.15	0.13	0.11	0.1	0.09	Legally Intoxicated Criminal Penalties
5	0.23	0.19	0.16	0.14	0.13	0.11	

Source:
Pennsylvania Liquor Control Board

Take note

- For *drivers*, the legal BAC limit is .08
- But for *miners*, the legal BAC limit is .039 for mining
- Most miners will risk decertification after their first drink

How long are alcohol and drugs in your system?

- Alcohol can go through your system in about 24 hours
- Certain drugs will stay in your body for as long as 30 days and they are entirely detectable
- The next 2 slides show how long drugs and alcohol are detectable in your body

Approximate Detection Periods

Substance	Urine	Hair	Blood / Oral Fluid
Alcohol	6–24 hours	up to 2 days	12–24 hours
	Note: Alcohol tests may measure EtG which can stay in urine for up to 80 hours		
Cotinine (a break-down product of nicotine)	2 to 4 days	up to 90 days	2 to 4 days
Amphetamines (except methamphetamine)	1 to 5 days	up to 90 days	12 hours
Methamphetamine	3 to 5 days	up to 90 days	1–3 days
MDMA (Ecstasy)	72 hours	up to 90 days	24 hours
Barbiturates (except phenobarbital)	1 day	up to 90 days	1 to 2 days
Phenobarbital	2 to 3 weeks	up to 90 days	4 to 7 days
Benzodiazepines	Therapeutic use: up to 7 days	up to 90 days	6 to 48 hours
	Chronic use (over one year): 4 to 6 weeks		

Approximate Detection Periods

Substance	Urine	Hair	Blood / Oral Fluid
Cannabis	2 to 7 days, up to >30 days after heavy use and/or in users with high body fat	up to 90 days	2–3 days in blood, up to 2 weeks in blood of heavy users. However, it depends on whether actual THC or THC metabolites are being tested for, the latter having a much longer detection time than the former. THC (found in marijuana) may only be detectable in saliva/oral fluid for 2–24 hours in most cases.
Cocaine	2 to 5 days with exceptions for certain kidney disorders	up to 90 days	2 to 5 days
Codeine	2 to 3 days	90 days	≤1 day
Morphine	2 to 4 days	up to 90 days	1 – 3 days
Heroin	1 to 4 days	up to 90 days	1– 2 days
LSD	12 to 24 hours	Undetectable	2 to 4 days
Methadone	3 days	up to 97 days	24 hours
PCP	3 to 7 days for single use; up to 30 days in chronic users	up to 90 days	1 to 3 days

High Energy Drink (HED) and the Heart

- HEDs
 - are fairly new products and not a lot is known about their long term affects on the body
 - caffeine content varies greatly by brand from 1-3 times as much as an 8oz. cup of coffee
 - they also contain glucose and taurine, an amino acid

But unlike the caffeine in coffee, HEDs additional ingredients, glucose and taurine, can cause increased heart contractibility which places increased stress on the heart.

This means your heart is doing more work than it needs which may cause problems.

Sources:

<http://www.webmd.com/food-recipes/news/20121025/how-much-caffeine-energy-drink>

<http://www.webmd.com/hypertension-high-blood-pressure/news/20131202/energy-drinks-affect-heart-mri-scans-show>

Compounding effects

- A German study conducted by, Dr. Jonas Dörner, pointed out the amount of caffeine in energy drinks is typically up to three times higher than in other drinks like coffee or cola, and high intake of caffeine may trigger rapid heart rate, palpitations, rises in blood pressure and in severe cases, seizures or sudden death
- Effects are compounded by drugs or alcohol

Source:

<http://www.webmd.com/hypertension-high-blood-pressure/news/20131202/energy-drinks-affect-heart-mri-scans-show>

Regulation

- A study by *Consumer Reports* tested 27 popular energy drinks.
 - 11 didn't list the amount of caffeine on the label
 - Among the 16 products that did, 5 had more than 20% caffeine than the label claimed
- With little or no regulation, the amounts of caffeine and other ingredients in these drinks are essentially unknown

Source:

<http://www.webmd.com/food-recipes/news/20121025/how-much-caffeine-energy-drink>

How much caffeine am I drinking?

- The average serving of coffee has about 100 mg of caffeine
- The same *Consumer Reports* tests showed 7 HEDs with *more than twice* that amount of caffeine, although the label didn't indicate amounts

HEDs and Insomnia

- HEDs are also linked to insomnia
- Even at work, a tired body will try to get rest
- This means that you may be less likely to detect hazards
- Disruptive sleep causes added stress to the body including decreased mental function, increases in blood pressure, irritability, and decreased work capacity

HED Wrap Up

- HEDs can cause irregularities to your heartbeat (prolonged contractibility)
- HEDs labels don't tell you what's inside, much less how much caffeine is involved
- They are not regulated well
- For sensitive people, they can cause rapid heart rate, palpitations, rises in blood pressure and in severe cases, seizures or sudden death

Source:

<http://www.webmd.com/hypertension-high-blood-pressure/news/20131202/energy-drinks-affect-heart-mri-scans-show>

Part B: What the Apprentice Miner Needs to Know

West Virginia Drug and Alcohol Policies

Substance abuse is not a new topic

- Every year, miners are hurt because their reactions are slowed by drugs or alcohol
- Their ability to predict hazards is reduced
- Worse yet, fellow miners are injured or killed by abusers

West Virginia has problems with substance abuse just like every other state

- But now, the Legislature, the Industry, the Union and the Office of Miners' Health Safety and Training are taking a stronger approach to abuse than in the past. In fact, much stronger
- Miners need to know about these new rules

The State is decertifying miners now

- By the end of 2014, the State will have decertified about 600 miners for violating the state's new drug and alcohol policy
- Protect yourself, protect your career and protect those around you

Know the rules

The policies in everyday language

- **Pre-employment testing** means that all miners will be tested for substance abuse prior to starting work
- New miners should know that they can be called for a drug and alcohol test as soon as a day after passing the 40 or 80 hour certification test

Source: WV Title 56, Series 19. Effective May 10, 2014

Here's what this really means

- A miner might be certified one day, and be called for pre-employment testing on short notice, even the next day
- A miner must be **drug free**

Here are some definitions all miners need to know

These definitions come from the May 10, 2014
“Rules Governing Substance Abuse Screening:
Standards and Procedures”

“Safety-Sensitive Position”

- Means that the person’s job responsibilities include duties and activities that involve the personal safety of the employee or others at the mine
- This is pretty much everyone on the mine site

“Safety-Sensitive” continued:

- If you fail a drug or alcohol test, you will lose your “safety sensitive” card
- you lose ALL certifications including your apprentice miners card and...
- you cannot go on mine property

“Serious Accident”

- Means “an accident where bodily injury requires the individual to be admitted to a medical facility overnight for reasons other than strains, sprains or observation as determined by a physician”

In a “Serious Accident”

- If you are in a serious accident, you will be tested
- If you are even involved in the accident, you will be tested

“Random Testing”

- Means that each person has an equal chance of being tested at random and unscheduled times
- Each year, at least 25 percent of miners must be randomly tested for substance abuse
- This occurs at least 4 times per year

“Split Sample”

- Means that part of a urine specimen is sent on to a *second lab* in the event that an *employee requests it* to be tested following a verified positive test of the primary specimen.
- *A lab and a doctor* are involved

Something to Know

- If you have an expired prescription, you may not take that medicine until the prescription is renewed
- The law now says that all prescriptions expire after one year
- You can't take your wife's or your friend's prescription, otherwise you risk decertification for taking unlawful medicine(s)

A miner who fails the drug/alcohol test in West Virginia

- Automatically fails in States that have reciprocity with WV
 - For example, Kentucky or other States with reciprocity agreements with West Virginia

Some other things to know

- A refusal to take the test means automatic decertification for a minimum of nine (9) months
- A second refusal (or fail) means permanent decertification; you can never work in West Virginia's mines again and any other state with an agreement with West Virginia

Employers must test urine for at least the following ten substances

- Amphetamines
- Cannabinoids (THC)
- Cocaine
- Opiates
- Phencyclidine (PCP)
- Benzodiazepines
- Propoxyphene
- Methadone
- Barbiturates
- Synthetic narcotics including bath salts and others

There is also a breath test for alcohol

And even though we already said this, it is very important

- An employer must:
 - Randomly test at least 25% of miners
 - Test at least 4 times per year
 - Test any miner who is “accident-involved”
- The likelihood is that *a user **will get caught***

Miners will face immediate suspension if:

- They test positive for drugs
- They test positive for alcohol
- They possess an adulterated specimen or if they submit an adulterated specimen
- They possess a substituted specimen or if they submit a substituted specimen
- The miner refuses to submit to a drug or alcohol test

Don't forget that an employer can require a test at any time for "reasonable suspicion"

The miner may appeal a suspension

- Within 30 days of the notice of suspension or revocation
- By requesting a hearing by the Board of Appeals
- A miner can then get all of his cards back

A miner under suspension may agree to a treatment plan

The actual legal document that you would sign runs to five pages- - here is part of page 1

**WEST VIRGINIA COAL MINE SAFETY
BOARD OF APPEALS**

IN THE MATTER OF:

WEST VIRGINIA OFFICE OF MINERS'
HEALTH, SAFETY AND TRAINING,
Petitioner,

v.

Respondent.

SUBSTANCE ABUSE TREATMENT AGREEMENT

Comes now the West Virginia Office of Miners' Health, Safety and Training (OMHST), by counsel, Barry L. Koerber, Assistant Attorney General and -----, *pro se*, (hereinafter referred to as the Parties) and set forth the terms and conditions of this Substance Abuse Treatment Agreement (Treatment Agreement) containing the

The treatment agreement says basically this

- The miner must agree and admit that he violated his employer's substance abuse screening policy program
- All certifications are *immediately* suspended
- The miner is *required* to attend substance abuse counseling and treatment
- The miner must comply with applicable laws and rules- -violation of the treatment plan results in revocation of certifications for at least three (3) years

There is more to the treatment plan

- The miner will submit samples regularly
- A test failure may result in permanent revocation
- All costs are paid by the miner
- The miner will submit to drug and alcohol testing at least every 30 days, or more often if required by the counselor.
- There will be a permanent record made of all transactions in the treatment plan

To summarize:

- The new rules are designed to protect miners' safety, not to punish them
- The rules are complicated
- The rules are serious
 - A second failure will result in PERMANENT REVOCATION of ALL CERIFICATIONS
- Company policies may exceed the minimum requirements discussed
- Breaking the rules can impact a miner's career and even bar him from future employment

...why take the risk of ruining a career?

Section 4 - Hearing Loss and Hearing Protection

Key Points

- Hearing loss is chronic
- By time you realize you have a hearing loss, it's too late
- Recreation and lifestyle contribute as much to hearing loss as work activities
- As people age their ability to hear diminishes

Noise Exposure

**HIGH NOISE
LEVELS CAN
DAMAGE HEARING**



Noise Exposure

Whenever machinery is being used to mine and transport coal, a considerable amount of noise will be present in the mine. This noise, when it is very loud, can be a serious threat to your health and safety.

It is a threat because high noise levels can affect your hearing, and a high noise level can interfere with communication between you and your fellow workers.

Noise Exposure

Under the Federal Coal Mine Health and Safety Act of 1969, you may not be exposed to sound levels greater than 90 decibels for an average of an eight hour shift. (You may legally be exposed to louder sounds for less time.)

A decibel is a measure of loudness. An average sound level of 90 dB for an entire shift would probably be judged as a very loud place to work in and could cause some hearing and communication problems.

Hearing Loss in Rural Communities

- 40-50% of males 18-27 years of age in rural communities have some hearing loss
- Nationally, only 12.5% of males in this age group have hearing loss
- Main reasons for increased hearing loss are from lifestyle:
 - Farm machinery/lawn care equipment
 - ATVs/motorcycles
 - Firearms/hunting
 - Personal music devices (iPods)

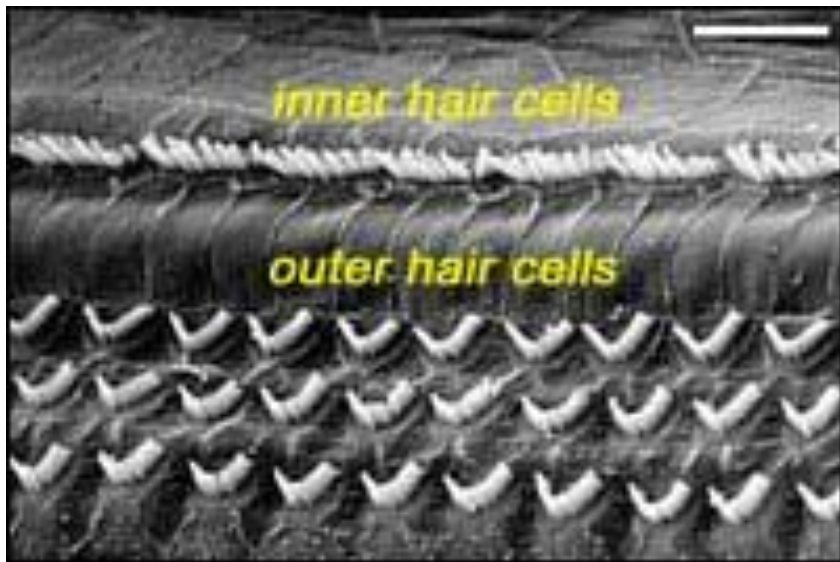
Source:

Humann, M.S., Sanderson, W., Flamme, G., Kelly, K., Moore G., Stromquist, A., & Merchant, J.A. (2011). Noise Exposures of Rural Adolescents. *The Journal of Rural Health* (27), 72-80.

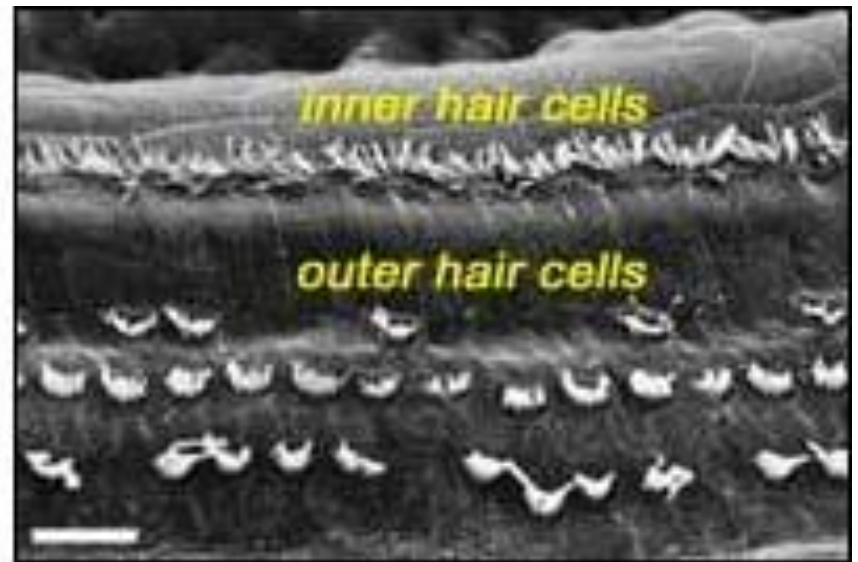
Consequences of Exposure to Noise

- Immediate short-term effects may involve:
 - temporary hearing loss
 - ringing in, or “dullness” of, the ears (tinnitus)
 - difficulty understanding speech
 - difficulty hearing sounds around you (e.g., warnings)
 - stress, and fatigue
- Persistent long-term effects may include:
 - hearing loss & tinnitus
 - reduced ability to understand speech
 - reduced ability to hear all sounds
 - cardiovascular disease

Photomicrographs of normal hairs and hair cells in the inner ear damaged by noise, causing hearing loss (plan views below)

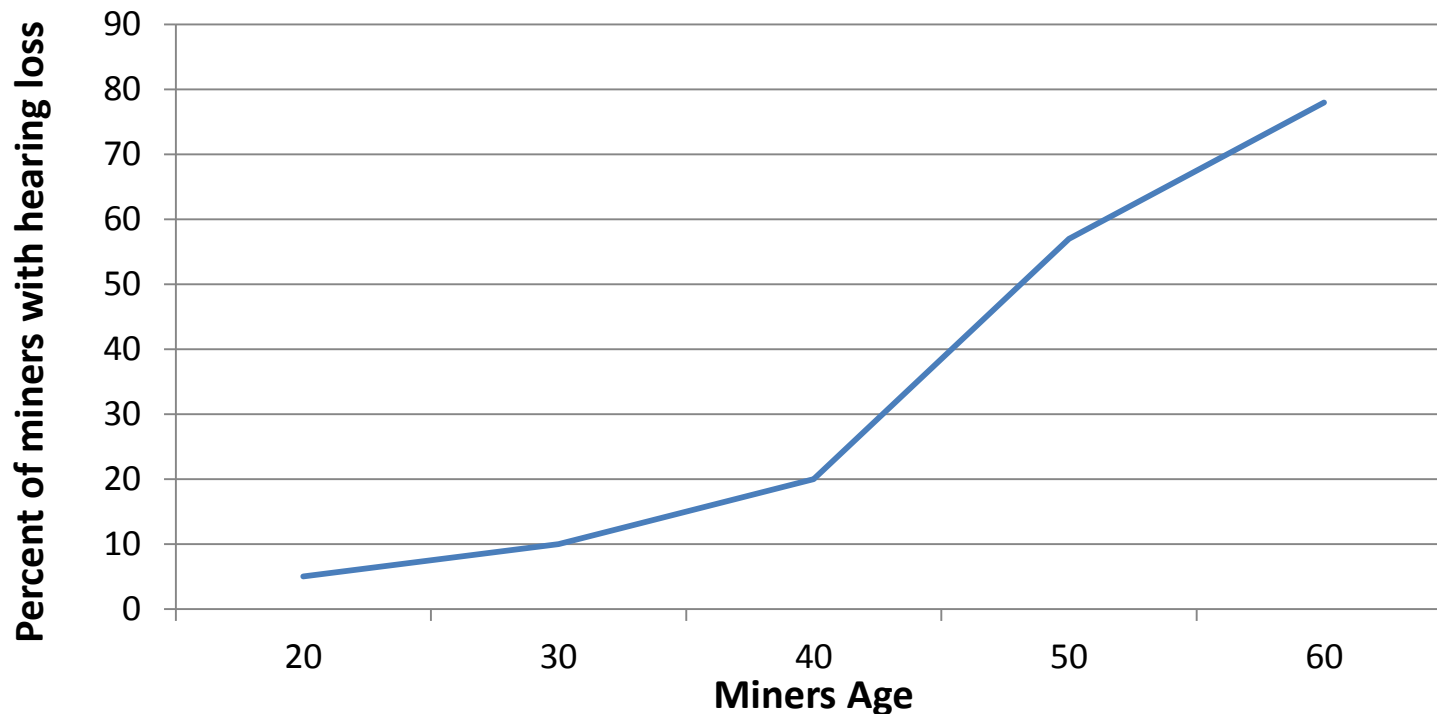


Normal



Damaged

Percentage of US miners with hearing loss as a function of age showing almost 80% have mild hearing loss, >25dB, by age 60



Source:

Bauer, E.R., Spencer, E.R., Smith, A.K., & Hudak, R.L. (2007). Reducing Noise-induced Hearing Loss in Longwall Coal Mine Workers: NIOSH's Approach. *National Institute for Occupational Safety and Health, Pittsburgh Research Laboratory, Hearing Loss Prevention Branch.*

Noise exposure data for mining occupations showing the percentage of samples that exceeded the threshold for affecting hearing (>80 dBA), and the percentage that exceeded the threshold for causing substantial hearing loss (>90 dBA)

Occupation	# of Samples	90-dBA threshold	80-dBA threshold
		% of samples >90 dBA(PEL)	% of samples >80 dBA(PEL)
Continuous Miner Helper	68	33.8	88.2
Continuous Miner Operator	262	49.6	96.2
Roof Bolt Operator (single)	234	21.8	85.5
Roof Bolt Operator (twin)	92	31.5	98.9
Shuttle Car Operator	260	13.5	78.5
Scoop Car Operator	94	18.1	74.5
Cutting Machine Operator	22	36.4	63.6
Headgate Operator	20	40	100
Longwall Operator	34	70.6	100
Jack Setter (longwall)	25	23	68

Source:

Bauer, E. R., & Kohler, J. L. (2000, August). Cross-sectional survey of noise exposure in the mining industry. In *Proceedings of the 31st Annual Institute of Mining Health, Safety and Research*. Blacksburg, VA: Virginia Polytechnic Institute and State University, Department of Mining and Minerals Engineering , 17-31.

How can you tell if your hearing is affected?

- Do you have to turn up the volume on television?
- Do you frequently have to ask others to repeat things?
- Do you have difficulty understanding when you are in groups or in noisy situations?
- Do you have to sit in the front in meetings or in church to understand?
- Do you have difficulty understanding women or young children?
- Do you have trouble knowing where sounds are coming from?
- Are you unable to understand when someone talks to you from another room?
- Have others told you that you don't seem to hear them?
- Do you avoid family meetings or social situations because you 'can't understand'?
- Do you have ringing or other noises (tinnitus) in your ears?

How did you score?

3 or less = no symptoms of hearing loss

3 to 5 = signs of slight hearing loss

5 to 7 = signs of moderate hearing loss

More than 7 = signs of significant hearing loss

What can be done

At work:

- Reduce the noise of machines and machinery
- Change work practices and/or adjust schedules to reduce exposure to noisy situations
- Wear hearing protection (muffs or plugs)

While the first two items may not be within your control as a miner, wearing hearing protection is. (See next slide)

You can decrease your noise exposure by simply moving further away from the source, if possible. For example, standing 5 feet from a 96 dB(A) noise source is hazardous but if you can increase your distance to 20ft the noise drops to 84 dB(A)

Source:

Oregon OSHA's Quick Guide to Hearing Protection <http://www.orosha.org/pdf/pubs/3349.pdf>

What can be done

Away from work:

- Reduce noise exposure (as it adds to the effect of exposure at work)
 - Wear hearing protection when working around your home, e.g., using chainsaws, weed whackers, tractors, or mowing the lawn
 - Wear hearing protection when participating in noisy hobbies such as shooting or hunting, motorcycling, wood working, or attending loud concerts or bars
 - Guns and chain saws produce noise in excess of 100 dB(A), motorcycles and snowmobiles in excess of 90 dB(A), and power tools for garden or woodworking in excess of 80 dB(A)
- Avoid excessive alcohol consumption, or smoking
- Pay attention to heart health to reduce the cardiovascular effects of noise (e.g., diet, exercise)

Hearing Protection

Ear plugs may also be worn to protect your hearing. If you use ear plugs, they must be kept clean to avoid ear infection. Clean them each day with alcohol. These ear protection devices are available from the mine foreman. The noise level will vary in the mine according to what equipment you are around and how near the working face your job brings you.



As an entry-level miner you are likely to have a job that is less noisy than the certified miners that work near the face. You should remember that the noise level will be higher near the face equipment when you begin working there. Therefore you should remember to protect yourself from loud noise at that time.



Hearing Protection

Types:

- Earplugs
 - Fit inside the ear canal
 - To be effective, need to total block the canal and create an airtight seal
 - Dirty or worn-out plugs will not seal the canal and may irritate it



- Earmuffs
 - Fit over the ear
 - Do not fit properly over glasses or long hair



Both types are equally effective. Using them together increases protection against high noise levels, over 105 dB(A). You should chose the hearing protection that is the most convenient, compatible and comfortable for you.

Source:

Oregon OSHA's Quick Guide to Hearing Protection <http://www.oro sha.org/pdf/pubs/3349.pdf>

Section 5 – Lifestyle Factors and Cardiovascular Disease

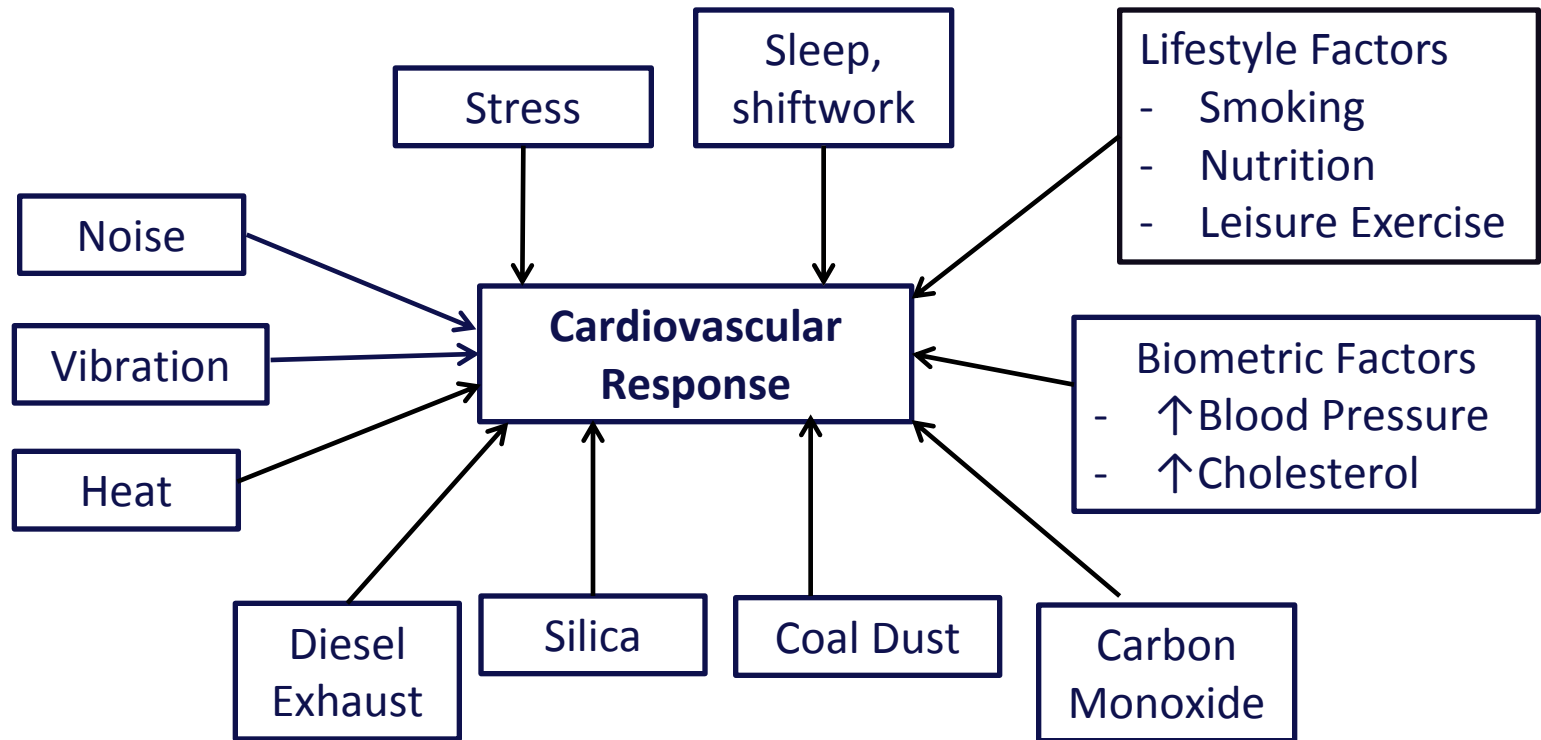
Key Points

- Lifestyle factors contribute more to cardiovascular disease than work activity
- Smoking, diet, and exercise are key factors

Whole Health Considerations

- From ages 25 - 55, the risk of a heart attack or a stroke goes up 10 times
- A 25 year old who smokes, has high blood pressure and high cholesterol has a 1 in 70 chance of having a heart attack or stroke by age 35
- At age 55, his or her odds are 1 in 8 (12.5%). The odds are almost 1 in 2 (50%) if you add in diabetes
- At 55, if you don't smoke, control your blood pressure and your cholesterol and fats and are not diabetic, the odds are no higher than 1 in 50 (<2%)

Health Exposures Contributing to Heart Disease



Sleep

- Sleep provides many benefits:
 - Gives the body a chance to rest and recover
 - Boosts memory
 - Reduces stress
 - Impacts a person's weight
- Sleep deprivation changes brain patterns and interferes with the production of “hunger hormones” causing you crave food even though you are not hungry

Fatigue

- Fatigue is the decline in mental and/or physical performance that results from prolonged exertion, lack of quality sleep, or disruption of the internal body clock
- Fatigue affects work performance and increases likelihood of errors
- The consequences of fatigue include:
 - Reduced alertness
 - Poor and slow perception
 - Sleepiness
 - Long-term health problems (associated with chronic fatigue)

Source:

Health and Safety Executive (2006). *Managing Shift Work*. Suffolk, England: HSE Books.

Sleep Aides

- Sleeping pills are not meant to be long-term solutions for better sleep
 - They become less effective with prolonged use
- They may create dependency issues
- They do not address the root cause of sleep problems
- Over-the-counter sleep aids may cause severe prolonged drowsiness that can carry over to your commute and your work

Stress

- Stress is the brain's response to any demand
- Chronic stress impairs you both mentally and physically
 - Mental signs
 - Anxiety (worry, self-doubt)
 - Depression (sad moods, feelings of hopelessness)
 - Physical signs
 - Stomach and digestive problems
 - High blood pressure
 - Insomnia
 - Frequent colds/illnesses
 - Headaches
 - Fatigue

Exercise is Good for Stress

- Exercise has immediate and long-term psychological benefits, such as:
 - Releasing feel-good chemicals (endorphins), creating a relaxed state
 - Promoting positive mood and well-being
 - Reduces anxiety
 - Reducing depression when performed regularly
 - The total amount of exercise is most important, just doing something on a regular basis

Section 6 – Sanitation Laws

Sanitation Laws

The Federal Government requires that the mine operator provide you with certain minimum sanitary facilities both on the surface and underground. These are required for your health and comfort.

The mine operator is required to provide you with the following sanitary facilities above ground at the mine:

1. Facilities to change clothes before and after your shift.
2. A locker or storage place to store your belongings while you are at work.
3. Bathing facilities where there is at least one shower for each five miners.
4. Toilet facilities where there is at least one toilet for each ten miners.
5. An adequate supply of toilet paper at each toilet.
6. Adequate handwashing facilities for each bathhouse.
7. Hot and cold running water must be provided.
8. The entire facility must have adequate heat, light and ventilation to maintain a comfortable environment.

Shower Room



Porta-Potties

A small portable toilet much like a camping toilet that is used underground. The law requires that these be located close to the working areas in a dry place under good roof.



Parting Thoughts

- An apprentice miner who has suitable protection against exposures at work and takes preventive health measures outside of work will live as long as the general US population
- Good dust control and selective use of respiratory protection can eliminate loss of lung function later in life
- Abuse of substances are easily detected with existing required screening and can lead to lifetime loss of employment in mining
- Passive routine health and lung checks may not be enough. Miners are expected to be active participants in their own safety and health

Appendix 3c. Slide by Slide Comparison Surface Mining Course

Slide by slide comparison of the current and previous surface miner training

The slide number mentioned at the top
of the following slides refer to the slide
in the current approved training
material.

Slide 1

Current

Previous

The following “Health and Sanitation” material of the 80 Hour Underground Miner Pre-Employment Training Program was developed by the University of Connecticut, Division of Occupational and Environmental Medicine, in conjunction with the West Virginia University Mining and Industrial Extension.

The developers wish to acknowledge the Alpha Foundation as the Project Funder.

All findings and conclusions are those of the authors and do not necessarily represent the views of the Foundation and any mention of a company or product does not constitute an endorsement of the Foundation.

No equivalent slide



Slide 2

Current

Health and Sanitation Unit 40 Hour Course

Previous slide 1

Unit 14

Health And Sanitation

Slide 3

Current

Topic Areas:

1. Lung Disease and Prevention
2. Injury and Musculoskeletal Disease
3. Drugs, Intoxicants, and Alcohol
4. Hearing Loss and Hearing Protection
5. Miner's & Operators Rights and Responsibilities
6. Lifestyle Factors and Cardiovascular Disease
7. Outdoor Risks

Previous Presentation Slide 2

Unit 14. Health And Sanitation

Lessons:

1. Dust and dust protection
2. Noise and hearing protection
3. Miner's and operator rights and responsibilities

Slide 4

Current

Section 1 – Lung Disease and Prevention

Previous Slide 3

Unit 14. Health And Sanitation

▶ Lessons 1

▶ Dust and dust protection

Slide 5

Current

Previous

Key Points

- Lifestyle factors contribute more to cardiovascular disease than work activity
- A coal miner can reduce his chance of lung disease by not smoking and minimizing dust exposure
- In order for a respirator to work properly it must be fit tested

No equivalent slide

Slide 6

Current

Previous Presentation

Lung Cancer and Coal Mining

- The largest risk factor for cancer is smoking
 - ~ 80-90% of smokers have some lung damage
- Silica dust is a possible carcinogen
- Miners need to follow procedures to control dust;
 - Surface watering
 - Door seal maintenance
 - Positive pressure in vehicle cabs

No equivalent slide

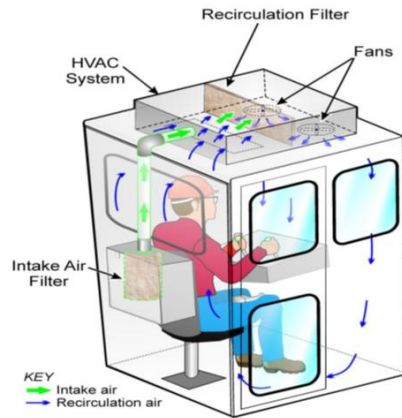
This slide was added to increase awareness of the lung cancer.

Slide 7

Current

Previous Presentation

Positive Pressure Cabs



No equivalent slide

This slide was added to increase awareness of the lung cancer.

Slide 8

Current

Previous Presentation

Playing the Odds

No equivalent slide

Age at Smoking Cessation	Odds of Dying from Lung Cancer at Specific Age			
	35	45	55	65
Never Started	0	1 in 25,000	1 in 14,000	1 in 5,000
Stopped at 35	0	<1 in 25,000	1 in 3,600	1 in 1,600
Stopped at 45	--	--	1 in 1,800	1 in 950
Stopped at 55	--	--	1 in 800	1 in 400
Never Stopped	1 in 10,000	1 in 2,200	1 in 600	1 in 250

Source:

Halpern, M. T., Gillespie, B. W., & Warner, K. E. (1993). Patterns of absolute risk of lung cancer mortality in former smokers. *Journal of the National Cancer Institute*, 85(6), 457-464.



This slide was added to increase awareness of smoking to lung cancer. It also shows that smoking cessation will decrease your chances of dying from lung cancer.

Slide 9

Current

Previous Presentation

Coal Workers Pneumoconiosis (CWP)

- *CWP is a medical term for Black Lung*
- CWP is a large factor in respiratory decline but it is preventable
- Normal Lung volume is about 5 liters or 5000 cc
- A miner who smokes and has CWP will lose about 100 cc/year
- A miner who works in a mine with good dust control will lose 5 cc/year

No equivalent slide

Slide 10

Current

Important Terminology

- Given pictures or verbal descriptions representing the following terms, you will be able to match each term with its picture or description
- The terms are:
 - Personal dust sampler
 - Respirable dust
 - Respirator

Previous Presentation Slide 4

Unit 14. Health And Sanitation

Training Objective

- Given pictures or verbal descriptions representing the following terms, you will be able to match each term with its picture or description.

The terms are:

1. Personal dust sampler
2. Respirable dust
3. Respirator

Slide 11

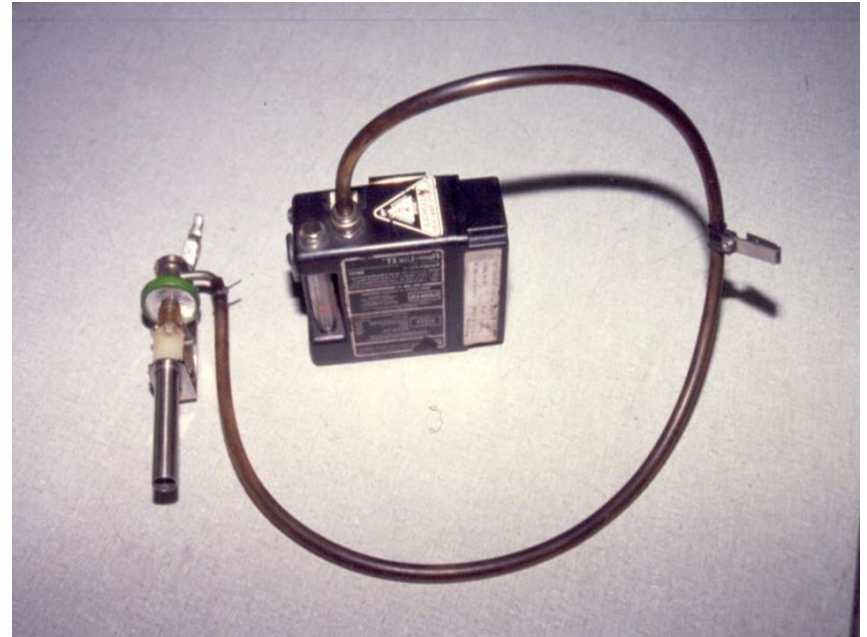
Current

Personal Dust Sampler



This is a small device, worn on a miner's overalls or placed at a specific location, that is used to measure the amount of dust in the working area. The Mine Safety and Health Administration uses the dust sampler to check the concentration of respirable dust.

Previous Presentation Slide 5



Slide 12

Current

Previous Presentation

New Personal Dust Monitor



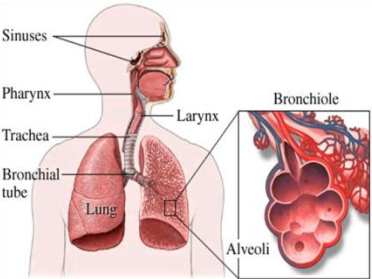
Presents newer version of device shown in previous presentation slide 5.

Slide 8

Current

Respirable Dust

This is very fine particles of coal dust that can be carried by air directly into the small air sacs (alveoli) of the lungs. When the dust reaches the air sacs it can be deposited in the lungs. The lungs will then react to these deposits of coal dust. The reaction of the lungs to the deposits of coal dust constitutes the basis of coal workers' pneumoconiosis.



Labels: Sinuses, Pharynx, Larynx, Trachea, Bronchial tube, Lung, Alveoli, Bronchiole

Most coal dust is larger and non-respirable (that is, it cannot reach the air sacs of the lungs) Respirable dust is too small to be seen by the naked eye. Respirable coal dust may also cause black lung.

The last sentence on the above slide is different than the slide approved by the West Virginia Office of Miners Health and Safety Training for training in West Virginia. The West Virginia version reads “Most coal dust is larger and non-respirable (that is, it cannot reach the air sacs of the lungs); it may also cause black lung.” The wording was not changed at the direction of the West Virginia Office of Miners Health and Safety Training.

Previous Slide 7

Respirable Dust:

This is very fine particles of coal dust that can be carried by air directly into the small air sacs (alveoli) of the lungs. When the dust reaches the air sacs it can be deposited in the lungs. The lungs will then react to these deposits of coal dust. The reaction of the lungs to the deposits of coal dust constitutes the basis of coal workers' pneumoconiosis.

Most coal dust is larger and nonrespirable (that is, it cannot reach the air sacs of the lungs); it may also cause black lung. Respirable dust is too small to be seen by the naked eye.

The text from the previous slide 7 was reorganized and a diagram of the respiratory system was added to enhance understanding.

Slide 14

Current

Previous Presentation Slide 8

Types of Respiratory Protection



Dust
Filtering
Face
Mask



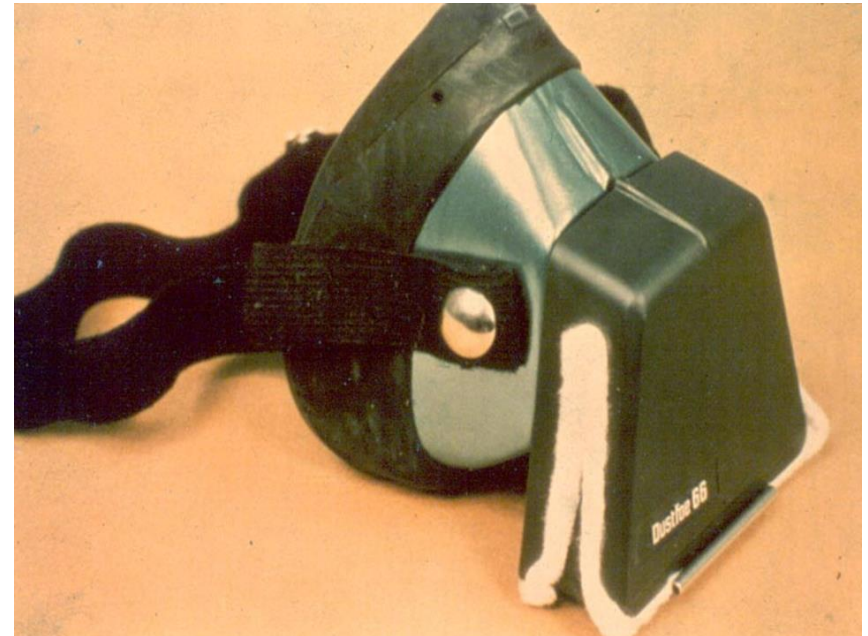
Air
Helmet



Cartridge
Respirator



Air Stream



Slide 15

Current

Previous Presentation

Respirators and Protection Factors

TYPE	EXAMPLE	PF
Air Purifying	½ Face	10
	Full Face	50
Powered Air Purifying (PAPR)	Loose Fit (Airstream)	25
	½ Mask	50
	Helmet/Hood	1000
Supplied Air	Continuous Flow	1000
	Pressure Demand	1000
Pressure Demand (Escape)	SCBA	10,000



No equivalent slide

Slide 16

Current

How to Use a Respirator

- Given pictures or verbal descriptions of correct and incorrect procedures for using a respirator, you will select the correct procedure

Previous Presentation Slide 9

Unit 14. Health And Sanitation

Training Objective

- Given pictures or verbal descriptions of correct and incorrect procedures for using a respirator, you will select the correct procedure.

Slide 17

Current

Previous Presentation

Tips for Fitting a Respirator

- Be sure to cover both the nose and mouth with the respirator
- Check to see if the edge of the respirator is flat on your face
- When it's hard to breath, change the filter or throw away a disposable filter

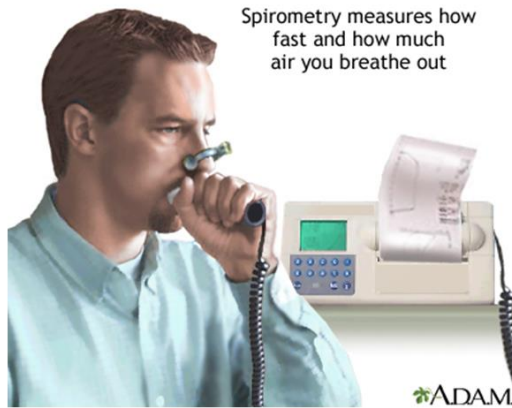
No equivalent slide

Slide 18

Current

Previous Presentation

Example of Spirometry (Breathing Test)



Spirometry measures how
fast and how much
air you breathe out

No equivalent slide

Slide 19

Current

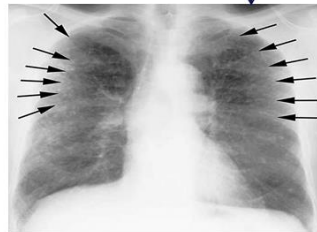
Previous Presentation



Progressive Massive Fibrosis (PMF)



Early Coal Workers
Pneumoconiosis (CWP)



Silicosis

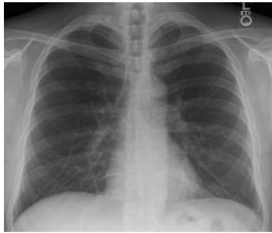
No equivalent slide

Slide 20

Current

Previous Presentation

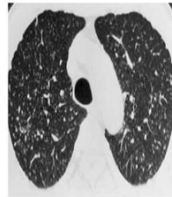
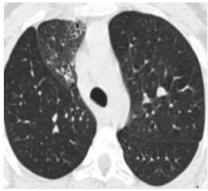
The x-ray presents a small part of the disease



Normal chest x-ray



Simple CWP



No equivalent slide

Slide 21

Current

Previous Presentation

No equivalent slide

Section 2 – Injury and Musculoskeletal
Disease

Slide 22

Current

Previous Presentation

Key Points

- Musculoskeletal diseases are more prevalent in mining than any other occupational group
- Mining equipment is specialized, offering limited space to add interventions

No equivalent slide

Sources:

Cherry, N. M., Meyer, J. D., Chen, Y., Holt, D. L., & McDonald, J. C. (2001). The reported incidence of work-related musculoskeletal disease in the UK: MOSS 1997–2000. *Occupational Medicine*, 51(7), 450-455.

McMillan, G., & Nichols, L. (2005). Osteoarthritis and meniscus disorders of the knee as occupational diseases of miners. *Occupational and environmental medicine*, 62(8), 567-575.



Slide 23

Current

Previous Presentation

Common Sources of Knee Pain for Miners Meniscus disorders and knee arthritis

- Frequency
 - Affects 6-24% of miners
 - 3-6 x higher than comparative light manufacturing workers
- Causes
 - Slips and falls (>50% of knee injuries)
 - Direct pressure from kneeling
 - Shear force (shoveling)
 - Mounting and dismounting equipment is the leading cause of slips and falls on surface mines
- Interventions
 - Non-surgical management (braces, supports and analgesics)

Source:

Cherry, N. M., Meyer, J. D., Chen, Y., Holt, D. L., & McDonald, J. C. (2001). The reported incidence of work-related musculoskeletal disease in the UK: MOSS 1997–2000. *Occupational Medicine*, 51(7), 450-455.

No equivalent slide

Slide 24

Current

Posture and Joint Loading

*Mining has many awkward postures
Over time, there is wear and tear on joints*



Previous Presentation

No equivalent slide

Slide 25

Current

Previous Presentation

Facts about Knee Pain

- Most people exhibit few symptoms walking on level ground or at the start of walking from a standing position
- Pain usually occurs when climbing up stairs and standing up from a chair
- Findings on X-rays do not predict disease severity
 - People with abnormal X-rays often have no pain
 - Other times people with minimal findings on X-ray report severe pain

No equivalent slide

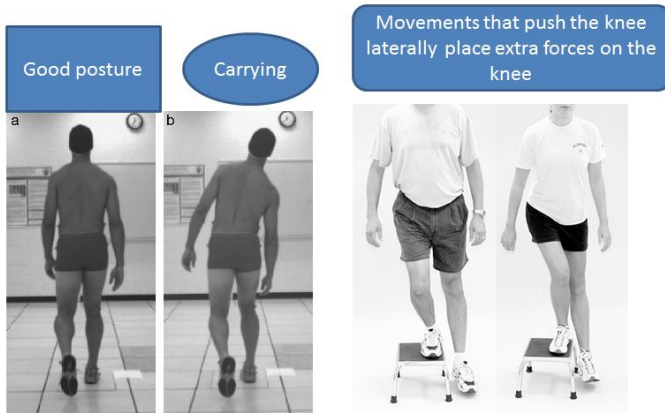
Slide 26

Current

Previous Presentation

Reducing Force on the Knee

No equivalent slide



Source:
Mundermann, A., Asay, J., Mundermann, L., & Andriacchi, T.P. (2008). Implications of increased medio-lateral trunk sway for ambulatory mechanics. *Journal of Biomechanics*, 41(1), 165-170.

Slide 27

Current

Previous Presentation

No equivalent slide

Section 3 – Drugs, Intoxicants, and Alcohol

REMEMBER: The currently approved WV Law on the following topics will always take precedence over the slides in this presentation.

Slide 28

Current

Previous Presentation

Key Points

- Drugs and alcohol are everybody's problem
- Drugs and alcohol use has increased among younger workers
- Help is available through company and community programs

No equivalent slide

Slide 29

Current

Previous Presentation

Part A: Drugs and Alcohol Affect Every Miner's Safety

The goal of a drug and alcohol policy is to create a safer, healthier mine for you and for your fellow miners. Its purpose is to protect, not punish.

The idea is to prevent alcohol and drug use and encourage people to voluntarily seek help for alcohol and drug problems BEFORE their behavior becomes a safety hazard.

No equivalent slide

Slide 30

Current

Previous Presentation

The science behind these policies is clear

No equivalent slide

Studies on the effects of alcohol have shown impairment at low Blood Alcohol Concentration(BAC) levels:

- ***All driving-related skills*** showed impairment by .07 BAC
- In studies examining divided attention, vigilance, and simulated piloting, ***73 percent of the tests showed impairment by .039 BAC****

The take-away - Skill and judgment are impaired at very low BAC.

Source:

National Highway Traffic Safety Administration, Traffic Safety Facts Banner, No. 223, May 2000.



Slide 31

Current

Previous Presentation

Observations on drug and alcohol use and injury at work

No equivalent slide

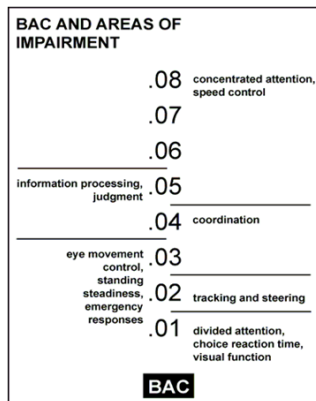
- Drug use has increased in the younger work force
- Every year, miners are hurt because their reactions are slowed by drugs or alcohol
- Even two drinks can cause dehydration or fatigue which reduces performance and impairs judgment
- **Worse yet**, *fellow miners are injured or killed by abusers*

Slide 32

Current

Previous Presentation

Effect of Blood Alcohol Concentration (BAC) on tasks



Source:
www.ct.gov/dmv/cwp/view.aspx?a=813&q=249562

No equivalent slide

Slide 33

Current

Previous Presentation

Did you know?

- One drink is defined as:
 - One shot, 1.25 oz., of 80 proof liquor (vodka, scotch)
 - 12 oz. of beer
 - 5 oz. of wine
- *They all have about the same alcohol content and effect on the body*

No equivalent slide

Slide 34

Current

Previous Presentation

Approximate Blood Alcohol Percentage
- Males

No equivalent slide

Drinks in 1 hour	Body Weight in Pounds						
	140	160	180	200	220	240	
0	0	0	0	0	0	0	Only Safe Driving Limit
1	0.03	0.02	0.02	0.02	0.02	0.02	Impairment Begins
2	0.05	0.05	0.04	0.04	0.03	0.03	
3	0.08	0.07	0.06	0.06	0.05	0.05	Driving Skills Affect Possible Criminal Penalties
4	0.11	0.09	0.08	0.08	0.07	0.06	
5	0.13	0.12	0.11	0.09	0.09	0.08	Legally Intoxicated Criminal Penalties

Source:
Pennsylvania Liquor Control Board

Slide 35

Current

Previous Presentation

Approximate Blood Alcohol Percentage -
Females

No equivalent slide

Drinks in 1 hour	Body Weight in Pounds						
	100	120	140	160	180	200	
0	0	0	0	0	0	0	Only Safe Driving Limit
1	0.05	0.04	0.03	0.03	0.03	0.02	Impairment Begins
2	0.09	0.08	0.07	0.06	0.05	0.05	Driving Skills Affect Possible Criminal Penalties
3	0.14	0.11	0.1	0.09	0.08	0.07	
4	0.18	0.15	0.13	0.11	0.1	0.09	Legally Intoxicated Criminal Penalties
5	0.23	0.19	0.16	0.14	0.13	0.11	

Source:
Pennsylvania Liquor Control Board

Slide 36

Current

Previous Presentation

Take note

- For *drivers*, the legal BAC limit is .08
- But for *miners*, the legal BAC limit is .039 for mining
- Most miners will risk decertification after their first drink

No equivalent slide

Slide 37

Current

Previous Presentation

How long are alcohol and drugs in your system?

- Alcohol can go through your system in about 24 hours
- Certain drugs will stay in your body for as long as 30 days and they are entirely detectable
- The next 2 slides show how long drugs and alcohol are detectable in your body

No equivalent slide

Slide 38

Current

Previous Presentation

Approximate Detection Periods

Substance	Urine	Hair	Blood / Oral Fluid
Alcohol	6–24 hours	up to 2 days	12–24 hours
	Note: Alcohol tests may measure EtG which can stay in urine for up to 80 hours		
Cotinine (a break-down product of nicotine)	2 to 4 days	up to 90 days	2 to 4 days
Amphetamines (except methamphetamine)	1 to 5 days	up to 90 days	12 hours
Methamphetamine	3 to 5 days	up to 90 days	1–3 days
MDMA (Ecstasy)	72 hours	up to 90 days	24 hours
Barbiturates (except phenobarbital)	1 day	up to 90 days	1 to 2 days
Phenobarbital	2 to 3 weeks	up to 90 days	4 to 7 days
Benzodiazepines	Therapeutic use: up to 7 days	up to 90 days	6 to 48 hours
	Chronic use (over one year): 4 to 6 weeks		

No equivalent slide

Slide 39

Current

Previous Presentation

Approximate Detection Periods

Substance	Urine	Hair	Blood / Oral Fluid
Cannabis	2 to 7 days, up to >30 days after heavy use and/or in users with high body fat	up to 90 days	2–3 days in blood, up to 2 weeks in blood of heavy users. However, it depends on whether actual THC or THC metabolites are being tested for, the latter having a much longer detection time than the former. THC (found in marijuana) may only be detectable in saliva/oral fluid for 2–24 hours in most cases.
Cocaine	2 to 5 days with exceptions for certain kidney disorders	up to 90 days	2 to 5 days
Codeine	2 to 3 days	90 days	≤1 day
Morphine	2 to 4 days	up to 90 days	1 – 3 days
Heroin	1 to 4 days	up to 90 days	1– 2 days
LSD	12 to 24 hours	Undetectable	2 to 4 days
Methadone	3 days	up to 97 days	24 hours
PCP	3 to 7 days for single use; up to 30 days in chronic users	up to 90 days	1 to 3 days

No equivalent slide

Slide 40

Current

Previous Presentation

High Energy Drink (HED) and the Heart

- HEDs
 - are fairly new products and not a lot is known about their long term effects on the body
 - caffeine content varies greatly by brand from 1-3 times as much as an 8oz. cup of coffee
 - they also contain glucose and taurine, an amino acid

But unlike the caffeine in coffee, HEDs additional ingredients, glucose and taurine, can cause increased heart contractibility which places increased stress on the heart.

This means your heart is doing more work than it needs which may cause problems.

Sources:

<http://www.webmd.com/food-recipes/news/20121025/how-much-caffeine-energy-drink>

<http://www.webmd.com/hypertension-high-blood-pressure/news/20131202/energy-drinks-affect-heart-mri-scans-show>

No equivalent slide



Slide 41

Current

Previous Presentation

Compounding effects

- A German study conducted by, Dr. Jonas Dorner, pointed out the amount of caffeine in energy drinks is typically up to three times higher than in other drinks like coffee or cola, and high intake of caffeine may trigger rapid heart rate, palpitations, rises in blood pressure and in severe cases, seizures or sudden death
- Effects are compounded by drugs or alcohol

No equivalent slide

Source:

<http://www.webmd.com/hypertension-high-blood-pressure/news/20131202/energy-drinks-affect-heart-mri-scans-show>



Slide 42

Current

Previous Presentation

Regulation

- A study by *Consumer Reports* tested 27 popular energy drinks.
 - 11 didn't list the amount of caffeine on the label
 - Among the 16 products that did, 5 had more than 20% caffeine than the label claimed
- With little or no regulation, the amounts of caffeine and other ingredients in these drinks are essentially unknown

No equivalent slide

Source:
<http://www.webmd.com/food-recipes/news/20121025/how-much-caffeine-energy-drink>



Slide 43

Current

Previous Presentation

How much caffeine am I drinking?

- The average serving of coffee has about 100 mg of caffeine
- The same *Consumer Reports* tests showed 7 HEDs with *more than twice* that amount of caffeine, although the label didn't indicate amounts

No equivalent slide

Slide 44

Current

Previous Presentation

HEDs and Insomnia

- HEDs are also linked to insomnia
- Even at work, a tired body will try to get rest
- This means that you may be less likely to detect hazards
- Disruptive sleep causes added stress to the body including decreased mental function, increases in blood pressure, irritability, and decreased work capacity

No equivalent slide

Slide 45

Current

Previous Presentation

HED Wrap Up

- HEDs can cause irregularities to your heartbeat (prolonged contractibility)
- HEDs labels don't tell you what's inside, much less how much caffeine is involved
- They are not regulated well
- For sensitive people, they can cause rapid heart rate, palpitations, rises in blood pressure and in severe cases, seizures or sudden death

No equivalent slide

Source:

<http://www.webmd.com/hypertension-high-blood-pressure/news/20131202/energy-drinks-affect-heart-mri-scans-show>



Slide 46

Current

Previous Presentation

Part B: What the Apprentice Miner
Needs to Know

No equivalent slide

West Virginia Drug and Alcohol
Policies

Slide 47

Current

Previous Presentation

Substance abuse is not a new topic

- Every year, miners are hurt because their reactions are slowed by drugs or alcohol
- Their ability to predict hazards is reduced
- Worse yet, fellow miners are injured or killed by abusers

No equivalent slide

Slide 48

Current

Previous Presentation

West Virginia has problems with substance abuse just like every other state

- But now, the Legislature, the Industry, the Union and the Office of Miners' Health Safety and Training are taking a stronger approach to abuse than in the past. In fact, much stronger
- Miners need to know about these new rules

No equivalent slide

Slide 49

Current

Previous Presentation

The State is decertifying miners now

- By the end of 2014, the State will have decertified about 600 miners for violating the state's new drug and alcohol policy
- Protect yourself, protect your career and protect those around you

Know the rules

No equivalent slide

Slide 50

Current

Previous Presentation

The policies in everyday language

- **Pre-employment testing** means that all miners will be tested for substance abuse prior to starting work
- New miners should know that they can be called for a drug and alcohol test as soon as a day after passing the 40 or 80 hour certification test

No equivalent slide

Source: WV Title 56, Series 19. Effective May 10, 2014



Slide 51

Current

Previous Presentation

Here's what this really means

- A miner might be certified one day, and be called for pre-employment testing on short notice, even the next day
- A miner must be **drug free**

No equivalent slide

Slide 52

Current

Previous Presentation

Here are some definitions
all miners need to know

No equivalent slide

These definitions come from the May 10, 2014
“Rules Governing Substance Abuse Screening:
Standards and Procedures”

Slide 53

Current

Previous Presentation

“Safety-Sensitive Position”

- Means that the person’s job responsibilities include duties and activities that involve the personal safety of the employee or others at the mine
- This is pretty much everyone on the mine site

No equivalent slide

Slide 54

Current

Previous Presentation

“Safety-Sensitive” continued:

- If you fail a drug or alcohol test, you will lose your “safety sensitive” card
- you lose ALL certifications including your apprentice miners card and...
- you cannot go on mine property

No equivalent slide

Slide 55

Current

Previous Presentation

“Serious Accident”

- Means “an accident where bodily injury requires the individual to be admitted to a medical facility overnight for reasons other than strains, sprains or observation as determined by a physician”

No equivalent slide

Slide 56

Current

Previous Presentation

In a “Serious Accident”

No equivalent slide

- If you are in a serious accident, you will be tested
- If you are even involved in the accident, you will be tested

Slide 57

Current

Previous Presentation

“Random Testing”

- Means that each person has an equal chance of being tested at random and unscheduled times
- Each year, at least 25 percent of miners must be randomly tested for substance abuse
- This occurs at least 4 times per year

No equivalent slide

Slide 58

Current

Previous Presentation

“Split Sample”

- Means that part of a urine specimen is sent on to a *second lab* in the event that an *employee requests it* to be tested following a verified positive test of the primary specimen.
- A *lab and a doctor* are involved

No equivalent slide

Slide 59

Current

Previous Presentation

Something to Know

- If you have an expired prescription, you may not take that medicine until the prescription is renewed
- The law now says that all prescriptions expire after one year
- You can't take your wife's or your friend's prescription, otherwise you risk decertification for taking unlawful medicine(s)

No equivalent slide

Slide 60

Current

Previous Presentation

A miner who fails the drug/alcohol test
in West Virginia

No equivalent slide

- Automatically fails in States that have reciprocity with WV
 - For example, Kentucky or other States with reciprocity agreements with West Virginia

Slide 61

Current

Previous Presentation

Some other things to know

- A refusal to take the test means automatic decertification for a minimum of nine (9) months
- A second refusal (or fail) means permanent decertification; you can never work in West Virginia's mines again and any other state with an agreement with West Virginia

No equivalent slide

Slide 62

Current

Previous Presentation

Employers must test urine for at least the following ten substances

- Amphetamines
- Cannabinoids (THC)
- Cocaine
- Opiates
- Phencyclidine (PCP)
- Benzodiazepines
- Propoxyphene
- Methadone
- Barbiturates
- Synthetic narcotics including bath salts and others

There is also a breath test for alcohol

No equivalent slide

Slide 63

Current

Previous Presentation

And even though we already said this,
it is very important

- An employer must:
 - Randomly test at least 25% of miners
 - Test at least 4 times per year
 - Test any miner who is “accident-involved”
- The likelihood is that *a user* **will get caught**

No equivalent slide

Slide 64

Current

Previous Presentation

Miners will face immediate suspension if:

- They test positive for drugs
- They test positive for alcohol
- They possess an adulterated specimen or if they submit an adulterated specimen
- They possess a substituted specimen or if they submit a substituted specimen
- The miner refuses to submit to a drug or alcohol test

Don't forget that an employer can require a test at any time for "reasonable suspicion"

No equivalent slide

Slide 65

Current

Previous Presentation

The miner may appeal a suspension

- Within 30 days of the notice of suspension or revocation
- By requesting a hearing by the Board of Appeals
- A miner can then get all of his cards back

No equivalent slide

Slide 66

Current

Previous Presentation

A miner under suspension may agree to a treatment plan

No equivalent slide

The actual legal document that you would sign runs to five pages- - here is part of page 1

WEST VIRGINIA COAL MINE SAFETY
BOARD OF APPEALS
IN THE MATTER OF:
WEST VIRGINIA OFFICE OF MINERS'
HEALTH, SAFETY AND TRAINING,
Petitioner,
v.
Respondent.
SUBSTANCE ABUSE TREATMENT AGREEMENT
Comes now the West Virginia Office of Miners' Health, Safety and Training (OMHST),
by counsel, Barry L. Koerber, Assistant Attorney General and -----, *pro se*,
(hereinafter referred to as the Parties) and set forth the terms and conditions of this
Substance Abuse Treatment Agreement (Treatment Agreement) containing the

Slide 67

Current

Previous Presentation

The treatment agreement says basically this

- The miner must agree and admit that he violated his employer's substance abuse screening policy program
- All certifications are *immediately* suspended
- The miner is *required* to attend substance abuse counseling and treatment
- The miner must comply with applicable laws and rules- -violation of the treatment plan results in revocation of certifications for at least three (3) years

No equivalent slide

Slide 68

Current

Previous Presentation

There is more to the treatment plan

- The miner will submit samples regularly
- A test failure may result in permanent revocation
- All costs are paid by the miner
- The miner will submit to drug and alcohol testing at least every 30 days, or more often if required by the counselor.
- There will be a permanent record made of all transactions in the treatment plan

No equivalent slide

Slide 69

Current

Previous Presentation

To summarize:

- The new rules are designed to protect miners' safety, not to punish them
- The rules are complicated
- The rules are serious
 - A second failure will result in PERMANENT REVOCATION of ALL CERIFICATIONS
- Company policies may exceed the minimum requirements discussed
- Breaking the rules can impact a miner's career and even bar him from future employment

...why take the risk of ruining a career?

No equivalent slide

Slide 70

Current

Section 4 - Hearing Loss and Hearing Protection

Previous Presentation Slide 13

Unit 14. Health And Sanitation

▶ Lessons 2

▶ Noise and hearing protection

Slide 71

Current

Previous Presentation

Key Points

- Hearing loss is chronic
- By time you realize you have a hearing loss, it's too late
- Recreation and lifestyle contribute as much to hearing loss as work activities
- As people age their ability to hear diminishes

No equivalent slide

Slide 72

Current

Previous Presentation

Hearing Loss in Rural Communities

- 40-50% of males 18-27 years of age in rural communities have some hearing loss
- Nationally, only 12.5% of males in this age group have hearing loss
- Main reasons for increased hearing loss are from lifestyle:
 - Farm machinery/lawn care equipment
 - ATVs/motorcycles
 - Firearms/hunting
 - Personal music devices (iPods)

Source:

Humann, M.S., Sanderson, W., Flamme, G., Kelly, K., Moore G., Stromquist, A., & Merchant, J.A. (2011). Noise Exposures of Rural Adolescents. *The Journal of Rural Health* (27), 72-80.

No equivalent slide

Slide 73

Current

Previous Presentation

Consequences of Exposure to Noise

- Immediate short-term effects may involve:
 - temporary hearing loss
 - ringing in, or “dullness” of, the ears (tinnitus)
 - difficulty understanding speech
 - difficulty hearing sounds around you (e.g., warnings)
 - stress, and fatigue
- Persistent long-term effects may include:
 - hearing loss & tinnitus
 - reduced ability to understand speech
 - reduced ability to hear all sounds
 - cardiovascular disease

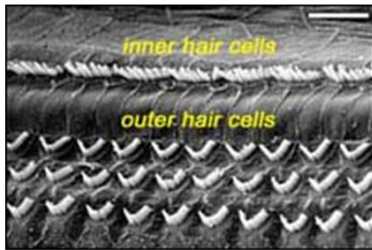
No equivalent slide

Slide 74

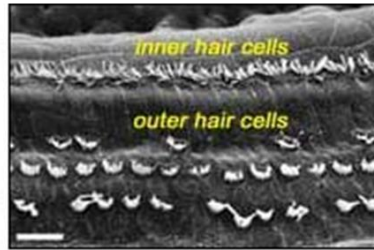
Current

Previous Presentation

Photomicrographs of normal hairs and hair cells in the inner ear damaged by noise, causing hearing loss
(plan views below)



Normal



Damaged

No equivalent slide

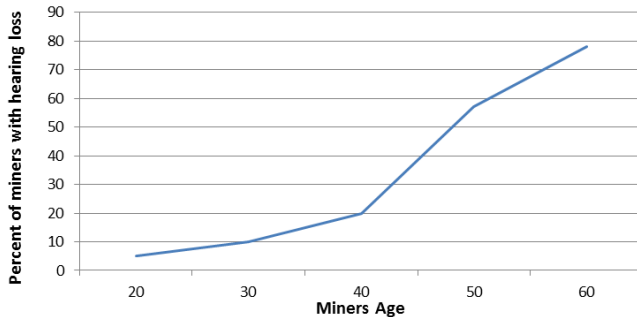
Slide 75

Current

Previous Presentation

Percentage of US miners with hearing loss as a function of age showing almost 80% have mild hearing loss, >25dB, by age 60

No equivalent slide



Source:

Bauer, E.R., Spencer, E.R., Smith, A.K., & Hudak, R.L. (2007). Reducing Noise-induced Hearing Loss in Longwall Coal Mine Workers: NIOSH's Approach. *National Institute for Occupational Safety and Health, Pittsburgh Research Laboratory, Hearing Loss Prevention Branch.*

Slide 76

Current

Previous Presentation

Noise exposure data for mining occupations showing the percentage of samples that exceeded the threshold for affecting hearing (>80 dBA), and the percentage that exceeded the threshold for causing substantial hearing loss (>90 dBA)

Occupation	# of Samples	90-dBA threshold	80-dBA threshold
		% of samples >90 dBA(PEL)	% of samples >80 dBA(PEL)
Scoop Car Operator	94	18.1	74.5
Cleaning Plant Operator	107	36.4	77.6
Bulldozer Operator	225	48.9	94.2
Fron-end-Loader Operator	244	16	76.6
High-wall Drill Operator	83	21.7	77.1
Refuse/Backfill Truck Driver	162	13.6	78.4
Coal Truck Driver	28	17.9	64.3

No equivalent slide

Source:

Bauer, E. R., & Kohler, J. L. (2000, August). Cross-sectional survey of noise exposure in the mining industry. In *Proceedings of the 31st Annual Institute of Mining Health, Safety and Research*. Blacksburg, VA: Virginia Polytechnic Institute and State University, Department of Mining and Minerals Engineering, 17-31.



Slide 77

Current

Previous Presentation

How can you tell if your hearing is affected?

- Do you have to turn up the volume on television?
- Do you frequently have to ask others to repeat things?
- Do you have difficulty understanding when you are in groups or in noisy situations?
- Do you have to sit in the front in meetings or in church to understand?
- Do you have difficulty understanding women or young children?
- Do you have trouble knowing where sounds are coming from?
- Are you unable to understand when someone talks to you from another room?
- Have others told you that you don't seem to hear them?
- Do you avoid family meetings or social situations because you 'can't understand'?
- Do you have ringing or other noises (tinnitus) in your ears?

How did you score? 3 or less = no symptoms of hearing loss
 3 to 5 = signs of slight hearing loss
 5 to 7 = signs of moderate hearing loss
 More than 7 = signs of significant hearing loss

No equivalent slide

Slide 78

Current

Previous Presentation

What can be done

At work:

- Reduce the noise of machines and machinery
- Change work practices and/or adjust schedules to reduce exposure to noisy situations
- Wear hearing protection (muffs or plugs)

While the first two items may not be within your control as a miner, wearing hearing protection is. (See next slide)

You can decrease your noise exposure by simply moving further away from the source, if possible. For example, standing 5 feet from a 96 dB(A) noise source is hazardous but if you can increase your distance to 20ft the noise drops to 84 dB(A)

No equivalent slide

Source:
Oregon OSHA's Quick Guide to Hearing Protection <http://www.orsosha.org/pdf/pubs/3349.pdf>



Slide 79

Current

Previous Presentation

What can be done

Away from work:

- Reduce noise exposure (as it adds to the effect of exposure at work)
 - Wear hearing protection when working around your home, e.g., using chainsaws, weed whackers, tractors, or mowing the lawn
 - Wear hearing protection when participating in noisy hobbies such as shooting or hunting, motorcycling, wood working, or attending loud concerts or bars
 - Guns and chain saws produce noise in excess of 100 dB(A), motorcycles and snowmobiles in excess of 90 dB(A), and power tools for garden or woodworking in excess of 80 dB(A)
- Avoid excessive alcohol consumption, or smoking
- Pay attention to heart health to reduce the cardiovascular effects of noise (e.g., diet, exercise)

No equivalent slide

Slide 80

Current

Previous Presentation Slide 15

Hearing Protection

Types:

- Earplugs
 - Fit inside the ear canal
 - To be effective, need to total block the canal and create an airtight seal
 - Dirty or worn-out plugs will not seal the canal and may irritate it

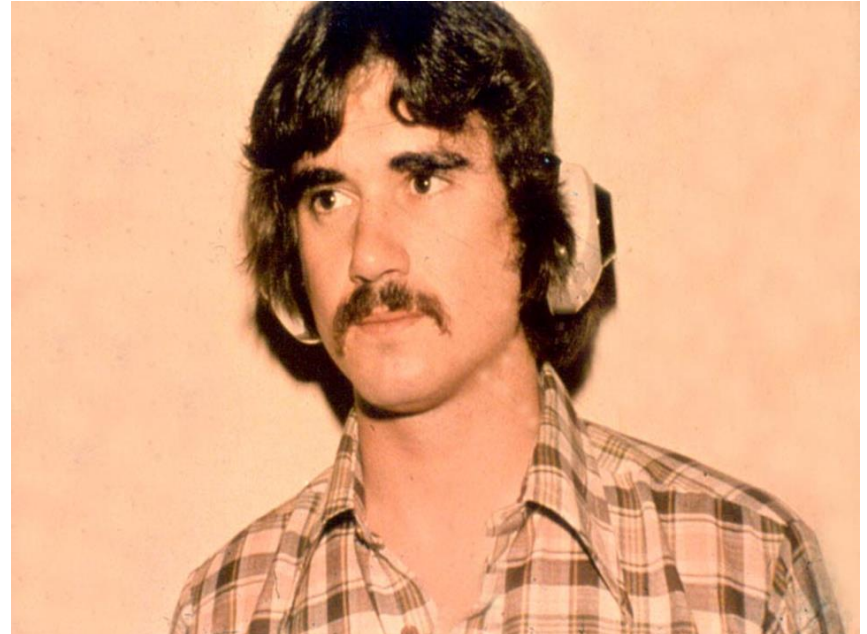


- Earmuffs
 - Fit over the ear
 - Do not fit properly over glasses or long hair



Both types are equally effective. Using them together increases protection against high noise levels, over 105 dB(A). You should choose the hearing protection that is the most convenient, compatible and comfortable for you.

Source:
Oregon OSHA's Quick Guide to Hearing Protection <http://www.oregosh.org/pdf/pubs/3349.pdf>



Slide 81

Current

Section 5 - Miner's and Operator Rights and Responsibilities

Previous Presentation Slide 16

Unit 14. Health And Sanitation

▶ Lessons 3

- ▶ Miner's and operator rights and responsibilities

Slide 82

Current

Previous Presentation

No equivalent slide

Section 6 – Lifestyle Factors and
Cardiovascular Disease

Slide 83

Current

Previous Presentation

Key Points

- Lifestyle factors contribute more to cardiovascular disease than work activity
- Smoking, diet, and exercise are key factors

No equivalent slide

Slide 84

Current

Previous Presentation

Whole Health Considerations

- From ages 25 - 55, the risk of a heart attack or a stroke goes up 10 times
- A 25 year old who smokes, has high blood pressure and high cholesterol has a 1 in 70 chance of having a heart attack or stroke by age 35
- At age 55, his or her odds are 1 in 8 (12.5%). The odds are almost 1 in 2 (50%) if you add in diabetes
- At 55, if you don't smoke, control your blood pressure and your cholesterol and fats and are not diabetic, the odds are no higher than 1 in 50 (<2%)

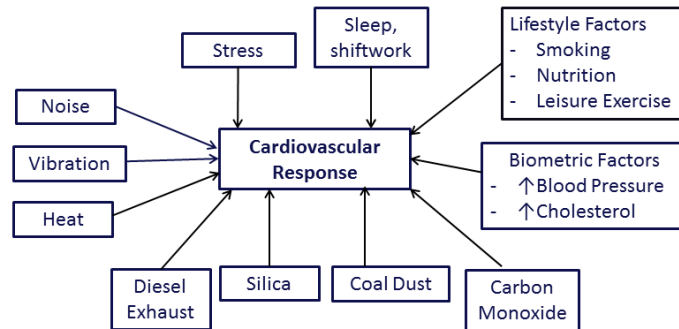
No equivalent slide

Slide 85

Current

Previous Presentation

Health Exposures Contributing to Heart Disease



No equivalent slide

Slide 86

Current

Previous Presentation

Sleep

- Sleep provides many benefits:
 - Gives the body a chance to rest and recover
 - Boosts memory
 - Reduces stress
 - Impacts a person's weight
- Sleep deprivation changes brain patterns and interferes with the production of "hunger hormones" causing you crave food even though you are not hungry

No equivalent slide

Slide 87

Current

Previous Presentation

Fatigue

- Fatigue is the decline in mental and/or physical performance that results from prolonged exertion, lack of quality sleep, or disruption of the internal body clock
- Fatigue affects work performance and increases likelihood of errors
- The consequences of fatigue include:
 - Reduced alertness
 - Poor and slow perception
 - Sleepiness
 - Long-term health problems (associated with chronic fatigue)

No equivalent slide

Source:
Health and Safety Executive (2006). *Managing Shift Work*. Suffolk, England: HSE Books.

Slide 88

Current

Previous Presentation

Sleep Aides

- Sleeping pills are not meant to be long-term solutions for better sleep
 - They become less effective with prolonged use
- They may create dependency issues
- They do not address the root cause of sleep problems
- Over-the-counter sleep aids may cause severe prolonged drowsiness that can carry over to your commute and your work

No equivalent slide

Slide 89

Current

Previous Presentation

Stress

- Stress is the brain's response to any demand
- Chronic stress impairs you both mentally and physically
 - Mental signs
 - Anxiety (worry, self-doubt)
 - Depression (sad moods, feelings of hopelessness)
 - Physical signs
 - Stomach and digestive problems
 - High blood pressure
 - Insomnia
 - Frequent colds/illnesses
 - Headaches
 - Fatigue

No equivalent slide

Slide 90

Current

Previous Presentation

Exercise is Good for Stress

- Exercise has immediate and long-term psychological benefits, such as:
 - Releasing feel-good chemicals (endorphins), creating a relaxed state
 - Promoting positive mood and well-being
 - Reduces anxiety
 - Reducing depression when performed regularly
- The total amount of exercise is most important, just doing something on a regular basis

No equivalent slide

Slide 91

Current

Previous Presentation

Section 7 – Outdoor Risks

- No equivalent slide

Slide 92

Current

Previous Presentation

Key Points

- Be aware of the outdoor environment and prepare appropriately
- Snakes and spiders can pose a risk
- Safety and health applies at home and work

- No equivalent slide

Slide 93

Current

Previous Presentation

Outdoor Environment - Heat



- Heat related conditions:
 - Heat stroke (most serious condition)
 - Heat Exhaustion
 - Heat Syncope (fainting)
 - Heat Cramps
- Symptoms of Heat Overexposure
 - High body temperature
 - Headache
 - Muscle Cramps
 - Dizziness
 - Profuse sweating or no sweating

- No equivalent slide

Source:
CDC <http://www.cdc.gov/niosh/topics/heatstress/>



Slide 94

Current

Previous Presentation

Outdoor Environment - Heat

- Recommendations for working in the heat:
 - Drink water frequently. Drink enough water that you never become thirsty. Approximately 1 cup every 15-20 minutes – 24-32oz/hour
 - Avoid alcohol
 - Avoid drinks with large amounts of caffeine or sugar
 - Monitor your physical condition and that of your coworkers

- No equivalent slide

Source:
CDC <http://www.cdc.gov/niosh/topics/heatstress/>



Slide 95

Current

Previous Presentation

Outdoor Environment - Cold

- Cold Related conditions:
 - Hypothermia
 - Frostbite
- Symptoms of cold exposure:
 - Shivering
 - Fatigue
 - Loss of coordination, confusion, disorientation
 - Numbness, tingling or bluish color of hands, feet, ears, nose

- No equivalent slide

Source:
CDC <http://www.cdc.gov/niosh/topics/coldstress/>



Slide 96

Current

Previous Presentation

Outdoor Environment - Cold

- Recommendations for working in the cold:
 - Wear appropriate clothing
 - Wear several layers of loose clothing. Layering provides better insulation
 - Make sure to protect the ears, face, hands and feet in extremely cold weather
 - Monitor your physical condition and that of your coworkers

- No equivalent slide

Source:
CDC <http://www.cdc.gov/niosh/topics/coldstress/>



Slide 97

Current

Previous Presentation

Wildlife

- West Virginia has poisonous snakes and spiders



Timber
Rattlesnake



Northern
Copperhead



Black Widow



Brown
Recluse

- No equivalent slide

Source:
Marshall University: https://www.marshall.edu/herp/pages/Snakes_Index.htm

WV Department of Agriculture:
<http://www.agriculture.wv.gov/divisions/comm/Documents/Publications%20PDF%20ONLY/Publications/Spiders.pdf>

Slide 98

Current

Previous Presentation

Parting Thoughts

- An apprentice miner who has suitable protection against exposures at work and takes preventive health measures outside of work will live as long as the general US population
- Good dust control and selective use of respiratory protection can eliminate loss of lung function later in life
- Abuse of substances are easily detected with existing required screening and can lead to lifetime loss of employment in mining
- Passive routine health and lung checks may not be enough. Miners are expected to be active participants in their own safety and health

- No equivalent slide

Appendix 3d. Slide by Slide Comparison Underground Mining Course

Slide by slide comparison of the current and previous underground miner training

The slide number mentioned at the top
of the following slides refer to the slide
in the current approved training
material.

Slide 1

Current

Previous

The following “Health and Sanitation” material of the 80 Hour Underground Miner Pre-Employment Training Program was developed by the University of Connecticut, Division of Occupational and Environmental Medicine, in conjunction with the West Virginia University Mining and Industrial Extension.

The developers wish to acknowledge the Alpha Foundation as the Project Funder.

All findings and conclusions are those of the authors and do not necessarily represent the views of the Foundation and any mention of a company or product does not constitute an endorsement of the Foundation.

No equivalent slide



Slide 2

Current

Previous slide 1

Health and Sanitation Unit

80 Hour Course

UNIT 12

HEALTH AND
SANITATION

Slide 3

Current

Previous

Topic Areas:

1. Lung Disease and it Prevention
2. Injury and Musculoskeletal Diseases
3. Drugs, Intoxicants, and Alcohol
4. Hearing Loss and Hearing Protection
5. Lifestyle Factors and Cardiovascular Disease
6. Sanitation Laws

No equivalent slide

Slide 4

Current

Previous Slide 2

Section 1 – Lung Disease and Prevention

LESSON 1

HEALTH TERM
DEFINITIONS

Slide 5

Current

Previous

Key Points

- Lifestyle factors contribute more to cardiovascular disease than work activity
- A coal miner can reduce his chance of lung disease by not smoking and minimizing dust exposure
- In order for a respirator to work properly it must be fit tested

No equivalent slide

Slide 6

Current

Health Term Definitions

Given lists of definitions and the following terms, the trainee should be able to correctly match each definition to each term:

1. Black Lung
2. Respirable dust
3. Respirator
4. Personal Dust Sampler/Personal Dust Monitor (PDM)
5. Ear Protection

Previous Slide 4



Given lists of definitions and the following terms, the trainee should be able to correctly match each definition to each term:

1. Personal dust sampler
2. Black lung
3. Respirable dust
4. Respirator
5. Ear Protection
6. Porta-Potties

Combined the title from previous slide 2 with the text of previous slide 4.

Slide 7

Current

Respirable Dust and Disease

One of the chief health hazards in the coal mining industry is breathing particles of coal dust that can lead to black lung.

The State of West Virginia and the Federal Government have recognized that breathing coal dust can cause black lung. By 1971 both the State and Federal Governments had passed laws providing benefits for miners who had contracted black lung.

It is important for you to learn some basic information about the presence of dust in the coal mine and how it can be controlled.

Previous Slide 3

One of the chief health hazards in the coal mining industry is breathing particles of coal dust that can lead to black lung.

The State of West Virginia and the Federal Government have recognized that breathing coal dust can cause black lung. By 1971 both the State and Federal Governments had passed laws providing benefits for miners who had contracted black lung.

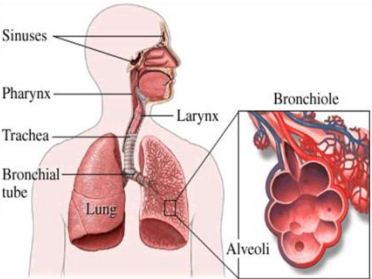
It is important for you to learn some basic information about the presence of dust in the coal mine and how it can be controlled.

Slide 8

Current

Respirable Dust

This is very fine particles of coal dust that can be carried by air directly into the small air sacs (alveoli) of the lungs. When the dust reaches the air sacs it can be deposited in the lungs. The lungs will then react to these deposits of coal dust. The reaction of the lungs to the deposits of coal dust constitutes the basis of coal workers' pneumoconiosis.



Most coal dust is larger and non-respirable (that is, it cannot reach the air sacs of the lungs) Respirable dust is too small to be seen by the naked eye. Respirable coal dust may also cause black lung.

The last sentence on the above slide is different than the slide approved by the West Virginia Office of Miners Health and Safety Training for training in West Virginia. The West Virginia version reads “Most coal dust is larger and non-respirable (that is, it cannot reach the air sacs of the lungs); it may also cause black lung.” The wording was not changed at the direction of the West Virginia Office of Miners Health and Safety Training.

Previous Slide 7

Respirable Dust:

This is very fine particles of coal dust that can be carried by air directly into the small air sacs (alveoli) of the lungs. When the dust reaches the air sacs it can be deposited in the lungs. The lungs will then react to these deposits of coal dust. The reaction of the lungs to the deposits of coal dust constitutes the basis of coal workers' pneumoconiosis.

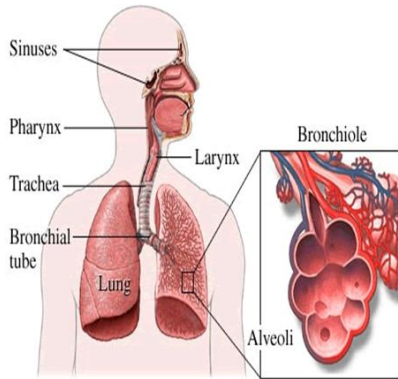
Most coal dust is larger and nonrespirable (that is, it cannot reach the air sacs of the lungs); it may also cause black lung. Respirable dust is too small to be seen by the naked eye.

The text from the previous slide 7 was reorganized and a diagram of the respiratory system was added to enhance understanding.

Slide 9

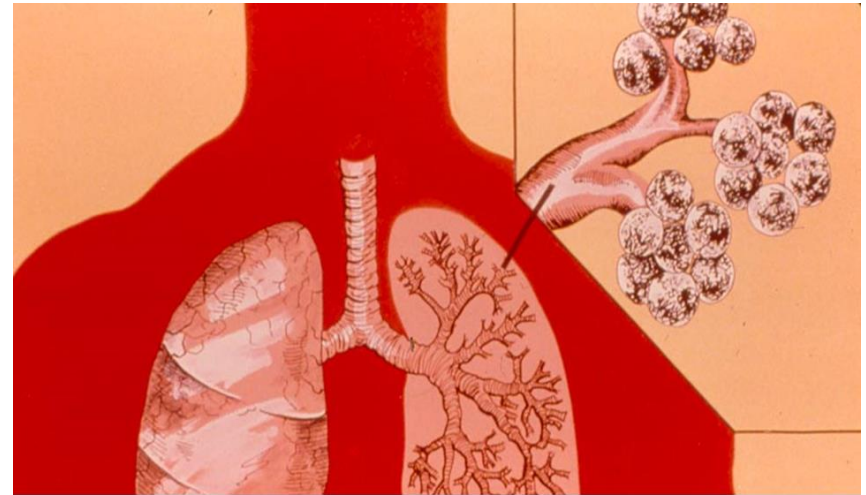
Current

Respirable Dust



When the larger particles of non-respirable coal dust collect in the mouth, nose and throat, you will find yourself coughing them up and spitting them out. This is a natural process of the filtering action of your body. It is a good sign to spit out coal dust. Then it is not part of your lungs.

Previous Slide 8



When the larger particles of nonrespirable coal dust collect in the mouth, nose and throat, you will find yourself coughing them up and spitting them out. This is a natural process of the filtering action of your body. It is a good sign to spit out coal dust. Then it is not part of your lungs.

The text from the previous slide 8 was copied and a improved diagram of the respiratory system was added to enhance understanding.

Slide 10

Current

Previous Presentation

Lung Cancer and Coal Mining

- The largest risk factor for cancer is smoking
 - ~ 80-90% of smokers have some lung damage
- Silica dust is a possible carcinogen
- Miners need to follow procedures to control dust;
 - Surface watering
 - Door seal maintenance
 - Positive pressure in vehicle cabs

No equivalent slide

This slide was added to increase awareness of the lung cancer.

Slide 11

Current

Previous Presentation

Playing the Odds

No equivalent slide

Age at Smoking Cessation	Odds of Dying from Lung Cancer at Specific Age			
	35	45	55	65
Never Started	0	1 in 25,000	1 in 14,000	1 in 5,000
Stopped at 35	0	<1 in 25,000	1 in 3,600	1 in 1,600
Stopped at 45	--	--	1 in 1,800	1 in 950
Stopped at 55	--	--	1 in 800	1 in 400
Never Stopped	1 in 10,000	1 in 2,200	1 in 600	1 in 250

Source:

Halpern, M. T., Gillespie, B. W., & Warner, K. E. (1993). Patterns of absolute risk of lung cancer mortality in former smokers. *Journal of the National Cancer Institute*, 85(6), 457-464.



This slide was added to increase awareness of smoking to lung cancer. It also shows that smoking cessation will decrease your chances of dying from lung cancer.

Slide 12

Current

Previous Presentation

Coal Workers Pneumoconiosis (CWP)

- *CWP is a medical term for Black Lung*
- CWP is a large factor in respiratory decline but it is preventable
- Normal Lung volume is about 5 liters or 5000 cc
- A miner who smokes and has CWP will lose about 100 cc/year
- A miner who works in a mine with good dust control will lose 5 cc/year

No equivalent slide

Slide 13

Current

Coal Workers Pneumoconiosis (CWP)

Coal miners and public health officials have long been concerned about occupational health hazards in coal mining. That concern produced the Federal Coal Mine Health and Safety Act of 1969 with its regulations concerning dust suppression and noise reduction.

One health hazard that has been a continuing concern to many people is black lung. We have learned in another lesson that black lung is caused by breathing in and keeping particles of coal dust in the lungs. These particles of coal dust build up slowly over a long time and gradually interfere with breathing.

Black lung is a complicated disease. In a sense, however, it can simply be thought of as a disease, caused from breathing coal dust, that makes it hard to breathe.



Previous Presentation Slide 16

Coal miners and public health officials have long been concerned about occupational health hazards in coal mining. That concern produced the Federal Coal Mine Health and Safety Act of 1969 with its regulations concerning dust suppression and noise reduction.

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Black lung is a complicated disease. In a sense, however, it can simply be thought of as a disease, caused from breathing coal dust, that makes it hard to breathe.

Slide 14

Current

Four Diseases of Black Lung

At least four diseases have been identified under the term black lung:

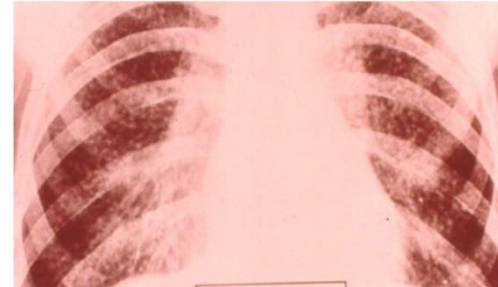
1. Simple Coal Workers' Pneumoconiosis is caused by breathing in and retaining very small particles of coal dust. It can be detected by X-rays of miners' lungs. The symptom of simple pneumoconiosis is shortness of breath
2. Complicated Pneumoconiosis is a very serious disease caused by long-term breathing of small coal dust particles. If a miner has this disease it will show up as large black areas on his lung X- ray



Current Slide 14 combines the text from previous slide 17 and 18

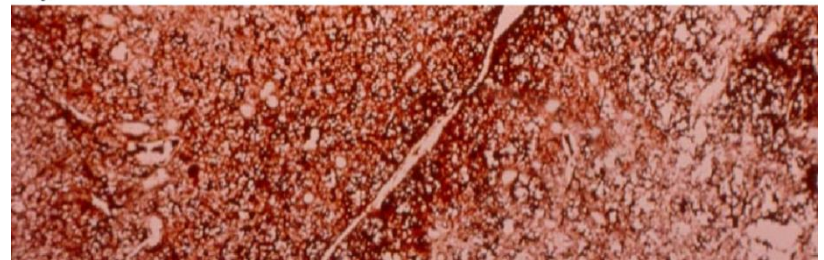
Previous Presentation Slide 17

At least four diseases have been identified under the term black lung. First, simple coal workers' pneumoconiosis is caused by breathing in and retaining very small particles of coal dust. It can be detected by X-rays of miners' lungs. The symptom of simple pneumoconiosis is shortness of breath.



Previous Presentation Slide 18

A second disease is complicated pneumoconiosis. This is a very serious disease caused by long-term breathing of small coal dust particles. If a miner has this disease it will show up as large black areas on his lung X- ray.



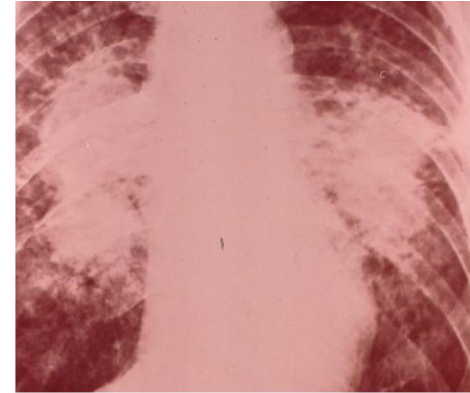
Slide 15

Current

Four Diseases of Black Lung

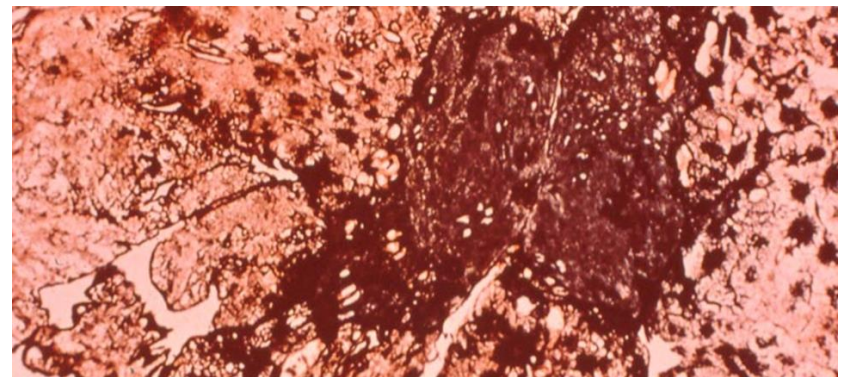
3. Emphysema is caused by breathing larger (respirable) dust particles. This disease can be observed by medical tests and the major symptom is shortness of breath
4. Chronic Bronchitis disease is also caused by breathing large dust particles and symptoms are shortness of breath and coughing

Previous Presentation Slide 19



A third disease is emphysema. This is caused by breathing larger (respirable) dust particles. This disease can be observed by medical tests and the major symptom is shortness of breath.

Previous Presentation Slide 20



The fourth disease is chronic bronchitis. This disease is also caused by breathing large dust particles and symptoms are shortness of breath and coughing.

Current Slide 15 combines the text from previous slide 19 and 20.

Slide 16

Current

Previous Presentation Slide 21

Decrease the Chance of CWP

You and the industry should work together to reduce the chance of you getting black lung. The mining company can do its part by providing up-to-date mining equipment and adequate ventilation. You can do your part by maintaining that equipment and ventilation system and by wearing your respirator.

You and the industry should work together to reduce the chance of you getting black lung. The mining company can do its part by providing up-to-date mining equipment and adequate ventilation. You can do your part by maintaining that equipment and ventilation system and by wearing your respirator.

Slide 17

Current

Respirators

The respirator is one of the more useful pieces of equipment the miner takes with him into the mine. If it is worn, it will filter both breathable and non-breathable coal dust from the air. This filtering could help keep you from contracting black lung. The respirator functions much like the air filter of your car. When dust is present in the air of the mine and you breathe it in through the respirator, it will filter the dust out of the air.

Previous Presentation Slide 23

The respirator is one of the more useful pieces of equipment the miner takes with him into the mine. If it is worn, it will filter both breathable and nonbreathable coal dust from the air. This filtering could help keep you from contracting black lung. The respirator functions much like the air filter of your car. When dust is present in the air of the mine and you breathe it in through the respirator, it will filter the dust out of the air.

Slide 18

Current

Respirators



A device that is worn over the nose and mouth of the miner to filter out both respirable and non-respirable coal dust. Whenever dusty conditions occur in the mine, it is very important for you to wear your respirator.

Previous Presentation Slide 9



Respirator:

A device that is worn over the nose and mouth of the miner to filter out both respirable and nonrespirable coal dust. Whenever dusty conditions occur in the mine, it is very important for you to wear your respirator.

Slide 19

Current

Previous Presentation

Respirators



Students will learn the correct procedure for using the respirator.

The basic steps to remember when using a mine respirator are:

1. Be sure to cover both your nose and your mouth with the respirator
2. Check to see if the edge of the respirator is flat on your face
3. If it becomes difficult to breathe, change the filter in the respirator or throw away the respirator if it is a disposable one

No equivalent slide

Slide 20

Current

Respirators

It may take you a few minutes to get used to working in the mine wearing a respirator. For example, it may be a little more difficult to breathe with the respirator on even when it is not clogged with dust. This can happen because you must pull air through the filter with it on, and you usually do not have to do that.

Whenever you think that your breathing is labored in the mine, you should check to see if the filter is clogged. Of course, our breathing occasionally requires more effort because we have been working hard.

The instructor will now review the two types of respirators. The disposable type and the replaceable type. Also changing the filter in the renewable type will be demonstrated.



Previous Presentation Slide 25

It may take you a few minutes to get used to working in the mine wearing a respirator. For example, it may be a little more difficult to breathe with the respirator on even when it is not clogged with dust. This can happen because you must pull air through the filter with it on, and you usually do not have to do that.

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Slide 21

Current

Previous Presentation

Types of Respiratory Protection



Dust
Filtering
Face
Mask



Air
Helmet



Cartridge
Respirator



Air Stream

No equivalent slide

Slide 22

Current

Previous Presentation

Respirators and Protection Factors

TYPE	EXAMPLE	PF
Air Purifying	½ Face	10
	Full Face	50
Powered Air Purifying (PAPR)	Loose Fit (Airstream)	25
	½ Mask	50
	Helmet/Hood	1000
Supplied Air	Continuous Flow	1000
	Pressure Demand	1000
Pressure Demand (Escape)	SCBA	10,000



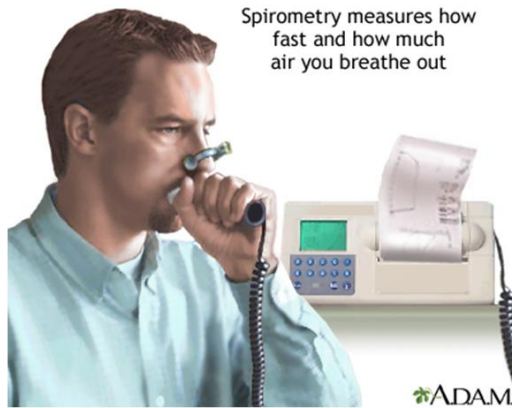
No equivalent slide

Slide 23

Current

Previous Presentation

Example of Spirometry (Breathing Test)



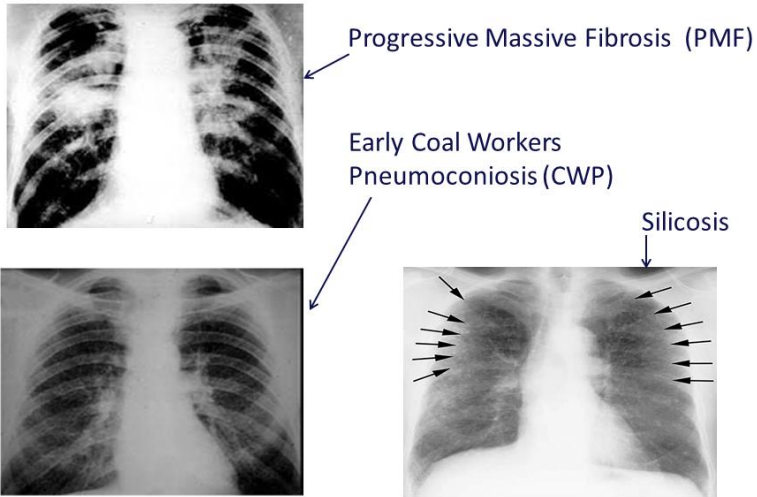
Spirometry measures how
fast and how much
air you breathe out

No equivalent slide

Slide 24

Current

Previous Presentation Slide 16-20



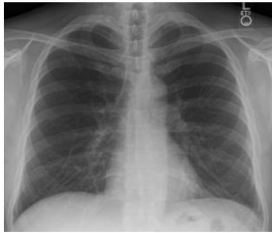
Expands on Slides 16-20 of previous presentation

Slide 25

Current

Previous Presentation Slide 16-20

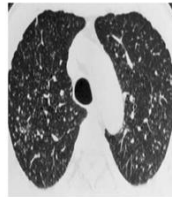
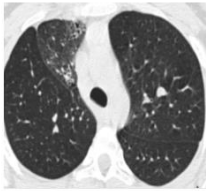
The x-ray presents a small part of the disease



Normal chest x-ray



Simple CWP



Expands on Slides 16-20 of previous presentation

Slide 26

Current

Personal Dust Sampler



This is a small device, worn on a miner's overalls or placed at a specific location, that is used to measure the amount of dust in the working area. The Mine Safety and Health Administration uses the dust sampler to check the concentration of respirable dust.

Previous Presentation Slide 5

Personal Dust Sampler:

This is a small device, worn on a miner's overalls or placed at a specific location, that is used to measure the amount of dust in the working area of the mine. The Mine Safety and Health Administration uses the dust sampler to check the ventilation of a mine. The sampler does not relate to black lung or black lung benefits. Black lung benefits are determined only by X-ray examination of your body.



Slide 27

Current

Previous Presentation

New Personal Dust Monitor



Presents newer version of device shown in previous presentation slide 5.

Slide 28

Current

Dust Control Devices

To keep the dust levels in the mine to as low a level as possible, mining machinery is often equipped with dust control devices. These devices include:

1. Water Spray
2. Dust Fans
3. Dust Collectors



Previous Presentation Slide 34

DUST CONTROL DEVICES

To keep the dust levels in the mine to as low a level as possible, mining machinery is often equipped with dust control devices. These devices include:

- *water spray*
- *dust fans*
- *dust collectors*



Slide 29

Current

Dust Control

For your health and safety in an underground coal mine, it is very important to reduce and control coal dust in the mine air.

It is important to reduce dust because it can cause black lung and also reduce vision in the mine. When your vision is reduced by dust, you can get into an accident because you cannot see dangers around you.



Previous Presentation Slide 36

For your health and safety in an underground coal mine, it is very important to reduce and control coal dust in the mine air.



It is important to reduce dust because it can cause black lung and also reduce vision in the mine. When your vision is reduced by dust, you can get into an accident because you cannot see dangers around you.

Slide 30

Current

Dust Control

The Federal Coal Mine Health and Safety Act of 1969 requires that you be protected from dangers related to dust in the mine by the use of water sprays, ventilation (fans) and dust collectors.



Previous Presentation Slide 37

The Federal Coal Mine Health and Safety Act of 1969 requires that you be protected from dangers related to dust in the mine by the use of water sprays, ventilation (fans) and dust collectors.



Slide 31

Current

Dust Control

Cleaning dust box
on roof bolting
machine.



Previous Presentation Slide 38

Cleaning dust box on roof bolting machine.



Slide 32

Current

Dust Control

You will find that all of these methods are used in most modern mines.

All of these devices are for your protection. You should never disconnect or dismantle any of these devices!

If any of the dust collection devices become damaged or defective, report it to your foreman so they can be repaired.

Also, if a ventilation curtain is knocked down near the face, it will upset the control of dust in that area. Replace the curtain at once.

Previous Presentation Slide 39

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Slide 33

Current

Previous Presentation

No equivalent slide

Section 2 – Injury and Musculoskeletal
Disease

Slide 34

Current

Previous Presentation

Key Points

- Musculoskeletal diseases are more prevalent in mining than any other occupational group
- Mining equipment is specialized, offering limited space to add interventions

No equivalent slide

Sources:

Cherry, N. M., Meyer, J. D., Chen, Y., Holt, D. L., & McDonald, J. C. (2001). The reported incidence of work-related musculoskeletal disease in the UK: MOSS 1997–2000. *Occupational Medicine*, 51(7), 450-455.

McMillan, G., & Nichols, L. (2005). Osteoarthritis and meniscus disorders of the knee as occupational diseases of miners. *Occupational and environmental medicine*, 62(8), 567-575.



Slide 35

Current

Previous Presentation

Common Sources of Knee Pain for Miners Meniscus disorders and knee arthritis

- Frequency
 - Affects 6-24% of miners
 - 3-6 x higher than comparative light manufacturing workers
- Causes
 - Slips and falls (>50% of knee injuries)
 - Direct pressure from kneeling
 - Shear force (shoveling)
 - Mounting and dismounting equipment is the leading cause of slips and falls on surface mines
- Interventions
 - Non-surgical management (braces, supports and analgesics)

Source:

Cherry, N. M., Meyer, J. D., Chen, Y., Holt, D. L., & McDonald, J. C. (2001). The reported incidence of work-related musculoskeletal disease in the UK: MOSS 1997–2000. *Occupational Medicine*, 51(7), 450-455.

No equivalent slide

Slide 36

Current

Previous Presentation

Posture and Joint Loading

*Mining has many awkward postures
Over time, there is wear and tear on joints*



No equivalent slide

Slide 37

Current

Previous Presentation

Facts about Knee Pain

- Most people exhibit few symptoms walking on level ground or at the start of walking from a standing position
- Pain usually occurs when climbing up stairs and standing up from a chair
- Findings on X-rays do not predict disease severity
 - People with abnormal X-rays often have no pain
 - Other times people with minimal findings on X-ray report severe pain

No equivalent slide

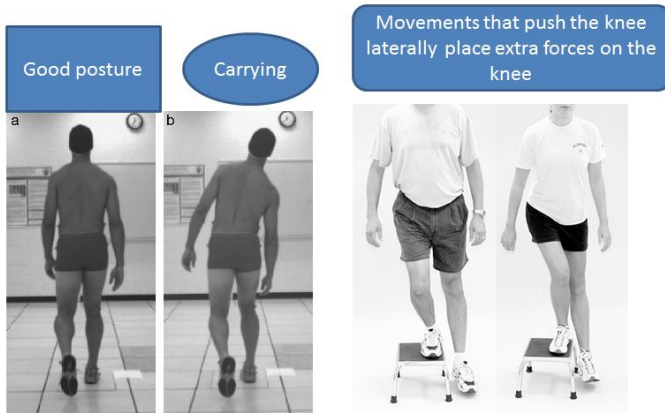
Slide 38

Current

Previous Presentation

Reducing Force on the Knee

No equivalent slide



Source:
Mundermann, A., Asay, J., Mundermann, L., & Andriacchi, T.P. (2008). Implications of increased medio-lateral trunk sway for ambulatory mechanics. *Journal of Biomechanics*, 41(1), 165-170.

Slide 39

Current

Previous Presentation

No equivalent slide

Section 3 – Drugs, Intoxicants, and Alcohol

REMEMBER: The currently approved WV Law on the following topics will always take precedence over the slides in this presentation.

Slide 40

Current

Previous Presentation

Key Points

- Drugs and alcohol are everybody's problem
- Drugs and alcohol use has increased among younger workers
- Help is available through company and community programs

No equivalent slide

Slide 41

Current

Previous Presentation

Part A: Drugs and Alcohol Affect Every Miner's Safety

The goal of a drug and alcohol policy is to create a safer, healthier mine for you and for your fellow miners. Its purpose is to protect, not punish.

The idea is to prevent alcohol and drug use and encourage people to voluntarily seek help for alcohol and drug problems BEFORE their behavior becomes a safety hazard.

No equivalent slide

Slide 42

Current

Previous Presentation

The science behind these policies is clear

No equivalent slide

Studies on the effects of alcohol have shown impairment at low Blood Alcohol Concentration(BAC) levels:

- ***All driving-related skills*** showed impairment by .07 BAC
- In studies examining divided attention, vigilance, and simulated piloting, ***73 percent of the tests showed impairment by .039 BAC****

The take-away - Skill and judgment are impaired at very low BAC.

Source:

National Highway Traffic Safety Administration, Traffic Safety Facts Banner, No. 223, May 2000.



Slide 43

Current

Previous Presentation

Observations on drug and alcohol use and injury at work

- Drug use has increased in the younger work force
- Every year, miners are hurt because their reactions are slowed by drugs or alcohol
- Even two drinks can cause dehydration or fatigue which reduces performance and impairs judgment
- **Worse yet**, *fellow miners are injured or killed by abusers*

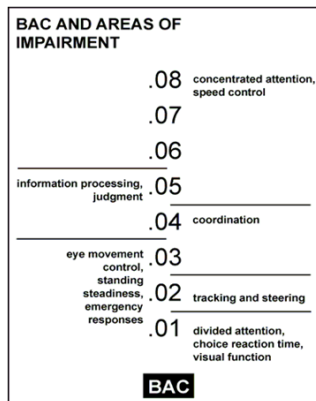
No equivalent slide

Slide 44

Current

Previous Presentation

Effect of Blood Alcohol Concentration (BAC) on tasks



Source:
www.ct.gov/dmv/cwp/view.aspx?a=813&q=249562

No equivalent slide

Slide 45

Current

Previous Presentation

Did you know?

- One drink is defined as:
 - One shot, 1.25 oz., of 80 proof liquor (vodka, scotch)
 - 12 oz. of beer
 - 5 oz. of wine
- *They all have about the same alcohol content and effect on the body*

No equivalent slide

Slide 46

Current

Previous Presentation

Approximate Blood Alcohol Percentage
- Males

No equivalent slide

Drinks in 1 hour	Body Weight in Pounds						
	140	160	180	200	220	240	
0	0	0	0	0	0	0	Only Safe Driving Limit
1	0.03	0.02	0.02	0.02	0.02	0.02	Impairment Begins
2	0.05	0.05	0.04	0.04	0.03	0.03	
3	0.08	0.07	0.06	0.06	0.05	0.05	Driving Skills Affect Possible Criminal Penalties
4	0.11	0.09	0.08	0.08	0.07	0.06	
5	0.13	0.12	0.11	0.09	0.09	0.08	Legally Intoxicated Criminal Penalties

Source:
Pennsylvania Liquor Control Board

Slide 47

Current

Previous Presentation

Approximate Blood Alcohol Percentage -
Females

No equivalent slide

Drinks in 1 hour	Body Weight in Pounds						
	100	120	140	160	180	200	
0	0	0	0	0	0	0	Only Safe Driving Limit
1	0.05	0.04	0.03	0.03	0.03	0.02	Impairment Begins
2	0.09	0.08	0.07	0.06	0.05	0.05	Driving Skills Affect Possible Criminal Penalties
3	0.14	0.11	0.1	0.09	0.08	0.07	
4	0.18	0.15	0.13	0.11	0.1	0.09	Legally Intoxicated Criminal Penalties
5	0.23	0.19	0.16	0.14	0.13	0.11	

Source:
Pennsylvania Liquor Control Board



Slide 48

Current

Previous Presentation

Take note

- For *drivers*, the legal BAC limit is .08
- But for *miners*, the legal BAC limit is .039 for mining
- Most miners will risk decertification after their first drink

No equivalent slide

Slide 49

Current

Previous Presentation

How long are alcohol and drugs in your system?

- Alcohol can go through your system in about 24 hours
- Certain drugs will stay in your body for as long as 30 days and they are entirely detectable
- The next 2 slides show how long drugs and alcohol are detectable in your body

No equivalent slide

Slide 50

Current

Previous Presentation

Approximate Detection Periods

Substance	Urine	Hair	Blood / Oral Fluid
Alcohol	6–24 hours	up to 2 days	12–24 hours
	Note: Alcohol tests may measure EtG which can stay in urine for up to 80 hours		
Cotinine (a break-down product of nicotine)	2 to 4 days	up to 90 days	2 to 4 days
Amphetamines (except methamphetamine)	1 to 5 days	up to 90 days	12 hours
Methamphetamine	3 to 5 days	up to 90 days	1–3 days
MDMA (Ecstasy)	72 hours	up to 90 days	24 hours
Barbiturates (except phenobarbital)	1 day	up to 90 days	1 to 2 days
Phenobarbital	2 to 3 weeks	up to 90 days	4 to 7 days
Benzodiazepines	Therapeutic use: up to 7 days	up to 90 days	6 to 48 hours
	Chronic use (over one year): 4 to 6 weeks		

No equivalent slide

Slide 51

Current

Previous Presentation

Approximate Detection Periods

Substance	Urine	Hair	Blood / Oral Fluid
Cannabis	2 to 7 days, up to >30 days after heavy use and/or in users with high body fat	up to 90 days	2–3 days in blood, up to 2 weeks in blood of heavy users. However, it depends on whether actual THC or THC metabolites are being tested for, the latter having a much longer detection time than the former. THC (found in marijuana) may only be detectable in saliva/oral fluid for 2–24 hours in most cases.
Cocaine	2 to 5 days with exceptions for certain kidney disorders	up to 90 days	2 to 5 days
Codeine	2 to 3 days	90 days	≤1 day
Morphine	2 to 4 days	up to 90 days	1 – 3 days
Heroin	1 to 4 days	up to 90 days	1– 2 days
LSD	12 to 24 hours	Undetectable	2 to 4 days
Methadone	3 days	up to 97 days	24 hours
PCP	3 to 7 days for single use; up to 30 days in chronic users	up to 90 days	1 to 3 days

No equivalent slide

Slide 52

Current

Previous Presentation

High Energy Drink (HED) and the Heart

- HEDs
 - are fairly new products and not a lot is known about their long term effects on the body
 - caffeine content varies greatly by brand from 1-3 times as much as an 8oz. cup of coffee
 - they also contain glucose and taurine, an amino acid

But unlike the caffeine in coffee, HEDs additional ingredients, glucose and taurine, can cause increased heart contractibility which places increased stress on the heart.

This means your heart is doing more work than it needs which may cause problems.

Sources:

<http://www.webmd.com/food-recipes/news/20121025/how-much-caffeine-energy-drink>

<http://www.webmd.com/hypertension-high-blood-pressure/news/20131202/energy-drinks-affect-heart-mri-scans-show>

No equivalent slide



Slide 53

Current

Previous Presentation

Compounding effects

- A German study conducted by, Dr. Jonas Dorner, pointed out the amount of caffeine in energy drinks is typically up to three times higher than in other drinks like coffee or cola, and high intake of caffeine may trigger rapid heart rate, palpitations, rises in blood pressure and in severe cases, seizures or sudden death
- Effects are compounded by drugs or alcohol

No equivalent slide

Source:
<http://www.webmd.com/hypertension-high-blood-pressure/news/20131202/energy-drinks-affect-heart-mri-scans-show>



Slide 54

Current

Previous Presentation

Regulation

- A study by *Consumer Reports* tested 27 popular energy drinks.
 - 11 didn't list the amount of caffeine on the label
 - Among the 16 products that did, 5 had more than 20% caffeine than the label claimed
- With little or no regulation, the amounts of caffeine and other ingredients in these drinks are essentially unknown

No equivalent slide

Source:
<http://www.webmd.com/food-recipes/news/20121025/how-much-caffeine-energy-drink>



Slide 55

Current

Previous Presentation

How much caffeine am I drinking?

- The average serving of coffee has about 100 mg of caffeine
- The same *Consumer Reports* tests showed 7 HEDs with *more than twice* that amount of caffeine, although the label didn't indicate amounts

No equivalent slide

Slide 56

Current

Previous Presentation

HEDs and Insomnia

- HEDs are also linked to insomnia
- Even at work, a tired body will try to get rest
- This means that you may be less likely to detect hazards
- Disruptive sleep causes added stress to the body including decreased mental function, increases in blood pressure, irritability, and decreased work capacity

No equivalent slide

Slide 57

Current

Previous Presentation

HED Wrap Up

- HEDs can cause irregularities to your heartbeat (prolonged contractibility)
- HEDs labels don't tell you what's inside, much less how much caffeine is involved
- They are not regulated well
- For sensitive people, they can cause rapid heart rate, palpitations, rises in blood pressure and in severe cases, seizures or sudden death

No equivalent slide

Source:

<http://www.webmd.com/hypertension-high-blood-pressure/news/20131202/energy-drinks-affect-heart-mri-scans-show>



Slide 58

Current

Previous Presentation

Part B: What the Apprentice Miner
Needs to Know

No equivalent slide

West Virginia Drug and Alcohol
Policies

Slide 59

Current

Previous Presentation

Substance abuse is not a new topic

- Every year, miners are hurt because their reactions are slowed by drugs or alcohol
- Their ability to predict hazards is reduced
- Worse yet, fellow miners are injured or killed by abusers

No equivalent slide

Slide 60

Current

Previous Presentation

West Virginia has problems with substance abuse just like every other state

- But now, the Legislature, the Industry, the Union and the Office of Miners' Health Safety and Training are taking a stronger approach to abuse than in the past. In fact, much stronger
- Miners need to know about these new rules

No equivalent slide

Slide 61

Current

Previous Presentation

The State is decertifying miners now

- By the end of 2014, the State will have decertified about 600 miners for violating the state's new drug and alcohol policy
- Protect yourself, protect your career and protect those around you

Know the rules

No equivalent slide

Slide 62

Current

Previous Presentation

The policies in everyday language

- **Pre-employment testing** means that all miners will be tested for substance abuse prior to starting work
- New miners should know that they can be called for a drug and alcohol test as soon as a day after passing the 40 or 80 hour certification test

No equivalent slide

Source: WV Title 56, Series 19. Effective May 10, 2014



Slide 63

Current

Previous Presentation

Here's what this really means

- A miner might be certified one day, and be called for pre-employment testing on short notice, even the next day
- A miner must be **drug free**

No equivalent slide

Slide 64

Current

Previous Presentation

Here are some definitions
all miners need to know

No equivalent slide

These definitions come from the May 10, 2014
“Rules Governing Substance Abuse Screening:
Standards and Procedures”

Slide 65

Current

Previous Presentation

“Safety-Sensitive Position”

- Means that the person’s job responsibilities include duties and activities that involve the personal safety of the employee or others at the mine
- This is pretty much everyone on the mine site

No equivalent slide

Slide 66

Current

Previous Presentation

“Safety-Sensitive” continued:

- If you fail a drug or alcohol test, you will lose your “safety sensitive” card
- you lose ALL certifications including your apprentice miners card and...
- you cannot go on mine property

No equivalent slide

Slide 67

Current

Previous Presentation

“Serious Accident”

- Means “an accident where bodily injury requires the individual to be admitted to a medical facility overnight for reasons other than strains, sprains or observation as determined by a physician”

No equivalent slide

Slide 68

Current

Previous Presentation

In a “Serious Accident”

No equivalent slide

- If you are in a serious accident, you will be tested
- If you are even involved in the accident, you will be tested

Slide 69

Current

Previous Presentation

“Random Testing”

- Means that each person has an equal chance of being tested at random and unscheduled times
- Each year, at least 25 percent of miners must be randomly tested for substance abuse
- This occurs at least 4 times per year

No equivalent slide

Slide 70

Current

Previous Presentation

“Split Sample”

- Means that part of a urine specimen is sent on to a *second lab* in the event that an *employee requests it* to be tested following a verified positive test of the primary specimen.
- A *lab and a doctor* are involved

No equivalent slide

Slide 71

Current

Previous Presentation

Something to Know

- If you have an expired prescription, you may not take that medicine until the prescription is renewed
- The law now says that all prescriptions expire after one year
- You can't take your wife's or your friend's prescription, otherwise you risk decertification for taking unlawful medicine(s)

No equivalent slide

Slide 72

Current

Previous Presentation

A miner who fails the drug/alcohol test
in West Virginia

No equivalent slide

- Automatically fails in States that have reciprocity with WV
 - For example, Kentucky or other States with reciprocity agreements with West Virginia

Slide 73

Current

Previous Presentation

Some other things to know

- A refusal to take the test means automatic decertification for a minimum of nine (9) months
- A second refusal (or fail) means permanent decertification; you can never work in West Virginia's mines again and any other state with an agreement with West Virginia

No equivalent slide

Slide 74

Current

Previous Presentation

Employers must test urine for at least the following ten substances

- Amphetamines
- Cannabinoids (THC)
- Cocaine
- Opiates
- Phencyclidine (PCP)
- Benzodiazepines
- Propoxyphene
- Methadone
- Barbiturates
- Synthetic narcotics including bath salts and others

There is also a breath test for alcohol

No equivalent slide

Slide 75

Current

Previous Presentation

And even though we already said this,
it is very important

- An employer must:
 - Randomly test at least 25% of miners
 - Test at least 4 times per year
 - Test any miner who is “accident-involved”
- The likelihood is that *a user* **will get caught**

No equivalent slide

Slide 76

Current

Previous Presentation

Miners will face immediate suspension if:

- They test positive for drugs
- They test positive for alcohol
- They possess an adulterated specimen or if they submit an adulterated specimen
- They possess a substituted specimen or if they submit a substituted specimen
- The miner refuses to submit to a drug or alcohol test

Don't forget that an employer can require a test at any time for "reasonable suspicion"

No equivalent slide

Slide 77

Current

Previous Presentation

The miner may appeal a suspension

- Within 30 days of the notice of suspension or revocation
- By requesting a hearing by the Board of Appeals
- A miner can then get all of his cards back

No equivalent slide

Slide 78

Current

Previous Presentation

A miner under suspension may agree to a treatment plan

No equivalent slide

The actual legal document that you would sign runs to five pages- - here is part of page 1

WEST VIRGINIA COAL MINE SAFETY
BOARD OF APPEALS
IN THE MATTER OF:
WEST VIRGINIA OFFICE OF MINERS'
HEALTH, SAFETY AND TRAINING,
Petitioner,
v.
Respondent.
SUBSTANCE ABUSE TREATMENT AGREEMENT
Comes now the West Virginia Office of Miners' Health, Safety and Training (OMHST),
by counsel, Barry L. Koerber, Assistant Attorney General and -----, *pro se*,
(hereinafter referred to as the Parties) and set forth the terms and conditions of this
Substance Abuse Treatment Agreement (Treatment Agreement) containing the

Slide 79

Current

Previous Presentation

The treatment agreement says basically this

- The miner must agree and admit that he violated his employer's substance abuse screening policy program
- All certifications are *immediately* suspended
- The miner is *required* to attend substance abuse counseling and treatment
- The miner must comply with applicable laws and rules- -violation of the treatment plan results in revocation of certifications for at least three (3) years

No equivalent slide

Slide 80

Current

Previous Presentation

There is more to the treatment plan

- The miner will submit samples regularly
- A test failure may result in permanent revocation
- All costs are paid by the miner
- The miner will submit to drug and alcohol testing at least every 30 days, or more often if required by the counselor.
- There will be a permanent record made of all transactions in the treatment plan

No equivalent slide

Slide 81

Current

Previous Presentation

To summarize:

- The new rules are designed to protect miners' safety, not to punish them
- The rules are complicated
- The rules are serious
 - A second failure will result in PERMANENT REVOCATION of ALL CERIFICATIONS
- Company policies may exceed the minimum requirements discussed
- Breaking the rules can impact a miner's career and even bar him from future employment

No equivalent slide

...why take the risk of ruining a career?

Slide 82

Current

Previous Presentation Slide 26

Section 4 - Hearing Loss and Hearing Protection

LESSON 4

EFFECTS OF NOISE ON HEARING

Slide 83

Current

Previous Presentation

Key Points

- Hearing loss is chronic
- By time you realize you have a hearing loss, it's too late
- Recreation and lifestyle contribute as much to hearing loss as work activities
- As people age their ability to hear diminishes

No equivalent slide

Slide 84

Current

Previous Presentation Slide 28

Noise Exposure

**HIGH NOISE
LEVELS CAN
DAMAGE HEARING**



Slide 85

Current

Previous Presentation Slide 27

Noise Exposure

Whenever machinery is being used to mine and transport coal, a considerable amount of noise will be present in the mine. This noise, when it is very loud, can be a serious threat to your health and safety.

It is a threat because high noise levels can affect your hearing, and a high noise level can interfere with communication between you and your fellow workers.

Whenever machinery is being used to mine and transport coal, a considerable amount of noise will be present in the mine. This noise, when it is very loud, can be a serious threat to your health and safety.

It is a threat because high noise levels can affect your hearing, and a high noise level can interfere with communication between you and your fellow workers.

Slide 86

Current

Previous Presentation Slide 29

Noise Exposure

Under the Federal Coal Mine Health and Safety Act of 1969, you may not be exposed to sound levels greater than 90 decibels for an average of an eight hour shift. (You may legally be exposed to louder sounds for less time.)

A decibel is a measure of loudness. An average sound level of 90 dB for an entire shift would probably be judged as a very loud place to work in and could cause some hearing and communication problems.

Under the Federal Coal Mine Health and Safety Act of 1969, you may not be exposed to sound levels greater than 90 decibels (a scale) for an average of an eight hour shift. (You may legally be exposed to louder sounds for less time.)

A decibel is a measure of loudness. An average sound level of 90 dB for an entire shift would probably be judged as a very loud place to work in and could cause some hearing and communication problems.

Slide 87

Current

Previous Presentation

Hearing Loss in Rural Communities

- 40-50% of males 18-27 years of age in rural communities have some hearing loss
- Nationally, only 12.5% of males in this age group have hearing loss
- Main reasons for increased hearing loss are from lifestyle:
 - Farm machinery/lawn care equipment
 - ATVs/motorcycles
 - Firearms/hunting
 - Personal music devices (iPods)

Source:

Humann, M.S., Sanderson, W., Flamme, G., Kelly, K., Moore G., Stromquist, A., & Merchant, J.A. (2011). Noise Exposures of Rural Adolescents. *The Journal of Rural Health* (27), 72-80.

No equivalent slide

Slide 88

Current

Previous Presentation

Consequences of Exposure to Noise

- Immediate short-term effects may involve:
 - temporary hearing loss
 - ringing in, or “dullness” of, the ears (tinnitus)
 - difficulty understanding speech
 - difficulty hearing sounds around you (e.g., warnings)
 - stress, and fatigue
- Persistent long-term effects may include:
 - hearing loss & tinnitus
 - reduced ability to understand speech
 - reduced ability to hear all sounds
 - cardiovascular disease

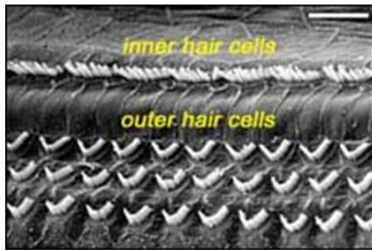
No equivalent slide

Slide 89

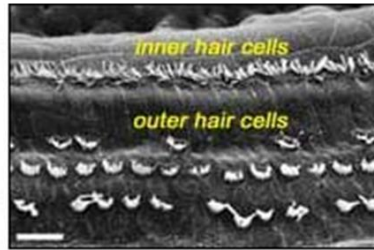
Current

Previous Presentation

Photomicrographs of normal hairs and hair cells in the inner ear damaged by noise, causing hearing loss
(plan views below)



Normal



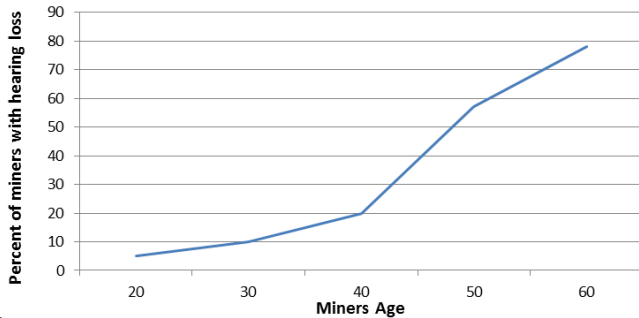
Damaged

No equivalent slide

Slide 90

Current

Percentage of US miners with hearing loss as a function of age showing almost 80% have mild hearing loss, >25dB, by age 60

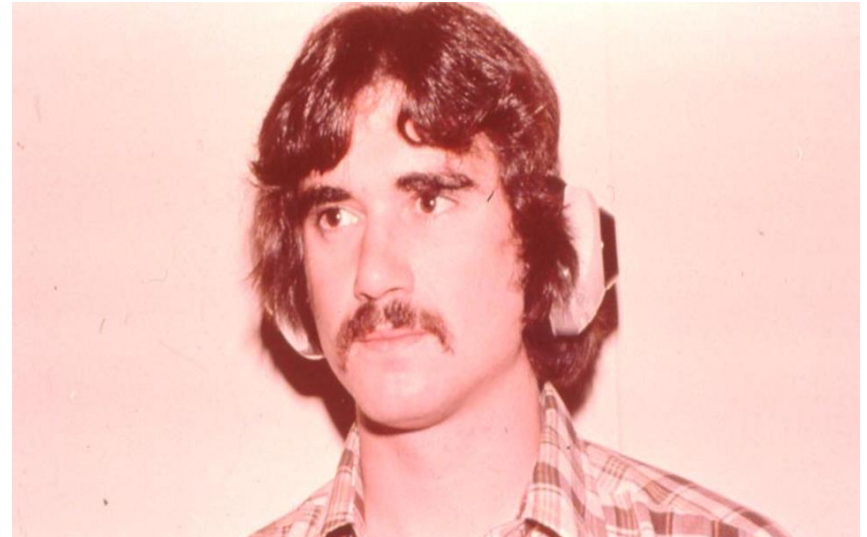


Source:

Bauer, E.R., Spencer, E.R., Smith, A.K., & Hudak, R.L. (2007). Reducing Noise-induced Hearing Loss in Longwall Coal Mine Workers: NIOSH's Approach. *National Institute for Occupational Safety and Health, Pittsburgh Research Laboratory, Hearing Loss Prevention Branch.*



Previous Presentation Slide 30



If you worked in that much noise for several years you would probably have a noticeable hearing problem.

Slide 91

Current

Previous Presentation

Noise exposure data for mining occupations showing the percentage of samples that exceeded the threshold for affecting hearing (>80 dBA), and the percentage that exceeded the threshold for causing substantial hearing loss (>90 dBA)

Occupation	# of Samples	90-dBA threshold	80-dBA threshold
		% of samples >90 dBA(PEL)	% of samples >80 dBA(PEL)
Continuous Miner Helper	68	33.8	88.2
Continuous Miner Operator	262	49.6	96.2
Roof Bolt Operator (single)	234	21.8	85.5
Roof Bolt Operator (twin)	92	31.5	98.9
Shuttle Car Operator	260	13.5	78.5
Scoop Car Operator	94	18.1	74.5
Cutting Machine Operator	22	36.4	63.6
Headgate Operator	20	40	100
Longwall Operator	34	70.6	100
Jack Setter (longwall)	25	23	68

No equivalent slide

Source:

Bauer, E. R., & Kohler, J. L. (2000, August). Cross-sectional survey of noise exposure in the mining industry. In *Proceedings of the 31st Annual Institute of Mining Health, Safety and Research*. Blacksburg, VA: Virginia Polytechnic Institute and State University, Department of Mining and Minerals Engineering, 17-31.



Slide 92

Current

Previous Presentation

How can you tell if your hearing is affected?

- Do you have to turn up the volume on television?
- Do you frequently have to ask others to repeat things?
- Do you have difficulty understanding when you are in groups or in noisy situations?
- Do you have to sit in the front in meetings or in church to understand?
- Do you have difficulty understanding women or young children?
- Do you have trouble knowing where sounds are coming from?
- Are you unable to understand when someone talks to you from another room?
- Have others told you that you don't seem to hear them?
- Do you avoid family meetings or social situations because you 'can't understand'?
- Do you have ringing or other noises (tinnitus) in your ears?

How did you score? 3 or less = no symptoms of hearing loss
 3 to 5 = signs of slight hearing loss
 5 to 7 = signs of moderate hearing loss
 More than 7 = signs of significant hearing loss

No equivalent slide

Slide 93

Current

What can be done

At work:

- Reduce the noise of machines and machinery
- Change work practices and/or adjust schedules to reduce exposure to noisy situations
- Wear hearing protection (muffs or plugs)

While the first two items may not be within your control as a miner, wearing hearing protection is. (See next slide)

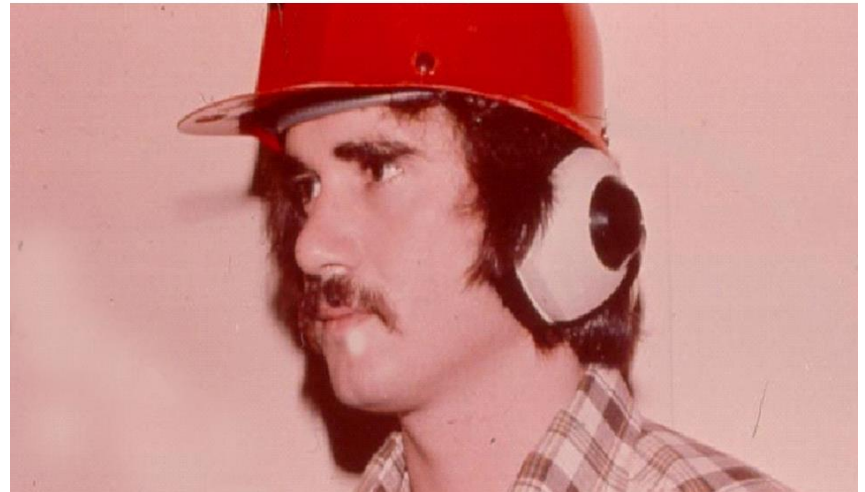
You can decrease your noise exposure by simply moving further away from the source, if possible. For example, standing 5 feet from a 96 dB(A) noise source is hazardous but if you can increase your distance to 20ft the noise drops to 84 dB(A)

Source:
Oregon OSHA's Quick Guide to Hearing Protection <http://www.orosha.org/pdf/pubs/3349.pdf>



Previous Presentation Slide 31

It is recommended that you attempt to protect yourself against hearing damage by wearing ear muffs or a hard hat that is equipped with ear protectors.



Slide 94

Current

Previous Presentation

What can be done

Away from work:

- Reduce noise exposure (as it adds to the effect of exposure at work)
 - Wear hearing protection when working around your home, e.g., using chainsaws, weed whackers, tractors, or mowing the lawn
 - Wear hearing protection when participating in noisy hobbies such as shooting or hunting, motorcycling, wood working, or attending loud concerts or bars
 - Guns and chain saws produce noise in excess of 100 dB(A), motorcycles and snowmobiles in excess of 90 dB(A), and power tools for garden or woodworking in excess of 80 dB(A)
- Avoid excessive alcohol consumption, or smoking
- Pay attention to heart health to reduce the cardiovascular effects of noise (e.g., diet, exercise)

No equivalent slide

Slide 95

Current

Hearing Protection

Ear plugs may also be worn to protect your hearing. If you use ear plugs, they must be kept clean to avoid ear infection. Clean them each day with alcohol. These ear protection devices are available from the mine foreman. The noise level will vary in the mine according to what equipment you are around and how near the working face your job brings you.

As an entry-level miner you are likely to have a job that is less noisy than the certified miners that work near the face. You should remember that the noise level will be higher near the face equipment when you begin working there. Therefore you should remember to protect yourself from loud noise at that time.



Previous Presentation Slide 32

Ear plugs may also be worn to protect your hearing. If you use ear plugs, they must be kept clean to avoid ear infection. Clean them each day with alcohol. These ear protection devices are available from the mine foreman. The noise level will vary in the mine according to what equipment you are around and how near the working face your job brings you.



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Slide 96

Current

Hearing Protection

Types:

- Earplugs
 - Fit inside the ear canal
 - To be effective, need to total block the canal and create an airtight seal
 - Dirty or worn-out plugs will not seal the canal and may irritate it
- Earmuffs
 - Fit over the ear
 - Do not fit properly over glasses or long hair



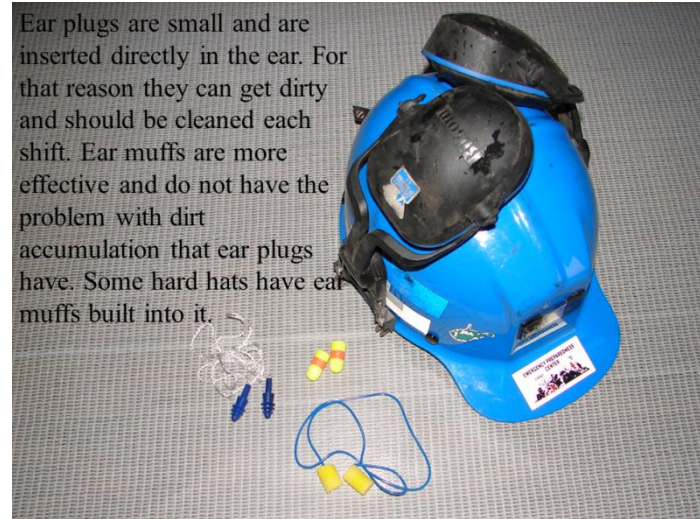
Both types are equally effective. Using them together increases protection against high noise levels, over 105 dB(A). You should choose the hearing protection that is the most convenient, compatible and comfortable for you.

Source:
Oregon OSHA's Quick Guide to Hearing Protection <http://www.oregoshare.org/pdf/pubs/3349.pdf>



Previous Presentation Slide 10, 11

Ear plugs are small and are inserted directly in the ear. For that reason they can get dirty and should be cleaned each shift. Ear muffs are more effective and do not have the problem with dirt accumulation that ear plugs have. Some hard hats have ear muffs built into it.



Ear Protection:

Two types of devices are currently used in coal mines and other industries to protect workers' hearing. These devices, ear plugs and ear muffs, serve to reduce the sound pressure of a noisy area at the worker's ear.



Slide 97

Current

Previous Presentation

No equivalent slide

Section 5 – Lifestyle Factors and
Cardiovascular Disease

Slide 98

Current

Previous Presentation

Key Points

- Lifestyle factors contribute more to cardiovascular disease than work activity
- Smoking, diet, and exercise are key factors

No equivalent slide

Slide 99

Current

Previous Presentation

Whole Health Considerations

- From ages 25 - 55, the risk of a heart attack or a stroke goes up 10 times
- A 25 year old who smokes, has high blood pressure and high cholesterol has a 1 in 70 chance of having a heart attack or stroke by age 35
- At age 55, his or her odds are 1 in 8 (12.5%). The odds are almost 1 in 2 (50%) if you add in diabetes
- At 55, if you don't smoke, control your blood pressure and your cholesterol and fats and are not diabetic, the odds are no higher than 1 in 50 (<2%)

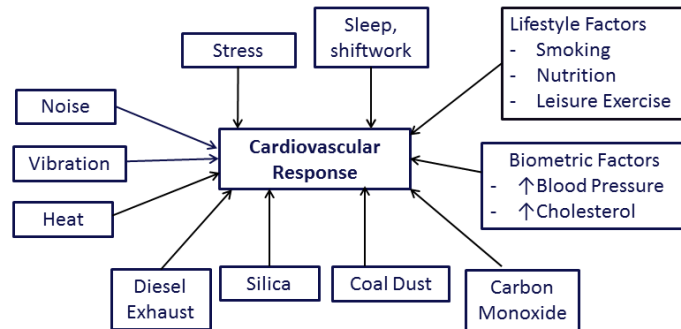
No equivalent slide

Slide 100

Current

Previous Presentation

Health Exposures Contributing to Heart Disease



No equivalent slide

Slide 101

Current

Previous Presentation

Sleep

- Sleep provides many benefits:
 - Gives the body a chance to rest and recover
 - Boosts memory
 - Reduces stress
 - Impacts a person's weight
- Sleep deprivation changes brain patterns and interferes with the production of "hunger hormones" causing you crave food even though you are not hungry

No equivalent slide

Slide 102

Current

Previous Presentation

Fatigue

- Fatigue is the decline in mental and/or physical performance that results from prolonged exertion, lack of quality sleep, or disruption of the internal body clock
- Fatigue affects work performance and increases likelihood of errors
- The consequences of fatigue include:
 - Reduced alertness
 - Poor and slow perception
 - Sleepiness
 - Long-term health problems (associated with chronic fatigue)

No equivalent slide

Source:
Health and Safety Executive (2006). *Managing Shift Work*. Suffolk, England: HSE Books.



Slide 103

Current

Previous Presentation

Sleep Aides

- Sleeping pills are not meant to be long-term solutions for better sleep
 - They become less effective with prolonged use
- They may create dependency issues
- They do not address the root cause of sleep problems
- Over-the-counter sleep aids may cause severe prolonged drowsiness that can carry over to your commute and your work

No equivalent slide

Slide 104

Current

Previous Presentation

Stress

- Stress is the brain's response to any demand
- Chronic stress impairs you both mentally and physically
 - Mental signs
 - Anxiety (worry, self-doubt)
 - Depression (sad moods, feelings of hopelessness)
 - Physical signs
 - Stomach and digestive problems
 - High blood pressure
 - Insomnia
 - Frequent colds/illnesses
 - Headaches
 - Fatigue

No equivalent slide

Slide 105

Current

Previous Presentation

Exercise is Good for Stress

- Exercise has immediate and long-term psychological benefits, such as:
 - Releasing feel-good chemicals (endorphins), creating a relaxed state
 - Promoting positive mood and well-being
 - Reduces anxiety
 - Reducing depression when performed regularly
- The total amount of exercise is most important, just doing something on a regular basis

No equivalent slide

Slide 106

Current

Previous Presentation Slide 40

Section 6 – Sanitation Laws

LESSON 6

SANITATION LAWS

Slide 107

Current

Sanitation Laws

The Federal Government requires that the mine operator provide you with certain minimum sanitary facilities both on the surface and underground. These are required for your health and comfort.

The mine operator is required to provide you with the following sanitary facilities above ground at the mine:

1. Facilities to change clothes before and after your shift.
2. A locker or storage place to store your belongings while you are at work.
3. Bathing facilities where there is at least one shower for each five miners.
4. Toilet facilities where there is at least one toilet for each ten miners.
5. An adequate supply of toilet paper at each toilet.
6. Adequate handwashing facilities for each bathhouse.
7. Hot and cold running water must be provided.
8. The entire facility must have adequate heat, light and ventilation to maintain a comfortable environment.

Previous Presentation Slide 42

The mine operator is required to provide you with the following sanitary facilities above ground at the mine:

1. Facilities to change clothes before and after your shift.
2. A locker or storage place to store your belongings while you are at work.
3. Bathing facilities where there is at least one shower for each five miners.
4. Toilet facilities where there is at least one toilet for each ten miners.
5. An adequate supply of toilet paper at each toilet.
6. Adequate handwashing facilities for each bathhouse.
7. Hot and cold running water must be provided.
8. The entire facility must have adequate heat, light and ventilation to maintain a comfortable environment.

Slide 108

Current

Shower Room



Previous Presentation Slide 43



Slide 109

Current

Porta-Potties

A small portable toilet much like a camping toilet that is used underground. The law requires that these be located close to the working areas in a dry place under good roof.



Previous Presentation Slide 12



Porta-Potties

A small portable toilet much like a camping toilet that is used underground. The law requires that these be located close to the working areas in a dry place under good roof.

Slide 110

Current

Previous Presentation

Parting Thoughts

- An apprentice miner who has suitable protection against exposures at work and takes preventive health measures outside of work will live as long as the general US population
- Good dust control and selective use of respiratory protection can eliminate loss of lung function later in life
- Abuse of substances are easily detected with existing required screening and can lead to lifetime loss of employment in mining
- Passive routine health and lung checks may not be enough. Miners are expected to be active participants in their own safety and health

- No equivalent slide

Appendix 4a. Surface Mining Course Evaluation

MINING TRAINING EVALUATION

Health and Sanitation– 40 Hour Course for Surface Mining

Over the past year, the West Virginia Office of Miners' Health Safety and Training has been working with the West Virginia Board of Miner Training, Education and Certification to evaluate an updated Health and Sanitation component to the surface and underground Apprentice Miner Training Course. The updated component and the evaluation are being conducted by a group composed of the West Virginia University Mining and Industrial Extension and the University of Connecticut, Division of Occupational and Environmental Medicine and is funded by the Alpha Foundation for the Improvement of Mine Safety and Health, Inc.

This survey is an evaluation of the “Health and Sanitation Unit” of the 40 hour course for surface mining. The “Unit” has been updated to include changes in West Virginia law and places a larger emphasis on preventative health. The survey is designed to assess the knowledge you gained from the presentation and the quality of the presentation.

Thank you for participating. The survey should take 10-15 minutes to complete. Please give the completed survey to the testing examiner.

Thank you for your time.

Please indicate the extent to which this presentation facilitated your learning in the following areas.

I. Lung Disease and its Prevention

1a. The training increased my understanding and awareness of:	<i>Strongly Disagree</i>	<i>Disagree</i>	<i>Neutral</i>	<i>Agree</i>	<i>Strongly Agree</i>
The fact that lung cancer is highest among coal miners who smoke	1	2	3	4	5
How to reduce the chances of lung disease by not smoking and minimizing dust exposure	1	2	3	4	5
The need to have a respirator fit-tested to ensure it works properly	1	2	3	4	5

1b. Please indicate whether the follow statements are true or false.	<i>True</i>	<i>False</i>
You can have dust disease with a normal x-ray and breathing test	<input type="radio"/>	<input type="radio"/>
The Airstream respirator is effective in reducing dust exposure	<input type="radio"/>	<input type="radio"/>
The Airstream respirator is comfortable, quiet, and light	<input type="radio"/>	<input type="radio"/>
To be effective, a respirator must be worn all of the time	<input type="radio"/>	<input type="radio"/>

1c. Please rate the presentation.	<i>Poor</i>	<i>Good</i>	<i>Needs improvement</i>
Quality of presentation	1	2	3
Quality of demonstration materials	1	2	3
Quality of the presenter	1	2	3

II. Injury and Musculoskeletal Diseases

2a. The training increased my understanding and awareness of:	<i>Strongly Disagree</i>	<i>Disagree</i>	<i>Neutral</i>	<i>Agree</i>	<i>Strongly Agree</i>
The higher prevalence of musculoskeletal disease in mining compared to other occupations	1	2	3	4	5
Reasons for prevalence of knee injuries in mining	1	2	3	4	5
Relationship of carrying equipment to knee disease	1	2	3	4	5
Interventions that can help miners with knee pain	1	2	3	4	5

2b. Please indicate whether the follow statements are true or false.	<i>True</i>	<i>False</i>
Mining work has many awkward postures that can cause wear and tear on joints	<input type="radio"/>	<input type="radio"/>
If you have knee pain, the x-ray will show how severe the damage is	<input type="radio"/>	<input type="radio"/>
Knee pain while walking on level ground is a better indicator of injury than pain when climbing stairs	<input type="radio"/>	<input type="radio"/>
Improvements in posture while working can reduce force on the knee	<input type="radio"/>	<input type="radio"/>

2c. Please rate the presentation.	<i>Poor</i>	<i>Good</i>	<i>Needs improvement</i>
Quality of presentation	1	2	3
Quality of demonstration materials	1	2	3
Quality of the presenter	1	2	3

III. Drugs, Intoxicants, and Alcohol

3a. The training increased my understanding and awareness of:	<i>Strongly Disagree</i>	<i>Disagree</i>	<i>Neutral</i>	<i>Agree</i>	<i>Strongly Agree</i>
MSHA's policy on drugs and alcohol	1	2	3	4	5
How alcohol impairs skill and judgment	1	2	3	4	5
The link between workplace injury and drug and alcohol use	1	2	3	4	5
The legal BAC limit for miners	1	2	3	4	5
Length of time that drugs/alcohol stays in your system	1	2	3	4	5
How detection periods vary for different substances	1	2	3	4	5
The health effects of high energy drinks	1	2	3	4	5
West Virginia Drug and Alcohol policies for miners	1	2	3	4	5
Consequences for failed drug and alcohol tests	1	2	3	4	5

Please check the best answer.

3b. The allowable blood alcohol concentration for miners is:

- ☐ The same as the legal limit for drivers
- ☐ Half the legal limit for drivers
- ☐ No measurable level of blood alcohol is permissible

3c. If you fail a drug test,

- ☐ You will get a 90 day suspension and will be allowed to take a retest
- ☐ You will be cleared for work if you have taken the prescription in the past, even if expired
- ☐ You will lose your 'safety sensitive card' and may be banned from all mining work
- ☐ You will be allowed back if you retake this certification course

3d. Please indicate whether the follow statements are true or false.	<i>True</i>	<i>False</i>
High energy drinks contain caffeine only	<input type="radio"/>	<input type="radio"/>
High energy drinks contain three times as much caffeine as a coffee/Coke	<input type="radio"/>	<input type="radio"/>
You cannot be called for a pre-employment drug test the day after certification	<input type="radio"/>	<input type="radio"/>
If you fail a drug test in West Virginia, it will affect your status in Kentucky	<input type="radio"/>	<input type="radio"/>

3e. Please rate the presentation.	<i>Poor</i>	<i>Good</i>	<i>Needs improvement</i>
Quality of presentation	1	2	3
Quality of demonstration materials	1	2	3
Quality of the presenter	1	2	3

IV. Hearing Loss and Hearing Protection

4a. The training increased my understanding and awareness of:	<i>Strongly Disagree</i>	<i>Disagree</i>	<i>Neutral</i>	<i>Agree</i>	<i>Strongly Agree</i>
The need to use hearing protection when engaged in any loud activity	1	2	3	4	5
How to prevent or reduce hearing loss	1	2	3	4	5
Types of hearing protection devices	1	2	3	4	5

4b. Please indicate whether the follow statements are true or false.	<i>True</i>	<i>False</i>
40-50% of males in rural communities have some hearing loss	<input type="radio"/>	<input type="radio"/>
Hearing loss is not associated with heart disease	<input type="radio"/>	<input type="radio"/>
Hearing loss is related to lifestyle and recreational activities such as using farm machinery, driving ATVs, shooting sports, and iPods	<input type="radio"/>	<input type="radio"/>

4c. Please rate the presentation.	<i>Poor</i>	<i>Good</i>	<i>Needs improvement</i>
Quality of presentation	1	2	3
Quality of demonstration materials	1	2	3
Quality of the presenter	1	2	3

V. Lifestyle Factors and Cardiovascular Disease

5a. The training increased my understanding and awareness of:	<i>Strongly Disagree</i>	<i>Disagree</i>	<i>Neutral</i>	<i>Agree</i>	<i>Strongly Agree</i>
The link between heart health and life expectancy	1	2	3	4	5
Environmental and lifestyle factors that contribute to heart disease	1	2	3	4	5
How to reduce risk factors for heart disease	1	2	3	4	5

Please check the best answer.
5b. Which of the following is not a benefit of sleep? <ul style="list-style-type: none"> <input type="radio"/> It gives the body a chance to rest and recover <input type="radio"/> It boosts memory <input type="radio"/> It increases muscle mass <input type="radio"/> It regulates food cravings

5c. Please indicate whether the follow statements are true or false.	<i>True</i>	<i>False</i>
Noise, vibration, and heat do not increase the risk of cardiovascular disease	<input type="radio"/>	<input type="radio"/>
Physical factors at work, respiratory factors (smoking, dust), and personal factors (diet, exercise) all effect cardiovascular health	<input type="radio"/>	<input type="radio"/>
Exercise can help you feel relaxed	<input type="radio"/>	<input type="radio"/>

5d. Please rate the presentation.	<i>Poor</i>	<i>Good</i>	<i>Needs improvement</i>
Quality of presentation	1	2	3
Quality of demonstration materials	1	2	3
Quality of the presenter	1	2	3

VI. Outdoor Risks

6a. The training increased my understanding and awareness of:	<i>Strongly Disagree</i>	<i>Disagree</i>	<i>Neutral</i>	<i>Agree</i>	<i>Strongly Agree</i>
Awareness and preparation for work in the outdoor environment	1	2	3	4	5
The risks posed by poisonous snakes and spiders	1	2	3	4	5
Health and safety practices at home and work	1	2	3	4	5

Please check the best answer.

6b. Which of the following is NOT a symptom of heat overexposure?

- ☐ High body temperature
- ☐ Dizziness
- ☐ Hunger
- ☐ Profuse sweating or no sweating

6c. Please indicate whether the follow statements are true or false.	<i>True</i>	<i>False</i>
Drinking beverages with large amounts of caffeine or sugar is recommended when working in extreme heat	<input type="radio"/>	<input type="radio"/>
Confusion and disorientation are symptoms of cold exposure	<input type="radio"/>	<input type="radio"/>
Poisonous snakes and spiders are found in West Virginia	<input type="radio"/>	<input type="radio"/>

6d. Please rate the presentation.	<i>Poor</i>	<i>Good</i>	<i>Needs improvement</i>
Quality of presentation	1	2	3
Quality of demonstration materials	1	2	3
Quality of the presenter	1	2	3

VII. Using What You Have Learned

7a. I will apply what I have learned in this training to:	<i>Strongly Disagree</i>	<i>Disagree</i>	<i>Neutral</i>	<i>Agree</i>	<i>Strongly Agree</i>
Prevent lung disease from happening to me	1	2	3	4	5
Prevent injury and musculoskeletal disease from happening to me	1	2	3	4	5
Prevent myself from the consequences of drug and alcohol misuse	1	2	3	4	5
Prevent myself from experiencing hearing loss	1	2	3	4	5
Prevent myself from experiencing heart disease	1	2	3	4	5
Prevent myself from exposure to outdoor risks					

VIII. Other

8a. Please indicate your level of agreement with the following items:	<i>Strongly Disagree</i>	<i>Disagree</i>	<i>Neutral</i>	<i>Agree</i>	<i>Strongly Agree</i>
Learners could see and hear the presentation clearly	1	2	3	4	5
The speaker/s were informative and easy to understand	1	2	3	4	5
The materials were too technical and not very practical	1	2	3	4	5
The materials were useful and interesting	1	2	3	4	5
Take home materials after the course is over would be useful	1	2	3	4	5
This was relevant to my future work in mining	1	2	3	4	5

Additional Comments/Suggestions: _____

Please leave this form in evaluation box or with the instructor. Thank you!

Appendix 4b. Underground Mining Course Evaluation

MINING TRAINING EVALUATION

Health and Sanitation– 80 Hour Course for Underground Mining

Over the past year, the West Virginia Office of Miners' Health Safety and Training has been working with the West Virginia Board of Miner Training, Education and Certification to evaluate an updated Health and Sanitation component to the surface and underground Apprentice Miner Training Course. The updated component and the evaluation are being conducted by a group composed of the West Virginia University Mining and Industrial Extension and the University of Connecticut, Division of Occupational and Environmental Medicine and is funded by the Alpha Foundation for the Improvement of Mine Safety and Health, Inc.

This survey is an evaluation of the “Health and Sanitation Unit” of the 80 hour course for underground mining. The “Unit” has been updated to include changes in West Virginia law and places a larger emphasis on preventative health. The survey is designed to assess the knowledge you gained from the presentation and the quality of the presentation.

Thank you for participating. The survey consists of 80 questions and should take 10-15 minutes to complete. Please give the completed survey to the testing examiner.

Thank you for your time.

Please indicate the extent to which this presentation facilitated your learning in the following areas.

I. Lung Disease and its Prevention

1a. The training increased my understanding and awareness of:	<i>Strongly Disagree</i>	<i>Disagree</i>	<i>Neutral</i>	<i>Agree</i>	<i>Strongly Agree</i>
The fact that lung cancer is highest among coal miners who smoke	1	2	3	4	5
How to reduce the chances of lung disease by not smoking and minimizing dust exposure	1	2	3	4	5
The need to have a respirator fit-tested to ensure it works properly	1	2	3	4	5

1b. Please indicate whether the follow statements are true or false.	<i>True</i>	<i>False</i>
You can have dust disease with a normal x-ray and breathing test	<input type="radio"/>	<input type="radio"/>
The Airstream respirator is effective in reducing dust exposure	<input type="radio"/>	<input type="radio"/>
The Airstream respirator is comfortable, quiet, and light	<input type="radio"/>	<input type="radio"/>
To be effective, a respirator must be worn all of the time	<input type="radio"/>	<input type="radio"/>

1c. Please rate the presentation.	<i>Poor</i>	<i>Good</i>	<i>Needs improvement</i>
Quality of presentation	1	2	3
Quality of demonstration materials	1	2	3
Quality of the presenter	1	2	3

II. Injury and Musculoskeletal Diseases

2a. The training increased my understanding and awareness of:	<i>Strongly Disagree</i>	<i>Disagree</i>	<i>Neutral</i>	<i>Agree</i>	<i>Strongly Agree</i>
The higher prevalence of musculoskeletal disease in mining compared to other occupations	1	2	3	4	5
Reasons for prevalence of knee injuries in mining	1	2	3	4	5
Relationship of carrying equipment to knee disease	1	2	3	4	5
Interventions that can help miners with knee pain	1	2	3	4	5

2b. Please indicate whether the follow statements are true or false.	<i>True</i>	<i>False</i>
Mining work has many awkward postures that can cause wear and tear on joints	<input type="radio"/>	<input type="radio"/>
If you have knee pain, the x-ray will show how severe the damage is	<input type="radio"/>	<input type="radio"/>
Knee pain while walking on level ground is a better indicator of injury than pain when climbing stairs	<input type="radio"/>	<input type="radio"/>
Improvements in posture while working can reduce force on the knee	<input type="radio"/>	<input type="radio"/>

2c. Please rate the presentation.	<i>Poor</i>	<i>Good</i>	<i>Needs improvement</i>
Quality of presentation	1	2	3
Quality of demonstration materials	1	2	3
Quality of the presenter	1	2	3

III. Drugs, Intoxicants, and Alcohol

3a. The training increased my understanding and awareness of:	<i>Strongly Disagree</i>	<i>Disagree</i>	<i>Neutral</i>	<i>Agree</i>	<i>Strongly Agree</i>
MSHA's policy on drugs and alcohol	1	2	3	4	5
How alcohol impairs skill and judgment	1	2	3	4	5
The link between workplace injury and drug and alcohol use	1	2	3	4	5
The legal BAC limit for miners	1	2	3	4	5
Length of time that drugs/alcohol stays in your system	1	2	3	4	5
How detection periods vary for different substances	1	2	3	4	5
The health effects of high energy drinks	1	2	3	4	5
West Virginia Drug and Alcohol policies for miners	1	2	3	4	5
Consequences for failed drug and alcohol tests	1	2	3	4	5

Please check the best answer.

3b. The allowable blood alcohol concentration for miners is:

- ☐ The same as the legal limit for drivers
- ☐ Half the legal limit for drivers
- ☐ No measurable level of blood alcohol is permissible

3c. If you fail a drug test,

- ☐ You will get a 90 day suspension and will be allowed to take a retest
- ☐ You will be cleared for work if you have taken the prescription in the past, even if expired
- ☐ You will lose your 'safety sensitive card' and may be banned from all mining work
- ☐ You will be allowed back if you retake this certification course

3d. Please indicate whether the follow statements are true or false.	<i>True</i>	<i>False</i>
High energy drinks contain caffeine only	<input type="radio"/>	<input type="radio"/>
High energy drinks contain three times as much caffeine as a coffee/Coke	<input type="radio"/>	<input type="radio"/>
You cannot be called for a pre-employment drug test the day after certification	<input type="radio"/>	<input type="radio"/>
If you fail a drug test in West Virginia, it will affect your status in Kentucky	<input type="radio"/>	<input type="radio"/>

3e. Please rate the presentation.	<i>Poor</i>	<i>Good</i>	<i>Needs improvement</i>
Quality of presentation	1	2	3
Quality of demonstration materials	1	2	3
Quality of the presenter	1	2	3

IV. Hearing Loss and Hearing Protection

4a. The training increased my understanding and awareness of:	<i>Strongly Disagree</i>	<i>Disagree</i>	<i>Neutral</i>	<i>Agree</i>	<i>Strongly Agree</i>
The need to use hearing protection when engaged in any loud activity	1	2	3	4	5
How to prevent or reduce hearing loss	1	2	3	4	5
Types of hearing protection devices	1	2	3	4	5

4b. Please indicate whether the follow statements are true or false.	<i>True</i>	<i>False</i>
40-50% of males in rural communities have some hearing loss	<input type="radio"/>	<input type="radio"/>
Hearing loss is not associated with heart disease	<input type="radio"/>	<input type="radio"/>
Hearing loss is related to lifestyle and recreational activities such as using farm machinery, driving ATVs, shooting sports, and iPods	<input type="radio"/>	<input type="radio"/>

4c. Please rate the presentation.	<i>Poor</i>	<i>Good</i>	<i>Needs improvement</i>
Quality of presentation	1	2	3
Quality of demonstration materials	1	2	3
Quality of the presenter	1	2	3

V. Lifestyle Factors and Cardiovascular Disease

5a. The training increased my understanding and awareness of:	<i>Strongly Disagree</i>	<i>Disagree</i>	<i>Neutral</i>	<i>Agree</i>	<i>Strongly Agree</i>
The link between heart health and life expectancy	1	2	3	4	5
Environmental and lifestyle factors that contribute to heart disease	1	2	3	4	5
How to reduce risk factors for heart disease	1	2	3	4	5

Please check the best answer.
5b. Which of the following is not a benefit of sleep? <ul style="list-style-type: none"> <input type="radio"/> It gives the body a chance to rest and recover <input type="radio"/> It boosts memory <input type="radio"/> It increases muscle mass <input type="radio"/> It regulates food cravings

5c. Please indicate whether the follow statements are true or false.	<i>True</i>	<i>False</i>
Noise, vibration, and heat do not increase the risk of cardiovascular disease	<input type="radio"/>	<input type="radio"/>
Physical factors at work, respiratory factors (smoking, dust), and personal factors (diet, exercise) all effect cardiovascular health	<input type="radio"/>	<input type="radio"/>
Exercise can help you feel relaxed	<input type="radio"/>	<input type="radio"/>

5d. Please rate the presentation.	<i>Poor</i>	<i>Good</i>	<i>Needs improvement</i>
Quality of presentation	1	2	3
Quality of demonstration materials	1	2	3
Quality of the presenter	1	2	3

VI. Using What You Have Learned

6a. I will apply what I have learned in this training to:	<i>Strongly Disagree</i>	<i>Disagree</i>	<i>Neutral</i>	<i>Agree</i>	<i>Strongly Agree</i>
Prevent lung disease from happening to me	1	2	3	4	5
Prevent injury and musculoskeletal disease from happening to me	1	2	3	4	5
Prevent myself from the consequences of drug and alcohol misuse	1	2	3	4	5
Prevent myself from experiencing hearing loss	1	2	3	4	5
Prevent myself from experiencing heart disease	1	2	3	4	5
Prevent myself from exposure to outdoor risks					

VII. Other

7a. Please indicate your level of agreement with the following items:	<i>Strongly Disagree</i>	<i>Disagree</i>	<i>Neutral</i>	<i>Agree</i>	<i>Strongly Agree</i>
Learners could see and hear the presentation clearly	1	2	3	4	5
The speaker/s were informative and easy to understand	1	2	3	4	5
The materials were too technical and not very practical	1	2	3	4	5
The materials were useful and interesting	1	2	3	4	5
Take home materials after the course is over would be useful	1	2	3	4	5
This was relevant to my future work in mining	1	2	3	4	5

Additional Comments/Suggestions: _____

Please leave this form in evaluation box or with the instructor. Thank you!

Appendix 5. All Employee Survey

Office
use only

CO	ID
0 0 0 0 0	
1 1 1 1 1	
2 2 2 2 2	
3 3 3 3 3	
4 4 4 4 4	
5 5 5 5 5	
6 6 6 6 6	
7 7 7 7 7	
8 8 8 8 8	
9 9 9 9 9	



CPH-NEW

Center for the Promotion of Health
in the New England Workplace

NO. 2 PENCIL	
RIGHT	WRONG

- Please Use No. 2 Pencil
- Fill in Bubble Completely
- Erase Completely to Change

HEALTHY WORKPLACE ALL EMPLOYEE SURVEY

For each question, please fill in the blank or circle that matches your response. Remember all surveys will be kept completely confidential.

Today's Date

1. In general, would you say your health is:

Don't know/Not sure

☐

Poor

☐

Fair

☐

Good

☐

Very good

☐

Excellent

☐

2. Has a doctor or other healthcare provider told you that you have currently any of the following conditions? If so, is this condition currently being treated with medication? Check all that apply.

- a) Elevated blood sugar or diabetes
- b) High blood pressure/hypertension
- c) Elevated cholesterol level
- d) Low back disease or spine problems
- e) Anxiety/depression

Diagnosed

☐
☐
☐
☐
☐

Taking medication
for condition

☐
☐
☐
☐
☐

3. What is your weight (in pounds?)

lbs.

4. What is your height (ex: 5'11")

ft.

in.

5. Nutrition experts recommend filling half of your plate with fruits and vegetables at every meal and snacking occasion. How often do you meet this goal?

Never

☐

Rarely

☐

Half the time

☐

Often

☐

Always

☐

6. Health experts say that you should do strength training exercises twice a week plus do other activities that increase your heart rate and breathing on several days each week. How often do you meet this goal?

Never

☐

Rarely

☐

Half the time

☐

Often

☐

Always

☐

7. Do you now smoke cigarettes everyday, some days, or not at all?

- ☐ Everyday
☐ Some days
☐ Not at all

8. Please indicate how often you have felt this way during the past week.

- | | Never | Sometimes | Often | Always |
|---|-----------------------|-----------------------|-----------------------|-----------------------|
| a) I had trouble keeping my mind on what I was doing. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| b) I felt depressed. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

9. In the past 30 days, how would you rate the average amount of stress at...

- | | No stress | A little stress | Moderate Stress | Substantial stress | Extreme stress |
|----------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| a) work? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| b) home? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

10. In the past 30 days,

- | | Strongly disagree | Disagree | Neutral | Agree | Strongly agree |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| a) I had a hard time doing my work because of my health. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| b) My health kept me from concentrating on my work. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

11. During the past 3 months, to what extent have you had pain, aching, numbness, or tingling in any of the body parts?

- | | None | Mild | Moderate | Severe | Extreme |
|----------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| a) Hand or wrist | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| b) Shoulder, neck, or upper back | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| c) Low back | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| d) Knee | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| e) Foot | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

12. Please answer the following questions about sleep.

- | | 6 hours or less | About 7 hours | About 8 hours | About 9 hours | About 10 hours or more |
|---|-----------------------|-----------------------|-----------------------|-----------------------|------------------------|
| a) During the work week, about how many hours of sleep do you typically get per 24-hour period? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| b) How many hours of sleep do you usually need to have good functioning the next day? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

13. How would you describe the quality of your sleep on a typical night?

- ☐ Very good
☐ Fairly good
☐ Fairly poor
☐ Very poor

14. During the past week, to what extent have you had difficulty sleeping because of any physical or emotional problems?

- ☐ No difficulty
☐ Mild difficulty
☐ Moderate difficulty
☐ Severe difficulty
☐ So much difficulty that I can't sleep

15. How much time do you spend traveling to and from work each day (round trip)?

- | | | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| < 15 minutes | 15-29 minutes | 30-59 minutes | 60-89 minutes | > 90 minutes |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

16. Please indicate how ready you are to make changes or improvements in your health in the following areas:

	I am not interested in making changes or improvements	I have considered making changes or improvements	I am ready to make a change	I have started making healthier choices	I make healthy choices on a regular basis
a) Be physically active	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) Practice good eating habits	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c) Avoid smoking or using tobacco	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d) Lose weight or maintain healthy weight	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e) Reduce the amount of stress in your daily life	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f) Get a full night's sleep every night	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g) Avoid alcohol, or drink in moderation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

17. The following questions ask about your experiences at your place of work.

	Strongly disagree	Disagree	Neutral	Agree	Strongly disagree
a) In this facility, management considers employee health, safety, and wellbeing to be important.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) My coworkers would support my use of sick days for illness or mental health.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c) My supervisor encourages healthy behaviors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d) My organization provides me with opportunities to be healthy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

18. My employer has provided me with the opportunities to:

	Strongly disagree	Disagree	Neutral	Agree	Strongly disagree
a) Be physically active	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) Eat a healthy diet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c) Live tobacco free	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d) Manage my stress	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

19. Please answer the following questions.

	Never	Occasionally	Sometimes	Often	Always
a) How often do things going on at work make you feel tense and irritable at home?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) How often do things going on at home make you feel tense and irritable on the job?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c) How often do the demands of your job interfere with your family life?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d) How often do the demands of your family interfere with your work on the job?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

20. Please indicate how much you agree or disagree with the following statements.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
a) Overall, my workplace is safe.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) My job duties often interfere with my ability to comply with safety rules.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c) Taking risks is part of my job.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d) Safety is a high priority with my supervisor.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e) Employees in my work group comply with the safety rules.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f) My employer has provided me with the opportunity to work safely.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g) I am concerned about my personal safety on this job.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h) My supervisor understands and supports my family and other personal responsibilities.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

21. How much do you agree or disagree with the following statements about your work?

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
a) All employee concerns are heard before job decisions are made.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) Job decisions are applied consistently to all affected employees.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c) More and more often, I talk about my work in a negative way.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d) At work, I often feel emotionally drained.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e) I would be taken seriously if I complained about disrespectful treatment.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f) Respectful treatment is the norm in my unit/work group.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

22. For each statement, select the answer that best describes your current job.

	Strongly Disagree	Disagree	Agree	Strongly agree
a) On my job, I have very little freedom to decide how I do my work.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) My job allows me to make a lot of decisions on my own.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c) I have enough time to get the job done.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d) My job requires working very hard.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e) The people I work with take a personal interest in me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f) The people I work with can be relied on when I need help.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Strongly Disagree	Disagree	Agree	Strongly agree
g) My supervisor is concerned about the welfare of those under him or her.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h) My supervisor is helpful in getting the job done.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i) My job requires me to be creative.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
j) My job requires a high level of skill.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
k) My job requires me to do repeated lifting, pushing, pulling, or bending.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
l) My job regularly requires me to perform repetitive or forceful hand movements.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
m) My job security is good.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
n) My job is emotionally demanding.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

23. Please indicate how much you agree or disagree with the following statements.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
a) All in all, I am satisfied with my job.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) Overall, I would recommend working with this organization to my family and friends.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c) I often think about quitting my job.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d) I will probably look for a new job during the next year.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

24. To what extent do any adults depend on you in any way to help them due to disability, chronic illness, or aging?

- ☐ No adults depend on me due to disability, chronic illness, or aging
- ☐ Another adult has primary responsibility
- ☐ I share responsibility equally with another adult
- ☐ I have primary responsibility

25. How much responsibility do you personally have for any children under 18 in your household?

- ☐ I have no children at home
- ☐ Another adult has primary responsibility
- ☐ I share responsibility with another adult
- ☐ I have primary responsibility

26. The following medications may affect hearing. Please indicate whether or how often you take the medications listed below.

<u>MEDICATION NAME</u>	Yes	No	Don't know
a) Antibiotics: gentamycin, tobramycin, erythromycin, or vancomycin	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) Chemotherapeutic (cancer treatment) agents: cisplatin, carboplatin, or vincristine	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c) Furosemide (Lasix)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d) Quinine	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e) Viagra, Cialis, or Levitra	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Often (regular use, at least once per week)	Sometimes (Occasional use, over the past year)	Rarely or never (non-user)
f) Aspirin	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

27. The following is a list of non-work activities that may involve sound and/or vibration. Please fill in the bubble for any hobbies or outside activities that you have participated in the past year. If you indicate participation in an activity, please estimate the number of hours that you participated in them in the past.

<u>ACTIVITY</u>	<u>YES</u>	<u>NO</u>	Estimated # of hours in the past year	Check here if you participated in activity in the past (more than 1 year ago)	Check here if you use hearing protection when you participate in activity	Total # of years you have been participating in this activity
a) Ride a motorcycle	<input type="radio"/>	<input type="radio"/>	_____	<input type="radio"/>	<input type="radio"/>	_____
b) Ride a snowmobile, jet ski, or motor boat	<input type="radio"/>	<input type="radio"/>	_____	<input type="radio"/>	<input type="radio"/>	_____
c) Use these power tools: grinder, sanders, or saws	<input type="radio"/>	<input type="radio"/>	_____	<input type="radio"/>	<input type="radio"/>	_____
d) Use a chainsaw	<input type="radio"/>	<input type="radio"/>	_____	<input type="radio"/>	<input type="radio"/>	_____
e) Use a gas snow blower	<input type="radio"/>	<input type="radio"/>	_____	<input type="radio"/>	<input type="radio"/>	_____
f) Play in a band	<input type="radio"/>	<input type="radio"/>	_____	<input type="radio"/>	<input type="radio"/>	_____
g) Play drums or electric guitar	<input type="radio"/>	<input type="radio"/>	_____	<input type="radio"/>	<input type="radio"/>	_____
h) Use a tractor, tiller, or farm equipment	<input type="radio"/>	<input type="radio"/>	_____	<input type="radio"/>	<input type="radio"/>	_____
i) Use a brush cutter or weed wacker	<input type="radio"/>	<input type="radio"/>	_____	<input type="radio"/>	<input type="radio"/>	_____
j) use a lawn mower or leaf blower	<input type="radio"/>	<input type="radio"/>	_____	<input type="radio"/>	<input type="radio"/>	_____

28) Not including your mining job, do you use any of the following tools/equipment, such as at a second job, for family farming, or at a volunteering activity?

a) Dye grinders or rotary sanders

Use tool?

- ☐ Yes
☐ No

Estimated # of hours
per month tools used

- ☐ Less than 1 hr/mth

☐ 1-10 hrs/mth

☐ More than 10
hrs/mth

☐ Check here if you
used these tools in
the past (more than 1
yr ago)

☐ Check here if you use
hearing protection
when you use these
tools

Total # of years you
have been using this
tool at second job

Years

0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9

b) Commercial chainsaw

Use tool?

- ☐ Yes
☐ No

Estimated # of hours
per month tools used

- ☐ Less than 1 hr/mth

☐ 1-10 hrs/mth

☐ More than 10
hrs/mth

☐ Check here if you
used these tools in
the past (more than 1
yr ago)

☐ Check here if you use
hearing protection
when you use these
tools

Total # of years you
have been using this
tool at second job

Years

0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9

c) Tractor or farm equipment

Use tool?

- ☐ Yes
☐ No

Estimated # of hours
per month tools used

- ☐ Less than 1 hr/mth

☐ 1-10 hrs/mth

☐ More than 10
hrs/mth

☐ Check here if you
used these tools in
the past (more than 1
yr ago)

☐ Check here if you use
hearing protection
when you use these
tools

Total # of years you
have been using this
tool at second job

Years

0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9

29) The following activities may involve loud noise. Please indicate if you take part in any of these activities AND how often you do.

a) Attend concerts, dances, races, or commercial sports events		
<u>PARTICIPATE IN ACTIVITY?</u>	<u>IF YES, HOW OFTEN?</u>	<u>IF YOU PARTICIPATE IN THIS ACTIVITY</u>
<input type="radio"/> Yes	<input type="radio"/> Daily	<input type="radio"/> Check here if you use hearing protection when participating in activity
<input type="radio"/> No	<input type="radio"/> Weekly	
	<input type="radio"/> Monthly	
	<input type="radio"/> Less than monthly	
b) Shoot at firing range or other location		
<u>PARTICIPATE IN ACTIVITY?</u>	<u>IF YES, HOW OFTEN?</u>	<u>IF YOU PARTICIPATE IN THIS ACTIVITY</u>
<input type="radio"/> Yes	<input type="radio"/> Daily	<input type="radio"/> Check here if you use hearing protection when participating in activity
<input type="radio"/> No	<input type="radio"/> Weekly	
	<input type="radio"/> Monthly	
	<input type="radio"/> Less than monthly	
c) Hunt with firearms		
<u>PARTICIPATE IN ACTIVITY?</u>	<u>IF YES, HOW OFTEN?</u>	<u>IF YOU PARTICIPATE IN THIS ACTIVITY</u>
<input type="radio"/> Yes	<input type="radio"/> Daily	<input type="radio"/> Check here if you use hearing protection when participating in activity
<input type="radio"/> No	<input type="radio"/> Weekly	
	<input type="radio"/> Monthly	
	<input type="radio"/> Less than monthly	
d) Use of personal music player, such as an iPod or MP3 player		
<u>PARTICIPATE IN ACTIVITY?</u>	<u>IF YES, HOW OFTEN?</u>	<u>IF YOU PARTICIPATE IN THIS ACTIVITY</u>
<input type="radio"/> Yes	<input type="radio"/> Daily	<input type="radio"/> Check here if you use hearing protection when participating in activity
<input type="radio"/> No	<input type="radio"/> Weekly	
	<input type="radio"/> Monthly	
	<input type="radio"/> Less than monthly	

30) The following questions ask how well you hear other people's speech. Please mark your response on the scales below where 0 = Not at all, and 10 = perfectly/always.

	Not at all 0	1	2	3	4	5	6	7	8	9	Perfectly/ always 10
a) You are in a small group of people sitting around a table in a quiet place. you can see everyone else in the group. Can you follow the conversation?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) You are in a small group of people sitting around a table in a noisy restaurant or bar. You can see everyone else in the group. Can you follow the conversation?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

(Question continued on next page)

c) You are talking with one other person in their house. There is continuous background noise, such as a TV, radio, or a fan. Can you understand what the other person is saying?

Not at all 0	1	2	3	4	5	6	7	8	9	Perfectly always 10
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

d) You are in conversation with one person in a room where there are many other people talking, such as at a party. Can you understand what the other person says?

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------

e) you are talking to someone in a place where there are a lot of echoes, such as a church or large railway station. Can you understand what the other person says?

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------

31. Age in years

Yrs Old

0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9

32. What is your gender?

- ☐ Male
☐ Female

33. What is your racial background? Mark all that apply.

- ☐ White, European descent
☐ Black, African American, African
☐ American Indian, Alaska Native
☐ Asian, Asian American (includes Filipino, Korean, Chinese, Pacific Islander, etc.)
☐ Other

34. Do you consider yourself Latino or Hispanic origin or descent?

- ☐ Yes (includes Puerto Rican, Cuban American, Mexican American, etc.)
☐ No, Latino, Hispanic, or Spanish

35. Please indicate the highest grade or year of school that you have completed.

- ☐ Less than high school
☐ High school graduate or GED
☐ Some college
☐ College degree (2 or 4 year college)
☐ Graduate degree

36) What is your current marital status?

- ☐ Married or live with partner
☐ Widowed
☐ Divorced or separated
☐ Single, never married

37. How many years have you worked at this organization?

Years	
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9

38. How many hours do you typically work each week?

Hours	
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9

39. What shift do you usually work?

- ☐ First shift
- ☐ Second shift
- ☐ Third shift
- ☐ Rotating

40. What is your level of supervisory responsibility?

- ☐ No supervisory responsibility
- ☐ Team leader
- ☐ Supervisor
- ☐ Manager
- ☐ Executive

41. Please provide any other comments you wish about your health and the workplace.

Thank you very much for your participation!

Appendix 6. Data Set and Codebook

Code book for MHWP data set

ID

	Value
Standard Attributes	Evaluation response number
Role	Input

Course

	Value
Standard Attributes	Course type
Role	Input
Valid Values	1.00 40 hour
	2.00 80 hour

Date

	Value
Standard Attributes	Date of Evaluation File yymmdd
Role	Input

LungA1

	Value
Standard Attributes	1ai. The link between coal mining, smoking and lung cancer
Role	Input
Labeled Values	1.00 Strongly Disagree
	2.00 Disagree

	3.00	Neutral
	4.00	Agree
	5.00	Strongly Agree

LungA2

		Value
Standard Attributes	Label	1aii. The link between lung disease, smoking, and dust exposure
	Role	Input
	1.00	Strongly Disagree
Labeled Values	2.00	Disagree
	3.00	Neutral
	4.00	Agree
	5.00	Strongly Agree

LungA3

		Value
Standard Attributes	Label	1aiii. Respirator fit
	Role	Input
	1.00	Strongly Disagree
Labeled Values	2.00	Disagree
	3.00	Neutral
	4.00	Agree
	5.00	Strongly Agree

LungB1

	Value
--	-------

Standard Attributes	Label	1bi. You can have dust disease with a normal x-ray and breathing test
	Role	Input
Labeled Values	.00	False
	1.00	True

LungB2

		Value
Standard Attributes	Label	1bii. The Airstream respirator is effective in reducing dust exposure
	Role	Input
Labeled Values	.00	False
	1.00	True

LungB3

		Value
Standard Attributes	Label	1biii. The Airstream respirator is comfortable, quiet and light
	Role	Input
Labeled Values	.00	False
	1.00	True

LungB4

		Value
Standard Attributes	Label	1biv. To be effective, a respirator must be worn at all times
	Role	Input
Labeled Values	.00	False
	1.00	True

LungC1

		Value
Standard Attributes	Label	1ci. Quality of presentation (lung)
	Role	Input
Labeled Values	1.00	Poor
	2.00	Good
	3.00	Needs Improvement

LungC2

		Value
Standard Attributes	Label	1cii. Quality of demonstration materials (lung)
	Role	Input
Labeled Values	1.00	Poor
	2.00	Good
	3.00	Needs Improvement

LungC3

		Value
Standard Attributes	Label	1ciii. Quality of the presenter (lung)
	Role	Input
Labeled Values	1.00	Poor
	2.00	Good
	3.00	Needs Improvement

MSDA1

		Value
Standard Attributes	Label	2ai. The link between MSDs in mining
	Role	Input
Labeled Values	1.00	Strongly Disagree
	2.00	Disagree
	3.00	Neutral
	4.00	Agree
	5.00	Strongly Agree

MSDA2

		Value
Standard Attributes	Label	2aii. Reasons for prevalence of knee injuries in mining
	Role	Input
Labeled Values	1.00	Strongly Disagree
	2.00	Disagree
	3.00	Neutral

4.00	Agree
5.00	Strongly Agree

MSDA3

	Value
Standard Attributes	2aiii. Relationship of carrying equipment to knee disease
Label	Role
1.00	Input
2.00	Strongly Disagree
Labeled Values	Disagree
3.00	Neutral
4.00	Agree
5.00	Strongly Agree

MSDA4

	Value
Standard Attributes	2aiv. Interventions that help miners with knee pain
Label	Role
1.00	Input
2.00	Strongly Disagree
Labeled Values	Disagree
3.00	Neutral
4.00	Agree
5.00	Strongly Agree

MSDA5

		Value
Standard Attributes	Label	<none>
	Role	Input
Valid Values	1.00	Strongly Disagree
	2.00	Disagree
	3.00	Neutral
	4.00	Agree
	5.00	Strongly Agree

MSDB1

		Value
Standard Attributes	Label	2bi. Awkward postures cause wear and tear on joints
	Role	Input
Labeled Values	.00	False
	1.00	True

MSDB2

		Value
Standard Attributes	Label	2bii. If you have knee pain, the x-ray will always have findings
	Role	Input
Labeled Values	.00	False
	1.00	True

MSDB3

	Value
--	-------

Standard Attributes	Label	2biii. Knee pain while walking on level ground is a better indicator of injury than pain when climbing stairs
	Role	Input
Labeled Values	.00	False
	1.00	True

MSDB4

		Value
Standard Attributes	Label	2biv. Improvements in posture reduce force on the knee
	Role	Input
Labeled Values	.00	False
	1.00	True

MSDC1

		Value
Standard Attributes	Label	2ci. Quality of presentation (MSD)
	Role	Input
Labeled Values	1.00	Poor
	2.00	Good
	3.00	Needs Improvement

MSDC2

		Value
Standard Attributes	Label	2cii. Quality of demonstration materials (MSD)
	Role	Input
Labeled Values	1.00	Poor
	2.00	Good
	3.00	Needs Improvement

MSDC3

		Value
Standard Attributes	Label	2ciii. Quality of presenter (MSD)
	Role	Input
Labeled Values	1.00	Poor
	2.00	Good
	3.00	Needs Improvement

DrugsA1

		Value
Standard Attributes	Label	3ai. MSHA's policy on drugs and alcohol
	Role	Input
Labeled Values	1.00	Strongly Disagree
	2.00	Disagree
	3.00	Neutral
	4.00	Agree
	5.00	Strongly Agree

DrugsA2

		Value
Standard Attributes	Label	3aii. How alcohol impairs skill and judgement
	Role	Input
Labeled Values	1.00	Strongly Disagree
	2.00	Disagree
	3.00	Neutral
	4.00	Agree
	5.00	Strongly Agree

DrugsA3

		Value
Standard Attributes	Label	3aiii. The link between workplace injury and drug and alcohol use
	Role	Input
Labeled Values	1.00	Strongly Disagree
	2.00	Disagree
	3.00	Neutral
	4.00	Agree
	5.00	Strongly Agree

DrugsA4

	Value
--	-------

Standard Attributes	Label	3aiv. The legal BAC limit for miners (which is less than that of drivers
	Role	Input
Labeled Values	1.00	Strongly Disagree
	2.00	Disagree
	3.00	Neutral
	4.00	Agree
	5.00	Strongly Agree

DrugsA5

		Value
Standard Attributes	Label	3av. Length of time that drugs/alcohol stays in your system
	Role	Input
Labeled Values	1.00	Strongly Disagree
	2.00	Disagree
	3.00	Neutral
	4.00	Agree
	5.00	Strongly Agree

DrugsA6

		Value
Standard Attributes	Label	3avi. How detection periods vary for different substances

Labeled Values	Role	Input
	1.00	Strongly Disagree
	2.00	Disagree
	3.00	Neutral
	4.00	Agree
	5.00	Strongly Agree

DrugsA7

		Value
Standard Attributes	Label	3avii. The health effects of high energy drinks
	Role	Input
Labeled Values	1.00	Strongly Disagree
	2.00	Disagree
	3.00	Neutral
	4.00	Agree
	5.00	Strongly Agree

DrugsA8

		Value
Standard Attributes	Label	3aviii. West Virginia Drug and Alcohol policies for miners
	Role	Input
Labeled Values	1.00	Strongly Disagree
	2.00	Disagree
	3.00	Neutral

4.00	Agree
5.00	Strongly Agree

DrugsA9

		Value
Standard Attributes	Label	3aix. Consequences for failed drug and alcohol tests
	Role	Input
Labeled Values	1.00	Strongly Disagree
	2.00	Disagree
	3.00	Neutral
	4.00	Agree
	5.00	Strongly Agree

DrugsB

		Value
Standard Attributes	Label	3b. The allowable blood alcohol concentration for miners is:
	Role	Input
Labeled Values	1.00	same as legal limit of drivers
	2.00	half the legal limit for drivers
	3.00	No measureable level of blood alcohol is permissible

DrugsC

		Value
Standard Attributes	Label	3c. If you fail a drug test,
	Role	Input
Labeled Values	1.00	90 day suspension and retest
	2.00	Cleared for work if taken prescription in the past
	3.00	lose safety card and banned from mining
	4.00	allowed back if retake the certification course

DrugsD1

		Value
Standard Attributes	Label	3di. High energy drinks contain caffeine only
	Role	Input
Labeled Values	.00	False
	1.00	True

DrugsD2

	Value
--	-------

Standard Attributes	Label	3dii. High energy drinks contain three times as much caffeine as a Coke/coffee
	Role	Input
Labeled Values	.00	False
	1.00	True

DrugsD3

		Value
Standard Attributes	Label	3diii. You can be called for a pre-employment drug test after certification
	Role	Input
Labeled Values	.00	False
	1.00	True

DrugsD4

		Value
Standard Attributes	Label	3div. If you fail a drug test in West Virginia, it will affect your status in Kentucky.
	Role	Input
Labeled Values	.00	False
	1.00	True

DrugsE1

		Value
Standard Attributes	Label	3ei. Quality of presentation (drugs)
	Role	Input
Labeled Values	1.00	Poor
	2.00	Good
	3.00	Needs Improvement

DrugsE2

		Value
Standard Attributes	Label	3eii. Quality of demonstration materials (drugs)
	Role	Input
Labeled Values	1.00	Poor
	2.00	Good
	3.00	Needs Improvement

DrugsE3

		Value
Standard Attributes	Label	3eiii. Quality of the presenter (drugs)
	Role	Input
Labeled Values	1.00	Poor
	2.00	Good
	3.00	Needs Improvement

NoiseA1

		Value
Standard Attributes	Label	4ai. Use of hearing protection when engaged in loud activity
	Role	Input
Labeled Values	1.00	Strongly Disagree
	2.00	Disagree
	3.00	Neutral
	4.00	Agree
	5.00	Strongly Agree

NoiseA2

		Value
Standard Attributes	Label	4aii. How to prevent or reduce hearing loss
	Role	Input
Labeled Values	1.00	Strongly Disagree
	2.00	Disagree
	3.00	Neutral
	4.00	Agree
	5.00	Strongly Agree

NoiseA3

		Value
Standard Attributes	Label	4aiii. Types of hearing protection devices

Labeled Values	Role	Input
	1.00	Strongly Disagree
	2.00	Disagree
	3.00	Neutral
	4.00	Agree
	5.00	Strongly Agree

NoiseB1

		Value
Standard Attributes	Label	4bi. Males in rural communities have some hearing loss
	Role	Input
Labeled Values	.00	False
	1.00	True

NoiseB2

		Value
Standard Attributes	Label	4bii. Hearing loss is associated with heart disease
	Role	Input
Labeled Values	.00	False
	1.00	True

NoiseB3

	Value
--	-------

Standard Attributes	Label	4biii. Hearing loss is related to lifestyle and recreational activities
	Role	Input
Labeled Values	.00	False
	1.00	True

NoiseC1

		Value
Standard Attributes	Label	4ci. Quality of presentation (noise)
	Role	Input
Labeled Values	1.00	Poor
	2.00	Good
	3.00	Needs Improvement

NoiseC2

		Value
Standard Attributes	Label	4cii. Quality of demonstration materials (noise)
	Role	Input
Labeled Values	1.00	Poor
	2.00	Good
	3.00	Needs Improvement

NoiseC3

		Value
Standard Attributes	Label	4ciii. Quality of presenter (noise)
	Role	Input
Labeled Values	1.00	Poor
	2.00	Good
	3.00	Needs Improvement

CVDA1

		Value
Standard Attributes	Label	5ai. The link between heart health and life expectancy
	Role	Input
Labeled Values	1.00	Strongly Disagree
	2.00	Disagree
	3.00	Neutral
	4.00	Agree
	5.00	Strongly Agree

CVDA2

		Value
Standard Attributes	Label	5aii. Environmental and lifestyle factors that contribute to heart disease
	Role	Input
Labeled Values	1.00	Strongly Disagree

	2.00	Disagree
	3.00	Neutral
	4.00	Agree
	5.00	Strongly Agree

CVDA3

		Value
Standard Attributes	Label	5aiii. How to reduce risk factors for heart disease
	Role	Input
Labeled Values	1.00	Strongly Disagree
	2.00	Disagree
	3.00	Neutral
	4.00	Agree
	5.00	Strongly Agree

CVDB

		Value
Standard Attributes	Label	5b. Which of the following is not a benefit of sleep?
	Role	Input
Labeled Values	1.00	gives body a chance to rest and recover
	2.00	boosts memory
	3.00	increases muscle mass
	4.00	regulates food cravings

CVDC1

		Value
Standard Attributes	Label	5ci. Noise, vibration, and heat increase the risk of cardiovascular disease
	Role	Input
Labeled Values	.00	False
	1.00	True

CVDC2

		Value
Standard Attributes	Label	5cii. Physical factors at work, respiratory factors (smoking, dust), and personal factors (diet, exercise) all effect cardiovascular health
	Role	Input
Labeled Values	.00	False
	1.00	True

CVDC3

		Value
--	--	-------

Standard Attributes	Label	5ciii. Exercise can help you feel relaxed
	Role	Input
Labeled Values	.00	False
	1.00	True

CVDD1

		Value
Standard Attributes	Label	5di. Quality of presentation (CVD)
	Role	Input
Labeled Values	1.00	Poor
	2.00	Good
	3.00	Needs Improvement

CVDD2

		Value
Standard Attributes	Label	5dii. Quality of demonstration materials (CVD)
	Role	Input
Labeled Values	1.00	Poor
	2.00	Good
	3.00	Needs Improvement

CVDD3

	Value
--	-------

Standard Attributes	Label	5diii. Quality of presenter (CVD)
	Role	Input
Labeled Values	1.00	Poor
	2.00	Good
	3.00	Needs Improvement

EXPOSEA1

		Value
Standard Attributes	Label	6ai. Awareness and preparation for work in the outdoor environment
	Role	Input
Labeled Values	1.00	Strongly Disagree
	2.00	Disagree
	3.00	Neutral
	4.00	Agree
	5.00	Strongly Agree

EXPOSEA2

		Value
Standard Attributes	Label	6aii. The risks posed by poisonous snakes and spiders
	Role	Input
Labeled Values	1.00	Strongly Disagree
	2.00	Disagree

	3.00	Neutral
	4.00	Agree
	5.00	Strongly Agree

EXPOSEA3

		Value
Standard Attributes	Label	6aiii. Health and safety practices at home and work
	Role	Input
Labeled Values	1.00	Strongly Disagree
	2.00	Disagree
	3.00	Neutral
	4.00	Agree
	5.00	Strongly Agree

EXPOSEB

		Value
Standard Attributes	Label	6b. Which of the following is NOT a symptom of heat overexposure?
	Role	Input
Labeled Values	1.00	high body temperature
	2.00	dizziness
	3.00	hunger
	4.00	profuse sweating or no sweating

EXPOSEC1

		Value
Standard Attributes	Label	6ci. Drinking beverages caffeine or sugar recommended in heat
	Role	Input
Labeled Values	.00	False
	1.00	True

EXPOSEC2

		Value
Standard Attributes	Label	6cii. Confusion and disorientation are symptoms of cold exposure
	Role	Input
Labeled Values	.00	False
	1.00	True

EXPOSEC3

		Value
Standard Attributes	Label	6ciii. Poisonous snakes and spiders are found in West Virginia
	Role	Input
Labeled Values	.00	False
	1.00	True

EXPOSED1

		Value
Standard Attributes	Label	6di. Quality of presentation
	Role	Input
Labeled Values	1.00	Poor
	2.00	Good
	3.00	Needs Improvement

EXPOSED2

		Value
Standard Attributes	Label	6dii. Quality of demonstration materials
	Role	Input
Labeled Values	1.00	Poor
	2.00	Good
	3.00	Needs Improvement

EXPOSED3

		Value
Standard Attributes	Label	6diii. Quality of the presenter
	Role	Input
Labeled Values	1.00	Poor
	2.00	Good
	3.00	Needs Improvement

Learn1

		Value
Standard Attributes	Label	7i.. Prevent lung disease from happening to me.
	Role	Input
Labeled Values	1.00	Strongly Disagree
	2.00	Disagree
	3.00	Neutral
	4.00	Agree
	5.00	Strongly Agree

Learn2

		Value
Standard Attributes	Label	7ii. Prevent injury and musculoskeletal disease from happening to me
	Role	Input
Labeled Values	1.00	Strongly Disagree
	2.00	Disagree
	3.00	Neutral
	4.00	Agree
	5.00	Strongly Agree

Learn3

	Value
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Standard Attributes	Label	7iii. Prevent myself from the consequences of drug and alcohol misuse
	Role	Input
Labeled Values	1.00	Strongly Disagree
	2.00	Disagree
	3.00	Neutral
	4.00	Agree
	5.00	Strongly Agree

Learn4

		Value
Standard Attributes	Label	7iv. Prevent myself from experiencing hearing loss
	Role	Input
Labeled Values	1.00	Strongly Disagree
	2.00	Disagree
	3.00	Neutral
	4.00	Agree
	5.00	Strongly Agree

Learn5

		Value
Standard Attributes	Label	7v. Present myself from experiencing heart disease
	Role	Input

Labeled Values	1.00	Strongly Disagree
	2.00	Disagree
	3.00	Neutral
	4.00	Agree
	5.00	Strongly Agree

Learn6

		Value
Standard Attributes	Label	7vi. Prevent myself from exposure to outdoor risks
	Role	Input
Labeled Values	1.00	Strongly Disagree
	2.00	Disagree
	3.00	Neutral
	4.00	Agree
	5.00	Strongly Agree

Train1

		Value
Standard Attributes	Label	8i. Learners could see and hear the presentation clearly
	Role	Input
Labeled Values	1.00	Strongly Disagree
	2.00	Disagree
	3.00	Neutral
	4.00	Agree

5.00	Strongly Agree
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Train2

		Value
Standard Attributes	Label	8ii. The speaker/s were informative and easy to understand
	Role	Input
Labeled Values	1.00	Strongly Disagree
	2.00	Disagree
	3.00	Neutral
	4.00	Agree
	5.00	Strongly Agree

Train3

		Value
Standard Attributes	Label	8iii. The materials were too technical and not very practical
	Role	Input
Labeled Values	1.00	Strongly Disagree
	2.00	Disagree
	3.00	Neutral
	4.00	Agree
	5.00	Strongly Agree

Train4

		Value
Standard Attributes	Label	8iv. The materials were useful and interesting
	Role	Input
Labeled Values	1.00	Strongly Disagree
	2.00	Disagree
	3.00	Neutral
	4.00	Agree
	5.00	Strongly Agree

Train5

		Value
Standard Attributes	Label	8v. The take home materials after the course would be useful
	Role	Input
Labeled Values	1.00	Strongly Disagree
	2.00	Disagree
	3.00	Neutral
	4.00	Agree
	5.00	Strongly Agree

Train6

		Value
Standard Attributes	Label	8vi. This was relevant to my future work in mining.
	Role	Input

Labeled Values	1.00	Strongly Disagree
	2.00	Disagree
	3.00	Neutral
	4.00	Agree
	5.00	Strongly Agree

ID	Course	Date	LungA1	LungA2	LungA3	LungB1	LungB2	LungB3
101.00	1.00	#####	4.00	4.00	5.00	0.00	1.00	0.00
102.00	1.00	#####	4.00	4.00	4.00	9999.00	9999.00	9999.00
103.00	1.00	222016.00	5.00	5.00	5.00	0.00	1.00	1.00
104.00	1.00	#####	4.00	4.00	5.00	1.00	1.00	1.00
105.00	1.00	#####	4.00	4.00	5.00	1.00	1.00	1.00
106.00	1.00	#NULL!	5.00	5.00	5.00	1.00	1.00	1.00
107.00	1.00	#####	4.00	4.00	5.00	0.00	1.00	1.00
108.00	1.00	#####	5.00	5.00	5.00	1.00	1.00	1.00
109.00	1.00	#####	4.00	4.00	5.00	1.00	1.00	1.00
110.00	1.00	#####	3.00	4.00	1.00	1.00	1.00	0.00
111.00	1.00	#NULL!	5.00	5.00	5.00	1.00	1.00	0.00
112.00	1.00	#NULL!	4.00	5.00	5.00	0.00	1.00	1.00
113.00	1.00	#NULL!	3.00	4.00	5.00	1.00	1.00	1.00
114.00	1.00	#NULL!	4.00	4.00	4.00	1.00	1.00	1.00
115.00	1.00	#NULL!	5.00	5.00	5.00	0.00	1.00	1.00
116.00	1.00	#NULL!	5.00	5.00	5.00	1.00	1.00	1.00
117.00	1.00	#####	5.00	5.00	5.00	1.00	1.00	1.00
118.00	1.00	#####	3.00	3.00	4.00	1.00	1.00	1.00
119.00	1.00	#####	4.00	5.00	5.00	1.00	1.00	1.00
120.00	1.00	#####	5.00	5.00	5.00	1.00	1.00	1.00
121.00	1.00	#####	3.00	4.00	5.00	1.00	1.00	1.00
122.00	1.00	#####	5.00	3.00	4.00	1.00	1.00	1.00
123.00	1.00	#####	1.00	1.00	2.00	1.00	0.00	0.00
124.00	1.00	#####	5.00	5.00	5.00	1.00	1.00	1.00
125.00	1.00	#####	4.00	3.00	4.00	1.00	1.00	1.00
126.00	1.00	#####	4.00	4.00	9999.00	1.00	1.00	1.00
127.00	1.00	#####	1.00	1.00	1.00	1.00	1.00	1.00
128.00	1.00	#####	2.00	2.00	2.00	0.00	1.00	0.00
129.00	1.00	372016.00	4.00	5.00	4.00	0.00	1.00	1.00
130.00	1.00	382016.00	3.00	3.00	4.00	1.00	1.00	1.00
131.00	1.00	382016.00	2.00	5.00	5.00	1.00	1.00	1.00
132.00	1.00	382016.00	5.00	4.00	5.00	1.00	1.00	1.00
133.00	1.00	382016.00	4.00	4.00	5.00	1.00	1.00	1.00
134.00	1.00	382016.00	4.00	4.00	4.00	1.00	1.00	1.00
135.00	1.00	#NULL!	1.00	4.00	4.00	0.00	1.00	1.00
136.00	1.00	#NULL!	3.00	4.00	4.00	0.00	1.00	1.00
137.00	1.00	#NULL!	9999.00	9999.00	9999.00	1.00	1.00	0.00
138.00	1.00	#NULL!	3.00	4.00	4.00	1.00	1.00	1.00
139.00	1.00	#NULL!	3.00	5.00	5.00	1.00	1.00	1.00
140.00	1.00	382016.00	4.00	3.00	4.00	1.00	0.00	1.00
141.00	1.00	382016.00	5.00	5.00	5.00	1.00	1.00	1.00
142.00	1.00	382016.00	4.00	4.00	5.00	1.00	1.00	1.00
143.00	1.00	382016.00	4.00	3.00	4.00	1.00	0.00	1.00
144.00	1.00	382016.00	4.00	4.00	5.00	1.00	1.00	1.00
145.00	1.00	382016.00	4.00	4.00	5.00	1.00	1.00	0.00
146.00	1.00	382016.00	4.00	5.00	5.00	0.00	1.00	1.00

147.00	1.00	342016.00	4.00	5.00	5.00	0.00	1.00	1.00
148.00	1.00	342016.00	3.00	4.00	5.00	1.00	1.00	1.00
149.00	1.00	#NULL!	4.00	5.00	5.00	1.00	1.00	1.00
150.00	1.00	#NULL!	4.00	4.00	4.00	1.00	1.00	1.00
151.00	1.00	#NULL!	4.00	5.00	4.00	0.00	1.00	1.00
152.00	1.00	#####	4.00	4.00	4.00	1.00	1.00	1.00
153.00	1.00	#####	4.00	4.00	4.00	1.00	1.00	1.00
154.00	1.00	412016.00	5.00	4.00	2.00	9999.00	1.00	1.00
155.00	1.00	442016.00	4.00	4.00	5.00	0.00	1.00	1.00
156.00	1.00	452016.00	4.00	4.00	4.00	1.00	1.00	0.00
157.00	1.00	452016.00	4.00	5.00	5.00	1.00	1.00	1.00
158.00	1.00	452016.00	4.00	4.00	4.00	9999.00	9999.00	9999.00
159.00	1.00	#####	3.00	3.00	4.00	1.00	1.00	1.00
160.00	1.00	#####	2.00	2.00	3.00	1.00	1.00	1.00
161.00	1.00	#####	4.00	4.00	5.00	1.00	1.00	1.00
162.00	1.00	#####	1.00	5.00	5.00	1.00	1.00	1.00
163.00	1.00	#####	4.00	2.00	5.00	0.00	1.00	1.00
164.00	1.00	#####	3.00	4.00	5.00	0.00	1.00	0.00
165.00	1.00	#####	5.00	5.00	5.00	1.00	1.00	1.00
166.00	1.00	#####	4.00	4.00	5.00	1.00	1.00	0.00
167.00	1.00	#####	2.00	2.00	4.00	1.00	1.00	1.00
168.00	1.00	#####	4.00	5.00	4.00	9999.00	9999.00	9999.00
169.00	1.00	#####	5.00	5.00	5.00	1.00	1.00	1.00
170.00	1.00	#####	5.00	5.00	5.00	1.00	1.00	1.00
171.00	1.00	#####	5.00	5.00	5.00	1.00	1.00	1.00
172.00	1.00	#####	5.00	5.00	5.00	0.00	1.00	0.00
173.00	1.00	#####	4.00	5.00	4.00	1.00	1.00	1.00
174.00	1.00	#####	5.00	5.00	5.00	1.00	1.00	1.00
175.00	1.00	#####	5.00	5.00	5.00	0.00	0.00	0.00
176.00	1.00	#####	4.00	4.00	5.00	1.00	1.00	1.00
177.00	1.00	#####	4.00	4.00	4.00	0.00	1.00	1.00
178.00	1.00	#####	5.00	5.00	5.00	1.00	1.00	1.00
201.00	2.00	#####	3.00	4.00	4.00	1.00	1.00	1.00
202.00	2.00	#####	5.00	5.00	4.00	1.00	1.00	1.00
203.00	2.00	#NULL!	4.00	4.00	4.00	0.00	1.00	1.00
204.00	2.00	#NULL!	4.00	3.00	3.00	1.00	1.00	1.00
205.00	2.00	#NULL!	5.00	5.00	5.00	1.00	1.00	1.00
206.00	2.00	#NULL!	4.00	5.00	5.00	0.00	1.00	1.00
207.00	2.00	#NULL!	4.00	4.00	4.00	1.00	1.00	1.00
208.00	2.00	#NULL!	5.00	1.00	5.00	0.00	1.00	1.00
209.00	2.00	#NULL!	5.00	5.00	5.00	1.00	1.00	1.00
210.00	2.00	#NULL!	4.00	4.00	4.00	1.00	1.00	1.00
211.00	2.00	#NULL!	5.00	5.00	5.00	0.00	1.00	1.00
212.00	2.00	#NULL!	1.00	1.00	1.00	1.00	1.00	1.00
213.00	2.00	#NULL!	5.00	5.00	5.00	0.00	1.00	9999.00
214.00	2.00	#####	5.00	5.00	5.00	1.00	1.00	1.00
215.00	2.00	#####	4.00	4.00	4.00	1.00	1.00	1.00

216.00	2.00	#NULL!	5.00	4.00	3.00	0.00	1.00	1.00
217.00	2.00	#NULL!	4.00	4.00	4.00	1.00	1.00	1.00
218.00	2.00	#NULL!	3.00	5.00	3.00	1.00	1.00	1.00
219.00	2.00	#NULL!	4.00	5.00	4.00	1.00	1.00	1.00

LungB4	LungC1	LungC2	LungC3	MSDA1	MSDA2	MSDA3	MSDA4	MSDA5
1.00	2.00	2.00	2.00	4.00	4.00	4.00	4.00	9999.00
1.00	2.00	2.00	2.00	3.00	3.00	3.00	3.00	9999.00
1.00	2.00	2.00	2.00	4.00	4.00	4.00	4.00	9999.00
1.00	2.00	2.00	2.00	4.00	4.00	4.00	4.00	9999.00
1.00	2.00	2.00	2.00	3.00	4.00	9999.00	3.00	9999.00
1.00	9999.00	9999.00	9999.00	9999.00	9999.00	9999.00	9999.00	9999.00
1.00	2.00	2.00	3.00	4.00	3.00	3.00	3.00	9999.00
1.00	2.00	2.00	2.00	5.00	5.00	5.00	5.00	9999.00
1.00	2.00	3.00	2.00	5.00	5.00	5.00	5.00	9999.00
0.00	2.00	2.00	2.00	4.00	4.00	3.00	3.00	9999.00
1.00	2.00	2.00	2.00	4.00	5.00	5.00	5.00	9999.00
1.00	2.00	2.00	2.00	5.00	5.00	5.00	5.00	9999.00
1.00	2.00	2.00	2.00	3.00	4.00	4.00	4.00	9999.00
1.00	2.00	2.00	2.00	4.00	4.00	3.00	3.00	9999.00
0.00	2.00	2.00	2.00	4.00	3.00	4.00	3.00	9999.00
1.00	2.00	2.00	2.00	4.00	4.00	4.00	4.00	9999.00
1.00	2.00	2.00	2.00	5.00	5.00	5.00	5.00	9999.00
1.00	2.00	2.00	2.00	3.00	4.00	3.00	3.00	9999.00
1.00	2.00	2.00	2.00	5.00	3.00	9999.00	9999.00	9999.00
1.00	2.00	2.00	2.00	5.00	5.00	5.00	5.00	9999.00
0.00	2.00	2.00	2.00	3.00	3.00	3.00	3.00	9999.00
1.00	2.00	2.00	2.00	3.00	4.00	4.00	4.00	9999.00
1.00	1.00	1.00	2.00	3.00	4.00	2.00	2.00	9999.00
1.00	2.00	2.00	2.00	4.00	4.00	3.00	4.00	9999.00
1.00	2.00	2.00	2.00	3.00	4.00	4.00	3.00	9999.00
1.00	2.00	2.00	2.00	4.00	4.00	3.00	4.00	9999.00
1.00	2.00	2.00	2.00	5.00	5.00	5.00	5.00	9999.00
1.00	1.00	1.00	1.00	3.00	3.00	3.00	3.00	9999.00
1.00	3.00	3.00	3.00	4.00	9999.00	9999.00	2.00	9999.00
1.00	2.00	2.00	2.00	4.00	4.00	4.00	4.00	9999.00
1.00	2.00	2.00	2.00	4.00	4.00	4.00	5.00	9999.00
1.00	2.00	2.00	2.00	5.00	5.00	5.00	5.00	9999.00
1.00	3.00	2.00	2.00	3.00	3.00	3.00	3.00	9999.00
1.00	2.00	2.00	2.00	3.00	4.00	4.00	4.00	9999.00
1.00	2.00	2.00	2.00	2.00	2.00	2.00	3.00	9999.00
1.00	2.00	2.00	2.00	2.00	3.00	2.00	3.00	9999.00
1.00	1.00	2.00	9999.00	4.00	3.00	4.00	3.00	9999.00
1.00	2.00	2.00	2.00	3.00	3.00	3.00	3.00	9999.00
1.00	2.00	2.00	2.00	4.00	3.00	4.00	5.00	9999.00
1.00	2.00	2.00	2.00	3.00	4.00	3.00	3.00	9999.00
1.00	2.00	2.00	2.00	3.00	3.00	3.00	3.00	9999.00
1.00	2.00	2.00	2.00	3.00	3.00	3.00	3.00	9999.00
1.00	2.00	2.00	2.00	3.00	4.00	3.00	3.00	9999.00
1.00	2.00	2.00	2.00	3.00	3.00	3.00	3.00	9999.00
1.00	2.00	2.00	2.00	4.00	3.00	3.00	5.00	9999.00
1.00	2.00	2.00	2.00	3.00	4.00	3.00	3.00	9999.00

1.00	2.00	2.00	2.00	5.00	5.00	5.00	5.00	9999.00
1.00	2.00	2.00	2.00	3.00	4.00	4.00	4.00	9999.00
1.00	2.00	2.00	2.00	3.00	4.00	4.00	4.00	9999.00
1.00	2.00	2.00	2.00	4.00	4.00	3.00	3.00	9999.00
1.00	3.00	3.00	3.00	4.00	9999.00	9999.00	2.00	9999.00
0.00	2.00	2.00	2.00	4.00	4.00	4.00	4.00	9999.00
1.00	2.00	2.00	2.00	3.00	3.00	3.00	4.00	9999.00
9999.00	2.00	2.00	2.00	4.00	2.00	3.00	4.00	9999.00
1.00	2.00	2.00	2.00	9999.00	5.00	5.00	5.00	9999.00
0.00	2.00	2.00	2.00	3.00	5.00	4.00	5.00	9999.00
1.00	2.00	2.00	2.00	4.00	3.00	3.00	4.00	9999.00
1.00	2.00	2.00	2.00	4.00	4.00	4.00	4.00	9999.00
1.00	2.00	2.00	2.00	9999.00	9999.00	9999.00	9999.00	9999.00
1.00	2.00	2.00	2.00	3.00	4.00	4.00	3.00	9999.00
1.00	2.00	2.00	2.00	4.00	9999.00	3.00	4.00	9999.00
1.00	2.00	2.00	2.00	4.00	4.00	4.00	2.00	9999.00
1.00	2.00	2.00	2.00	4.00	4.00	4.00	4.00	9999.00
1.00	2.00	2.00	2.00	3.00	5.00	4.00	3.00	9999.00
1.00	2.00	2.00	2.00	5.00	5.00	5.00	5.00	9999.00
1.00	2.00	2.00	2.00	3.00	5.00	5.00	5.00	9999.00
1.00	2.00	2.00	2.00	2.00	3.00	3.00	3.00	9999.00
1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	9999.00
1.00	2.00	2.00	2.00	5.00	5.00	4.00	5.00	9999.00
1.00	2.00	2.00	2.00	5.00	5.00	5.00	5.00	9999.00
1.00	2.00	2.00	2.00	5.00	5.00	5.00	5.00	9999.00
1.00	2.00	2.00	2.00	5.00	5.00	5.00	5.00	9999.00
1.00	2.00	2.00	2.00	4.00	5.00	4.00	3.00	9999.00
1.00	2.00	2.00	2.00	4.00	4.00	4.00	4.00	9999.00
1.00	2.00	2.00	2.00	3.00	4.00	4.00	4.00	9999.00
1.00	2.00	2.00	2.00	4.00	4.00	4.00	3.00	9999.00
0.00	2.00	2.00	2.00	3.00	4.00	3.00	2.00	9999.00
1.00	2.00	2.00	2.00	5.00	5.00	5.00	5.00	9999.00
1.00	2.00	2.00	2.00	2.00	3.00	3.00	4.00	9999.00
1.00	2.00	2.00	2.00	3.00	3.00	3.00	4.00	9999.00
1.00	3.00	3.00	2.00	4.00	4.00	2.00	4.00	9999.00
1.00	3.00	3.00	2.00	5.00	3.00	3.00	3.00	9999.00
1.00	2.00	2.00	2.00	4.00	4.00	5.00	5.00	9999.00
1.00	2.00	2.00	2.00	4.00	3.00	2.00	3.00	9999.00
0.00	2.00	2.00	2.00	4.00	4.00	4.00	4.00	9999.00
1.00	2.00	2.00	2.00	4.00	4.00	5.00	3.00	9999.00
0.00	2.00	2.00	2.00	4.00	4.00	4.00	4.00	9999.00
1.00	2.00	2.00	2.00	5.00	3.00	2.00	2.00	9999.00
1.00	2.00	3.00	2.00	4.00	4.00	2.00	3.00	9999.00
0.00	2.00	2.00	2.00	5.00	5.00	4.00	3.00	9999.00
1.00	2.00	2.00	2.00	5.00	5.00	5.00	5.00	9999.00
0.00	2.00	2.00	2.00	5.00	5.00	5.00	5.00	9999.00
1.00	2.00	2.00	2.00	4.00	4.00	4.00	4.00	4.00

0.00	2.00	2.00	2.00	4.00	4.00	3.00	4.00	5.00
1.00	2.00	2.00	2.00	4.00	4.00	4.00	4.00	4.00
1.00	2.00	2.00	2.00	3.00	5.00	5.00	4.00	4.00
1.00	2.00	2.00	2.00	3.00	3.00	3.00	3.00	3.00

MSDB1	MSDB2	MSDB3	MSDB4	MSDC1	MSDC2	MSDC3	DrugsA1	DrugsA2
1.00	0.00	1.00	1.00	2.00	2.00	2.00	5.00	5.00
1.00	9999.00	9999.00	1.00	2.00	2.00	2.00	4.00	4.00
1.00	0.00	1.00	1.00	2.00	2.00	2.00	5.00	5.00
1.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00	4.00
1.00	0.00	1.00	1.00	2.00	2.00	2.00	5.00	5.00
1.00	0.00	1.00	0.00	2.00	2.00	2.00	5.00	5.00
1.00	1.00	1.00	1.00	2.00	2.00	3.00	5.00	5.00
1.00	1.00	1.00	1.00	2.00	2.00	2.00	5.00	5.00
1.00	0.00	0.00	1.00	2.00	2.00	2.00	5.00	5.00
1.00	0.00	0.00	1.00	2.00	2.00	2.00	5.00	5.00
1.00	1.00	0.00	1.00	2.00	2.00	2.00	4.00	5.00
1.00	0.00	0.00	1.00	2.00	2.00	2.00	5.00	5.00
1.00	1.00	0.00	1.00	2.00	2.00	2.00	4.00	4.00
1.00	0.00	0.00	1.00	2.00	2.00	2.00	4.00	4.00
1.00	0.00	0.00	1.00	2.00	2.00	2.00	5.00	5.00
1.00	0.00	0.00	1.00	2.00	2.00	2.00	5.00	5.00
1.00	0.00	1.00	0.00	2.00	2.00	2.00	5.00	5.00
1.00	1.00	1.00	1.00	2.00	2.00	2.00	5.00	4.00
1.00	0.00	1.00	1.00	2.00	2.00	2.00	5.00	5.00
9999.00	9999.00	9999.00	9999.00	9999.00	9999.00	9999.00	9999.00	9999.00
1.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00	4.00
1.00	0.00	0.00	1.00	2.00	2.00	2.00	4.00	4.00
1.00	0.00	1.00	1.00	1.00	1.00	2.00	4.00	3.00
1.00	1.00	0.00	1.00	2.00	2.00	2.00	4.00	4.00
1.00	0.00	0.00	1.00	2.00	2.00	2.00	5.00	4.00
1.00	0.00	0.00	1.00	2.00	2.00	2.00	4.00	4.00
1.00	1.00	1.00	1.00	2.00	2.00	2.00	5.00	5.00
1.00	0.00	0.00	1.00	2.00	2.00	2.00	1.00	1.00
1.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00	5.00
1.00	1.00	0.00	1.00	2.00	2.00	2.00	4.00	4.00
1.00	1.00	0.00	1.00	2.00	2.00	2.00	5.00	5.00
1.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00	4.00
1.00	0.00	0.00	1.00	2.00	2.00	2.00	5.00	5.00
1.00	1.00	0.00	1.00	2.00	2.00	2.00	4.00	4.00
1.00	0.00	0.00	1.00	2.00	2.00	2.00	5.00	5.00
1.00	0.00	1.00	1.00	2.00	2.00	2.00	4.00	4.00
1.00	1.00	1.00	1.00	2.00	2.00	2.00	3.00	5.00
1.00	1.00	0.00	1.00	2.00	2.00	2.00	4.00	4.00
1.00	1.00	1.00	1.00	2.00	2.00	2.00	5.00	5.00
0.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00	4.00
1.00	0.00	1.00	1.00	2.00	2.00	2.00	5.00	5.00
1.00	0.00	0.00	1.00	2.00	2.00	2.00	5.00	5.00
1.00	0.00	0.00	1.00	2.00	2.00	2.00	3.00	3.00
1.00	0.00	0.00	1.00	2.00	2.00	2.00	5.00	5.00
1.00	0.00	0.00	1.00	2.00	2.00	2.00	5.00	5.00
1.00	0.00	0.00	1.00	2.00	2.00	2.00	5.00	5.00

	1.00	0.00	0.00	1.00	2.00	2.00	2.00	5.00	5.00
	1.00	1.00	0.00	1.00	2.00	2.00	2.00	4.00	4.00
	1.00	1.00	0.00	1.00	2.00	2.00	2.00	4.00	5.00
	1.00	1.00	0.00	1.00	2.00	2.00	2.00	5.00	5.00
	1.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00	5.00
	1.00	1.00	1.00	1.00	2.00	2.00	2.00	5.00	5.00
	1.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00	4.00
	1.00	0.00	1.00	1.00	2.00	2.00	2.00	5.00	4.00
	1.00	1.00	1.00	1.00	2.00	2.00	2.00	5.00	5.00
	1.00	0.00	1.00	1.00	2.00	2.00	2.00	4.00	3.00
	1.00	1.00	1.00	1.00	2.00	2.00	2.00	5.00	5.00
	1.00	0.00	0.00	1.00	2.00	2.00	2.00	4.00	4.00
	1.00	1.00	1.00	9999.00	2.00	2.00	2.00	4.00	4.00
	1.00	1.00	1.00	1.00	2.00	2.00	2.00	5.00	5.00
9999.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	5.00	5.00
	1.00	0.00	1.00	1.00	2.00	2.00	2.00	5.00	5.00
	1.00	0.00	1.00	1.00	2.00	2.00	2.00	4.00	4.00
	1.00	1.00	0.00	1.00	2.00	2.00	2.00	5.00	5.00
	1.00	1.00	1.00	1.00	2.00	2.00	2.00	5.00	5.00
	1.00	0.00	1.00	1.00	2.00	2.00	2.00	2.00	4.00
	1.00	1.00	1.00	1.00	2.00	2.00	2.00	5.00	5.00
	1.00	1.00	1.00	1.00	2.00	2.00	2.00	3.00	5.00
	1.00	1.00	1.00	1.00	2.00	2.00	2.00	5.00	5.00
	1.00	1.00	1.00	1.00	2.00	2.00	2.00	5.00	5.00
	1.00	0.00	1.00	1.00	2.00	2.00	2.00	4.00	5.00
	1.00	0.00	0.00	1.00	2.00	2.00	2.00	5.00	5.00
	1.00	1.00	0.00	1.00	2.00	2.00	2.00	5.00	5.00
	1.00	0.00	1.00	1.00	2.00	2.00	2.00	5.00	5.00
	1.00	0.00	1.00	1.00	2.00	2.00	2.00	4.00	3.00
	1.00	1.00	1.00	1.00	2.00	2.00	2.00	5.00	5.00
	1.00	0.00	1.00	1.00	2.00	2.00	2.00	5.00	5.00
	1.00	1.00	0.00	1.00	2.00	2.00	2.00	5.00	5.00
	0.00	0.00	0.00	1.00	3.00	3.00	2.00	4.00	4.00
	1.00	0.00	0.00	1.00	2.00	2.00	2.00	5.00	3.00
	1.00	1.00	1.00	1.00	2.00	2.00	2.00	5.00	4.00
	1.00	0.00	1.00	1.00	2.00	2.00	2.00	4.00	4.00
	1.00	0.00	0.00	1.00	2.00	2.00	2.00	4.00	4.00
	1.00	0.00	0.00	1.00	2.00	2.00	2.00	5.00	5.00
	1.00	0.00	0.00	1.00	2.00	2.00	2.00	4.00	4.00
	1.00	0.00	0.00	1.00	2.00	2.00	2.00	5.00	3.00
	1.00	1.00	0.00	1.00	2.00	3.00	2.00	5.00	4.00
	1.00	0.00	1.00	1.00	2.00	2.00	2.00	5.00	5.00
	1.00	0.00	0.00	1.00	2.00	2.00	2.00	5.00	5.00
	1.00	0.00	0.00	1.00	2.00	2.00	2.00	5.00	5.00
	1.00	1.00	0.00	1.00	2.00	2.00	2.00	4.00	4.00

0.00	0.00	1.00	1.00	2.00	2.00	2.00	5.00	5.00
0.00	0.00	0.00	1.00	2.00	2.00	2.00	5.00	5.00
1.00	0.00	0.00	1.00	2.00	2.00	2.00	4.00	4.00
1.00	0.00	0.00	1.00	9999.00	2.00	2.00	5.00	4.00

DrugsA3	DrugsA4	DrugsA5	DrugsA6	DrugsA7	DrugsA8	DrugsA9	DrugsB	DrugsC
5.00	5.00	5.00	5.00	5.00	5.00	5.00	3.00	3.00
4.00	4.00	4.00	4.00	4.00	4.00	4.00	2.00	9999.00
5.00	4.00	4.00	4.00	4.00	4.00	5.00	3.00	3.00
4.00	4.00	4.00	4.00	4.00	4.00	4.00	3.00	4.00
5.00	3.00	3.00	2.00	9999.00	4.00	5.00	3.00	2.00
5.00	5.00	5.00	5.00	5.00	5.00	5.00	1.00	1.00
5.00	5.00	5.00	5.00	5.00	5.00	5.00	2.00	3.00
5.00	5.00	5.00	5.00	5.00	5.00	5.00	2.00	1.00
5.00	5.00	5.00	5.00	5.00	5.00	5.00	2.00	3.00
5.00	5.00	5.00	5.00	5.00	5.00	5.00	1.00	3.00
5.00	5.00	5.00	5.00	5.00	5.00	5.00	2.00	3.00
5.00	5.00	5.00	5.00	5.00	5.00	5.00	3.00	3.00
4.00	4.00	4.00	4.00	4.00	4.00	4.00	2.00	1.00
4.00	4.00	4.00	4.00	3.00	4.00	5.00	2.00	1.00
5.00	3.00	5.00	5.00	4.00	4.00	5.00	2.00	3.00
4.00	5.00	5.00	4.00	4.00	5.00	5.00	3.00	4.00
5.00	5.00	5.00	5.00	5.00	5.00	5.00	1.00	1.00
4.00	3.00	3.00	3.00	3.00	4.00	3.00	3.00	3.00
5.00	5.00	5.00	5.00	5.00	5.00	5.00	3.00	3.00
9999.00	9999.00	9999.00	9999.00	9999.00	9999.00	9999.00	9999.00	9999.00
4.00	4.00	4.00	4.00	4.00	4.00	4.00	3.00	3.00
4.00	4.00	4.00	4.00	4.00	4.00	4.00	1.00	1.00
3.00	2.00	2.00	2.00	2.00	9999.00	2.00	3.00	3.00
4.00	4.00	4.00	4.00	4.00	4.00	4.00	1.00	3.00
4.00	5.00	4.00	3.00	3.00	3.00	5.00	3.00	3.00
4.00	3.00	3.00	3.00	3.00	4.00	4.00	3.00	3.00
5.00	5.00	5.00	5.00	5.00	5.00	5.00	3.00	3.00
1.00	1.00	1.00	1.00	1.00	1.00	1.00	3.00	3.00
4.00	4.00	4.00	4.00	4.00	4.00	4.00	2.00	3.00
3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
5.00	5.00	5.00	5.00	5.00	5.00	5.00	3.00	3.00
4.00	4.00	4.00	4.00	4.00	4.00	4.00	3.00	3.00
5.00	4.00	4.00	4.00	4.00	4.00	4.00	3.00	1.00
4.00	4.00	3.00	3.00	2.00	4.00	4.00	3.00	3.00
5.00	5.00	5.00	5.00	3.00	5.00	5.00	2.00	3.00
4.00	4.00	4.00	4.00	4.00	4.00	2.00	2.00	3.00
4.00	2.00	5.00	4.00	5.00	4.00	4.00	2.00	3.00
4.00	4.00	4.00	4.00	4.00	4.00	4.00	2.00	1.00
5.00	5.00	5.00	5.00	5.00	5.00	5.00	2.00	3.00
4.00	4.00	4.00	5.00	5.00	5.00	5.00	3.00	3.00
5.00	4.00	4.00	3.00	4.00	4.00	4.00	3.00	3.00
4.00	3.00	3.00	3.00	4.00	5.00	5.00	3.00	3.00
4.00	3.00	2.00	3.00	3.00	3.00	3.00	3.00	1.00
5.00	5.00	4.00	4.00	4.00	5.00	5.00	3.00	3.00
5.00	5.00	5.00	5.00	5.00	5.00	5.00	3.00	1.00
5.00	5.00	5.00	3.00	3.00	5.00	5.00	3.00	3.00

[illegible]

[illegible]

DrugsD1	DrugsD2	DrugsD3	DrugsD4	DrugsE1	DrugsE2	DrugsE3	NoiseA1	NoiseA2
0.00	1.00	0.00	1.00	2.00	2.00	2.00	5.00	5.00
0.00	9999.00	0.00	1.00	2.00	2.00	2.00	4.00	4.00
0.00	1.00	0.00	1.00	2.00	2.00	2.00	5.00	5.00
0.00	0.00	0.00	0.00	2.00	2.00	2.00	4.00	4.00
0.00	1.00	1.00	0.00	2.00	2.00	2.00	5.00	5.00
0.00	1.00	0.00	1.00	2.00	2.00	2.00	4.00	4.00
0.00	1.00	0.00	1.00	3.00	3.00	3.00	4.00	5.00
0.00	0.00	0.00	1.00	2.00	2.00	2.00	5.00	5.00
0.00	1.00	0.00	1.00	2.00	2.00	2.00	5.00	5.00
0.00	1.00	0.00	1.00	2.00	2.00	2.00	4.00	4.00
0.00	1.00	0.00	1.00	2.00	2.00	2.00	5.00	5.00
0.00	1.00	0.00	1.00	2.00	2.00	2.00	5.00	5.00
0.00	1.00	0.00	1.00	2.00	2.00	2.00	4.00	4.00
0.00	1.00	0.00	1.00	2.00	2.00	2.00	5.00	4.00
0.00	1.00	0.00	0.00	2.00	2.00	2.00	5.00	5.00
0.00	1.00	1.00	1.00	2.00	2.00	2.00	5.00	5.00
0.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00	4.00
0.00	1.00	0.00	1.00	2.00	2.00	2.00	5.00	5.00
9999.00	9999.00	9999.00	9999.00	2.00	2.00	2.00	5.00	5.00
0.00	1.00	0.00	1.00	2.00	2.00	2.00	4.00	4.00
0.00	1.00	0.00	0.00	2.00	2.00	2.00	4.00	4.00
0.00	0.00	1.00	1.00	1.00	1.00	2.00	4.00	4.00
0.00	1.00	0.00	1.00	2.00	2.00	2.00	5.00	5.00
0.00	1.00	0.00	1.00	2.00	2.00	2.00	5.00	5.00
0.00	1.00	0.00	1.00	3.00	3.00	3.00	5.00	5.00
1.00	1.00	0.00	1.00	2.00	2.00	2.00	5.00	5.00
1.00	1.00	0.00	1.00	2.00	2.00	2.00	1.00	1.00
1.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00	4.00
0.00	1.00	0.00	0.00	2.00	2.00	2.00	4.00	4.00
0.00	1.00	0.00	1.00	2.00	2.00	2.00	5.00	5.00
0.00	1.00	0.00	0.00	2.00	2.00	2.00	4.00	4.00
0.00	0.00	0.00	1.00	2.00	2.00	2.00	3.00	3.00
0.00	0.00	0.00	0.00	2.00	2.00	2.00	4.00	4.00
0.00	1.00	1.00	1.00	2.00	2.00	2.00	5.00	5.00
0.00	1.00	0.00	1.00	2.00	2.00	2.00	5.00	4.00
1.00	1.00	1.00	1.00	2.00	2.00	2.00	5.00	5.00
0.00	1.00	0.00	1.00	2.00	2.00	2.00	4.00	4.00
0.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00	4.00
0.00	1.00	0.00	0.00	2.00	2.00	2.00	5.00	5.00
0.00	1.00	0.00	0.00	2.00	2.00	2.00	5.00	5.00
0.00	0.00	0.00	0.00	2.00	2.00	2.00	4.00	4.00
0.00	1.00	0.00	1.00	2.00	2.00	2.00	5.00	5.00
0.00	1.00	0.00	0.00	2.00	2.00	2.00	4.00	4.00
0.00	1.00	0.00	1.00	2.00	2.00	2.00	5.00	5.00
0.00	1.00	0.00	1.00	2.00	2.00	2.00	5.00	5.00

[illegible]

0.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00	3.00
0.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00	4.00
0.00	1.00	1.00	1.00	2.00	2.00	2.00	3.00	3.00
0.00	1.00	1.00	1.00	3.00	2.00	2.00	4.00	4.00

NoiseA3	NoiseB1	NoiseB2	NoiseB3	NoiseC1	NoiseC2	NoiseC3	CVDA1	CVDA2
5.00	1.00	1.00	1.00	2.00	2.00	2.00	5.00	5.00
4.00	9999.00	1.00	9999.00	2.00	2.00	2.00	4.00	4.00
5.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00	4.00
4.00	1.00	1.00	1.00	2.00	2.00	2.00	3.00	3.00
5.00	1.00	1.00	1.00	3.00	2.00	2.00	3.00	3.00
4.00	1.00	0.00	1.00	2.00	2.00	2.00	4.00	4.00
5.00	0.00	1.00	1.00	2.00	2.00	3.00	3.00	3.00
5.00	1.00	1.00	1.00	2.00	2.00	2.00	5.00	5.00
5.00	1.00	1.00	1.00	2.00	2.00	2.00	5.00	5.00
4.00	1.00	0.00	1.00	2.00	2.00	2.00	4.00	4.00
5.00	1.00	0.00	1.00	2.00	2.00	2.00	5.00	5.00
5.00	1.00	1.00	1.00	2.00	2.00	2.00	5.00	5.00
4.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00	4.00
4.00	1.00	0.00	1.00	2.00	2.00	2.00	4.00	4.00
4.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00	4.00
5.00	0.00	1.00	1.00	2.00	2.00	2.00	5.00	4.00
5.00	1.00	0.00	1.00	2.00	2.00	2.00	5.00	5.00
4.00	1.00	0.00	0.00	2.00	2.00	2.00	3.00	3.00
5.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00	4.00
5.00	1.00	1.00	1.00	2.00	2.00	2.00	5.00	5.00
4.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00	4.00
4.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00	4.00
2.00	0.00	0.00	0.00	1.00	1.00	2.00	2.00	2.00
5.00	0.00	1.00	1.00	2.00	2.00	2.00	4.00	4.00
5.00	1.00	0.00	1.00	2.00	2.00	2.00	5.00	5.00
4.00	1.00	1.00	1.00	3.00	3.00	3.00	3.00	3.00
5.00	1.00	1.00	1.00	2.00	2.00	2.00	5.00	5.00
1.00	0.00	0.00	1.00	2.00	2.00	2.00	3.00	4.00
4.00	1.00	9999.00	1.00	9999.00	9999.00	9999.00	4.00	4.00
4.00	0.00	1.00	1.00	2.00	2.00	2.00	3.00	3.00
5.00	1.00	1.00	1.00	2.00	2.00	2.00	5.00	5.00
4.00	0.00	1.00	1.00	2.00	2.00	2.00	4.00	4.00
3.00	1.00	1.00	1.00	2.00	2.00	2.00	3.00	3.00
4.00	1.00	0.00	1.00	2.00	2.00	2.00	4.00	4.00
5.00	0.00	0.00	1.00	2.00	2.00	2.00	4.00	4.00
4.00	1.00	0.00	1.00	2.00	2.00	2.00	4.00	5.00
5.00	1.00	0.00	1.00	2.00	2.00	2.00	4.00	4.00
4.00	0.00	0.00	1.00	2.00	2.00	2.00	4.00	4.00
4.00	1.00	0.00	1.00	2.00	2.00	2.00	4.00	4.00
5.00	1.00	1.00	1.00	2.00	2.00	2.00	5.00	5.00
5.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00	4.00
4.00	0.00	0.00	1.00	2.00	2.00	2.00	3.00	3.00
5.00	0.00	1.00	1.00	2.00	2.00	2.00	3.00	3.00
4.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00	4.00
5.00	0.00	1.00	1.00	2.00	2.00	2.00	5.00	5.00
5.00	1.00	0.00	1.00	2.00	2.00	2.00	3.00	5.00

5.00	1.00	1.00	1.00	2.00	2.00	2.00	5.00	5.00
4.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00	4.00
5.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00	4.00
5.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00	4.00
4.00	1.00	9999.00	1.00	9999.00	9999.00	9999.00	4.00	4.00
5.00	0.00	0.00	0.00	2.00	2.00	2.00	4.00	3.00
4.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00	4.00
5.00	1.00	0.00	1.00	2.00	2.00	2.00	3.00	3.00
5.00	1.00	1.00	1.00	2.00	2.00	2.00	5.00	5.00
5.00	1.00	0.00	1.00	2.00	2.00	2.00	4.00	3.00
5.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00	4.00
4.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00	4.00
3.00	1.00	0.00	1.00	2.00	2.00	2.00	3.00	3.00
5.00	0.00	9999.00	1.00	2.00	2.00	2.00	4.00	4.00
5.00	0.00	1.00	1.00	2.00	2.00	2.00	4.00	4.00
5.00	0.00	1.00	1.00	2.00	2.00	2.00	5.00	5.00
4.00	1.00	0.00	1.00	2.00	2.00	2.00	4.00	4.00
5.00	1.00	0.00	0.00	2.00	2.00	2.00	4.00	4.00
5.00	1.00	1.00	1.00	2.00	2.00	2.00	5.00	5.00
5.00	1.00	0.00	1.00	2.00	2.00	2.00	5.00	4.00
4.00	1.00	0.00	1.00	2.00	2.00	2.00	3.00	3.00
4.00	0.00	1.00	1.00	2.00	2.00	2.00	2.00	2.00
5.00	1.00	1.00	1.00	2.00	2.00	2.00	5.00	5.00
5.00	1.00	1.00	1.00	2.00	2.00	2.00	5.00	5.00
5.00	1.00	1.00	1.00	2.00	2.00	2.00	5.00	5.00
4.00	1.00	0.00	1.00	2.00	2.00	2.00	5.00	5.00
4.00	1.00	1.00	1.00	2.00	2.00	2.00	5.00	5.00
5.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00	4.00
5.00	1.00	1.00	1.00	2.00	2.00	2.00	5.00	5.00
5.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00	4.00
3.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00	3.00
5.00	1.00	1.00	1.00	2.00	2.00	2.00	5.00	5.00
5.00	1.00	1.00	1.00	2.00	2.00	2.00	3.00	4.00
4.00	1.00	1.00	1.00	2.00	2.00	2.00	3.00	3.00
4.00	1.00	0.00	1.00	3.00	3.00	2.00	4.00	4.00
4.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00	4.00
4.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00	4.00
4.00	1.00	1.00	1.00	2.00	2.00	2.00	3.00	4.00
4.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00	3.00
5.00	1.00	0.00	1.00	2.00	2.00	2.00	4.00	4.00
4.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00	4.00
3.00	1.00	0.00	1.00	2.00	2.00	2.00	4.00	4.00
3.00	1.00	0.00	1.00	2.00	3.00	2.00	5.00	5.00
5.00	1.00	1.00	1.00	2.00	2.00	2.00	5.00	5.00
5.00	1.00	0.00	1.00	2.00	2.00	2.00	5.00	5.00
5.00	1.00	1.00	1.00	2.00	2.00	2.00	5.00	5.00
4.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00	4.00

4.00	1.00	1.00	1.00	2.00	2.00	2.00	5.00	4.00
4.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00	4.00
3.00	1.00	1.00	1.00	2.00	2.00	2.00	3.00	3.00
4.00	1.00	1.00	0.00	2.00	2.00	2.00	4.00	4.00

CVDA3	CVDB	CVDC1	CVDC2	CVDC3	CVDD1	CVDD2	CVDD3	EXPOSEA1
5.00	3.00	1.00	1.00	0.00	2.00	2.00	2.00	5.00
4.00	4.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00
4.00	4.00	0.00	1.00	1.00	2.00	2.00	2.00	4.00
3.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	3.00
3.00	4.00	0.00	0.00	0.00	2.00	3.00	3.00	4.00
4.00	4.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00
3.00	3.00	0.00	1.00	1.00	2.00	2.00	3.00	4.00
5.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00	5.00
5.00	4.00	0.00	1.00	1.00	2.00	2.00	2.00	5.00
4.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00	4.00
5.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00	4.00
5.00	4.00	0.00	1.00	1.00	2.00	2.00	2.00	5.00
4.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00	4.00
4.00	4.00	0.00	1.00	1.00	2.00	2.00	2.00	4.00
4.00	3.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00
4.00	2.00	1.00	0.00	1.00	2.00	2.00	2.00	4.00
5.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00	5.00
3.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00	4.00
4.00	2.00	0.00	1.00	1.00	2.00	2.00	2.00	4.00
5.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00	5.00
4.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00
4.00	4.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00
2.00	3.00	0.00	1.00	0.00	1.00	1.00	2.00	2.00
4.00	4.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00
4.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00	4.00
3.00	4.00	0.00	1.00	1.00	3.00	3.00	3.00	4.00
5.00	3.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00
4.00	4.00	0.00	1.00	1.00	2.00	2.00	2.00	4.00
4.00	9999.00	0.00	1.00	9999.00	3.00	3.00	3.00	4.00
3.00	2.00	0.00	1.00	1.00	2.00	2.00	2.00	3.00
5.00	3.00	1.00	1.00	1.00	2.00	2.00	2.00	5.00
4.00	4.00	0.00	1.00	1.00	2.00	2.00	2.00	4.00
3.00	1.00	0.00	1.00	0.00	2.00	2.00	2.00	4.00
4.00	4.00	0.00	1.00	0.00	2.00	2.00	2.00	4.00
4.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00	4.00
4.00	3.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00
5.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00	4.00
4.00	4.00	0.00	1.00	1.00	2.00	2.00	2.00	4.00
4.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00	5.00
5.00	4.00	0.00	1.00	1.00	2.00	2.00	2.00	4.00
4.00	3.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00
3.00	4.00	0.00	0.00	0.00	2.00	2.00	2.00	4.00
3.00	2.00	0.00	1.00	1.00	2.00	2.00	2.00	3.00
3.00	4.00	1.00	1.00	0.00	2.00	2.00	2.00	4.00
5.00	3.00	1.00	1.00	1.00	2.00	2.00	2.00	5.00
5.00	4.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00

5.00	4.00	0.00	1.00	1.00	2.00	2.00	2.00	5.00
4.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00	4.00
4.00	4.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00
4.00	3.00	1.00	1.00	1.00	2.00	2.00	2.00	5.00
4.00	9999.00	0.00	1.00	9999.00	3.00	3.00	3.00	4.00
4.00	3.00	1.00	0.00	0.00	2.00	2.00	2.00	4.00
4.00	3.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00
3.00	3.00	1.00	1.00	1.00	2.00	2.00	2.00	3.00
5.00	4.00	1.00	1.00	1.00	2.00	2.00	2.00	5.00
4.00	9999.00	9999.00	1.00	1.00	2.00	2.00	2.00	4.00
4.00	4.00	0.00	1.00	1.00	2.00	2.00	2.00	5.00
4.00	2.00	0.00	0.00	0.00	2.00	2.00	2.00	4.00
3.00	2.00	1.00	0.00	1.00	2.00	2.00	2.00	4.00
4.00	4.00	0.00	1.00	1.00	2.00	2.00	2.00	4.00
4.00	4.00	1.00	1.00	9999.00	2.00	2.00	2.00	4.00
5.00	4.00	1.00	1.00	0.00	2.00	2.00	2.00	5.00
4.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00	4.00
4.00	4.00	0.00	0.00	1.00	2.00	2.00	2.00	5.00
5.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00	5.00
4.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00	3.00
3.00	3.00	1.00	1.00	1.00	2.00	2.00	2.00	3.00
2.00	4.00	1.00	1.00	1.00	2.00	2.00	2.00	2.00
5.00	2.00	1.00	1.00	1.00	2.00	2.00	2.00	5.00
5.00	2.00	1.00	1.00	1.00	2.00	2.00	2.00	5.00
5.00	2.00	1.00	1.00	1.00	2.00	2.00	2.00	5.00
5.00	4.00	0.00	0.00	1.00	2.00	2.00	2.00	5.00
5.00	3.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00
4.00	4.00	0.00	1.00	1.00	2.00	2.00	2.00	4.00
5.00	3.00	1.00	1.00	1.00	2.00	2.00	2.00	5.00
4.00	3.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00
3.00	4.00	0.00	1.00	1.00	2.00	2.00	2.00	4.00
5.00	9999.00	1.00	1.00	1.00	2.00	2.00	2.00	5.00
3.00	3.00	0.00	1.00	0.00	2.00	2.00	2.00	9999.00
3.00	4.00	1.00	1.00	1.00	2.00	2.00	2.00	9999.00
4.00	3.00	0.00	1.00	1.00	3.00	3.00	2.00	9999.00
4.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00	9999.00
4.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00	9999.00
3.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00	9999.00
4.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00	9999.00
4.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00	9999.00
4.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00	9999.00
4.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00	9999.00
4.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00	9999.00
3.00	3.00	0.00	1.00	1.00	3.00	2.00	2.00	9999.00
5.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00	9999.00
5.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00	9999.00
5.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00	9999.00
4.00	2.00	1.00	0.00	1.00	2.00	2.00	2.00	9999.00

5.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	9999.00
4.00	9999.00	1.00	0.00	1.00	2.00	2.00	2.00	9999.00
3.00	2.00	1.00	1.00	1.00	2.00	2.00	2.00	9999.00
4.00	2.00	1.00	1.00	1.00	2.00	2.00	2.00	9999.00

EXPOSEA2	EXPOSEA3	EXPOSEB	EXPOSEC1	EXPOSEC2	EXPOSEC3	EXPOSED1	EXPOSED2	EXPOSED3
5.00	5.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00
3.00	4.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00
4.00	4.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00
3.00	3.00	3.00	1.00	1.00	1.00	2.00	2.00	2.00
4.00	4.00	3.00	0.00	0.00	1.00	2.00	2.00	2.00
9999.00	9999.00	3.00	0.00	0.00	1.00	2.00	2.00	2.00
3.00	4.00	3.00	0.00	0.00	1.00	2.00	2.00	3.00
5.00	5.00	3.00	0.00	0.00	1.00	2.00	2.00	2.00
5.00	5.00	1.00	0.00	0.00	1.00	2.00	2.00	2.00
4.00	4.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00
4.00	4.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00
2.00	4.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00
4.00	4.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00
4.00	4.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00
3.00	3.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00
4.00	3.00	3.00	0.00	0.00	1.00	2.00	2.00	2.00
5.00	5.00	3.00	0.00	1.00	0.00	2.00	2.00	2.00
3.00	4.00	3.00	0.00	0.00	1.00	2.00	2.00	2.00
5.00	4.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00
5.00	5.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00
4.00	4.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00
4.00	4.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00
1.00	1.00	3.00	0.00	1.00	1.00	1.00	1.00	2.00
4.00	4.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00
4.00	5.00	3.00	0.00	0.00	1.00	2.00	2.00	2.00
3.00	3.00	3.00	0.00	1.00	1.00	3.00	3.00	3.00
1.00	1.00	3.00	0.00	0.00	1.00	2.00	2.00	2.00
3.00	3.00	3.00	0.00	0.00	1.00	2.00	2.00	2.00
4.00	4.00	3.00	0.00	0.00	1.00	9999.00	9999.00	9999.00
3.00	3.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00
5.00	5.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00
4.00	4.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00
4.00	3.00	3.00	0.00	0.00	1.00	2.00	2.00	2.00
4.00	4.00	4.00	0.00	1.00	1.00	2.00	2.00	2.00
5.00	5.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00
4.00	4.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00
5.00	5.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00
4.00	4.00	3.00	0.00	0.00	1.00	2.00	2.00	2.00
5.00	5.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00
4.00	4.00	3.00	1.00	0.00	1.00	2.00	2.00	2.00
4.00	4.00	3.00	0.00	0.00	1.00	2.00	2.00	2.00
4.00	4.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00
3.00	3.00	3.00	0.00	0.00	1.00	2.00	2.00	2.00
4.00	4.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00
3.00	5.00	3.00	0.00	1.00	1.00	2.00	2.00	2.00
3.00	5.00	3.00	0.00	0.00	1.00	2.00	2.00	2.00

[illegible]

[illegible]

[illegible]

5.00	5.00	5.00	5.00	5.00	9999.00	5.00	5.00	2.00
4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	2.00
4.00	4.00	5.00	4.00	5.00	4.00	4.00	5.00	2.00
5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	2.00
2.00	2.00	2.00	2.00	2.00	9999.00	9999.00	9999.00	9999.00
4.00	4.00	4.00	4.00	4.00	9999.00	3.00	3.00	9999.00
4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	2.00
4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	2.00
5.00	4.00	5.00	5.00	5.00	9999.00	5.00	5.00	5.00
3.00	3.00	3.00	3.00	3.00	9999.00	4.00	3.00	2.00
5.00	4.00	5.00	5.00	4.00	5.00	5.00	5.00	2.00
4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
3.00	3.00	9999.00	9999.00	9999.00	9999.00	3.00	3.00	3.00
4.00	4.00	4.00	4.00	4.00	9999.00	4.00	4.00	4.00
9999.00	9999.00	4.00	9999.00	9999.00	9999.00	5.00	5.00	2.00
5.00	5.00	5.00	5.00	5.00	9999.00	5.00	5.00	5.00
4.00	4.00	4.00	4.00	4.00	9999.00	4.00	4.00	2.00
5.00	5.00	5.00	5.00	5.00	9999.00	5.00	5.00	1.00
5.00	5.00	9999.00	9999.00	9999.00	9999.00	5.00	5.00	1.00
3.00	4.00	5.00	3.00	3.00	4.00	4.00	3.00	3.00
3.00	3.00	3.00	3.00	3.00	9999.00	3.00	3.00	3.00
4.00	4.00	4.00	4.00	3.00	2.00	4.00	4.00	2.00
5.00	5.00	5.00	5.00	5.00	9999.00	5.00	5.00	5.00
5.00	5.00	5.00	5.00	5.00	9999.00	5.00	5.00	5.00
5.00	5.00	5.00	5.00	5.00	9999.00	5.00	5.00	5.00
5.00	5.00	5.00	5.00	5.00	9999.00	5.00	5.00	1.00
5.00	5.00	5.00	4.00	5.00	4.00	5.00	5.00	2.00
5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	2.00
5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	1.00
4.00	5.00	5.00	4.00	4.00	9999.00	4.00	4.00	3.00
4.00	4.00	4.00	4.00	4.00	4.00	4.00	5.00	3.00
5.00	5.00	5.00	5.00	5.00	9999.00	5.00	5.00	5.00
5.00	5.00	5.00	5.00	5.00	4.00	5.00	5.00	2.00
3.00	3.00	4.00	3.00	3.00	9999.00	4.00	4.00	2.00
3.00	3.00	3.00	4.00	3.00	3.00	2.00	5.00	5.00
5.00	3.00	3.00	4.00	3.00	3.00	4.00	5.00	2.00
4.00	4.00	4.00	4.00	4.00	9999.00	4.00	4.00	4.00
4.00	4.00	4.00	5.00	4.00	9999.00	4.00	5.00	2.00
4.00	4.00	4.00	4.00	4.00	9999.00	4.00	4.00	2.00
5.00	5.00	5.00	5.00	5.00	9999.00	4.00	5.00	1.00
5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	1.00
3.00	3.00	3.00	3.00	3.00	9999.00	5.00	5.00	3.00
5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	4.00
5.00	5.00	5.00	3.00	5.00	3.00	5.00	5.00	1.00
5.00	5.00	5.00	5.00	5.00	9999.00	5.00	5.00	5.00
5.00	5.00	5.00	5.00	5.00	9999.00	5.00	5.00	1.00
4.00	4.00	4.00	4.00	4.00	9999.00	4.00	4.00	4.00

4.00	4.00	4.00	4.00	4.00	9999.00	3.00	4.00	4.00
5.00	4.00	4.00	4.00	4.00	9999.00	4.00	4.00	4.00
3.00	3.00	3.00	3.00	3.00	9999.00	3.00	3.00	3.00
4.00	4.00	4.00	4.00	4.00	9999.00	4.00	4.00	4.00

Train4	Train5	Train6
5.00	4.00	4.00
4.00	3.00	4.00
2.00	4.00	4.00
3.00	3.00	3.00
5.00	5.00	5.00
4.00	3.00	5.00
4.00	3.00	5.00
5.00	3.00	5.00
5.00	3.00	5.00
4.00	4.00	4.00
5.00	4.00	5.00
9999.00	5.00	5.00
4.00	5.00	4.00
4.00	4.00	4.00
5.00	3.00	5.00
5.00	5.00	5.00
2.00	5.00	5.00
4.00	4.00	4.00
5.00	5.00	5.00
5.00	5.00	5.00
4.00	3.00	4.00
4.00	4.00	4.00
2.00	4.00	4.00
4.00	4.00	4.00
4.00	3.00	5.00
4.00	4.00	3.00
5.00	4.00	5.00
9999.00	9999.00	9999.00
9999.00	9999.00	9999.00
4.00	4.00	5.00
5.00	5.00	5.00
4.00	4.00	4.00
5.00	5.00	5.00
5.00	3.00	5.00
9999.00	2.00	3.00
4.00	4.00	5.00
4.00	4.00	4.00
4.00	3.00	3.00
4.00	4.00	4.00
4.00	4.00	5.00
5.00	3.00	5.00
4.00	4.00	4.00
3.00	3.00	3.00
4.00	4.00	4.00
3.00	4.00	5.00
4.00	3.00	3.00

9999.00	5.00	5.00
4.00	5.00	4.00
4.00	4.00	4.00
4.00	2.00	4.00
9999.00	9999.00	9999.00
5.00	5.00	5.00
4.00	3.00	4.00
4.00	4.00	2.00
5.00	5.00	5.00
3.00	4.00	5.00
5.00	5.00	5.00
4.00	4.00	4.00
3.00	3.00	3.00
4.00	4.00	5.00
4.00	4.00	4.00
5.00	5.00	5.00
4.00	2.00	4.00
5.00	3.00	5.00
5.00	5.00	5.00
3.00	5.00	4.00
3.00	4.00	4.00
9999.00	2.00	4.00
5.00	5.00	5.00
5.00	5.00	5.00
5.00	5.00	5.00
5.00	5.00	5.00
4.00	5.00	5.00
5.00	4.00	5.00
5.00	2.00	5.00
4.00	4.00	4.00
4.00	4.00	5.00
5.00	5.00	5.00
5.00	4.00	4.00
4.00	4.00	4.00
3.00	4.00	4.00
4.00	3.00	5.00
4.00	4.00	4.00
4.00	3.00	5.00
4.00	4.00	4.00
4.00	3.00	5.00
5.00	5.00	5.00
3.00	3.00	4.00
2.00	1.00	5.00
5.00	3.00	5.00
5.00	5.00	5.00
5.00	3.00	4.00
4.00	4.00	4.00

3.00	4.00	5.00
4.00	4.00	4.00
3.00	3.00	3.00
4.00	3.00	3.00