



# Mine Inspection Program Evaluation



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Mine Safety and Health Administration

Final Report

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## **Foreword**

This report was prepared by ICF Consulting. The material in it represents ICF Consulting's best judgment in light of the information available to us at the time for preparation. Opinions expressed in this report are those of the ICF Consulting staff involved in the project and not necessarily those of the Department of Labor or the Mine Safety and Health Administration (MSHA).

The ICF Consulting team wishes to extend our appreciation to the members of the MSHA Core Team for their dedication and commitment to this review. We would also like to recognize the outstanding cooperation that was provided by personnel in MSHA offices and at mining industry operations (management and labor). Both MSHA and mining industry management and labor were very supportive and eager to contribute ideas and recommendations.

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## 1.0 Executive Summary

The Mine Safety and Health Administration (MSHA) has a mandate to conduct safety inspections of the Nation's mines in their entirety—twice per year at surface mines and four times per year at underground mines—under Section 103(a) of the Federal Mine Safety and Health Act of 1977 (Mine Act). The purpose of these inspections is to verify mine operators' compliance with statutory requirements and to determine whether an imminent danger exists.

ICF Consulting was selected by MSHA to conduct an independent outcome evaluation of the mine safety inspection program. The purpose of the evaluation was to assess the effectiveness and efficiency of inspection activities. The evaluation also included a review of streamlined inspection initiatives proposed by Coal's Reinvention Work Group and Metal and Non-Metal's (MNM) Voluntary Compliance Partnership (VCP), and an analysis of the allocation and distribution of inspection enforcement resources. Our recommendations were to be based on the assumption that resources will be maintained within current and future budgetary constraints and should take into consideration the specific inspection requirements set forth in the Mine Act and associated regulations. The evaluation, conducted between October 2002 and May 2003, was based on an analysis of MSHA data, interviews with over 100 individuals representing MSHA and the mining industry (management and labor), a review of internal documents, and a review of industry and other governmental inspection programs.

Based on our evaluation we found that MSHA's inspection program is generally compliant with statutory and regulatory requirements. In terms of outcomes, the inspectors evaluate compliance with applicable regulations, and recognize and cite both instances of mines' non-compliance with statutory requirements and imminent (potentially catastrophic) dangers. Moreover, inspectors and mine operators interviewed agreed that enforcement aimed at preventing major events such as fires and explosions is helping prevent such incidents. However, we also identified a number of opportunities to improve the effectiveness and efficiency of the inspection program. Our specific findings and recommendations are summarized below.

***Inspection Enforcement Activities:*** MSHA and mining industry management and labor we interviewed believe that inspections continue to be a key component of MSHA's overall mission to protect the health and safety of the Nation's miners, and we concur. Representatives of the mining industry view the inspection program as a tool to evaluate safety issues and acknowledge that fair and thorough inspections can help improve safety performance. However, the data indicate that the numbers and types of days lost injuries occurring over the past 5 to 10 years are not well correlated either quantitatively or qualitatively with the citations issued through inspection enforcement activities. This suggests that at least some factors contributing to the current incident rates are not being captured in the process for issuing citations. Moreover, mining industry personnel interviewed stated that the inspections do not necessarily focus on a mine's overall approach to safety or the most critical or hazardous mine activities and conditions in significant depth to identify factors that may have a more influential impact on safety performance.

We recommend that MSHA increase the effectiveness of the inspection process by including *elements* of industry and other governmental inspection practices and the Coal Reinvention Work Group's recommendations such that an inspection of a mine in its entirety highlights an evaluation of the underlying problems or gaps in site level safety programs that contribute to fatalities and other days lost injuries. This recommendation applies to both Coal and MNM and would involve using the inspection activities of other inspectors in completing reviews, establishing priorities for inspecting high risk areas or activities within the operational portion of a mine, conducting representative sampling of safety activities documented in mine records,

## 1.0 Executive Summary (continued)

and developing criteria proposed for in-depth inspection of abandoned or inactive portions of a mine with long established compliance histories.

**Compliance Assistance:** Compliance assistance is being provided to the mine sites by inspectors during an inspection. The mining industry appreciates this assistance especially when the inspectors engage in compliance assistance activities that are directly relevant to their specific situations. However, the frequency and form of compliance assistance varies among the inspectors and these activities have not been fully institutionalized and incorporated into the inspection process.

We recommend that MSHA proceed with its plans to institutionalize compliance assistance during inspections by: determining the most valuable type of assistance for various mines; incorporating compliance assistance into the daily routine of the inspection process; expanding Educational Field Services activities; and making compliance assistance materials widely available.

**Inspection Consistency:** During interviews with mine personnel, we heard comments about inconsistencies among the inspectors. The differing areas of expertise among inspectors are viewed as both a strength and a weakness of the current inspection program. MSHA personnel see it primarily as a strength, since it allows fresh perspectives on particular areas as inspectors rotate through the mines. (In addition to mine rotation, MSHA manages the potential inconsistencies by conducting internal meetings to review new regulations and field supervisors indicate that they routinely review the basis for inspectors' citations.) Mine personnel expressed concern about inconsistencies they perceived between different districts and different inspectors making decisions in the field as to what constitutes a citation or a significant and substantial (S&S) citation.

We recommend that MSHA take steps to improve consistency across districts and among inspectors. Possible steps include: expanding the use of inspection guides during inspections to ensure consistent review of applicable regulations; using the supervisory review process to confirm that the inspectors are following updated inspection procedures; and upgrading the Inspection Procedures Handbooks and refresher training to provide the inspectors with an ability to more consistently interpret or assess compliance with applicable regulations.

**Written Inspection Procedures:** To establish a basis for consistency and training of new inspectors, both Coal and MNM have developed written inspection procedures covering three phases of an inspection—pre-inspection, on-site activities, and report preparation. The written inspection procedures for Coal and MNM, however, differ in terms of content and rigor. Although differences in the procedures are understandable given the type and range of mines that need to be inspected within Coal and MNM, the degree of the differences are not aligned with the “One MSHA Strategy” of conveying to miners a single organization with one set of policies. In addition, MNM procedures have not been updated to reflect changes in health monitoring requirements.

We recommend that MSHA standardize, update, and modify the inspection procedures used by Coal and MNM. In particular, utilize a similar format for both Coal and MNM Inspection Procedures Handbooks, and fine-tune the details in Coal and MNM's Inspection Procedures Handbooks to reflect the inspection process recommendations for increasing the time on-site for conducting the inspection, as well as the focusing of the inspection as outlined in this report.

**District Resources:** MSHA has an inspection force of approximately 900 staff members, and at the end of 2002 Coal had 597 inspectors and MNM had 310 inspectors. Within

## 1.0 Executive Summary (continued)

Coal there are approximately 2,000 mines to inspect with the majority being underground; MNM has approximately 13,000 mines with the vast majority being surface. Decisions regarding staffing needs are based on the number and complexity of operating mines. Coal has achieved an average inspection completion rate of approximately 98 percent over the past five years; MNM has achieved an average completion rate of 81 percent over the same period of time. MNM has made efforts to reallocate resources among the districts to increase the completion rates and during 2002 the overall completion rate was 88 percent. In reviewing resource allocations we concluded that the availability of inspector resources is an important element in achieving the mandated number of inspections. We also noted that Coal has appreciably greater personnel resources than MNM and that the resource allocations within Coal may not be totally aligned with current miner activity. We further noted that Coal's resources appear to be distributed differently across districts, while the MNM resources are distributed fairly evenly.

We recommend that MSHA consider reallocating inspection resources across Coal districts and between Coal and MNM, as much as practical, to address these inspection resource issues.

**Recruitment and Training:** MSHA has an established program in place to train and retrain inspectors for both Coal and MNM. The initial training program consists of both classroom and on-the-job training to familiarize inspectors with applicable regulations and the inspection process. Most of the interviewees stated that the initial training was appropriate and prepared them to undertake job responsibilities, but the refresher training program needs to be enhanced to help address the inconsistencies in interpretation, develop new skill sets, or enhance existing skill sets. It is also perceived by mine personnel and within MSHA, whom we interviewed, that the mining industry experience base within the inspectorate may diminish with time.

We recommend that MSHA: upgrade the refresher training to provide the inspectors with skills and techniques to enhance compliance assistance activities; use the results of the Job Task Analysis (JTA) to examine, design, or require specific continuing education coursework to close the skills gap; and establish a recruiting plan to replace retiring inspectors to ensure that mining experience is retained within the inspectorate. (We note that changes in the National Mine Health and Safety Academy training programs are one intended outcome of the MSHA JTA initiative.)

**Streamlining Initiatives:** MNM proposed the VCP initiative to provide recognition to those mines with excellent safety and health programs. Coal established an internal Reinvention Work Group to examine current inspection procedures. The proposals prepared by Coal and MNM for enhancing (streamlining) the inspection process, in our opinion, are generally consistent with mandated inspection requirements and are reinforced by ICF Consulting's data-gathering and analysis activities.

We recommend that MSHA implement MNM's VCP initiative to provide a mechanism to recognize mines with outstanding safety performance records and the Coal's Reinvention Work Group's recommendations to increase the time on-site in conducting inspections and the value and quality of the inspection process. In particular, both Coal and MNM should update the written inspection procedures to reflect the Reinvention Work Group recommendations for prioritizing the on-site portion of the inspection, modifying the specific tasks outlined for reviewing the Uniform Mine File (UMF) prior to an inspection and the order in which areas of the mine are to be inspected, and using the inspection activities of other inspectors in completing an inspection.

## **2.0 Introduction**

### **2.1 Context for Evaluation**

The Mine Act mandates that MSHA place priority on preventing deaths and serious injuries from unsafe and unhealthful conditions and practices in mines. As MSHA moves forward in the 21<sup>st</sup> Century, it is seeking to determine the most efficient and effective allocation and distribution of enforcement and compliance assistance resources that will have positive effects on mine safety and health. ICF Consulting was selected to undertake an evaluation of the inspection program because of its long history of program evaluation work in a wide range of industries and programs, and its extensive experience in helping organizations, including those in the mining industry, to enhance inspection or auditing practices. ICF Consulting worked with a Core Evaluation Team consisting of MSHA and Department of Labor personnel. This team provided inputs, reviewed and approved the design of the evaluation approach, and provided quantitative and qualitative data that were critical to the completion of this project.

MSHA and mining industry management and labor were very supportive and eager to contribute ideas and recommendations. MSHA and mining industry representatives very willingly accepted the opportunity to participate in the interview process and cooperated with ICF Consulting to schedule the mine site and MSHA office visits and interviews in a timely manner. Information was provided to the ICF Consulting team in a candid and objective manner. Representatives of the mining industry view the inspection program as a tool to evaluate safety issues and acknowledge that fair and thorough inspections can help improve safety performance. MSHA personnel believe that inspections are a key component of MSHA's overall mission to protect the health and safety of the Nation's miners.

### **2.2 Purpose and Scope**

MSHA requested that ICF Consulting evaluate the regular inspection program as implemented by Coal and MNM in order to assess current effectiveness and efficiency and to develop recommendations for improving the current program. The regular inspector program covers the twice per year inspections at surface mines and the four times per year inspections at underground mines. These inspections are generally referred to as AAAs for Coal and 01s for MNM. The evaluation also included a review of streamlined inspection initiatives proposed by Coal and MNM, and an analysis of the allocation and distribution of inspection enforcement resources. Our recommendations were to be based on the assumption that resources will be maintained within current and future budgetary constraints and should take into consideration the specific inspection requirements set forth in the Mine Act and associated regulations.

### **2.3 Evaluation Design**

To undertake our evaluation, ICF Consulting developed a program evaluation design and prepared a work plan that was approved by MSHA's Core Evaluation Team. The work plan outlined a series of questions and identified data sources that were used to gather information in order to evaluate the efficiency and effectiveness of the inspection program and related plans for enhancement generally referred to as streamlined processes. A copy of the design document is presented in Appendix A.

The main focus question of this evaluation was: Is the inspection program effective and efficient in fulfilling its mission and are there opportunities for improvement? Within the parameters of the main question, the program evaluation focused on the following specific questions:

## 2.0 Introduction (continued)

- Is the inspection program meeting the statutory and regulatory requirements? Is it compliant?
- Is the inspection program designed and implemented in a manner that accomplishes the program goals? Is it effective?
- Is the inspection program maximizing the utilization of its resources in performing its activities? Is it efficient?
- How can the inspection program be improved?

In order to address these questions, the program evaluation consisted of a four-pronged approach that included:

- Quantitative data analysis;
- Qualitative field site visits and interviews;
- Document review; and
- A review of industry and other government agencies that have inspection programs.

The Mine, Accident, Injury, and Illness Database was provided by MSHA and used as the primary database to support the data analysis activities of the inspection program evaluation. The database contained approximately 3,631,838 records related to accidents, injuries, inspections, violations, miners and miner hours for the period October 1992 through December 2002. Data in the database were also available for inspections conducted between 1973 and 1992. Data were reviewed for completeness and consistency and the period 1998 – 2002 was used to support data analysis for the inspection program evaluation. The 1998 – 2002 data set contained 1,684,605 records.

Data were analyzed, evaluated, and summarized by calendar year (Jan 1-Dec 31) and fiscal year (Oct 1-Sept 30). Four major categories were used to group data:

- Major commodity (i.e., Coal or MNM)
- Mine type (i.e., surface or underground)
- District (i.e., MSHA defined geographic area)
- Type of mine worker (i.e., operator or contractor)

Data were manipulated, analyzed, and summary statistics were prepared using the following tools:

- Microsoft Access, version 1997 SR-2 – queries that extract data for a particular range of dates or quarters
- Crystal Reports, version 8.5 – reports that group data according to the evaluation categories
- Microsoft Excel, version 2000 (9.0.4402 SR-1) – tables that collect and present summary data



## 2.0 Introduction (continued)

- Microsoft Excel, version 2000 (9.0.4402 SR-1) – computes least squares exponential regressions

Field interviews were conducted at MSHA offices and at mine sites to collect additional qualitative information. A topical outline and a field guide were developed to assist the interviewers in addressing operational and organizational issues related to the inspection program, inspection program health and safety statistics, and options for streamlining inspections. Copies of these guides are presented in Appendix B. We interviewed approximately 100 individuals at the locations in Table 1.

**Table 1: Internal and External Interviews**

Organization	Location
<b>Internal to MSHA</b>	
MSHA Headquarters	VA, Rosslyn
MSHA Inspectors and Supervisors (Job Task Analysis Workshop)	WV, Beckley
MNM District Managers' Meeting	PA, Bruceton
Coal District Managers' Meeting	WV, Beckley
MSHA Leadership Meeting	WV, Beckley
Coal District 4	WV, Mt. Hope District Office
Coal District 4	WV, Mt. Carbon Field Office
Coal District 5	VA, Norton District Office
Coal District 8	IN, Vincennes District Office
Coal District 8	IL, Hillsboro Field Office
Coal District 9	CO, Denver District Office
MNM Northeastern District	NH, Manchester Field Office
MNM North Central District	IN, Vincennes Field Office
MNM South Central District	TX, San Antonio Field Office
MNM Rocky Mountain District	CO, Denver District Office
MNM Rocky Mountain District	UT, Salt Lake City Field Office
MNM Western District	CA, Vacaville District Office
MNM Health Monitoring	VA, Rosslyn
<b>Mining Industry</b>	
Arch Coal (Catenary Coal, Samples Mine)	WV, Coal District 4
Freeman United Coal Company (Coal Crown II Mine)	VA, Coal District 8
Paramont Coal Company of Virginia LLC (VICC No. 7 Mine)	VA, Coal District 5
General Chemical	WY, MNM Rocky Mountain District
Hanson Permanente	CA, MNM Western District
IMC Phosphates	FL, MNM South East District
Kennecott Utah Copper Mines	UT, MNM Rocky Mountain District
Mulzer Stone (Rockport Yard)	IN, MNM North Central District
Sherwin Alumina Company	TX, MNM South Central District

Persons interviewed at MSHA locations included headquarters staff, district managers, field managers and supervisors, and inspectors. Interviewees at mining industry locations included managers, health and safety coordinators, and miners (including union mine safety representatives).

## **2.0 Introduction (continued)**

To supplement the information gathered during our interviews, we reviewed relevant documents. These documents included the following:

1. MSHA in the Twenty First Century: A Discussion of the Initiatives and Prerogatives to Improve the Effectiveness of MSHA
2. FY 2003 Annual Performance Plan
3. MSHA Policy and Procedures Manual
4. Coal General Inspection Procedures Handbook
5. MNM General Inspection Procedures Handbook
6. MNM Supervisor's Handbook
7. Accountability Program Manual
8. Coal Mine Health Inspection Procedures
9. MNM Accompanied and Unaccompanied Supervisory Review Form
10. Citation and Order Writing Handbook for Coal Mines and Metal and Non Metal Mines
11. MSHA Strategic Plan Fiscal Years 2003-2008 (Final Draft)
12. Accident & Occupational Illness Prevention Program
13. MNM Compliance Program
14. Selected Case Law Summaries (covering spot inspections and definition of an inspection of a mine in its entirety)
15. MNM Voluntary Compliance Partnership Initiative
16. Streamlining Proposal for Coal (1996)
17. Coal Employee and Supervisory Mentoring Programs
18. US Department of Labor, Mine Safety and Health Administration, Coal Mine Safety and Health Report of Investigation of the No. 5 Mine, Jim Walters Resources, Inc.
19. Internal Review of MSHA's Action at the No. 5 Mine, Jim Walters Resources, Inc.
20. MSHA Mine, Accident, Injury, and Illness Database
21. 2002-2003 Fatalgrams and Fatality Investigation Reports ([www.msha.gov](http://www.msha.gov))
22. Selected Inspection Reports
23. Title 30 of the Code of Federal Regulations (CFR) with a focus on Parts 56, 57, 75, and 77
24. Metal and Nonmetal Procedure Instruction Letter No. 101-IV-1 (1/01/2001)
25. Job Task Analysis Workforce Reports for Coal and MNM
26. MSHA's Briefing Book 2002
27. The Role of Training and Development in Implementing Initiatives and Prerogatives to Improve the Effectiveness of MSHA
28. Study of MNM Mining Enforcement and Compliance Assistance, 1983-2000

## **2.0 Introduction (continued)**

Most Federal agencies, including MSHA, are being asked to use human, financial, and information technology resources in the most effective manner. We researched inspection programs undertaken by other Federal agencies to understand how resources are being managed to undertake enforcement activities. The primary information source for each agency was its website.

The agencies included:

- Nuclear Regulatory Commission
- Environmental Protection Agency
- United States Department of Agriculture Food Safety Inspection Service
- Occupational Safety and Health Administration
- United States Coast Guard
- Federal Aviation Administration
- Internal Revenue Service
- Food and Drug Administration
- United States Department of Interior, Bureau of Land Management, Office of Surface Mining Reclamation and Enforcement

## **2.4 Report Organization**

The remainder of this report is organized as follows:

- Section 3.0 summarizes the results of the analysis of the MSHA Mine, Accident, Injury, and Illness Database for regular inspections (AAAs in Coal and 01s in MNM), data gathered through site visits and interviews to evaluate the inspection program's consistency with Mine Act requirements and the effectiveness and efficiency of the inspection program.
- Section 4.0 summarizes features of other governmental agency inspection programs, lists characteristics of inspection or audit programs within the mining industry, provides an overview of the streamlined proposals MSHA has developed, and includes a comparative analysis of these other programs and practices.
- Section 5.0 summarizes the findings and conclusions from our review of MSHA's inspection program and recommendations to improve the effectiveness and efficiency of the inspection program.

### 3.0 Inspection Program Review

#### 3.1 Consistency with Statutory and Regulatory Requirements

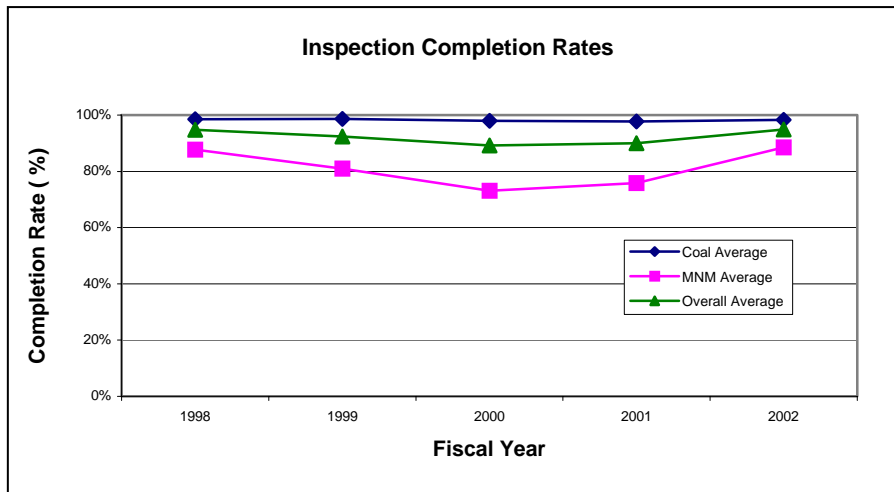
MSHA is required to undertake inspections at set frequencies, verify compliance with applicable regulations, issue citations for noncompliance, and review imminent hazards. The information we gathered and analyzed for these dimensions is outlined below.

##### 3.1.1 Completion Rates

As mandated by the Mine Act, MSHA is required to conduct a minimum number of inspections per year at each mine—twice per year at surface mines and four times per year at underground mines. This has generally been interpreted by MSHA as requiring inspections once per six months or once per quarter. Within Coal there are approximately 2,000 mines to inspect and the majority are underground; MNM has approximately 13,000 mines to inspect and the vast majority are surface mines. The number of coal mines has decreased from 1998-2002, with decreases in both surface and underground. Within MNM, the number of mines has increased over that same period of time, primarily as a function of an increase in the number of surface mines.

MSHA calculates completion rates using an algorithm that takes into account the realities of the mining industry (e.g., seasonal variations in mine operations, etc.). Based on MSHA's calculations, Coal has achieved an average completion rate of 98 percent for the past five years. For MNM the average completion rate has been approximately 81 percent for that same period of time. MSHA's calculated completion rates are depicted in Figure 1.

**Figure 1: Average Inspection Completion Rates**



### 3.0 Inspection Program Review (continued)

The completion rates for Coal districts have ranged from 94 to 100 percent over the past five years. The completion rates achieved for MNM districts have ranged from 53 percent to 98 percent over that same period of time. The district completion rates calculated by MSHA are listed in Table 2.

**Table 2: District Inspection Completion Rates**

District	Fiscal Year/ Percent Completion Rate				
	1998	1999	2000	2001	2002
<b>Coal</b>					
C0100 (Wilkes-Barre)	99	99	99	99	100
C0200 (New Stanton)	99	97	96	98	96
C0300 (Morgantown)	98	99	99	97	98
C0400 (Mt. Hope)	99	99	99	96	99
C0500 (Norton)	99	99	99	98	99
C0600 (Pikeville)	99	99	98	98	99
C0700 (Barbourville)	99	99	98	98	99
C0800 (Vincennes)	100	99	96	97	98
C0900 (Denver)	99	98	97	98	98
C1000 (Madisonville)	94	100	100	97	99
C1100 (Birmingham)	99	97	97	99	96
<b>MNM</b>					
M2000 (Northeastern)	97	95	82	69	83
M3000 (Southeastern)	95	99	89	94	98
M4000 (North Central)	90	85	79	77	88
M5000 (South Central)	87	75	64	70	94
M6000 (Rocky Mountain)	85	79	69	64	72
M7000 (Western)	72	53	56	81	96

MSHA has attempted to address the variations within MNM through management reviews to understand underlying factors contributing to gaps in completion rates. We understand from District and Assistant Managers and inspectors that the number of mines, travel distances, and the availability of inspector resources are contributing factors influencing completion rates. In response, MNM added and reallocated staff to field offices where resources were needed and Field Offices developed schedules to ensure that mines with compliance problems receive the required number of inspections per year. On occasion, MNM has drawn on inspectors from other MNM districts as well as Coal to assist in undertaking inspections to increase the overall completion rate. In 2002, the completion rates within MNM districts ranged from 72 to 98 percent.

In our opinion, the overall inspection program is reasonably compliant with frequency of inspection requirements, although there is a need to increase the completion rates for MNM. We also collected comments related to the value of using resources to conduct inspections at regular frequencies for mines that are no longer operational [but are not closed or abandoned] or that "mine" intermittently.

### 3.0 Inspection Program Review (continued)

#### 3.1.2 Regulatory Focus

The inspectors are required to focus on the requirements of the Mine Act of 1977 and applicable portions of Title 30 of the Code of Federal Regulations. By examining a number of inspection reports and by interviewing a number of inspectors and mining industry management and labor personnel, we confirmed that the inspectors focus on regulatory compliance. Principal safety requirements with which the inspectors must confirm compliance are formidable, as illustrated in Table 3.

**Table 3. Principal Safety Regulation Areas for Mines**

<i>Regulatory Area</i>	<i>30 CFR Section</i>			
	<i>Coal, Underground</i>	<i>Coal, Surface</i>	<i>MNM, Underground</i>	<i>MNM, Surface</i>
Aerial Tramways			57.10000	56.10000
Air Quality			57.5000	56.5000
Auger Mining		77.1500		
Combustible Materials	75.400			
Communications	75.1600			
Compressed Air and Boilers			57.13000	56.13000
Diesel-powered Equipment	75.1900			
Drilling and Rotary Jet			57.7000	56.7000
Electrical Equipment General	75.500	77.500		
Electricity			57.12000	56.12000
Emergency Shelters	75.1500			
Explosives & Blasting	75.1300	77.1300	57.6000	56.6000
Fire Prevention	75.1100	77.1100	57.4000	56.4000
Grounding	75.700			
High Voltage	75.800			
Hoisting and Mantrips/ Personnel Hoisting	75.1400	77.1400	57.19000	56.19000
Illumination			57.17000	56.17000
Loading, Haulage and Dumping		77.1600	57.9000	56.9000
Low Voltage	75.900			
Machinery and Equipment			57.14000	56.14000
Maps	75.1200			
Materials Storage and Handling			57.16000	56.16000
Methane			57.22000	
Miscellaneous	75.1700	77.1700	57.20000	56.20000
Personal Protection			57.15000	56.15000
Roof Support/Ground Control	75.200	77.1000	57.3000	56.3000
Safeguards for Mechanical Equipment		77.400		
Safety Programs			57.18000	56.18000
Slope and Shaft Sinking		77.1900		
Surface Installations		77.200		
Thermal Dryers		77.300		
Trailing Cables	75.600			
Travelways			57.11000	56.11000
Trolley Wires		77.1800		
Ventilation	75.300		57.8000	

**Notes to Table 3**

Excluded from the table, but not insignificant, are 30 CFR Sections 48 (Training/retraining of miners) and 70, 71, and 72 (Health Standards), among others.

### **3.0 Inspection Program Review (continued)**

#### **3.1.3 Reporting**

MSHA is required to issue a report for each inspection conducted and issue a citation or order for noncompliance with statutory requirements. In reviewing a sample of inspection reports, we noted the reports are prepared in a consistent manner, and the citation forms include substantial detail about the rationale for the citations. However, inspectors' field notes, in our opinion, do not generally contain enough information detailing what was inspected and concluded in those cases where there was no specific citation.

#### **3.1.4 Imminent Dangers**

During an inspection, MSHA is required to determine whether an imminent danger exists. Mine personnel interviewed stated that the inspection process provides another pair of eyes to look at safety issues, but question whether the inspectors are focusing on hazard recognition and work practices that may lead to a serious incident or accident. Several mine personnel interviewed indicated that behavioral issues (e.g., taking short cuts in the implementation of work activities, initiating work without fully understanding or assessing hazard situations) contribute more to safety incidents than "conditions."

Several mine operators suggested that the inspections tend to place a priority on employee and union complaints, possibly at the expense of addressing other potential safety concerns. They also suggested that there maybe a need to examine hazards from a more comprehensive perspective during an inspection. That is, examine a mine's overall safety program to confirm strengths or potential weaknesses. MSHA has recognized this need and is planning to address it through increased compliance assistance activity.

### **3.2 Program Effectiveness**

The design and implementation of the inspection program was evaluated relative to program goals to evaluate its effectiveness. Design and implementation features reviewed included the program's contributions to achieving MSHA's goals for miner safety and health, the allocation of resources to the districts, training programs, and staff roles and responsibilities.

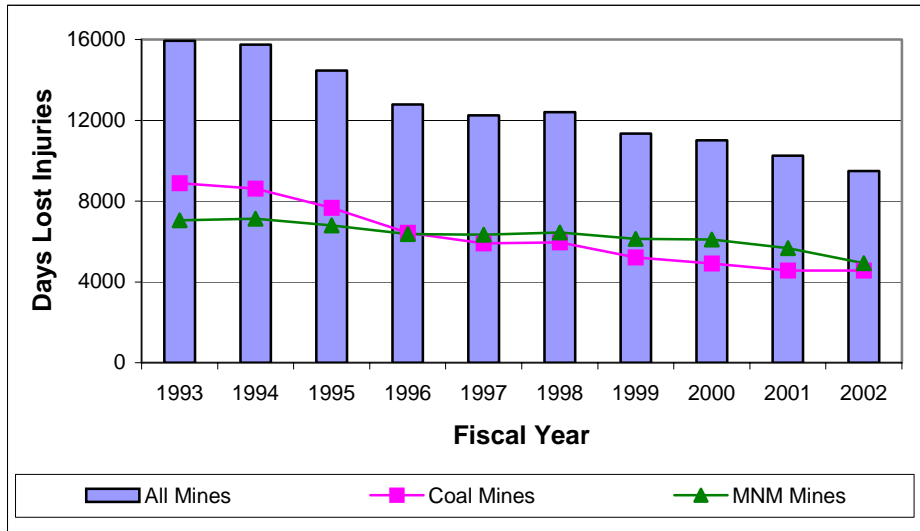
#### **3.2.1 Miner Health and Safety**

MSHA has a mission to protect the health and safety of our Nation's miners through inspections, technical assistance, and other outreach activities as specified in the Mine Act of 1977. Over the past three decades, MSHA technical assistance, education and training, and enforcement efforts and the mining industry's safety program improvement activities have resulted in significant reductions in fatality and days lost injury rates. In fact, mining deaths and injuries are at an all time low. However, during the period 1992-2002 the trend in reductions of fatalities and other days lost injuries began to plateau even though there are still year-to-year reductions.

### 3.0 Inspection Program Review (continued)

This “plateau” behavior is characteristic of phenomena that decline at linear first order rates. (See Figure 2)

**Figure 2: Days Lost Injury Data: Operators and Contractors**



**Notes to Figure 2**

Both mine operator and contractor injuries are included. “Days Lost Injuries” refers to fatalities (01), permanent total or partial disability (02), days away from work only (03), days away from work and restricted activity (04), and restricted activity only (05).

To address what it considers an unsatisfactory rate of improvement in safety performance, MSHA has established aggressive safety goals of reducing fatality rates by 15 percent per year and to reduce the all-injury rate by 50 percent by the end of 2005 compared to the FY 2000 baseline. MSHA has recognized that traditional enforcement mechanisms may not be sufficient to achieve these goals. In ICF Consulting’s analysis, we plotted numbers (not rates) of fatalities and injuries against time (see Figure 3). On this basis, projected times for reaching a 15 percent reduction in fatalities is 4.7 years and for a 50 percent reduction in total injuries is 12 years.



### 3.0 Inspection Program Review (continued)

Figure 3a: Projected Decrease in Fatalities

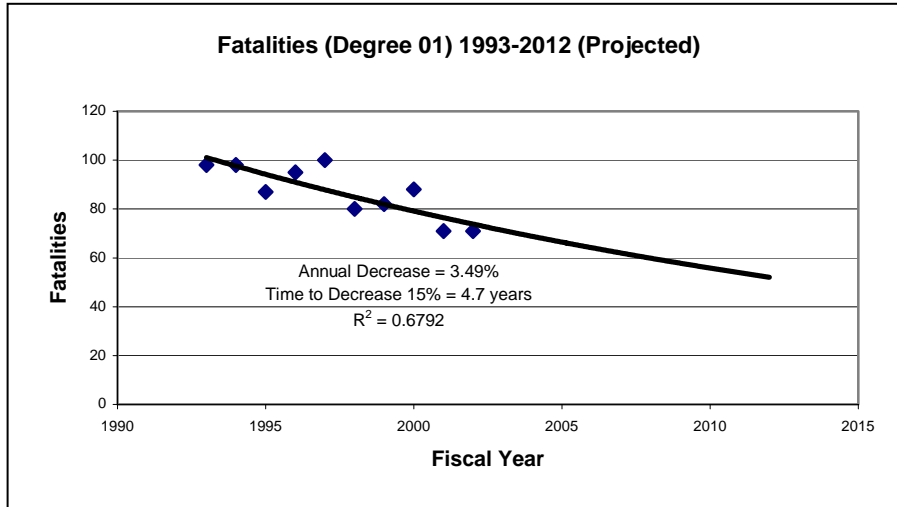
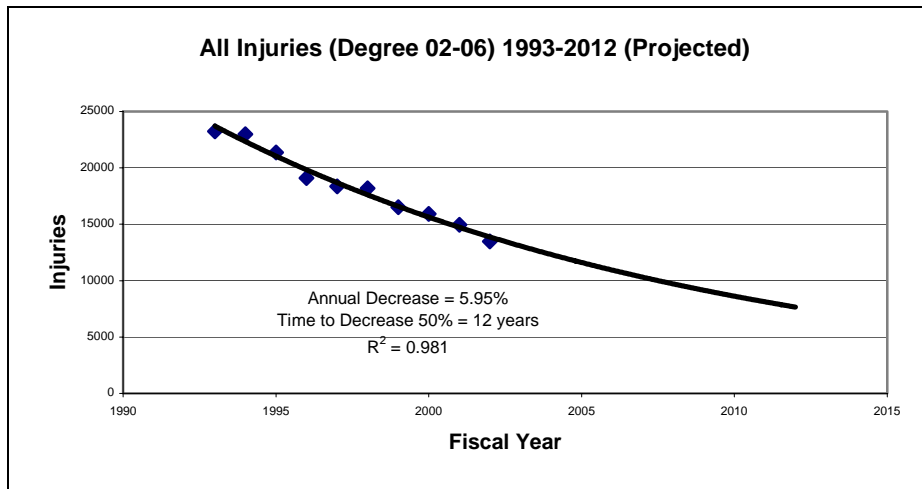


Figure 3b: Projected Decrease in All Injuries



**Notes to Figure 3**

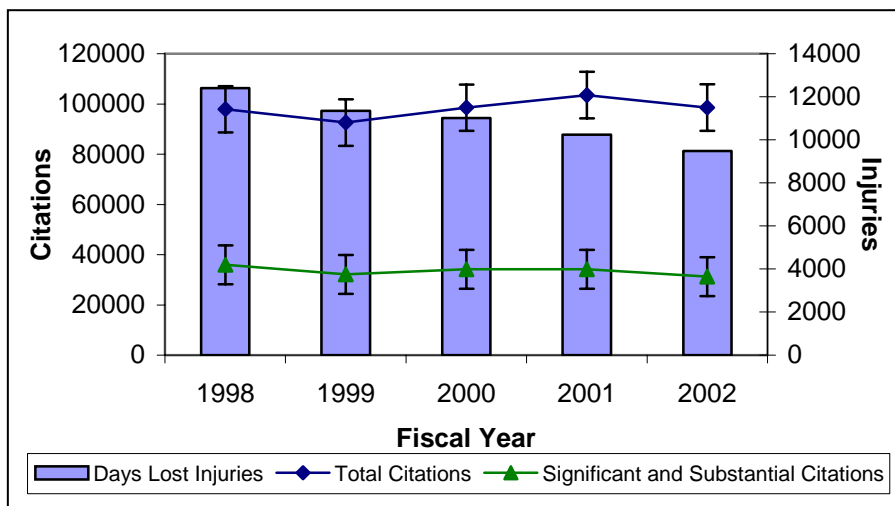
Fatalities and injuries for both operators and contractors are included. The extrapolation curves shown in Figures 3a and 3b are least squares exponential regressions. To facilitate comparison with MSHA's goal, injuries plotted in Figure 3b are for total injuries, which include degrees 02 through 04 (days away), 05 (days restricted activity only), and 06 (no days lost, no restricted activity). Note that Figures 3a and 3b are based on *numbers*, not on *rates*, of fatalities and injuries. It is not expected that the rate will decline more rapidly than the number, given that the number of miner hours has been decreasing over the past five years.

### 3.0 Inspection Program Review (continued)

To evaluate the inspection program’s potential impact on miner health and safety in greater detail, we analyzed the relationship among the number of citations and S&S citations issued during regular inspections—AAAs and 01s—and total number of days lost injuries, and asked mining industry management and labor about the types of citations they receive and the nature of the on-site injuries.

We found that the absolute numbers of citations and S&S citations issued during AAA or 01 inspections have not decreased substantially over the past five years (See Figure 4). One might have expected that, over time, actions by the mines to correct the cited violations would lead to a decrease in citations. This expectation is not supported by the data, which suggests that mine operators may be addressing only the specific *symptomatic* non-compliance cited and not correcting the underlying *systemic* causes. This observation supports MSHA’s plan to designate root cause analysis as an appropriate target for increased compliance assistance. Figure 4 also suggests that there is no clear correlation between the numbers of days lost injuries and the numbers of total and S&S citations for MSHA as a whole.

**Figure 4: Relationship Between Days Lost Injuries, Total Citations and S&S Citations Issued During Regular Inspections**



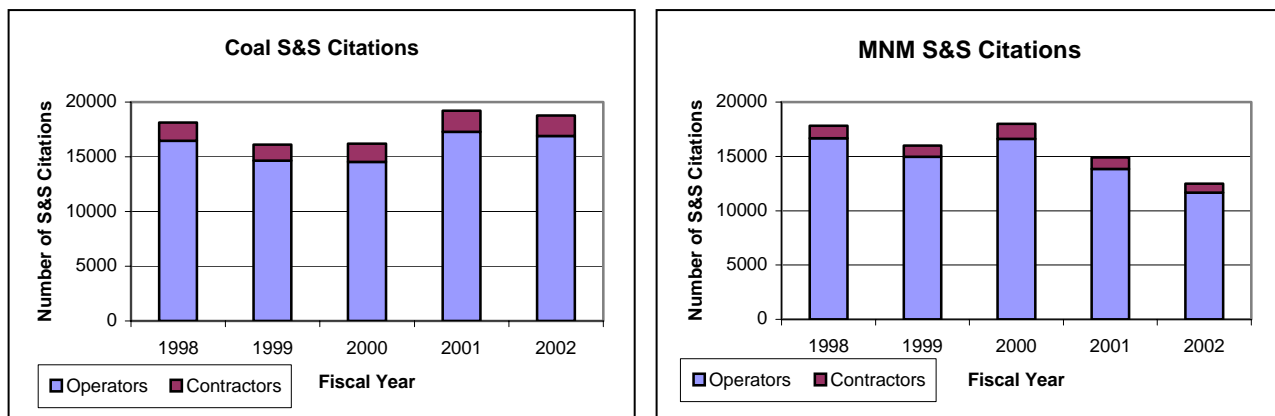
**Notes to Figure 4**

In all of the ICF Consulting analyses, graphs, and tables, only citations arising from regular inspections (AAAs in Coal and 01s in MNM) are included. Fatalities and injuries for both operators and contractors are included. “Days Lost Injuries” refers to fatalities (degree 01), days lost injuries assigned degrees 02 (permanent total or partial disability), 03 (days away from work only), 04 (days away from work and restricted activity), and 05 (restricted activity only).

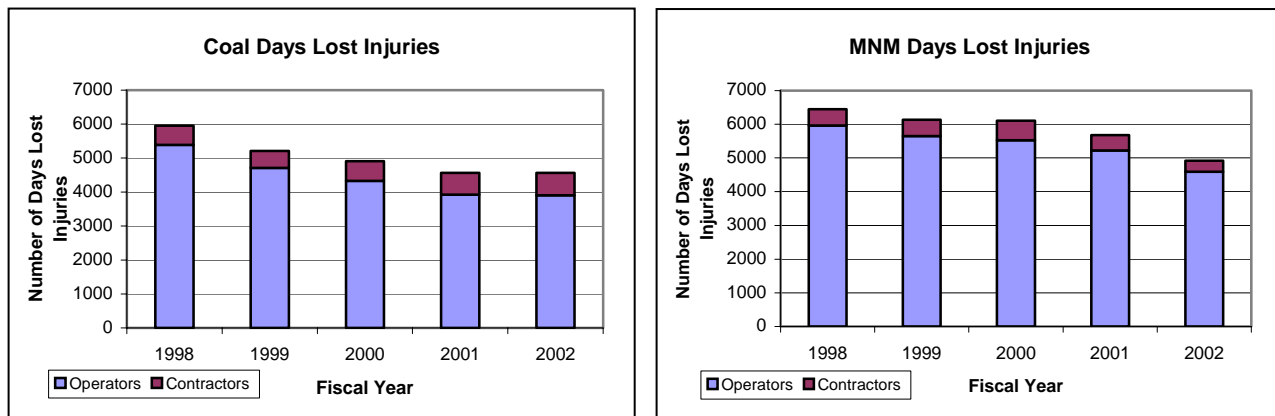
### 3.0 Inspection Program Review (continued)

When Coal and MNM are looked at separately, a similar pattern appears. The number of S&S citations issued during regular inspections or days lost injuries has not declined rapidly, except for MNM in the two most recent years. (See Figures 5 and 6)

**Figure 5: S&S Citations Issued During Regular Inspections: Operators and Contractors**



**Figure 6: Days Lost Injuries: Operators and Contractors**



**Notes to Figure 6**

Days Lost Injuries are degrees 01 through 05.

At the district level we also found a similar pattern in the data—for the most part there is no clear relationship between the total number of fatalities and days lost injuries and the total number of citations and S&S citations issued during regular inspections. We were told that earlier MSHA studies had indicated similar results.

During our interviews with mine and MSHA personnel, we heard many times that there is no correlation between the types of citations issued and the nature of the more frequent types of [nonfatal] accidents at individual mines. To explore the relationship between citations and on-going injuries, we examined health and safety data at four mines. In preparing these tables we relied on MSHA’s Accident, Injury, and Illness database with respect to injury classification and

### 3.0 Inspection Program Review (continued)

made very basic correlations with the regulatory citations issued during regular inspections. This information is summarized in Tables 4 through 7.

At this level of analysis, the correlation between regulatory sections cited and causes of on-going injuries is imperfect. One logical inference would be that some potential injuries are prevented when the mine operator corrects the regulatory violations that have been cited. It is not possible to quantify the “avoided” injuries. However, other inferences are equally plausible. For example, it is possible that the existence of the inspection enforcement process, in and of itself, results in increased attention to safety by the mine operators. Another logical inference is that the regulations—and therefore the compliance enforcement inspections—do not address the root causes of on-going injuries, which include back strains, abrasions, etc.

**Table 4. Comparison of Citations with Injury Records (FY1998 to FY2002)—Example for a MNM Surface Operation**

Citations			Number of Miners Injured		
Regulation Cited	Total	S&S	Classification	Days Away	Restricted Activity
56 CFR 14000 Machinery	55	19	Machinery Powered Haulage	5 1	
56 CFR 12000 Electricity	55	8			
56 CFR 4000 Fire Protection	26				
56 CFR 16000 Materials Storage and Handling	15	4	Handling of Materials	10	6
56 CFR 5000 Air Quality	13	3	Occupational illness	2	
56 CFR 15000 Personal Protection	12	8			
56 CFR 11000 Travelways	11	7	Slip or Fall of Person	8	2
			Hand Tools (non-powered)	4	5
			Explosion of Gas or Dust	1	
<b>Subtotal of Listed Items</b>	<b>187</b>	<b>49</b>		<b>29</b>	<b>13</b>
<i>Totals</i>	<i>216</i>	<i>57</i>		<i>31</i>	<i>13</i>

**Notes to Table 4**

Only citations to 30 CFR Part 56 have been included. Not all citations with fewer than 10 occurrences are tabulated. Days away include degrees 01 through 04, and restricted activity is degree 05. The number of degree 07 (occupational illness) incidents is listed for comparison with the number of Air Quality citations.

**Table 5. Comparison of Citations with Injury Records (FY1998 to FY2002)—Example for a MNM Underground Operation**

Citations			Number of Miners Injured		
Regulation Cited	Total	S&S	Classification	Days Away	Restricted Activity
57 CFR 12000 Electricity	68	14			
57 CFR 22000 Methane	61				
57 CFR 14000 Machinery & Equipment	42	6	Machinery Powered Haulage	7 16	11 11
57 CFR 4000 Fire Protection	22				
57 CFR 15000 Personal Protection	2	2			
57 CFR 11000 Travelways	3	1	Slip or Fall of Person	13	8
57 CFR 1600 Materials Storage and Handling	4		Handling of Materials	17	20
			Stepping or Kneeling on Object	4	2
			Hand Tools (non-powered)	3	6
<b>Subtotal of Listed Items</b>	<b>202</b>	<b>23</b>		<b>60</b>	<b>58</b>
<i>Totals</i>	<i>225</i>	<i>30</i>		<i>65</i>	<i>62</i>

**Notes to Table 5**

Only citations to 30 CFR Part 57 have been included. Not all citations with fewer than 5 occurrences are tabulated. Days away include degrees 01 through 04, and restricted activity is degree 05.

### 3.0 Inspection Program Review (continued)

**Table 6. Comparison of Citations with Injuries (FY1998 to FY2002)—Example for a Coal Surface Operation**

Citations			Number of Miners Injured		
Regulation Cited	Total	S&S	Classification	Days Away	Restricted Activity
77 CFR 1600 Loadage & Hauling	170	138	Powered Haulage	7	
77 CFR 400 Safeguards for Mechanical Equipment	90	81	Machinery	12	
72 CFR 600 and 77 CFR 1300 Explosives & Blasting	31	16			
77 CFR 1100 Fire Protection	13	7			
77 CFR 500 Electrical Equipment	9	3			
77 CFR 1000 Ground Control	8	8			
			Handling of Materials	16	1
			Slip or Fall of Person	15	1
<b>Subtotal of Listed Items</b>	<b>321</b>	<b>253</b>		<b>50</b>	<b>2</b>
<i>Totals</i>	<i>342</i>	<i>268</i>		<i>57</i>	<i>2</i>

**Notes to Table 6**

Only citations to 30 CFR Part 77 have been included. Not all citations with fewer than 10 occurrences are tabulated. Days away include degrees 01 through 04, and restricted activity is degree 05.

**Table 7. Comparison of Citations with Injuries (1998 to 2002)—Example for a Coal Underground Operation**

Citations			Number of Miners Injured		
Regulation Cited	Total	S&S	Classification	Days Away	Restricted Activity
75 CFR or 77 CFR 500 Electrical Equipment	147	85			
75 CFR 400 Combustible Materials	94	31			
75 CFR 1100 Fire Protection	86	15			
75 CFR 300 Ventilation	80	30			
75 CFR 600 Trailing Cables	67	13			
75 CFR 1900 Diesel-powered Equipment	43	6			
77 CFR 200 Surface Installations	44	22			
75 CFR 200 Roof Support	39	23	Fall of Roof or Fall of Face	6	
77 CFR 400 Safeguards for Mechanical Equipment	34	18	Machinery	8	
			Handling of Materials	30	
			Slip or Fall of Person	26	
			Powered Haulage	10	
			Hand Tools (non-powered)	6	
<b>Subtotal of Listed Items</b>	<b>634</b>	<b>243</b>		<b>86</b>	
<i>Totals</i>	<i>699</i>	<i>271</i>		<i>105</i>	

**Notes to Table 7**

Only citations to 30 CFR Parts 75 and 77 have been included. Not all citations with fewer than 10 occurrences are tabulated. Days away include degrees 01 through 04, and restricted activity is degree 05.

Industry also perceives that different district offices and different inspectors “make their own rules” by interpreting the regulations differently. In some instances this is done by incorporating specific requirements into required plans (e.g., the Roof Control Plan or Ventilation Control Plan for underground mines) before they are approved. Mining industry personnel expressed concern about inconsistencies they perceived between different inspectors making decisions in the field as to what constitutes a citation or an S&S citation. We concluded that the process for issuing citations requires greater scrutiny to determine whether or not the inspectors are analyzing inspection information in a consistent manner.

### **3.0 Inspection Program Review (continued)**

During our interviews we heard multiple times that many citations are “nit-picky” or that the regulations cited are unreasonable or outdated. Mine industry personnel also noted that inspectors, to varying degrees, advise mines to correct situations that are not specifically violations of the requirements and, thus, do not result in citations. Mine personnel believe that these “punch list items” must be taken as seriously as citations in order to avoid an adversarial relationship with the inspector. In addition, there is a perception among some of the mine operators interviewed that the dollar value of the penalties for citations may not be a driver for improved safety performance. One mine visited viewed “overlapping citations” (both contractor and mine cited for the same violation) as unreasonable and unfair.

#### **3.2.2 Organization and Resources**

To analyze the effectiveness of MSHA’s inspection organization and resources, we reviewed: the allocations of inspector resources to each of the districts relative to the mining activity within the district; the training provided to the inspectors to implement inspection activities consistent with program goals; and the roles and responsibilities of the managers, supervisors, and inspectors.

##### **3.2.2.1 Resource Allocations**

We understand from MSHA that inspector resource allocations, to a large degree, are made based on the number of miners and complexity of the mines within a district. At the end of 2002, Coal had 597 inspectors and MNM had 310. Over the past five years Coal has had an average of 578 inspectors and MNM 288. To examine the appropriateness of inspection resource allocations for Coal and MNM, we made an assumption that the number of miner hours would be a reasonable surrogate parameter for approximating the number, size, and complexity of operations within a Coal or MNM district.

Figures 7 and 8 indicate that Coal has a higher proportion of inspector resources than MNM relative to the average number of miner hours. The complexity of mining coal and number of regulations that must be reviewed during an inspection can account for much of the difference in inspector resource allocations between Coal and MNM. However, when considering the total number of mines MNM is required to inspect, the smaller number of inspectors within MNM districts is, in our opinion, having an influence on completion rates.

For MNM, the resource allocations appear relatively even across districts. Within Coal, there are differences in resource levels across districts, which may relate, in part, to the different types of mining activities in different regions. These Coal data also suggest, however, that the resource allocations may not be totally aligned with decreases in mining activities. District 1 (Wilkes Barre) in particular seems to be high in its relative resources since 2000, although it does have a large number of small mines which might indicate a higher than average resource requirement. However, this district also appears to have had a higher than average rate of mine closings suggesting that staff attrition may not have kept pace with the decreasing workload.

### 3.0 Inspection Program Review (continued)

Figure 7: MNM Inspectors Per Miner (Operator and Contractor) Hour

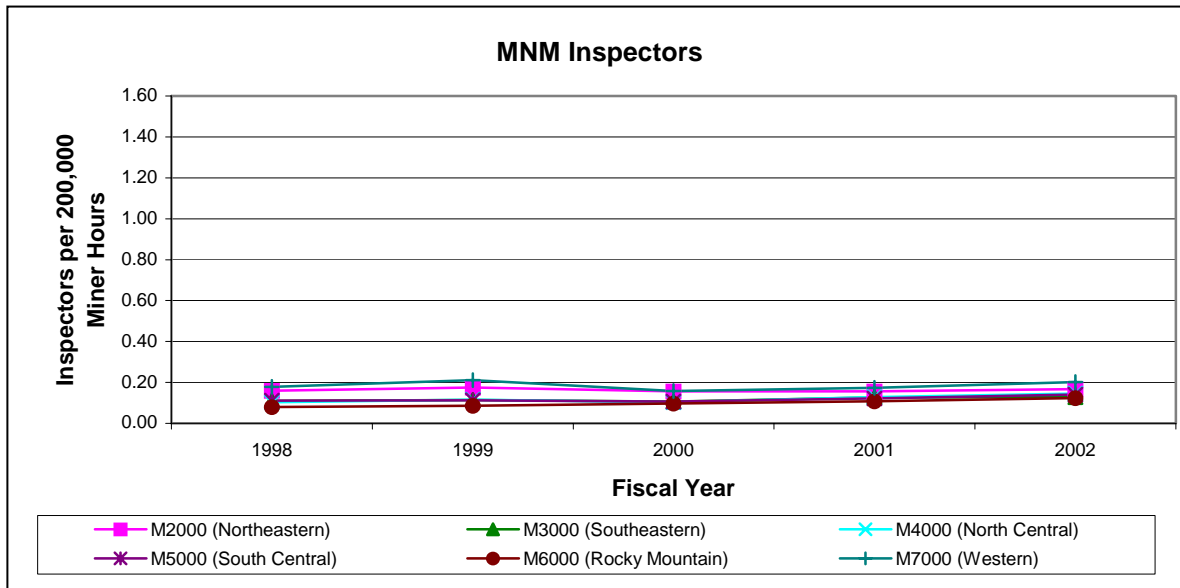
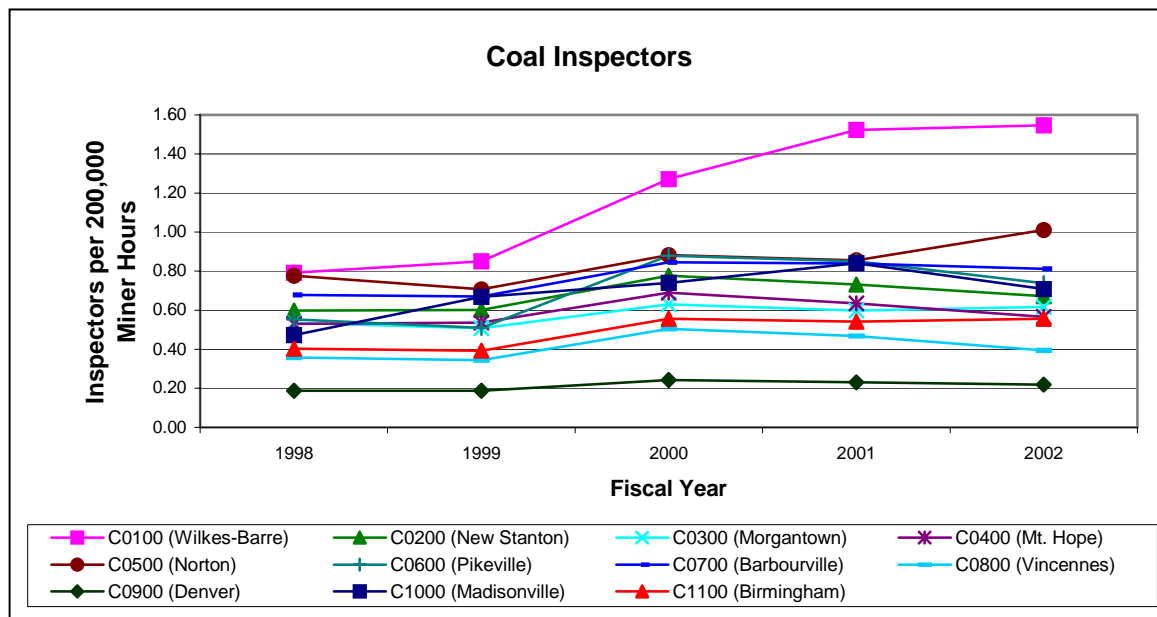


Figure 8: Coal Inspectors Per Miner (Operator and Contractor) Hour



**Notes to Figures 7 and 8**

Data on contractor hours are available only on a total Coal or MNM level. Overall, the contractor-to-operator hours ratio is approximately twice as high for Coal mines (20-25%) as for MNM mines (10-12%). To facilitate comparison of Coal versus MNM resource allocations at a district level, we assigned contractor hours to districts as if each district within Coal or MNM used the same proportion of contractor hours as Coal or MNM overall.

### 3.0 Inspection Program Review (continued)

We also examined to what extent the districts are applying the same level of effort to conduct inspections. Table 8 indicates that the total hours and on-site hours per inspection are, on average, about three times higher for Coal than MNM; report hours are about six times higher; and travel hours two to three times higher. This reflects the fact that MNM has a large number of small mines, such as sand and gravel operations with five or fewer workers. Table 8 also indicates that the on-site inspection time for Coal has increased over the past several years and slightly decreased for MNM. For both Coal and MNM, the reporting and travel time per inspection have remained relatively constant over that same period of time.

**Table 8: Average Hours Per Inspection**

Type of Mine	Fiscal Year				
	1998	1999	2000	2001	2002
<b>Average Total Hours per Inspection</b>					
<b>Coal</b>	<b>61.5</b>	<b>62.2</b>	<b>64.1</b>	<b>67.5</b>	<b>72.9</b>
Surface	34.5	34.1	34.7	34.7	35.1
Underground	85.7	88.5	91.0	97.3	108.1
<b>MNM</b>	<b>20.5</b>	<b>22.5</b>	<b>23.9</b>	<b>22.4</b>	<b>19.8</b>
Surface	19.0	20.5	21.6	25.0	18.4
Underground	46.8	54.1	59.1	55.5	48.9
<b>Average On-site Hours per Inspection</b>					
<b>Coal</b>	<b>39</b>	<b>40</b>	<b>41</b>	<b>43</b>	<b>48</b>
Surface	22	22	22	22	23
Underground	54	56	58	63	71
<b>MNM</b>	<b>13</b>	<b>15</b>	<b>16</b>	<b>15</b>	<b>13</b>
Surface	12	14	15	17	12
Underground	32	37	41	40	34
<b>Average Report Hours per Inspection</b>					
<b>Coal</b>	<b>11.3</b>	<b>11.4</b>	<b>11.4</b>	<b>12.0</b>	<b>12.3</b>
Surface	5.6	5.4	5.4	5.5	5.4
Underground	16.5	16.9	16.9	17.8	18.7
<b>MNM</b>	<b>2.2</b>	<b>2.3</b>	<b>2.3</b>	<b>1.9</b>	<b>1.8</b>
Surface	2.1	2.0	2.1	2.1	1.7
Underground	4.9	5.6	6.4	4.6	4.1
<b>Average Travel Hours per Inspection</b>					
<b>Coal</b>	<b>11.1</b>	<b>11.2</b>	<b>11.6</b>	<b>12.2</b>	<b>13.0</b>
Surface	6.9	6.8	6.9	6.9	6.9
Underground	14.9	15.3	15.9	17.0	18.7
<b>MNM</b>	<b>4.9</b>	<b>5.3</b>	<b>5.4</b>	<b>5.1</b>	<b>4.8</b>
Surface	4.7	4.9	4.9	5.8	4.5
Underground	9.6	11.3	11.7	11.4	10.9



### 3.0 Inspection Program Review (continued)

We also noted that the reporting time for MNM is lower than Coal on both a total and per inspector basis, even though there may be a lack of clerical support in some MNM field offices. In addition, because MNM has many more facilities to inspect, the total travel time and the amount of travel time per inspector are greater for MNM than for Coal. (See Table 9)

**Table 9: Total Inspection Hours and Inspection Hours per Inspector**

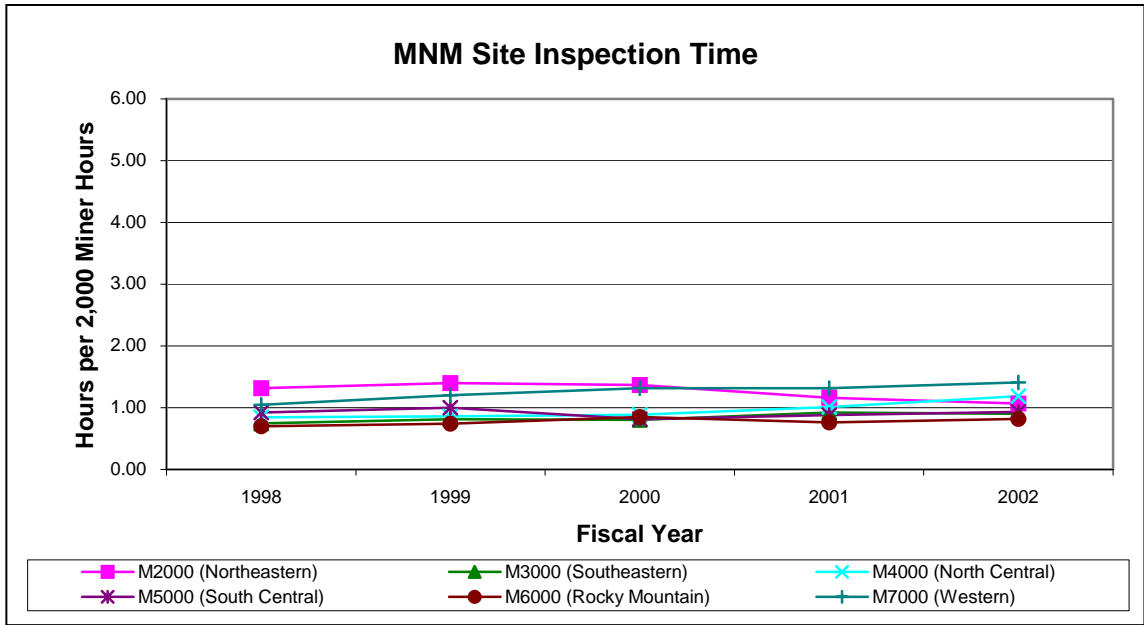
Type of Mine	Fiscal Year				
	1998	1999	2000	2001	2002
<b>Total Inspection Hours per Year</b>					
<b>Coal</b>	<b>403,009</b>	<b>381,445</b>	<b>370,300</b>	<b>386,623</b>	<b>432,022</b>
Surface	107,000	100,622	95,569	94,485	100,517
Underground	296,009	280,823	274,731	292,138	331,505
<b>MNM</b>	<b>317,941</b>	<b>333,564</b>	<b>329,813</b>	<b>318,743</b>	<b>323,200</b>
Surface	278,688	286,909	279,975	273,830	284,730
Underground	39,253	46,655	49,838	44,913	38,470
<b>On-site Hours per Year</b>					
<b>Coal</b>	<b>256,031</b>	<b>242,943</b>	<b>237,516</b>	<b>248,320</b>	<b>282,000</b>
Surface	68,461	64,367	61,778	60,550	65,238
Underground	187,570	178,576	175,738	187,770	216,762
<b>MNM</b>	<b>206,751</b>	<b>222,090</b>	<b>223,439</b>	<b>219,019</b>	<b>215,632</b>
Surface	179,653	189,982	188,864	187,051	188,963
Underground	27,098	32,108	34,575	31,968	26,669
<b>Report Hours per Year</b>					
<b>Coal</b>	<b>74,317</b>	<b>69,873</b>	<b>65,805</b>	<b>68,457</b>	<b>72,976</b>
Surface	17,253	16,092	14,849	15,115	15,555
Underground	57,064	53,781	50,956	53,342	57,421
<b>MNM</b>	<b>34,745</b>	<b>33,442</b>	<b>32,371</b>	<b>26,923</b>	<b>29,453</b>
Surface	30,645	28,615	27,000	23,238	26,192
Underground	4,100	4,827	5,371	3,685	3,261
<b>Travel Hours per Year</b>					
<b>Coal</b>	<b>72,661</b>	<b>68,629</b>	<b>66,979</b>	<b>69,846</b>	<b>77,046</b>
Surface	21,286	20,163	18,943	18,820	19,724
Underground	51,375	48,466	48,036	51,026	57,322
<b>MNM</b>	<b>76,445</b>	<b>78,032</b>	<b>74,003</b>	<b>72,801</b>	<b>78,115</b>
Surface	68,390	68,312	64,111	63,541	69,575
Underground	8,055	9,720	9,892	9,260	8,540
<b>Average Total Hours per Inspector</b>					
<b>Coal</b>	741	760	595	620	724
<b>MNM</b>	1,182	1,138	1,217	1,076	1,043
<b>Average On-site Hours per Inspector</b>					
<b>Coal</b>	470	484	382	398	472
<b>MNM</b>	769	758	824	740	696
<b>Average Report Hours per Inspector</b>					
<b>Coal</b>	137	139	106	110	122
<b>MNM</b>	129	114	119	91	95
<b>Average Travel Hours per Inspector</b>					
<b>Coal</b>	134	136	108	112	129
<b>MNM</b>	284	266	273	246	252

Figures 9 and 10 indicate the inspection time by district normalized to the number of miner years in that district. MNM inspectors spend approximately the same average amount of time conducting the on-site portion of an inspection across all districts, and the inspection time per miner year has not changed appreciably in five years. Within Coal there are some differences

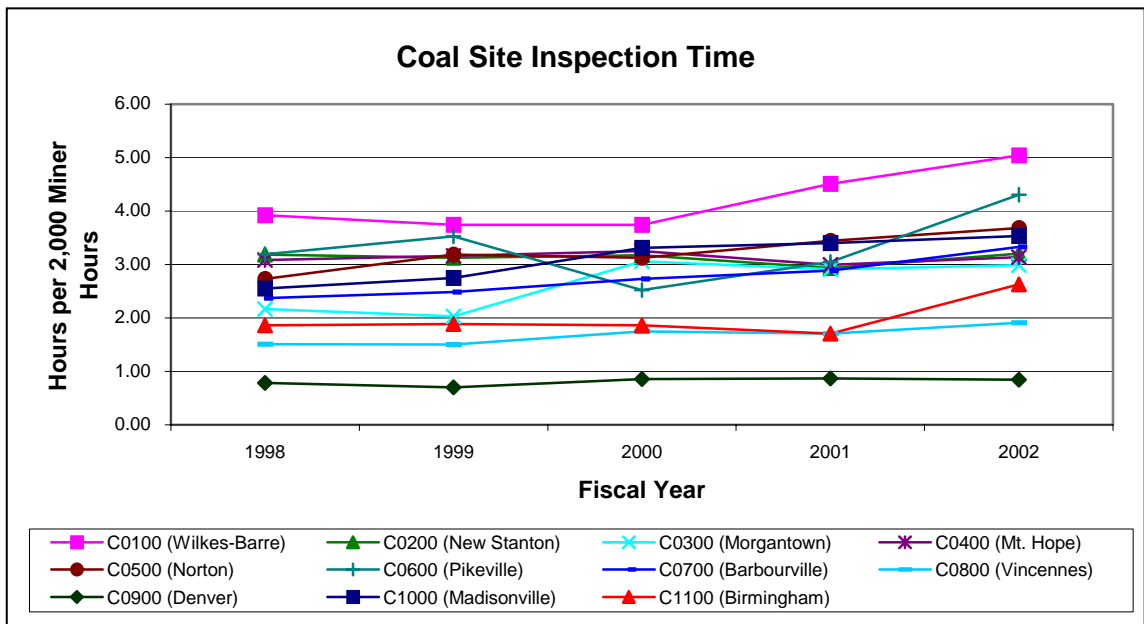
### 3.0 Inspection Program Review (continued)

that are most likely attributable to the size and complexity of the mines in the district, but may also reflect a lag in adjusting resource allocations as mining activity in a district decreases.

**Figure 9: MNM On-site Inspection Time Per District**



**Figure 10: Coal On-site Inspection Time Per District**



### **3.0 Inspection Program Review (continued)**

#### **3.2.2.2 Inspector Training Programs**

Inspectors are provided with a core program of education to become qualified as Authorized Representatives. In general, an inspector spends one year as a trainee, with approximately 26 weeks of classroom training at the National Mine Health and Safety Academy (Beckley, WV) and 26 weeks of on-the-job training with a seasoned inspector. The classroom training covers inspection procedures and typical conditions the inspector would need to review while on-site at a mining operation—including ground control hazards, haulage, hoists and elevators, blasting, roof control, and health monitoring. In terms of refresher training, Coal inspectors are scheduled to receive approximately two weeks per year and MNM inspectors two weeks every other year. The supervisor and inspector decide together which courses should be taken as part of the refresher training process. These courses, for the most part, are similar to the ones taken during the initial training period although they may vary to reflect new regulations such as hazard communication. Many of the inspectors interviewed indicated that the initial training was appropriate but they do not currently receive much value from this refresher training.

Several MSHA staff members interviewed also indicated that there might be gaps in the attendance of inspectors in refresher training, which may relate to, among other things, the scheduling of Academy classes in comparison to inspectors' workload "crunch times." In addition, several interviewees suggested that training, including annual refresher training, may need to be upgraded to cover new or different skill sets such as improved communication skills, so that inspections are more effective. MSHA intends to use the results of the JTA to support efforts in this direction. Suggestions from MSHA and mining industry personnel for enhancing the refresher training include the following:

- Review of new regulations to enhance consistency in interpretation.
- Presentation skills to enhance the delivery of compliance assistance "spot training" undertaken by inspectors during site reviews.
- Writing skills to enhance the communication of the underlying facts associated with a citation or order.
- Overview of behavioral safety issues that frequently contribute to safety problems.

#### **3.2.2.3 Roles and Responsibilities and Resource Management**

Overall, district managers and field office supervisors have responsibility for establishing travel area inspection schedules, monitoring inspection schedule implementation, confirming that the citations have been appropriately evaluated and issued, and conferencing with mining industry personnel regarding any of the citations issued during an inspection. These responsibilities appear to be clearly communicated and understood across MSHA. The inspectors also clearly understand their role in conducting inspections and issuing citations and believe they are helping to improve the working conditions in the mines to enhance safety performance.

Each year supervisors are required to conduct paper reviews and field reviews of each inspector to ensure consistency in the implementation of the inspection process and interpretation of the regulations. Overwhelmingly this process was viewed as positive by both the inspectors and supervisors. It helps to identify inconsistencies among the individual inspectors. Supervisors indicated that an equally important, or perhaps even more important, benefit was providing an opportunity for communicating with mine management.

During interviews with mining industry personnel, we were told repeatedly about inconsistencies among the inspectors. The differing areas of expertise among inspectors are

### **3.0 Inspection Program Review (continued)**

viewed as both a strength and a weakness of the current inspection program. MSHA personnel see it primarily as strength, since it allows fresh perspectives on particular areas as inspectors rotate through the mines. (Note: In addition to mine rotation, MSHA manages the potential inconsistencies by conducting internal meetings to review new regulations and field supervisors indicate that they routinely review the basis for inspectors' citations.) Mine personnel are concerned about resulting inconsistencies of interpretation in the application of regulations. Mine personnel also indicated they can predict the types of citations a particular inspector will issue because of his or her background.

More often than not, comments were made during interviews regarding the hiring and qualifications of inspectors in the years to come. Several MSHA management personnel indicated that the hiring process might not always result in the hiring of the most qualified inspectors (e.g., those with hands on mining experience).

Both MSHA and mining industry personnel raised concerns about the experience level and skill sets of inspectors, now and in future. Currently the work force is comprised primarily of inspectors who come directly from the mining industry. It is perceived that the mining industry experience base within the inspectorate may diminish with time. The Mine Act requires inspectors to have five years of "mining experience." An individual who has a mining degree with several years experience as an apprentice inspector can meet this requirement. Mine industry personnel interviewed were skeptical that this is an adequate replacement for actual in-mine experience.

### **3.3 Inspection Program Efficiency**

Inspection program efficiency was evaluated as a function of MSHA's efforts to maximize inspection resources. Based upon a review of inspection implementation practices within Coal and MNM, we found that efforts to be more efficient or utilize resources in the best possible manner exist but have not been fully institutionalized. We also acknowledge differences between Coal and MNM with regard to undertaking inspections based on the types of operations and regulations to be reviewed; however, in our opinion, there are opportunities to make the inspection process more consistent across MSHA.

#### **3.3.1 Inspection Process**

To establish and ensure consistency among inspectors in conducting inspections to assess compliance and evaluate imminent hazards, both Coal and MNM have developed and implemented written procedures. The procedures established by Coal and MNM are similar in that they outline three distinct phases of the inspection process—pre-inspection, on-site activities, and post inspection report preparation. While discussing the implementation of these procedures with MSHA and representatives from the mining industry, a diverse set of comments was offered.

- Coal inspectors questioned the value of traversing all drifts in a mine every quarter, reviewing all paperwork that may not change from quarter to quarter or half year to half year, repetitive reviews of the UMF when site conditions do not change, and confirming the self contained self rescuer (SCSR) tracking program.
- MNM inspectors do not always feel they have the time or the experience to undertake health monitoring during an inspection. Several MNM mines indicated that health monitoring was not routinely undertaken. Coal interviewees indicated that health

### 3.0 Inspection Program Review (continued)

monitoring is very time-consuming, especially when confirmatory sampling is required.

- Several mining industry personnel commented that MSHA applies the same inspection process to all mines and questioned whether that approach was still practical or useful since there are a wide and diverse group of mining operations to inspect. Some suggested that small mines, with no or limited health and safety staff resources, require the inspector to focus on compliance. At large established mines, with health and safety staff, the focus could be on the mine's compliance delivery systems (i.e., overall safety programs) and on hazard management.
- Abandoned areas of the mine are inspected according to those inspectors we interviewed. However, several inspectors also indicated that the primary focus of their inspection activities is on operational areas of the mine.
- Several mining industry personnel commented that inspectors, at times, extended the number of days spent at a mine during an inspection. Several also noted that inspectors do not put in full days when they are at the mine. (MSHA considers writing inspections reports/citations as "on-site" time, even if it the inspector returns to the office to do this.)
- Some inspectors use checklists to assist in the review of specific topics (e.g., dam safety or emergency evacuation plans). This type of tool provides a basis for consistent review of applicable requirements, but the inspectors' union has not endorsed their use.
- During inspections, MSHA and mining industry management and labor stated that the inspectors engage in "compliance assistance" through informal training and provide mining industry management and labor with suggestions for improving safety performance. Mine management and labor particularly appreciate when the compliance assistance provided is relevant to their specific mining operations and safety situations (e.g., if the mine is having problems with machine guarding, the compliance assistance is focused on guarding); however, they also noted that it varies depending upon individual inspectors (i.e., some inspectors provide compliance assistance while others may not). We also noted that inspectors generally do not record in their field notes the types of compliance assistance provided during an inspection.
- Mining industry personnel stated that Educational Field Service (EFS) personnel no longer schedule regular field visits to operating mines; mining industry personnel (management and labor) miss these MSHA EFS employees. (MSHA personnel indicated that EFS staff are relatively limited in number and have large geographic areas to cover, therefore these staff members may not be able to schedule visits to mine sites on a regular basis.) By providing compliance assistance during an inspection, MSHA partially compensates for the absence of regularly scheduled visits to the mine sites by EFS personnel.

These comments suggest that there are opportunities to enhance on-site activities to increase the depth and rigor of safety inspections and compliance assistance.

### 3.0 Inspection Program Review (continued)

#### 3.3.2 Inspection Procedures

The written Inspection Procedures Handbooks for Coal and MNM are prescriptive but differ in terms of content and rigor. For example:

- The Coal Inspection Procedures Handbook outlines in very specific detail the steps an inspector is required to follow in conducting each phase of an inspection. As a consequence of the specificity of these procedures, the inspector has little flexibility in how an inspection is undertaken.

For example, Coal inspectors are instructed to follow step-by-step instructions such as: *“MSHA personnel should proceed to the area selected for inspection as quickly as possible after arriving at the mine site. When inspection personnel travel to a working section while conducting inspections or investigations, they should check all the working places for imminent dangers as soon as practical after arrival on the section and before examining equipment or observing any cycle of operation. Even if mine management has, at the time of arrival, started to take action to correct the condition(s) or practice(s), cite the violations.”*

In practice, we were told; Coal makes some allowances for special circumstances, such as informal identification of imminent danger. In contrast, the MNM Inspection Procedures Handbook does not contain step-by-step guidance. Instead, the MNM inspectors are provided with an inspection framework or a general set of rules to follow in undertaking inspections.

- Coal inspectors are required to collect samples of mine air, dust, and noise during each inspection. For MNM, criteria have been established for sampling requirements. Mines ranked as “A” and producing ground silica, asbestos etc, are to be sampled annually. Conversely, mines ranked as “B” are to be sampled at least every three years. (Note: The MNM Inspection Procedures Handbook has not been updated to reflect the ranking scheme referenced above that is described in MSHA’s Policy and Procedures Manual and the 1/01/2001 Procedure Instruction Letter No. 101-IV-1.)
- The Coal Inspection Procedures Handbook includes a section on citations and orders; the MNM Inspection Procedures Handbook does not include a similar section. However, there is a separate handbook for both Coal and MNM covering citations and orders.

Although differences in the procedures are understandable given the type and range of mines that need to be inspected within Coal and MNM, the redundancy and lack of standardization, in our opinion, are not aligned with the “One MSHA Strategy” of conveying to miners a single organization with one set of policies. In addition, we believe that the absence of a single manual that contains the most up-to-date inspection procedures along with the absence of inspection guides and tools to be used on-site for the inspectors to help ensure that the regulations are reviewed and interpreted in a consistent manner may be counterproductive in terms of achieving consistency in approach among the inspectors.

#### 3.3.3 Selected Modifications to the Inspection Procedures

MSHA staff and mining industry management and labor were asked about activities that have been undertaken or to identify modifications to increase the efficiency of the inspection process. Within several MSHA districts, enhancements to the implementation of inspection procedures have been undertaken with the goal of conducting more efficient and, in some cases, more

### **3.0 Inspection Program Review (continued)**

focused reviews of particular requirements or conditions on-site. These changes include the following:

- When possible, results of specialists' inspections are being incorporated into the regular (AAA) inspections for coal mines.
- When scheduling inspections, priority is given to sites that have a history of citations or safety incidents.
- Greater focus is placed on corrective actions related to accidents and incidents during an inspection.
- Inspectors focus more on operational activities than on inactive portions of a mine during an inspection.

Mine personnel suggested the following for enhancing the overall efficiency or focus of the inspection program:

- Conduct spot checks (e.g., many short visits over the course of a year) of mines with good safety records.
- Prioritize inspections so that mines with good safety records are inspected less frequently than mandated levels.
- Conduct focused inspections, that is, focus on several key safety issues or hazards based on a review of the mine's accident history and feedback from miners.
- Spend more time at mines with safety problems and less time at mines with good safety records. (The additional time could be used to review compliance issues in greater depth or to provide mine-specific training.)

#### **3.3.4 Organizational Issues Influencing the Inspection Process**

Several cultural or organizational factors were identified during our discussions with MSHA personnel as being particularly important to consider if any changes to existing inspection procedures are to be proposed. MSHA staff stated that if an incident were to occur under an enhanced inspection program (that is, operational or high risk areas of a mine received a more in-depth review than non-operational areas of the mine, but an incident were to occur within the non-operational area), the inspectors would want to clearly understand if there would be any ramifications. The inspectors interviewed also stated that the performance evaluation review process is designed more towards rewarding inspectors for completion of the required number of inspections rather than on the quality of the inspections that they conduct.

#### **4.0 Government, Industry Inspection Activities, and MSHA's Streamlined Inspection Program Initiatives**

This section briefly summarizes features of other Federal agency inspection programs, lists characteristics of industry inspection/audit programs, and summarizes MSHA proposals that have been discussed but not implemented to streamline the inspection process. This section also briefly compares and contrasts MSHA's inspection program to other Federal agency programs and industry practices.

##### **4.1 Governmental Inspection Programs**

We reviewed several other inspection programs within the Federal government to understand their overall function and design relative to MSHA's mandated regular inspection program. These programs are summarized below.

- The Nuclear Regulatory Commission (NRC) inspects all of its licensees, with power plants receiving the greatest scrutiny. Power plants are inspected based on a tiered approach by both resident inspectors and regional specialists. The inspection tiers are:
  - Continuous inspection by at least two resident inspectors.
  - Periodic inspections by regional inspection specialists. Specialists may conduct 10-25 routine inspections per year at each plant, depending upon activities at the plant and problems that may occur.
  - Semiannual inspections by the region with prior performance a factor in scheduling.
  - As needed inspections, including special inspections of facilities that exceeded thresholds during routine inspections.

Reactors at test or research facilities are inspected based on risk, with those licensed at less than two megawatts inspected every two years and those licensed at or above two megawatts inspected annually.

- The US Department of Agriculture (USDA) Food Safety Inspection System (FSIS) must ensure that all meat and poultry products sold in the United States are "safe, wholesome, and correctly labeled and packaged." As part of that mission, meat and poultry sold in interstate and foreign commerce (imported) is inspected by FSIS, which also monitors state inspection programs for products produced and sold within a state. FSIS recently adopted a new regulatory scheme whereby instead of focusing only on individual problems in plants, FSIS inspectors and compliance personnel will evaluate whether plant systems are working as intended to prevent and control contamination.
- The US Coast Guard (USCG) inspects and issues Certificates of Inspection (COI) for maritime vessels. Under 46 CFR 8, with guidance from Navigation and Vessel Inspection Circular (NVIC) 2-99, the Streamlined Inspection Program (SIP) was established in 1999 as an alternative to the traditional annual inspections for vessels. The program is not designed for all companies, and operators must apply to be included in the SIP. According to the USCG: "The Streamlined Inspection Program (SIP) is a voluntary alternate method of inspecting a vessel to ensure regulatory compliance. Instead of the traditional Coast Guard inspection by a marine inspector, the SIP allows onboard and shore side vessel operating personnel to conduct the majority of inspections required, and to have the adequacy of these inspections verified by Coast Guard marine inspectors on a regular basis."



#### **4.0 Government, Industry Inspection Programs and MSHA's Streamlined Inspection Program Initiatives (continued)**

- The Air Transportation Oversight System (ATOS) was implemented in 1998 as a new approach to Federal Aviation Administration (FAA) certification and surveillance oversight, using system safety principles and systematic processes to assure that air carriers are in compliance with the Federal regulations. This approach enables Flight Standards inspectors to be more effective in the oversight of air carriers by focusing on the most critical safety aspects of an air carrier's operation.
- The Food and Drug Administration (FDA) announced in 2003 that it has accomplished the initial objectives set in its ongoing initiative to modernize the agency's regulation of pharmaceutical manufacturing and product quality. The initiative was designed to evaluate and improve upon the agency's approach to reviews and inspections related to the manufacturing of human and animal drugs and biologics. Under the new initiative, the FDA will focus its resources on inspections that are likely to achieve the greatest public health impact (e.g., sterile drug manufacturing).
- In March of 2003, the Occupational Safety and Health Administration (OSHA) announced its Enhanced Enforcement Program. This program focuses on those employers who have received "high gravity" citations. High gravity citations are issued when an employer's violations are considered to be at the highest level of severity. For the past several years, OSHA has used a site-specific targeting inspection program that consists of employer-reported injury and illness data received through OSHA's Data Initiative.
- The Environmental Protection Agency (EPA) uses Risk Prioritization to strategically target its enforcement and compliance activities as a deterrent to pollution and to encourage greater compliance with the law. EPA has developed tools to assist inspectors in conducting reviews.
- The Bureau of Land Management, Office of Surface Mining Reclamation and Enforcement is required under Section 517 of the Surface Mining and Reclamation Act of 1977 to conduct inspections of any surface coal mining and reclamation operations that are necessary to evaluate the administration of approved State programs, or to develop or enforce any Federal program. The inspections by the regulatory authority must: occur on an irregular basis averaging not less than one partial inspection per month and one complete inspection per calendar quarter for the surface coal mining and reclamation operation covered by each permit; occur without prior notice to the permittee or his agents or employees except for necessary on-site meetings with the permittee; and include the filing of inspection reports adequate to enforce the requirements of and to carry out the terms and purposes of this Act.

#### **4.2 Industry Inspection/Audit Programs**

Many companies within the mining industry have established inspection or audit programs that focus on environmental as well as safety programs. To a large degree, these programs are established as an internal verification that operating sites are in compliance with applicable laws and regulations. Characteristics of inspection or audit programs within general industry as well as the mining industry include some of the following:

#### **4.0 Government, Industry Inspection Programs and MSHA's Streamlined Inspection Program Initiatives (continued)**

- The objectives of an inspection or audit include verifying conformance with governmental regulations, internal policies and procedures, and assessing management systems.
- Inspection or audit frequency and site selection are based on environmental, health, and safety (EHS) factors such as risks, impacts, and complexity of operations. The audit frequency is based on a scheme such that higher-risk facilities are audited more frequently than medium or low risk facilities.
- Inspections or audits are implemented in accordance with established procedures and tools. The audit process generally consists of:
  - Conducting pre-audit planning tasks to arrange logistics, etc.
  - Initiating the on-site portion of the audit with an opening meeting.
  - Collecting of information to evaluate compliance program activities.
  - Reviewing and analyzing information gathered during the audit.
  - Closing the audit with a meeting to discuss findings and potential recommendations.

Typically areas of high risk are reviewed in depth.

- Protocols, guides, or other checklists are used to enhance consistency and reliability when conducting inspections or audits. Sampling schemes, when appropriate, are utilized to obtain representative data. Information gathered through interviewing and verification is relevant, objective, and sufficient to support results. Working papers are prepared during the ongoing activities of an inspection or audit and are retained, at a minimum, until the completion of the review.
- Written and signed reports are prepared at the end of each review. The results are reported to the appropriate levels of management and prepared in a formal manner that is easily understood by the recipients. Corrective actions are tracked until completion (frequently verification of closure occurs during the next scheduled audit).
- Quality checks are conducted during the inspection or audit (e.g., confirmation that the findings are consistent with evidence gathered and reliably communicated in reports) to assure accuracy of the fieldwork and to encourage continuous improvement of inspection/audit management systems, procedures, and implementation.

#### **4.3 MSHA's Streamlined Inspection Program Initiatives**

##### **4.3.1 Proposed Modifications to Coal Inspection Procedures**

An internal Reinvention Work Group was assembled several years ago within Coal. The purpose of the Work Group was to examine current inspection procedures to determine if there were opportunities for enhancing program efficiency. Topics discussed included the possibility of eliminating or reducing work that did not increase the value or quality of an inspection, methods for increasing on-site inspection time, and focusing inspectors' attention on problem areas and operations. The proposed modifications prepared by the work group addressed issues related to:

- Modifying the requirement for reviewing the UMF prior to an inspection if mining conditions have not changed since the last inspection.

#### **4.0 Government, Industry Inspection Programs and MSHA's Streamlined Inspection Program Initiatives (continued)**

- Changing the order in which areas of a mine are inspected to reduce predictability.
- Establishing priorities for conducting regular inspections taking into consideration each mine's history of compliance, problem areas, hazards, or the need for added emphasis on specific areas.
- Using the inspection activities of other inspectors at a mine site in completing an overall inspection.
- Modifying the scheduling process so that the required number of inspections is conducted within the fiscal year, instead of completing inspections within a given quarter.
- Amending the rock dust survey requirements to provide some flexibility on the part of the inspector if the mine has a good rock dust program and has demonstrated this through a record of compliance based on surveys conducted over an extended period of time.

##### **4.3.2 MNM's VCP Initiative**

MNM proposed the VCP Initiative to provide recognition to those mines that have excellent safety and health programs. The VCP Initiative is similar to OSHA's Voluntary Protection and EPA's Performance Track programs. MNM anticipates that no more than approximately five percent of total operations would be eligible for VCP status. To participate and potentially be recognized for excellent safety and health programs, a mine operator must meet eight specific criteria including, but not limited to, its incident rate and citation history. The partnership requirements include:

- Having a written safety and health program that MSHA determines will effectively promote a safe and healthy workplace.
- Training miners in hazard recognition, accident prevention, MSHA requirements, and miner rights under the Mine Act.
- Conducting and documenting comprehensive or site-wide inspections and audits at least weekly to review conditions at the mine and work habits of the miners. These audits are in addition to inspections required under Title 30.
- Retaining records of daily workplace examinations and pre-operational inspections for MSHA review.
- Having a policy to deal with non-complying contractors, and having a copy of each contractor's safety and health program or a statement that the contractor will abide to the operator's program.
- Having the support and cooperation of the miners and retaining a single declaration of that support.

#### **4.0 Government, Industry Inspection Programs and MSHA's Streamlined Inspection Program Initiatives (continued)**

The application would be reviewed and an on-site visit conducted to verify the information submitted in the application. Mandated regular inspections of a mine that had been approved under the VCP Initiative would continue. These inspections would include:

- Conducting an inspection of the mine in its entirety to the extent required confirming compliance with applicable regulations is at a high level.
- As appropriate, sampling the mine for exposures to noise, dust, and other contaminants to confirm compliance with applicable regulations.
- Inspecting a representative sample of equipment to verify conformance with applicable standards.
- Discussing the implementation of the safety and health program with management and labor to confirm full implementation.
- Providing compliance assistance, as needed.
- Notifying site representatives of any findings identified during an inspection.

If conditions observed during an inspection suggest that the mine no longer qualifies for VCP status, the appropriate MNM district manager will notify mine management and the miner's representative.

#### **4.4 Comparative Assessment of Other Inspection Proposals or Practices**

In reviewing other inspection programs, we noted that:

- The approach used by other Federal agencies and industry to conduct inspections includes greater emphasis on either an element of risk prioritization or a focus on overall management systems to control hazards. These are not explicit features of MSHA's inspection program that are detailed in the Coal or MNM inspection procedures manuals.
- MSHA inspectors are required to examine all records, equipment, and operations and are required to verify completion of each corrective action before a citation can be closed. These are not explicit requirements of other Federal agencies and industry inspection programs.
- Elements of the proposals set forth by Coal and MNM for enhancing (streamlining) the inspection process are more consistent with industry and other governmental inspection programs in that they recommend the focusing of inspection efforts on areas or programs that are more inherently hazardous or require more improvement to meet applicable regulations with the goal of trying to enhance the safety and health of the working conditions of the miner.

## 5.0 Summary of Results and Recommendations

Based on the data gathered by and provided to ICF Consulting, we concluded that the inspection program is generally compliant with statutory and regulatory requirements. There are, however, opportunities for increasing the effectiveness of program activities, and to institutionalize efforts to be more efficient in the implementation of inspection activities. The more specific results are outlined below as well as our recommendations for increasing the efficiency and effectiveness of the inspection program.

### 5.1 Inspection Enforcement Activities

#### ***Evaluation Results***

Inspectors and mine operators interviewed agree that inspections have contributed to improvements in miner health and safety and that enforcement aimed at preventing major events such as fires, explosions, fall of roof or wall, etc., is helping to prevent such incidents. However, representatives from both the mining industry (management and labor) and MSHA expressed sound reasons for modifying the on-site portion of the inspection program to improve the safety and health of the miner while maintaining the requirements to conduct inspections of the mine in its entirety at mandated frequencies. These include the following:

- Although the inspection program being implemented is consistent with statutory requirements, the data indicate that the numbers and types of days lost injuries occurring over the past 5 to 10 years are not well correlated either quantitatively or qualitatively with the citations issued through inspection enforcement activities. This suggests that at least some factors contributing to the current incident rates are not being captured in the process for issuing citations. In addition, some mine operators commented that the value of the citations might not be a driver for improved safety performance.
- The inspection enforcement activities have been implemented in the same basic way for nearly thirty years. Although improvements in mining industry safety performance have clearly been made, the traditional approach—reviewing conformance with applicable regulations and issuing citations—is not designed to instruct the inspectors to focus on overall safety programs or on the most critical or hazardous mine activities and conditions in significant depth to identify factors that may have a more influential impact on safety performance. Many industry and governmental inspection programs are designed in a manner to examine these types of factors in addition to compliance.

#### ***Recommendations***

1. Implement an approach within Coal and MNM that incorporates aspects of industry and other governmental agency inspection practices and Coal's Reinvention Work Group suggestions for inspecting a mine in its entirety that increases: a) the time allocated to the on-site portion of the inspection; and b) the focus of the on-site inspection process so that the inspectors are in a position to evaluate in greater depth the underlying problems or gaps in mine level safety programs that may be contributing to fatalities and other days lost injuries. Specifically:
  - Increase the time allocated for inspecting the operational portions of the mine by:
    - Modifying the requirement for reviewing the UMF prior to an inspection if the mine has not changed since the last inspection or the inspector is familiar with the mine and the contents of the UMF.
    - Establishing procedures to determine the frequency with which abandoned or inactive portions of a mine requires in-depth inspection.

## 5.0 Summary of Results and Recommendations (continued)

- Modifying the procedures that specify the order in which areas of a mine are inspected to reduce predictability and to increase the time allocated to inspect high-risk areas in greater depth.
  - Increase the focus of the on-site inspection such that greater emphasis is placed on evaluating the underlying problems or gaps in mine level safety programs that potentially contribute to fatalities and other days lost injuries. That is:
    - Prioritize inspection activities with the assistance of the supervisor by taking into consideration:
      - Compliance history
      - Methane liberation
      - Accident and injury frequency rates
      - Prior mine conditions and conditions encountered during the current inspection
      - Overall health and safety programs at the mine
      - Miners attitudes towards safety
      - Other information available to the inspector such as voluntary compliance initiatives undertaken by the mine
    - Establish criteria for using the inspection activities of other inspectors at a mine site in completing an overall regular (AAA or 01) inspection.
  - Increase the time allocated to inspecting the physical conditions of the mine and interviewing employees about safety programs and concerns by instructing the inspectors to confirm that the following records are being prepared consistently by mine personnel and then conduct a physical inspection of a representative sample of safety activities documented in the mine's records to verify that that the safety issues are being identified and corrected:
    - Pre-shift inspections
    - Supplemental inspections
    - On-shift examinations
    - Hazardous conditions records
    - Weekly examinations
    - Compressed-air receivers and other unfired pressure vessels inspection reports
    - Records of inspection and repairs for boilers
    - Records of defective self-propelled mobile equipment, until the defects are corrected
    - Inspections and testing for rollover protective structures when alterations or repairs are performed or when stressed use has occurred
2. Use the Accountability Program (which is being modified with implementation planned for 2003) to examine in detail the determination and issuance of citations to confirm that the appropriate level of enforcement is being applied. In particular, focus on citation history to determine if trends have been identified and evaluated as appropriate for enforcement purposes and the citations clearly reflect underlying safety problems at the mine sites.
  3. Periodically conduct an independent review of the overall effectiveness of the updated inspection process, to supplement the individual supervisory reviews. During these independent reviews examine whether or not the inspection procedures and citations are

## 5.0 Summary of Results and Recommendations (continued)

contributing to enhanced safety performance.

### 5.2 Compliance Assistance

#### ***Evaluation Results***

Inspectors are providing compliance assistance to the mine sites during inspections. Mine operators and labor appreciate this assistance especially when the inspectors engage in compliance assistance activities that are directly relevant to their specific situations. However, the frequency and form of compliance assistance varies among the inspectors and these activities have not been fully institutionalized and incorporated into the inspection procedures.

#### ***Recommendations***

1. Determine the type of compliance assistance required at mine sites by:
  - Reviewing information about a mine to identify recurring issues or problem areas.
  - Contacting mine owners, operators, and holding companies through a questionnaire, survey, or direct contact to determine the requirements for additional assistance (e.g., training, reviewing safety reports, behavioral factors, citation review and explanation). Inspectors, supervisors, district managers, or headquarters safety officers can make the initial contact.
2. Through supervisory reviews, obtain feedback on the nature of the compliance assistance being provided and the value to mine management and labor.
3. Formalize or incorporate compliance assistance into the daily routine of the inspection process and program, using a similar approach to that taken by some MNM inspectors who spend the first hour on-site doing compliance assistance. Elements to consider include:
  - Evaluating a mine's overall safety program.
  - Providing technical support, training materials, and sharing "best practices" methods.
  - Assisting with accident and violation analysis and hazard identification.
  - Improving inspectors' skills at root cause analysis, so they can assist mines in developing systemic—not just symptomatic—corrective actions for conditions that are continually generating citations.
  - Encouraging inspectors to explain the reason for citations or other safety concerns.

Document the compliance assistance that is being provided by inspectors during regular inspections.

4. Expand EFS to include compliance assistance through more on-site visits or newsletters about current issues and topics in safety and health, equipment, maintenance, etc.
5. Document compliance assistance presentations, handouts, talking points, and discussion materials; make available on the MSHA Intranet and website; and distribute among all district and field offices for use by all inspectors.

## 5.0 Summary of Results and Recommendations (continued)

### 5.3 Mechanisms and Tools for Enhancing Consistency

#### *Evaluation Results*

Mining industry personnel expressed concern about inconsistencies they perceived between different districts and different inspectors making decisions in the field as to what constitutes a citation or an S&S citation. The differing areas of expertise among inspectors are viewed as both a strength and a weakness of the current inspection program. MSHA personnel see it primarily as a strength, since it allows fresh perspectives on particular areas as inspectors rotate through the mines. Mine personnel say that they can predict what citations an inspector will write based on his or her background.

The use of inspection tools, guides, or checklists to assist the inspectors in conducting reviews is not widely used or endorsed within MSHA, although they are a common feature of industry inspection or audit programs. Inspector guides are typically used by industry and other governmental agencies to help minimize inconsistency among the inspectors, increase the rigor of on-site activities, and increase the information included in inspection reports. Such guides are particularly helpful to an inspector operating outside the realm of his or her area of specialization and when the regulations include multiple provisions and are quite specific. Examples of regulations with multiple and specific provisions include:

- Fire Prevention Safeguards in Surface Metal/Nonmetal Mines [30 CFR 56.4100 to 4130] — warning signs, flammable liquid storage, accumulation of combustible materials, combustion engines, battery charging stations, and belt conveyors.
- Electrical Equipment in Underground Coal Mines [30 CFR 75.513-75.524] — electrical conductors, electrical connections and splices in conductors, proper fittings for metal frames, insulation of power wires, circuit-breaking devices, main power circuits, electrical switches, exposed, ungrounded conductors and telephone lines, fittings for lighting fixtures, electric face equipment, electric self-propelled equipment.

In addition, many of the results of the JTA are amenable for conversion to an inspector guide format.

Inspection reports are prepared in a consistent manner, and the citation forms include substantial detail about the rationale for the citations. However, in our opinion, inspectors' field notes contain very limited information, which is insufficient to allow confirmation of what was inspected, and what was concluded in those cases where there was no specific citation. Field notes also do not document the informal compliance assistance-related conversations that may occur frequently during inspections.

#### *Recommendations*

1. Expand the use of inspector guides and tools during inspections.
  - Assemble an MSHA inspectors' work group to collect, identify, and review common and best practices with regard to tools (checklists or similar inspection guides) currently in use throughout MSHA.
  - Develop a preliminary set of standard inspector guides for use during inspections.



## 5.0 Summary of Results and Recommendations (continued)

- Once agreed upon and approved, distribute guides to use when completing inspections.
  - Make guides available on the MSHA Intranet and website.
2. Establish some minimum standards for documentation of inspection activities—both enforcement and compliance assistance—in inspectors' field notes.
  3. Upgrade the procedures manuals and refresher training to provide the inspectors with an ability to more consistently interpret or assess compliance with applicable regulations.
  4. Use the supervisory review process to confirm that the inspectors are following updated inspection procedures.

## 5.4 Written Inspection Procedures

### ***Evaluation Results***

To establish a basis for consistency and training of new inspectors, both Coal and MNM have developed written inspection procedures that cover all aspects of an inspection. The written inspection procedures for Coal and MNM differ in terms of content and rigor. Although differences in the procedures are understandable given the type and range of mines that need to be inspected within Coal and MNM, the degree of the differences are not aligned with the "One MSHA Strategy" of conveying to miners a single organization with one set of policies. MNM procedures have not been updated to reflect changes in health monitoring requirements.

### ***Recommendations***

Standardize, update, and modify the inspection procedures used by Coal and MNM. In particular:

1. Utilize a similar format for both Coal and MNM Inspection Procedures Handbooks.
2. Fine-tune the details in Coal and MNM's Inspection Procedures Handbooks to correspond with the changes recommended for the inspection process. Specifically:
  - Modify the requirement for reviewing the UMF prior to an inspection such that the inspector is expected to be familiar with the UMF.
  - Include procedures to determine the frequency with which abandoned or inactive portions of a mine require in-depth review during an inspection.
  - Modify the requirement regarding the order in which areas of a mine are inspected to reduce predictability and to increase the time allocated to inspect high-risk areas in greater depth.
  - Revise Coal and MNM inspection procedural manuals to provide a mechanism for using the inspection activities of other inspectors at a mine site in completing a regular inspection.
  - Outline the steps and the factors to be considered for establishing priorities for conducting the on-site portion of the inspection.

## 5.0 Summary of Results and Recommendations (continued)

3. With regard to MNM, update the sections regarding health monitoring to reflect current practices.
4. Review all MSHA documents that contain inspection guidance and eliminate redundancies so that all appropriate inspection procedures are contained in the Coal and MNM handbooks. For example, eliminate the redundancies between the Inspection Handbooks and MSHA Policy and Procedures Manual, Citation and Order Writing Handbook for Coal Mines and Metal and Non Metal Mines, and the Metal and Nonmetal Procedure Instruction Letters.
5. Develop a process to review and update, as appropriate, the inspection procedures on a periodic basis.

## 5.5 District Resources

### ***Evaluation Results***

In terms of the inspection organization, we noted that responsibilities for program implementation are clearly understood among the district managers, assistant managers, supervisors, and inspectors. Moreover, the internal requirement to review inspectors twice per year is widely viewed as a practice to help ensure consistency among the members of the inspectorate.

With regard to inspector resources, there are differences between the overall number of inspectors available to Coal and MNM to complete the required number of inspections. Although some of the differences in inspector resources relate to the complexity and volume of regulations applicable to coal operations, in our opinion the overall number of inspectors within MNM is having an influence on the completion rates and hours allocated to the on-site portion of the inspections.

We also heard concerns from within MSHA and outside the agency that there is a need to maintain a high level of mining experience among the inspectors. We also heard from several MSHA employees that: 1) the performance appraisal process is focused more on rewarding inspectors for completing the required number of inspections rather than on the quality of the inspections; and 2) inspectors want to clearly understand the basis for evaluating their performance if an incident were to occur at a mine that was inspected using a focused approach methodology instead of the current inspection procedures. These issues need to be managed if any enhancements are made to the inspection program.

### ***Recommendations***

1. Increase the completion rates and on-site inspection time for MNM. Since MSHA's 2003 budget does not provide for additional inspection resources, suggestions for increasing MNM completion rates include the following:
  - As inspectors retire within Coal districts that are relatively "resource rich" reallocate new hires to MNM (combine with efficiency increases in Coal to prevent impairment of the ability to meet their inspection completion targets).

## 5.0 Summary of Results and Recommendations (continued)

- To accommodate travel schedules for MNM inspectors, consider deploying inspectors to mine sites from the closest field office, whether Coal or MNM.
2. If the inspection process is modified to reflect the proposed recommendations in this report regarding the focusing of inspection activities, ensure that inspectors are evaluated against updated inspection procedures if any serious incidents occur at a mine.
  3. Modify the annual performance review criteria to include compliance assistance activities undertaken during an inspection and the quality of the inspections.

## 5.6 Recruitment and Training

### ***Evaluation Results***

Inspectors are provided with a core program of education to become qualified as Authorized Representatives. Most of the interviewees stated that the initial training was appropriate and that the refresher-training program for inspectors needs to be augmented to address the inconsistencies in interpretation, develop new skill sets, and enhance existing skill sets. In addition, we noted that any changes in the inspection program would need to be reinforced through training. It is also perceived by mine personnel and within MSHA, whom we interviewed, that the mining industry experience base within the inspectorate may diminish with time.

### ***Recommendations***

1. Review mechanisms and criteria for recruitment to determine whether opportunities exist for attracting more experienced mine safety professionals to replace retiring inspectors, to ensure that mining experience is retained within the inspectorate, and to enhance the knowledge base regarding hazard and behavioral safety recognition techniques.
2. Upgrade the refresher training to provide the inspectors with skills and techniques to enhance compliance assistance implementation activities—presentation skills, hazard assessment techniques, and more consistently interpret or assess compliance with applicable regulations.
3. Use the results of the JTA to examine weaknesses in current inspection program processes and design or require specific refresher training coursework to close the skills gap.
4. Provide a mechanism so that the inspectors and supervisors can select courses relevant to their needs during the two-week refresher course.
5. Ensure that MNM inspectors participate in the bi-annual refresher or journeyman-training program on a regular basis.
6. Cross-train MNM and Coal inspectors and new hires so that there are greater opportunities to utilize inspectors such that they can conduct inspections at both coal and MNM mines, as appropriate.
7. Implement or pilot a distance-learning program that takes training to the field offices by making coursework available through the Internet. That way, inspectors don't have to come to the Academy for training (crunch time issue cited earlier); they can receive training from their home, their office or their hotel, while on extended travel. Computer based learning modules can be more readily developed and deployed, thus saving travel costs, instructor

## **5.0 Summary of Results and Recommendations (continued)**

and facility costs at the Academy.

8. Establish a remote training facility in the Midwest, with computers and training materials and offer specific courses tailored to MNM inspectors.

## **5.7 Streamlining Initiatives**

### ***Evaluation Results***

The proposals set forth by Coal and MNM for enhancing (streamlining) the inspection process are sound and reinforced by the results of ICF Consulting's data gathering and analysis. The proposals require that the mandated number of inspections continue to be conducted at operating mines. They are intended to enhance the use of the inspection staff by focusing their inspection efforts on mines, areas or programs that are more inherently hazardous or require more improvement to meet applicable regulations. Both initiatives are designed with the goal of enhancing the safety and health of the working conditions of the miner.

### ***Recommendations***

1. Implement the VCP Initiative to provide MNM mines that have excellent safety performance records an ability to highlight their accomplishments relative to peers.
2. Expand the VCP Initiative description to define the modifications, if any that will be made to the routine inspection program for qualifying VCP mines.
3. Conduct a 12-month post-implementation review of the VCP and evaluate its performance against program goals and objectives. If outcomes are positive, continue further implementation to additional MNM mine sites and consider expanding to include select Coal mine sites.
4. Include in both Coal and MNM's inspection procedure manuals the Reinvention Work Group's suggestions, that address the focusing of inspections and increasing the efficiency of the inspection process, as outlined in this report.

## Appendix A. Mine Inspection Program Evaluation Design Document



The U.S. Department of Labor  
Mine Safety and Health Administration (MSHA)

Mine Inspection Program Evaluation  
Design

November 27, 2002

**powered** by perspective





### Purpose and Scope

#### **Purpose**

The Mine Safety and Health Administration (MSHA) seeks to evaluate its current inspection program in the Coal and Metal and Nonmetal mining sectors in order to assess current effectiveness and to develop recommendations for improving the current program.

#### **Scope: Main Question**

Is the inspection program effective and efficient in fulfilling its mission and are there opportunities for improvement?

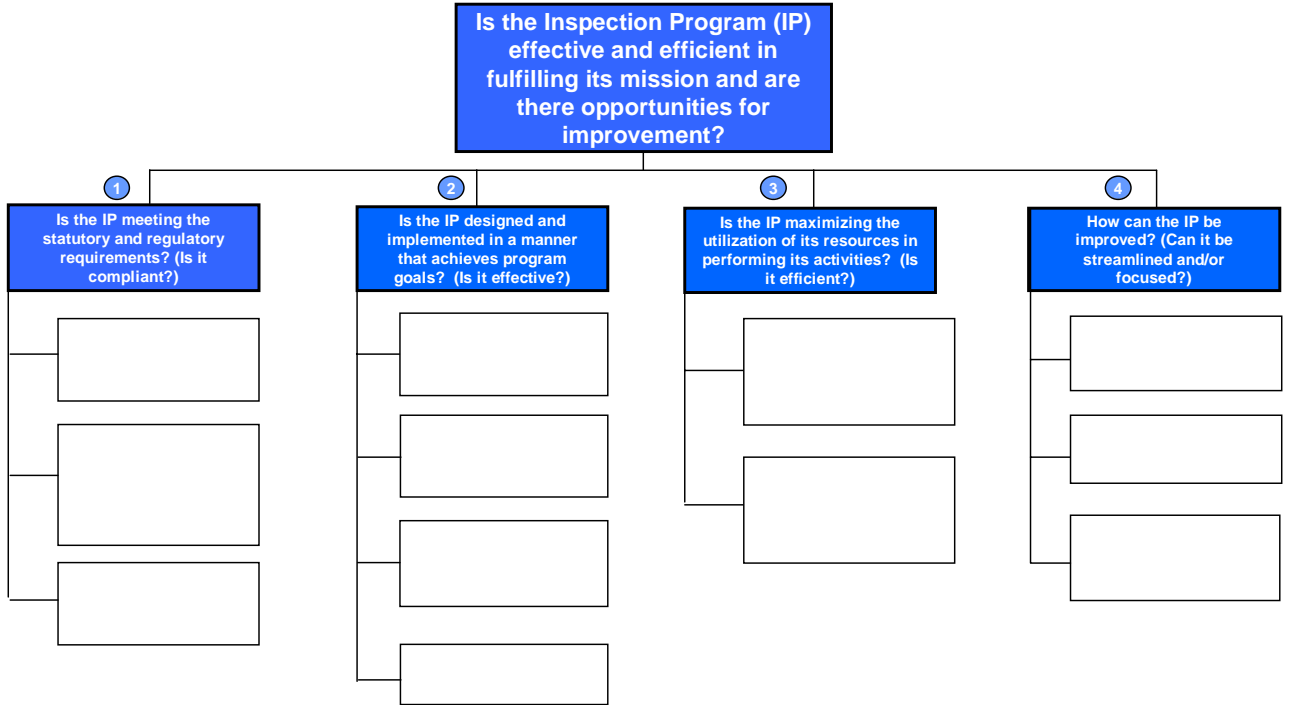


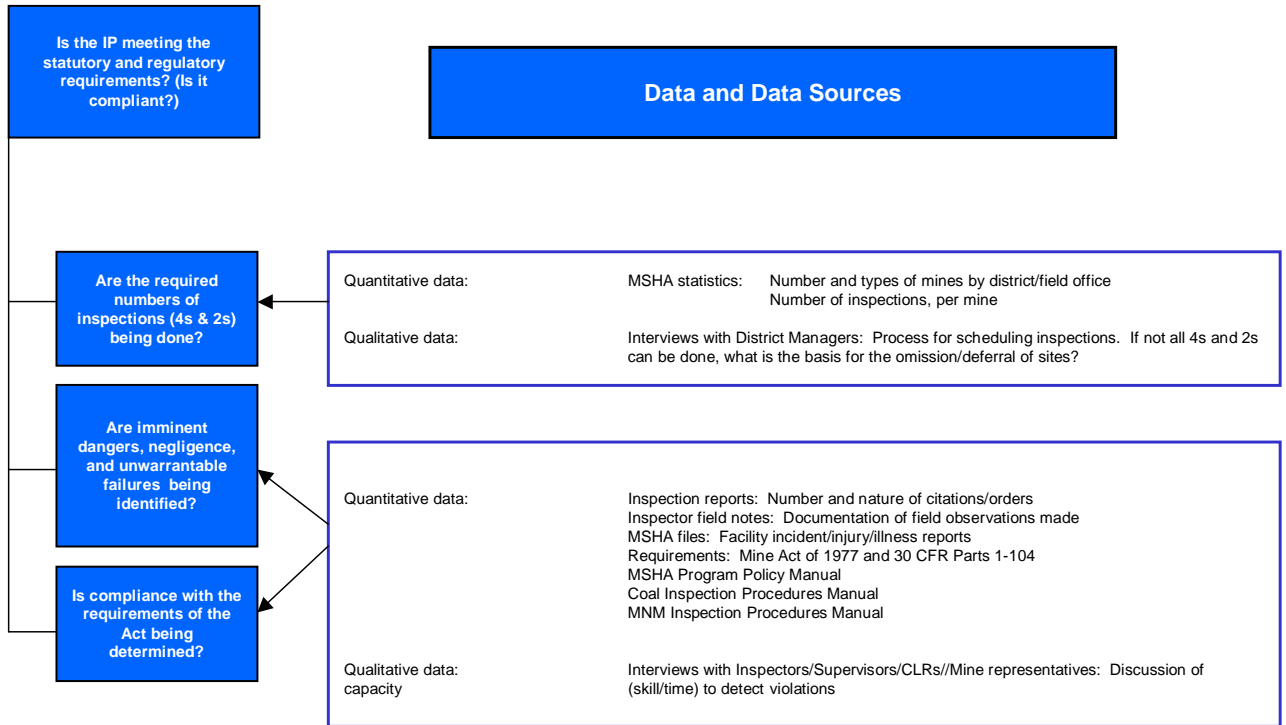
## Mine Inspection Program Evaluation

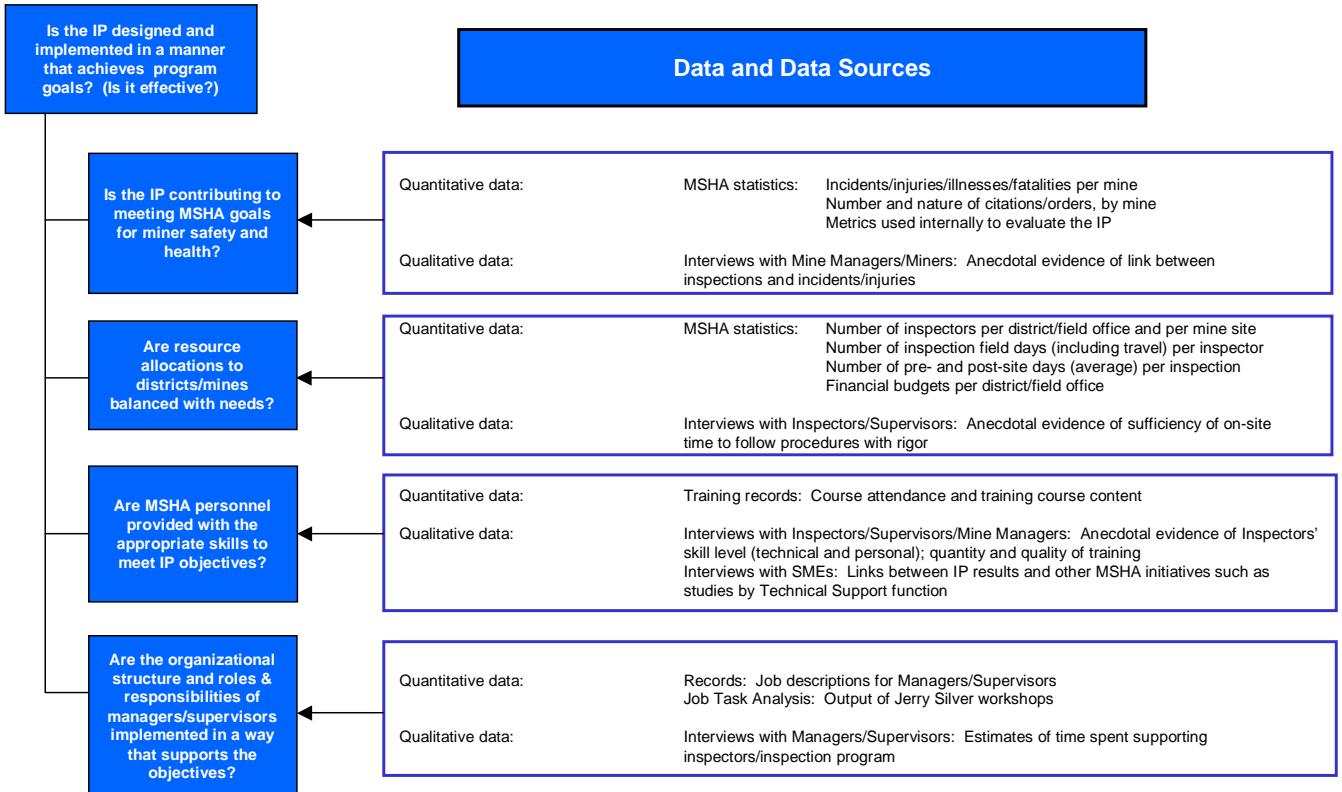
### Proposed Sub-Questions

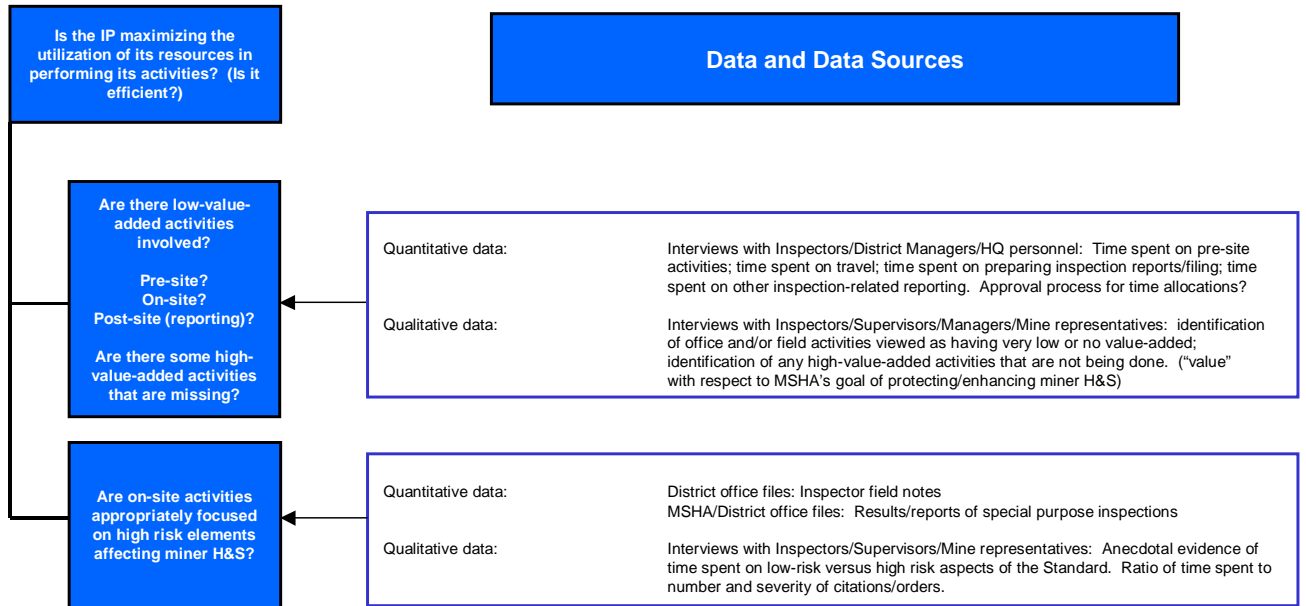
- 1 Is the inspection program meeting the statutory and regulatory requirements? (Is it compliant?)
- 2 Is the inspection program designed and implemented in a manner that accomplishes program goals? (Is it effective?)
- 3 Is the inspection program maximizing the utilization of its resources in performing its activities? (Is it efficient?)
- 4 How can the inspection program be improved? (Can it be streamlined or focused?)

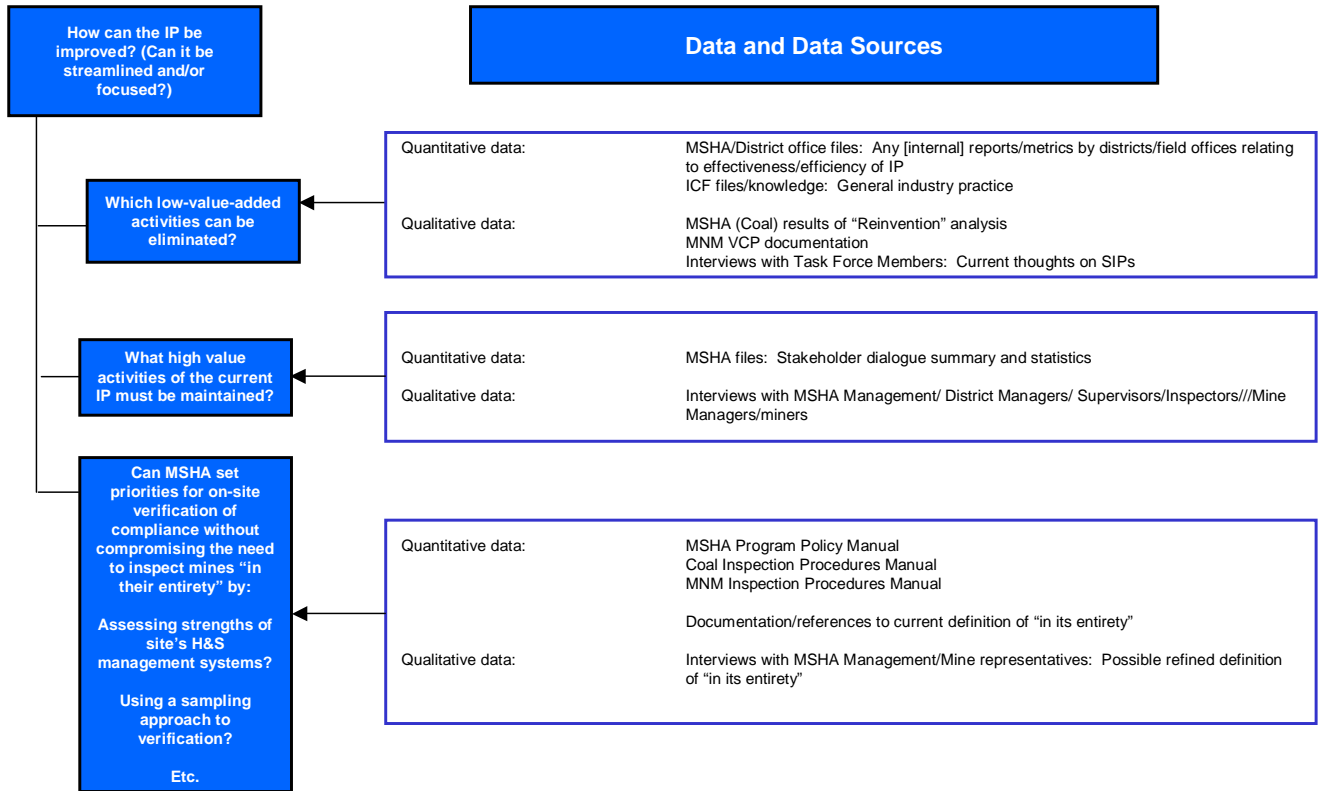












## **Appendix B. Guides for MSHA and Mining Industry Interviews**



The U.S. Department of Labor  
Mine Safety and Health Administration (MSHA)

Mine Inspection Program Evaluation  
Field Interview Guide

December 16, 2002

**powered** by perspective





## Topical Outline for Visits to Mining Industry Locations

1. Strengths and weaknesses associated with the current inspection program.
2. Key benefits of the inspection program.
3. Value of the inspection program
  - a. To mine operators
  - b. To mine workers.
4. Concept and value of inspecting the mine site "in its entirety" relative to an active, inactive, or abandoned section of a mine.
5. Typical activities associated with an inspection
  - a. High value-added tasks (i.e., those that contribute most directly to improved health and safety)
  - b. Low value-added tasks (i.e., those that have little apparent effect on miners' health and safety).
6. Major hazards/risks to health and safety for this type of operation.
7. Types of fatalities or serious incidents at the mine over the past five years.
8. Typical types of citations identified during an inspection of the mine over the past five years.
9. Modifications to the safety inspection program (pre-inspection, on-site, post-inspection) that should be considered by MSHA.
10. Any objections to modifying (expanding or contracting) the process for conducting inspections.
11. Perceived need for additional/different training and skills for Inspectors if the process of conducting an inspection were modified.
12. Any unanticipated impacts if there were a change in the process of conducting inspections.
13. Types of activities the mine would like to see the inspectors engage in if the inspection program were to be modified so as to increase its effectiveness and efficiency.





## Mine Inspection Program Evaluation Project—Interview Guide for MSHA Field Visits

Question Number	Question	District Manager and Assistant Manager	Field Office Supervisor	Inspector <sup>1</sup>
<b>Operational and Organizational Issues Related to the Inspection Program</b>				
1	Please provide an overview of the demographics of your region <sup>2</sup> . That is: <ul style="list-style-type: none"> <li>• The number, location, and staffing of field offices</li> <li>• Number, type<sup>3</sup>, and size of mines</li> </ul>	X	X	
2	Please provide an overview of the completion of required inspections <sup>4</sup> in the District. That is: <ul style="list-style-type: none"> <li>• How many 4s and 2s are scheduled to be completed during 2002?</li> <li>• How many were actually completed?</li> <li>• If applicable, why were the required inspections not completed and how was it determined which inspections were deferred?</li> </ul>	X	X	X
3	What are the overall responsibilities of the district manager, supervisor, and inspector with regard to the implementation of the inspection program? <ul style="list-style-type: none"> <li>• How would you prioritize the specific inspection responsibilities of the district manager, supervisor, and inspector?</li> <li>• What are the other major responsibilities of the district manager, supervisor, and inspector?</li> <li>• Are there any inspection or administrative tasks that the inspector or supervisor performs that are not value-added or part of the inspection program?</li> </ul>	X	X	X
4	What are your views regarding the value of observing inspectors two times per year, as required?	X	X	X
5	Can you describe the flow of information from managers, to supervisors to inspectors and between and among other districts?	X	X	X
6	What is your definition of compliance assistance? <ul style="list-style-type: none"> <li>• To what extent is compliance assistance integrated into the current inspection program?</li> <li>• What activities in the current inspection program are, or can be considered compliance assistance?</li> <li>• Could more compliance assistance be provided without diluting the enforcement aspects?</li> <li>• Do supervisors and inspectors have the appropriate training required to provide compliance assistance?</li> </ul>	X	X	X

<sup>1</sup> Inspector is synonymous with compliance specialist.

<sup>2</sup> Region means District, Field Office territory, or individual Inspector's territory.

<sup>3</sup> "Type" may include union vs. non-union; large corporation vs. small company, etc., as well as product (for metal/nonmetal) and underground vs. surface.

<sup>4</sup> Throughout this document, inspection refers to the 4s and 2s—the four times (underground mines) and two times (surface mines) per year inspections mandated by the Mine Safety Act of 1977. These are also known as AAA inspections in Coal and as O1 inspections in M/NM. It is recognized that the frequency may be less for mines that operate seasonally.



## Mine Inspection Program Evaluation Project—Interview Guide for MSHA Field Visits

Question Number	Question	District Manager and Assistant Manager	Field Office Supervisor	Inspector
<b>Inspection Program</b>				
7	<p>What is the level of effort (person hours) involved or required to conduct a regular inspection, by type/size of mine?</p> <ul style="list-style-type: none"> <li>• Pre-inspection</li> <li>• On-site</li> <li>• Post inspection</li> </ul> <p>Has the time required to complete an inspection increased, decreased or remained the same over the past several years?</p> <p>What is the reason for the change?</p>	<b>X</b>	<b>X</b>	<b>X</b>
8	<p>Are the current levels of resources sufficient to complete the required number of regular inspections?</p> <ul style="list-style-type: none"> <li>• If no, what additional resources, personnel and/or other, are needed?</li> <li>• Would a shared inspection pool, e.g., coal/metal/nonmetal, help ensure that the required number of inspections is completed?</li> <li>• If yes why? If no, why not?</li> </ul>	<b>X</b>	<b>X</b>	<b>X</b>
9	<p>What is your definition of conducting an inspection of the mine site in its entirety?</p> <ul style="list-style-type: none"> <li>• How would the owner or operator of the mine define entirety?</li> <li>• How does this definition apply to active, inactive, abandoned mines?</li> </ul>	<b>X</b>	<b>X</b>	<b>X</b>
10	<p>Are inspection procedures performed uniformly across similar type mines and among all inspectors? For example, are inspectors doing different things or interpreting regulations differently?</p>	<b>X</b>	<b>X</b>	<b>X</b>
11	<p>What are the strengths and weaknesses associated with the current inspection program?</p>	<b>X</b>	<b>X</b>	<b>X</b>
12	<p>Are there any barriers, including language barriers, to the successful implementation of the existing inspection program?</p>	<b>X</b>	<b>X</b>	<b>X</b>
13	<p>What is the general consensus among mine management (including owners and operators) and mine workers (mine stakeholders) regarding the current inspection program?</p> <ul style="list-style-type: none"> <li>• Would these stakeholders be receptive to changes in the inspection program?</li> <li>• If yes, why? If no, why not?</li> <li>• Are there any specific changes these stakeholders would welcome in the inspection program that do not conflict with statutory requirements?</li> <li>• What could be done to increase the stakeholders' acceptance of changes?</li> </ul>	<b>X</b>	<b>X</b>	<b>X</b>



## Mine Inspection Program Evaluation Project—Interview Guide for MSHA Field Visits

Question Number	Question	District Manager and Assistant Manager	Field Office Supervisor	Inspector
<b>Health and Safety Statistics</b>				
14	What types of fatalities and serious incidents have occurred at mines over the past two years? <ul style="list-style-type: none"> <li>• Has this trend changed over time?</li> <li>• Are there any underlying reasons why these fatalities or serious incidents have occurred?</li> </ul>	<b>X</b>	<b>X</b>	<b>X</b>
15	Are inspectors trained to identify situations that contribute to fatalities and serious incidents? <ul style="list-style-type: none"> <li>• Should the inspection program focus on such situations?</li> <li>• How can the inspection program be enhanced to help inspectors identify these situations?</li> </ul>	<b>X</b>	<b>X</b>	<b>X</b>
16	What are the typical types of citations identified by the inspectors over the past two years? <ul style="list-style-type: none"> <li>• Do these citations reflect the types of fatalities and serious incidents that have occurred over the past several years?</li> <li>• If no, why not?</li> </ul>	<b>X</b>	<b>X</b>	<b>X</b>
<b>Streamlining Inspections</b>				
17	Are you aware of any streamlined inspection procedures under development or proposed by MSHA? <ul style="list-style-type: none"> <li>• What are potential challenges and/or barriers to the successful implementation of streamlined inspection procedures?</li> <li>• If changes were implemented, would the inspectors and supervisors require any additional training?</li> <li>• How would streamlined inspector procedures increase the efficiency and effectiveness of the safety inspector program?</li> </ul>	<b>X</b>	<b>X</b>	<b>X</b>
18	Are there other modifications to the inspection program that should be considered and, if so, why?	<b>X</b>	<b>X</b>	<b>X</b>
19	If the inspection program is streamlined or made more efficient, what additional activities would the inspectors perform and why?	<b>X</b>	<b>X</b>	<b>X</b>
20	Are there any other issues related to a streamlined inspection program that should be noted?	<b>X</b>	<b>X</b>	<b>X</b>
<b>Other</b>				
21	Did you participate in the 2001 “Stakeholder Dialog” meetings?  If so, what were your perceptions of stakeholder opinions/concerns about the inspection program?	<b>X</b>		