

November 13, 2014

MEMORANDUM FOR PATRICIA W. SILVEY
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Mine Safety and Health Administration

THROUGH: NEAL H. MERRIFIELD
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SUBJECT: MSHA Office of Accountability Review, Metal and Nonmetal
Rocky Mountain District, Denver, Colorado Field Office and
Star Mine Operations, LLC, Revenue Mine (05-03528)

I. Introduction

This is a report of the Office of Accountability's review of the Rocky Mountain District, and Denver, Colorado Field Office's inspection and enforcement actions at Star Mine Operations, LLC, Revenue Mine (05-03528), preceding a fatal accident that occurred on November 17, 2013. Nicholas K. Cappanno and Rick L. Williams, miners at the Revenue Mine, died from carbon monoxide poisoning after entering an unventilated area of the mine where the Operator had detonated deteriorated explosives the previous day.

After the accident, the Assistant Secretary of Labor for Mine Safety and Health directed the Office of Accountability to conduct an accountability review of the Rocky Mountain District and Denver Colorado Field Offices' actions pertaining to the Revenue Mine. The review took place from January 2014 through May 2014 and was conducted by Supervisory Accountability Specialist, Ted Smith, Accountability Specialists, Troy Davis and Mark Odum, and Assistant District Manager (North Central District), Christopher Hensler. The Review Team also consulted with Mine Safety and Health Administration (MSHA or Agency) Technical Support staff with expertise in ventilation and explosives and with attorneys in the Office of the Solicitor, Division of Mine Safety and Health for legal counsel and advice.

The Review Team believes that it is important to note some factors that should be considered to provide context for the Report. The Federal government was shut down from October 1 to October 17, 2013. During the shutdown, the Department of Labor (DOL), including MSHA, was operating under a contingency plan that allowed the Agency to conduct excepted activities during a lapse in appropriations. The shutdown plan provided for inspections that targeted mines with a history of compliance or safety issues, and provided for hazard-specific inspections of mines, investigations of accidents, and investigations of safety complaints from miners.

During the shutdown, MSHA enforcement personnel were prohibited from conducting mandated regular inspections of the mines in their entirety. Inspectors were allowed to conduct only spot inspections; one spot inspection was conducted at the Revenue Mine during the shutdown.¹ When the shutdown ended, MSHA inspectors returned to work on October 21, 2013, and began conducting regular inspections at mines they were unable to inspect during the shutdown. On October 22-24, 2013, a regular, complete inspection was conducted at the Revenue Mine.

The accountability review revealed positive findings in several areas, including the following:

- In the October 2011 inspection, the inspector identified the mine did not have the appropriate plans and training. The inspector issued the appropriate orders and closed the mine and removed all miners from the property to ensure their safety.
- In the October 2011 inspection, the inspector also worked closely with the mine operator and provided information and direction while working with the Rocky Mountain District staff to obtain the appropriate plans for operation.

¹ Historically, Metal and Nonmetal has completed a majority of the mandated first quarter inspections in October and November.

- Educational Field Services (EFS) had a notable presence at the mine both monitoring and participating in training the miners over the time period reviewed.
- Inspectors documented health and safety discussions and observations of miners work practices.
- Inspectors provided information to the operator and miners pertaining to the “Rules to Live By” during their inspections.
- In the October 2013 inspection, the inspector disseminated materials and discussed miners’ rights and also made himself available to meet with miners off-site to discuss any concerns.

Based on its examination of all relevant data and information, the Review Team identified three findings concerning MSHA’s general enforcement actions at the Revenue Mine, and determined that they did not cause or contribute to the accident. The Review Team’s findings, conclusions and recommendations for corrective actions are detailed below. Metal and Nonmetal Mine Safety and Health’s (MNM) response to the report, which includes the corrective actions already taken or planned, is attached.

II. Executive Summary

The Revenue Mine is an underground silver mine located in Ouray County, Colorado. It was abandoned for twenty-seven years before Star Mine Operations, LLC bought it in October 2011 and started rehabilitation and development work in preparation for active mining operations.

Facts Related to the Accident

On November 13, 2013, Revenue Mine management conducted an annual refresher training session during which management and miners discussed the subject of deteriorated explosives. The accident victims, Rick Williams, a Shift Boss for the Operator, and Nicholas Cappanno, a new miner with one month of mining experience, were present at this meeting. Ross Tabberer of Western Explosive Systems Company (WESCO²), the mine’s explosives distributor, was present at the refresher training session and explained that deteriorated explosives should be disposed of as follows: (1) taken out of the mine and burned; (2) detonated over time with normal production blasts until the entire supply was exhausted; or, (3) WESCO could remove deteriorated explosives from the mine property. The Operator’s actions to detonate the deteriorated explosives in the Monogahela Drift, site of the November 17, 2013 accident, were not consistent with Tabberer’s instructions.

² WESCO is a “joint venture” with Dyno Nobel, Inc., the explosives manufacturer.

On the November 16, 2013 day shift, one day before the accident, Williams, Cappanno, and other miners transferred approximately 1,600 pounds of deteriorated explosives to the end of the Monogahela Drift for detonation. Miners complained of bad air in the Monogahela Drift while transporting the explosives and Williams told them to work slower because of low oxygen. The detonation occurred at approximately 2:00 p.m. and at 3:30 p.m. the crew departed the mine without informing the oncoming shift of the blast and without barricading the Monogahela Drift.

The Operator's actions to destroy the deteriorated explosives underground directly conflicted with the manufacturer's recommendations for safe disposal of deteriorated explosives and was a violation of MSHA's standards (30 CFR 57.6900). The Operator failed to ensure the safety of the oncoming shifts by informing them of potential hazards in the area, including the presence of toxic and poisonous gasses in the area.

Later, during the night shift on November 16, three miners working in the Monogahela Drift reported poor air quality or "bad air" in the drift. Two of the miners experienced headaches, nausea, and dizziness. The miners reported the conditions to mine management. The Operator did not investigate or take any action with respect to the miners' complaints/reports and did not take any actions to prevent other miners from entering the drift.

On November 17, 2013 (dayshift), Cappanno said that he wanted to travel into the drift to observe the results of the blast. He and another miner, Cory A. Geist, went into the drift. Management did not instruct either miner to enter the Monogahela Drift and this was not a part of their assigned tasks. When they approached the face of the drift, Cappanno was overcome by carbon monoxide gas, fell to the ground, and was nonresponsive. Geist also felt ill, but was able to retreat from the area and alert other miners that Cappanno needed assistance.

Williams was overcome by carbon monoxide during an attempt to rescue Cappanno. Twenty other miners participated in the rescue attempt. Seven miners were subsequently hospitalized for follow-up treatment for carbon monoxide poisoning.

Accident Investigation Findings

The MSHA Accident Investigation (AI) Team concluded that the accident occurred due to:

- The Operator's failure to dispose of deteriorated explosives in a safe manner;
- The Operator's failure to ensure a competent person conducted a post-blast examination;

- The Operator's failure to establish an accurate and effective ventilation plan;
- The Operator's failure to barricade or seal unventilated areas; and
- The Operator's failure to indoctrinate new employees in safe work procedures, or properly train miners.

The AI Team also conducted a post-accident spot inspection³ of the mine and issued 101 citations and orders.

Accountability Review Team Findings

The Review Team determined that there is no evidence that any MSHA action caused or contributed to the fatal accident on November 17, 2013. In analyzing the reports from the fifteen MSHA inspections/investigations that occurred after the mine reopened in 2011 and before November 17, 2013, and the AI Team's post-accident spot inspection reports, the Review Team identified the following three findings with MSHA's inspection and investigation-related activities at the Revenue Mine prior to the accident:

- Some inspections were not conducted thoroughly and according to MSHA policy and procedures.
- Some inspections were not documented completely and thoroughly.
- The overall condition of the mine relative to the level of enforcement inspectors documented in previous inspections differed from conditions observed post-accident.

The Accountability Review Team worked jointly with Metal and Nonmetal Mine Safety and Health at both the District and Headquarters levels to develop appropriate corrective actions that will strengthen the supervisory and inspection processes and result in improved training of Metal and Nonmetal enforcement staff.

III. Purpose, Scope and Methodology

The purpose of the Accountability Review was twofold: 1) determine the level of Agency compliance with established policies, procedures, and guidance associated with enforcement of the regulations at the Revenue Mine; and 2) determine whether current MSHA enforcement policies, procedures, guidance, and training sufficiently address the conditions and practices associated with the fatal accident.

³ Spot inspections are generally safety and health inspections that target a specific area or activity at the mine. The spot inspection conducted after this accident was an inspection of the mine in its entirety.

The review covered the time period from October 2011, when Star Mine Operations, LLC (Operator) purchased the Revenue Mine, through November 2013. During that time, the Rocky Mountain District, Denver, Colorado Field Office inspection personnel conducted fifteen inspections and investigations. These included regular safety and health inspections, spot inspections, hazard complaint inspections, and a non-fatal accident investigation.

In conducting this accountability review, the Review Team reviewed all of the inspection reports, including enforcement actions, mine status information, mine maps, and information obtained from the accident investigation. The Review Team analyzed previous Office of Accountability reviews conducted in the Rocky Mountain District, including one in the Denver Field Office, and four District accountability reviews conducted during Calendar Years 2009, 2010, 2011, and 2012. Additionally, the Review Team conducted interviews with relevant District personnel, which took place on March 3, 2014 and March 24, 2014.

IV. Overview of Star Mine Operations

Following is a general description of operations at the Revenue Mine leading up to the time of the accident. It is based on information obtained from the accident investigation, mine maps, inspection reports and interviews conducted with MSHA staff. In 2013, the mine was in development. Incidental to this development work, the Operator removed and stockpiled ore to be processed at a later date.

Mill and Crusher Gallery

Development and construction of the underground mill and crusher gallery was nearing completion at the time of the accident. The mill had not processed any ore.

Yellow Rose Drift

The Operator was developing raises⁴ in crosscut numbers 2, 3 and 4. The Operator planned to connect the raises laterally in preparation for shrink stope mining activities scheduled to start in early summer 2014. The Operator continued to develop the Yellow Rose Drift toward the projected secondary escapeway. At the time of the accident, the

⁴ Raises are driven in a vertical or steeply inclined direction off a drift. During the development of raises, gravity assists in drilling and mucking, thereby making the process more economically feasible.

Operator was developing the secondary escapeway in crosscut number 8 in preparation for driving a raise to the surface.

Virginus Drift

In the Virginus Drift, the Operator was developing three raises into the upper level old works for ventilation - to allow air to exhaust through the upper level old works to the top of the mountain. In the process of developing the raises in the drift, the Operator established a refuge area⁵ approximately 200 feet outby the Virginus and Monogahela Drifts in the Revenue Level Tunnel.

Monogahela Drift

The Monogahela Drift was the site of the Operator's November 16 explosives detonation and the November 17 accident. At the time of the accident, the Operator was rehabilitating and exploring the Monogahela Drift in preparation for future mining. Activities included drilling and blasting of rock and ore, and hauling materials. The Operator was installing, or preparing to install, infrastructure such as pipe, track, water drainage systems and ventilation tubing. The Operator also was working in the "Chinaman's Chute", an area off the Monogahela Drift, installing ground support as needed.

V. Review of Agency Compliance with Policies, Procedures and Guidance Associated with Enforcement of the Regulations

The Review Team identified three findings with general enforcement and inspections at the Revenue Mine; they are not related to the November 17, 2013 accident: (1) Inspectors did not always conduct thorough inspections in accordance with the General Inspection Procedures Handbook (GIPH); (2) Inspectors did not document inspections in accordance with some of the GIPH requirements; and (3) the overall condition of the mine relative to the level of enforcement inspectors documented in previous inspections differed from conditions observed post-accident.

The Review Team evaluated the degree to which enforcement personnel followed existing Agency policies and procedures in the following areas:

- Mandatory inspection activities at the mine;

⁵ A refuge area is a shelter location for underground miners when, using the normal travel means, the miners cannot reach the surface within one hour from at least two separate escapeways.

- Enforcement actions at the mine;
- Hazardous condition complaint responses and inspections;
- Bureau of Alcohol, Tobacco, Firearms, and Explosives (BATFE)⁶ regulations as they relate to MSHA's responsibilities contained in a Memorandum of Understanding between the two agencies; and
- MSHA's documentation of inspections at the mine.

The review also included an analysis and evaluation of Agency compliance with procedures related to supervisory and second level management oversight and inspector training.

A. Inspections

This section addresses three issues with respect to inspections of the Revenue Mine – compliance with inspection procedures, documentation of inspections, and level of enforcement.

Under Section 103(a) of the Mine Act, “the Secretary shall make inspections of each underground coal or other mine in its entirety at least four times a year and of each surface coal or other mine in its entirety at least two times a year.” The Metal and Nonmetal General Inspection Procedures Handbook PH13-IV-1 (GIPH) sets forth procedures for Metal and Nonmetal (MNM) enforcement personnel to follow when conducting inspections of underground and surface mines and mills as required under the Mine Act.

There were 15 MSHA inspections and investigations from the time Star Mine Operations purchased the Revenue Mine until November 2013. See Table 1 below. The Accountability Review Team evaluated the inspection reports for these inspections and investigations to determine the comprehensiveness of inspections and the adequacy of enforcement personnel's documentation of inspections.

⁶ The GIPH abbreviates the Bureau of Alcohol, Tobacco, Firearms, and Explosives as BATFE or ATF. For purposes of this report, the Bureau is referred to as “BATFE.”

Table 1⁷

Inspection Activity (activity code)	Beginning Date	Ending Date	Event No.
Regular Safety and Health Inspection (E01)*	10/19/2011	10/24/2011	6555095
Spot Inspection (E16)	7/2/2012	7/2/2012	6559962
Regular Safety and Health Inspection (E01)	7/17/2012	7/18/2012	6559969
Compliance Follow-up Inspection (E15)	8/14/2012	8/15/2012	6559971
Non-Fatal Accident Investigation (E07)	10/1/2012	10/3/2012	6613306
Regular Safety and Health Inspection (E01)	10/2/2012	10/4/2012	6613307
Verbal Hazard Complaint Inspection (E04)	3/12/2013	3/13/2013	6613013
Regular Safety and Health Inspection (E01)	7/8/2013	7/16/2013	6616390
Part 50 Audit (E25)	7/8/2013	7/15/2013	6616391
Verbal Hazard Complaint Inspection (E04)	8/5/2013	8/6/2013	6616099
Verbal Hazard Complaint Inspection (E04)	9/16/2013	9/17/2013	6616311
Spot Inspection (E16)	10/8/2013	10/9/2013	6616314
103 (g) Written Notification Hazard Complaint Inspection (E03)	10/22/2013	10/22/2013	6616316
Regular Safety and Health Inspection (E01)	10/22/2013	10/24/2013	6616317
Spot Inspection (E16)	11/12/2013	11/14/2013	6619586

*The October, 2011 regular inspection was surface only; there was no activity underground.

Regular Inspection Procedures

i. Requirements

The Metal and Nonmetal GIPH sets forth requirements for mine inspections. Regular mine safety and health inspections consist of: (1) activities done by inspectors prior to arriving at the mine, (2) the physical inspection of the mine, and (3) activities conducted after the inspection is completed. An inspection of a mine in its entirety should include all active work areas. Work areas include non-barricaded

⁷ E01 inspections are regular safety and health inspections of a mine in its entirety that are required by the Mine Act to determine if imminent dangers exist and to ascertain compliance with mandatory health and safety standards, approved plans, current mine conditions, and other requirements of the Act. The Operator had not started underground development work in October 2011, so the first regular E01 inspection covered only examinations of surface areas. The regular inspection in July 2013 was lengthier than the other regular underground inspections because it included health sampling activities.

areas that are safe to inspect. A regular safety and health inspection of a mine in its entirety includes the following areas, equipment, and documentation:

- inspection of the active mine, mill, shops, pump houses, electrical transmission facilities and/or substations, flammable and combustible storage areas, all operating mobile and fixed equipment, etc.;
- inspection of each active mining cycle;
- inspection of all explosives magazines and storage facilities;
- inspection of active haulage and service roads, dumps, stockpiles, warehouses, leaching ponds, impoundments, pipelines, storage tanks, offices, etc.;
- review of work practices and procedures;
- inspection of all work shifts, including non-production (excluding security personnel only shifts) and maintenance shifts;
- inspection of all required documentation (e.g., employment, injuries, illnesses, miner training, HazCom records, hoist personnel physicals)

See GIPH Ch. 5, pgs. 32-33

ii. Findings of Fact Regarding MSHA Inspections of the Revenue Mine

During the review period, inspectors conducted the required number of regular inspections at the Revenue Mine. Inspectors conducted five regular inspections. The first regular inspection covered surface areas of the mine, exclusively, because work was not yet being performed underground. The four subsequent regular inspections included the inspection of underground areas. The Review Team determined that there were three regular inspections that enforcement personnel did not conduct in accordance with all of the requirements of MSHA's GIPH.

The inspector who conducted the October 2013 inspection did not inspect the Monogahela Drift. Between October 2011 and October 2012, the Operator was not conducting any work in the Drift, and therefore, MSHA inspectors were not required to conduct inspections in that area. In July 2013, the inspector documented that he inspected portions of the Monogahela Drift in his inspection report; however the Review Team determined that the inspector traveled to the intersection of the Revenue and Monogahela Drifts in July 2013, but did not actually go into the Monogahela Drift.

Prior to his October 2013 inspection, the inspector reviewed the ventilation plan dated January 23, 2013. The latest ventilation plan, dated September 27, 2013, had been forwarded to the Field Office but may not have been available to the inspector. The

federal government shutdown occurred October 1, 2013 and extended through October 17, 2013. MSHA returned to regular inspection activities on October 21, 2013 and began the inspection of the Revenue mine on October 22, 2013. His inspection notes document that he reviewed the most recent Escape and Evacuation plan dated August 30, 2013. This plan states that “Currently miners are performing rehab work in the Revenue Tunnel. And will be working in the Monogahela NW drift shortly.” In the January 2013 ventilation plan, however, the mine Operator reported to the District that work was ongoing in the Monogahela Drift. Specifically, the plan stated:

We currently have two main working areas in the mine, the Yellow Rose Drift S.E. and the main Revenue Tunnel extending into the Monogahela Drift N.W. Both of these working areas are being supplied abundant quantities of fresh air by the main fans as shown on the mine map. As we work in additional areas that are out of the main air flow we will use booster (auxiliary) fans and flexible vent bag to provide adequate air to those areas.

Based on information obtained from interviews, the inspector did not inspect the Monogahela Drift during his regular inspection in October 2013 because members of mine management told the inspector that work was not being performed in the Monogahela Drift⁸. There were no miners working in the Monogahela Drift while the inspector was onsite throughout the dayshift during the October inspection. Miners did work in the Drift on the evening shift, but there was an hour and a half break between shifts. The dayshift exited the mine at 3:30 pm and the evening shift entered at 5:00 pm.

Inspectors also did not examine conditions inside the explosives storage facility or conduct an inventory of explosives during the October 2013 inspection and did not evaluate, and/or document evaluation of, abandoned/barricaded areas per the GIPH during three regular inspections. These issues are discussed in detail below in sections

⁸ The accountability Review Team reviewed the Operator’s daily shift reports which indicated the Operator was working in the Monogahela Drift as of October 8, 2013. Daily shift reports from October 8, 2013 through November 16, 2013 showed the Operator was conducting various forms of work in the Monogahela Drift during this period, (e.g., installing, or preparing to install, infrastructure such as pipe, track, water drainage systems, and ventilation tubing). Mine operators are not required by regulation to provide daily shift reports to MSHA. MSHA inspectors are not required to review daily shift reports. The inspectors did not review these reports and the reports were not used in the inspector’s determination as to whether to inspect the Monogahela Drift in October 2013.

B. Explosives Storage Facilities and Blasting Practices and C. Barricaded and Abandoned Areas.

iii. Conclusions and Recommendations

The Review Team concluded that the inspector did not inspect the Monogahela Drift during the regular inspection in October 2013 because the Operator informed him no work was being performed in that area.

The Review Team concluded that the inspector did not inspect the explosives storage facility during one of the four regular underground inspections, specifically the October 2013 regular inspection, due to an oversight. Based on his interview, the inspector stated that he intended to inspect the storage facility, but it was locked and he forgot to return later during the inspection. This is addressed in more detail below in section B.

The Review Team concluded that inspectors did not inspect or evaluate abandoned/barricaded areas during three of the regular inspections conducted during the review period. The GIPH contains sufficient guidance for the inspection, evaluation, and documentation of abandoned/barricaded areas. The Review Team was unable to determine why inspectors did not follow the procedures in the GIPH. The Accountability Review Team, in consultation with Metal and Nonmetal management concluded that focused training in this area was necessary and will resolve the issue.

The Review Team recommends additional training for inspectors in the requirements of the GIPH related to underground inspections, reviewing mine maps, and documenting completeness of regular underground inspections.

- The training should emphasize a thorough review of operator workplace examination records, including an evaluation of workplace conditions and mine activities, to identify areas required to be inspected.
- The training should include instruction on the policies and procedures related to barricading, specifically the inspection, evaluation, and documentation of abandoned/barricaded areas.

Level of Enforcement at the Revenue Mine

i. Requirements

Section 104(a) of the Mine Act states “If, upon inspection or investigation, the Secretary or his authorized representative believes that an operator of a coal or other mine subject to this Act has violated this Act, or any mandatory health or safety standard, rule, order,

or regulation promulgated pursuant to this Act, he shall, with reasonable promptness, issue a citation to the operator. Each citation shall be in writing and shall describe with particularity the nature of the violation, including a reference to the provision of the Act, standard, rule, regulation, or order alleged to have been violated.”

When issuing a citation or order, inspectors must evaluate the gravity associated with the hazard identified by weighing (1) the likelihood of an occurrence of the injury or illness against which the standard is directed; (2) the gravity of the injury or illness if it has occurred or were to occur; and (3) the number of persons affected if the event or injury occurred or were to occur. Inspectors must also evaluate the operator’s negligence. See Citation and Order Writing Handbook, pages 10-18.

ii. Findings of Fact

The Review Team evaluated MSHA’s 15 inspections/investigations of the Revenue Mine conducted prior to the accident to determine whether enforcement personnel properly evaluated the gravity and negligence on all of the citations/orders issued as required in the Handbook.

Following the November 17 accident, the MSHA AI Team conducted an E16 spot inspection of the Revenue Mine during which they issued 101 citations/orders. It is not uncommon for MSHA to issue a relatively high number of citations and orders during spot inspections conducted after a fatal accident. The AI Team spot inspection consisted of three, two-person inspection teams each composed of an inspector and a manager. The three inspectors recorded on-site inspection time totaling 97.5 hours for this spot inspection, compared to one inspector and 18.25 on-site hours during the October 2013 regular inspection and hazard complaint inspection.

The Review Team evaluated the 101 citations and orders the AI Team issued during the spot inspection to determine if the conditions cited existed during the October 2013 inspection. It is not possible to determine if 73 of the violations the AI team cited existed during the October 2013 regular inspection, as these citations were issued in areas where daily mining activities result in frequent changes to mining conditions. However, 15 of the citations were observed in areas of the mine that the inspector did not inspect during the October 2013 regular inspection.

There were 13 citations and orders the AI Team cited that the inspector did not identify during the October 2013 regular inspection because of a lack of understanding of several policies and procedures, or unclear policies and

procedures. These citations and orders were associated with abandoned/barricaded areas; ventilation or maps; refuge areas and escapeways; and training. Findings, conclusions and recommendations addressing these four issues are discussed in detail in the applicable sections of this report.

iii. Conclusions and Recommendations.

The Review Team determined that inspectors properly evaluated the violations they cited, however, inspectors did not always identify some conditions and practices cited during the post-accident spot inspection, in the areas of barricaded and abandoned areas; ventilation; refuge areas/chambers; and, training. The Review Team recommends that the Administrator for MNM review the training associated with hazard recognition in underground mines and, where necessary, provide additional focused training for inspectors in hazard recognition at underground mines. Recommendations regarding barricaded and abandoned areas; ventilation; refuge areas/chambers; and, training are included in the applicable sections of this report.

Adequacy of Inspection Documentation

i. Requirements

Inspectors are responsible for accurately documenting information collected or observed during on-site activities and for accurately completing required Agency forms. Inspectors also are responsible for taking clear, concise, detailed, factual notes, in ink, for all inspections or investigations, particularly those involving enforcement actions. See GIPH Ch. 7, pg. 60. Inspectors must document the following categories of information in their field notes:

- Dates of each day spent on site;
- Daily arrival and departure times from the mine or mill site;
- Names and titles of company officials, miners' representatives, and miners who either traveled with the inspection party, attended the pre- or post-conference, or discussed safety and health concerns with the inspector;
- Relevant statements made during pre- and post-inspection conferences;
- Fixed and mobile equipment and areas of the mine that were inspected including equipment and areas of the mine that were not inspected. Inspectors should document with specificity why equipment or areas of the mine or mill were not inspected;
- Explosives storage magazines, facilities, and relevant records inspected;

- Barricaded or abandoned areas of the mine that were inspected including barricaded or abandoned areas of the mine that were not inspected. Inspectors should document with specificity why barricaded or abandoned areas of the mine were not inspected;
- Areas of major construction or new projects;
- Relevant conversations with miners, miners' representatives, and mine operator's representatives regarding issues raised during the inspection and/or safety and health issues at the mine or mill; and
- Other relevant safety and health information.

GIPH Ch. 7, pg. 62. The documentation in an inspector's general field notes should supplement, not duplicate, the list of items detailed on MSHA's Regular Inspection Form (MSHA Form 4000-49B).

GIPH Ch. 5, pg. 36. Inspectors are required to complete BATFE forms (BATFE 5400.5 and BATFE 5030.5) regarding their findings for every explosives magazine and/or explosives storage facility inspected. Inspectors shall note all violations, whether of MSHA or BATFE standards, on the BATFE or other approved form. The form is to be transmitted to the appropriate BATFE office as determined by the District Manager.

ii. Findings of Fact

The Review Team evaluated the fifteen inspection/investigation reports for completeness and compliance with documentation policy and procedures. Inspectors did not follow some of the documentation procedures in four regular E01 inspections:

- The October 2013 inspection report did not include an inspection of explosives records or the required BATFE forms for explosives storage facilities.
- Only one report, July 2012, included documentation on the 4000-49B form of "drifts and shafts" that were "blocked to prevent access." Three regular inspections had no documentation of abandoned and/or barricaded areas.
- Blasting practices were referenced during one inspection, October 2013, in which the inspector stated "Virginus x-cuts - shot the burn and the box last night – everything still looks ok." Three regular inspections did not document inspection/observance of blasting practices or why the blasting cycle was not observed.

- The inspection reports note that contractors were on site during regular inspections in October 2012, July 2013 and October 2013, but the inspectors did not document that they inspected the contractors' activities or document reasons why they did not inspect them.

District personnel told the Review Team that in the past meetings with MSHA, BATFE personnel verbally told them that completed BATFE forms were not absolutely necessary for inspections where no BATFE violations were found. However, the District staff assistant reiterated the policy in the GIPH in a July 26, 2011 email to Field Office Supervisors stating "Please ensure that a BATFE form 5030.5 is filled out for each applicable mine inspection. This form must be sent to the BATFE area supervisor in your area even if there are no BATFE violations observed. Please contact me with any questions."

iii. Conclusions and Recommendations

The Review Team concluded that inspection documentation for the E01 regular inspections was adequately descriptive of violations observed, but not adequate for: blasting practices; inspection of the explosives storage facility; explosives records and the required BATFE forms for explosives storage facilities; barricaded areas denoted on the mine map and encountered in the mine; and inspection of contractors.

The Review Team concluded that the guidance provided in the GIPH is clear on the requirements for documentation for inspection of contractors, explosive facilities and abandoned/barricaded areas and, with the exception of completing the required BATFE forms, was unable to determine why inspectors did not follow those procedures.

The Review Team concluded that the inspector did not complete the BATFE forms during the October 2013 inspection because of the statement from the BATFE that forms were not absolutely necessary when the inspector did not find BATFE violations.

The Accountability Review Team recommends additional training for inspectors regarding the documentation requirements in the GIPH.

Explosives Storage Facilities and Blasting Practices

iv. Requirements

MSHA conducts inspections of explosive storage magazines, facilities, and associated records on behalf of the Bureau of Alcohol, Tobacco, Firearms, and

Explosives (BATFE) pursuant to a 1980 Memorandum of Understanding (MOU) between MSHA and BATFE. The MOU requires MSHA inspectors to review records maintained by mine operators when explosives materials are used, transported, or stored at surface and underground mining or milling operations. Inspectors are also required to verify compliance with appropriate MSHA and/or BATFE standards regarding the construction and maintenance of magazines and underground storage facilities. See GIPH Ch. 5, pg. 35.⁹

“MSHA’s regulations on underground storage facilities are usually considered to be substantially equivalent to, and in compliance with, BATFE regulations.” GIPH Ch. 5, pg. 36. MSHA standards for explosives in underground mines are contained in 30 CFR Part 57, Subpart E, and address the use, storage, and transportation of explosives.

The GIPH addresses MSHA’s responsibilities for the inspection of explosives magazines and explosives storage facilities, including responsibilities resulting from the MOU with BATFE. See GIPH pgs. 35-37.

The GIPH pg. 33 contains the specific requirements for inspections of mining cycles involving blasting:

Inspectors shall make every effort to observe each phase of all mining cycles during every regular inspection of a mine or mill. The term “mining cycle” includes, but is not limited to: activities such as drilling, blasting, mucking, timbering, scaling, and the transfer and/or haulage of ore or waste. If a phase of the mining cycle, such as blasting, only occurs once in the mine during the course of an inspector’s inspection, the inspector will take appropriate steps to observe and note the conditions, procedures, and practices associated with those blasting activities...Mining cycles not observed during an inspection shall be documented in the inspector’s general field notes along with any specific observations and conversations regarding observed mining cycles.

GIPH Ch. 5, pg. 36. Inspectors are required to complete BATFE forms (BATFE 5400.5 and BATFE 5030.5) regarding their findings for every explosives magazine and/or explosives storage facility inspected. Inspectors shall note all violations, whether of

⁹ In 2008, a District accountability review identified the need for MSHA to revisit the MOU and work with BATFE toward possible revisions regarding the daily transaction and usage records. MSHA has continued to work with BATFE since 2008 and has a draft revised MOU pending review and clearance.

MSHA or BATFE standards, on the BATFE or other approved form. The form is to be transmitted to the appropriate BATFE office as determined by the District Manager. GIPH Ch. 5, pg.36. Explosives in an underground mine are to be stored in a magazine that complies with appropriate MSHA and BATFE regulations or in an appropriately constructed storage facility.

GIPH Ch. 7, pg. 62. Furthermore, inspectors are required to document in their general field notes explosives storage magazines, facilities, and relevant records inspected.

v. Findings of Fact

The Review Team looked at the July 2012, October 2012, July 2013 and October 2013 regular inspections to determine whether inspectors followed procedures set forth in the GIPH for inspecting explosives storage facilities.¹⁰ Inspectors documented inspections of the main explosives storage facility during all four regular underground inspections, however, during his interview, the inspector who conducted the October 2013 regular inspection stated that his inspection was limited to the entrances to the main explosives storage facility because the storage facility was locked at the time, even though his documentation showed he inspected the powder magazine and the primer magazine. The inspector informed the Review Team that the mine management person accompanying him did not have the key to unlock the explosives storage facility and the inspector forgot to return to inspect the storage facility.

Inspectors documented inspections of explosives records/inventories for two of the four regular underground inspections and completed the BATFE forms for three of the four regular underground inspections. The regular inspections conducted in July 2012 and October 2013 did not include inspections of the explosives records/inventory. As mentioned above, District personnel told the Review Team that the BATFE verbally told MSHA that BATFE forms were not absolutely necessary for inspections where no BATFE violations were found.

Additionally, three of the four underground inspection reports did not document any observations of blasting practices or document that blasting practices were not observed. The inspections and documentation of the blasting practices at the Revenue Mine were incomplete in that some inspection reports contained no documentation of whether or not blasting occurred.

¹⁰ No explosives were being used at the mine during the inspection completed October 2011 and the inspection covered only surface areas.

During the E16 spot inspection following the accident, the AI Team issued 15 citations/orders for violations involving the explosives storage facility, blasting practices, and explosives transportation. The citations and orders were not issued as contributory to the fatal accident.

Based on information reviewed and the interviews conducted, inspectors did not receive any information from miners or any other sources regarding deteriorated explosives. The inspector who conducted the regular inspection in October 2013 did not physically inspect the explosives records/inventory for the main explosives storage facility.

vi. Conclusion and Recommendations

The Review Team concluded that the GIPH and the MOU between MSHA and the BATFE provided adequate guidance for inspections and documentation of inspections of explosives storage facilities, associated records, and blasting practices. Based on interviews with inspectors and reviews of the inspection reports, however, inspectors did not always follow the procedures outlined in the GIPH requiring inspection of explosives storage facilities.

Based on interviews, the Review Team concluded that the inspector did not inspect the explosives storage facility during one of the four regular underground inspections due to an oversight initially caused by lack of access to the storage facility and later his forgetting to return to complete the examination of the storage facility.

The Review Team concluded that the inspector did not complete the BATFE form based on verbal instructions from the BATFE. In addition, inspectors did not document records/inventories of explosives during two of the four regular underground inspections. The Review Team concluded the guidance provided in the GIPH is clear on the requirements for documentation of records/inventories of explosives and documentation of the inspection, or not inspecting, the blasting cycles.

In addition to the previous recommendation for additional training for inspectors and supervisors regarding the documentation requirements in the GIPH, the Review Team recommends that the Administrator for MNM review the explosives training provided to inspectors and supervisors and provide supplementary training for inspectors and supervisors in the requirements of the GIPH regarding inspections of explosives storage facilities/magazines, associated records, and observations of blasting practices.

Further, the Review Team recommends that MSHA revisit its MOU with BATFE to determine if the agency should continue to provide the service it currently provides to BATFE.

B. Barricaded and Abandoned Areas

i. Requirements

Under 30 CFR § 57.20011, the Operator must post barricades or warning signs at all approaches in areas where health or safety hazards exist that are not immediately obvious to employees. The warning signs must be readily visible, legible, and display the nature of the hazard and any protective action required.

The GIPH sets forth the procedures for inspections of barricaded and abandoned areas. Specifically, inspectors must:

- Obtain information from miners and the mine operator to determine why barricades are in place/reasons for the abandonment, how long the barricades have been in place or how long the area has been abandoned, whether mining will be conducted in the area in the future (for abandoned areas), and what (if any) hazard they prevent miners from accessing and/or may be present.
- Review applicable mine maps, workplace examination records, and other documents to acquire additional knowledge about these areas.
- Review the areas to determine if they must meet the signage and/or barricade requirements found in 30 CFR Parts 56/57.20011.

See GIPH Ch. 5, pgs. 33-34. Inspectors are required to document the barricaded or abandoned areas of the mine they inspected in their field notes and should state with specificity why a barricaded or abandoned area of the mine was not inspected. See GIPH Ch. 7, pg. 62.

ii. Findings of Facts

The Review Team reviewed the five regular E01 inspection reports, the January 2013 and September 2013 ventilation plan and maps, and the escape and evacuation plan to determine if inspectors inspected and documented inspections of barricaded and abandoned areas in accordance with Agency policy and procedures. The January 23, 2013 and September 27, 2013, ventilation map showed several drifts that had been mined off the Revenue Level Drift prior to Star Mine Operations taking ownership. The map noted some

of these areas as “Barricaded (No Entrance)” while some drifts shown on the map did not have such designations.

During the July 2012 regular inspection, the inspector noted on the MSHA Regular Inspection Information form 4000-49B that he did not inspect some areas designated as restricted and no access. In the relevant section on the 4000-49B - “Was the entire mine inspected?” – the inspector checked “no” and provided the following explanation:

All areas that miners are working in and in the process of doing rehab work on were inspected. This mine has multiple levels and have [sic] many drifts and shafts that have not been started in the rehab process as of yet and are blocked to prevent access until rehab work begins.

In the inspection reports for the E01 regular inspections conducted in October 2012, July 2013 and October 2013, the inspectors did not document evaluations of the barricaded areas. Specifically, inspectors did not evaluate why the barricades were in place, how long they had been in place, what hazards, if any, they prevented miners from accessing or whether mining would be conducted in the areas in the future,. Inspectors also did not document why they did not inspect barricaded areas and/or abandoned areas.

Additionally, for the last three regular inspections, inspectors did not include documentation of any discussions with miners, management, or workers about the status of barricaded areas or abandoned workings in the inspection reports.

iii. Conclusions and Recommendations

The Review Team concluded that the GIPH provides sufficient guidance on the inspection and documentation of abandoned workings/barricaded areas, but inspectors did not properly evaluate barricaded areas during their inspections and were not always inspecting and/or documenting their inspection of these areas. Based on all the information gathered during the review, the Review Team concluded that inspectors lacked understanding of the requirements.

In addition to the previous recommendation to provide additional training for inspectors and supervisors regarding the documentation requirements in the GIPH and supervisory review and approval of inspection reports, the Review Team recommends that the Administrator for MNM review the training provided to inspectors and supervisors regarding barricaded and abandoned areas and to revise the training as needed. Supplemental training should be provided for inspectors and supervisors focusing specifically on the inspections, evaluations,

and documentation of abandoned workings and barricaded areas.

C. Ventilation Plan and Map

i. Requirements

Under 30 CFR §57.8520, operators must submit written ventilation plans, and any revisions of the plans, to the District Manager for review and comment upon his written request. The District Manager reviews submitted plans to ensure they include everything required under the standard. The regulations do not require MNM mine ventilation plans be approved by MSHA.

Prior to conducting a regular inspection of a mine or a mill, inspectors must assemble appropriate documentation and review mine file data. This includes mine ventilation plans and mine maps (for underground mines, if available). See GIPH Ch. 5, pgs. 29-30. Inspectors must review ventilation plans and mine maps to ensure that they include all of the elements required by 30 CFR §57.8520 and the inspector must document his or her review of the plans in their notes or on the appropriate MSHA form.

Metal and Nonmetal general inspection policies and procedures do not require in-mine, physical inspections, during or after the plan review process, to examine ventilation systems and evaluate the accuracy of the ventilation maps.

ii. Findings of Fact

The Rocky Mountain District Office's procedures for the review of ventilation plans and maps submitted to the District Manager for underground mines are as follows:

1. The Mine Safety and Health Assistant (Assistant) date stamps the plan when it is received, and attaches a workflow worksheet used to track the plan through the process.
2. The Assistant transmits the plan to either the Assistant District Manager (ADM, Technical) or to the Safety and Health Specialist, depending on availability, for review.
3. After reviewing the plan, the specialist transmits it to the ADM, Technical. If the specialist identifies deficiencies, the ADM and/or specialist discuss the plan with the District Manager.
4. The District Manager sends a letter to the mine operator indicating that the plan and map have been received and reviewed and no changes are necessary or

informing the operator of modifications needed. Generally the letter will allow 10 days from date of receipt for the mine operator to resubmit a modified plan. If the mine operator does not respond or the response is inadequate, the District meets or corresponds with the operator until the operator submits an acceptable ventilation plan and map. In the event of an impasse, the District takes appropriate enforcement action.

The review of the ventilation plan and map consists of a checklist the District developed to ensure adherence to the requirements of 30 CFR §57.8520. The District conducts these reviews to identify where the air will flow based on the location of ventilation controls. As part of the map review, the specialist and/or ADM reviews the air courses from intakes through the working areas and to the returns out of the mine to determine if the air flow directions and quantities depicted on the map are reasonable.

In the case of the Revenue Mine, the Operator submitted its most recent ventilation plan and map on August 23, 2013. District staff followed the aforementioned procedures. The District sent a letter outlining deficiencies in the plan to the mine Operator requesting additional information in accordance with 30 CFR §57.8520. The Operator submitted a revised and corrected ventilation plan and map on September 25, 2013. The District Manager sent a letter dated September 27, 2013 to the Operator stating the updated plan had been received and reviewed. This letter stated that the "...plan is only acceptable while the mine is in rehab and development mode. Prior to this mine going into production mode, an updated ventilation plan with all required information must be submitted to this office for review."

During the four regular underground E01 inspections conducted prior to the accident, inspectors documented their review of the ventilation plan and map by checking the box on the MSHA Form 4000-49B.

Following the accident, the AI Team found inaccuracies between the ventilation shown on the September 25 mine map and the actual underground conditions. The AI Team determined that the Operator did not ensure the accuracy of the mine map and the map did not show accurate directions and quantities of principal air flows in the mine.

iii. Conclusions and Recommendations

The District had a process in place to track ventilation plans through the review process until the plan is considered acceptable. Without a physical inspection of the mine's ventilation system, the District had no reason to believe that the information the Operator provided on the Revenue Mine ventilation map was inaccurate.

The Review Team recommends that the Administrator for MNM explore the possibility of revising policies and procedures to provide for in-mine physical reviews of ventilation systems as part of the District reviews of the ventilation plans and maps. The in-mine portion of the review could be conducted as part of the E01 inspections. The procedures could specify the items to be reviewed during the in-mine physical evaluation. This list of reviewed items could be retained along with the plan documentation. See Section VI – below for additional discussion.

Additionally, the Review Team recommends that the Administrator for MNM develop training specific to mine maps and evaluating ventilation systems for incorporation into inspector and supervisor training. The Administrator for MNM should consider the need for additional non-management personnel with the training and background needed to review underground mine ventilation and maps.

D. Refuge Areas/Escapeways

i. Requirements

Under 30 CFR § 57.11050(a), Escapeways and Refuge:

Every mine shall have two or more separate, properly maintained escapeways to the surface from the lowest levels which are so positioned that damage to one shall not lessen the effectiveness of the others. A method of refuge shall be provided while a second opening to the surface is being developed. A second escapeway is recommended, but not required, during the exploration or development of an ore body.

Under this standard, "exploration or development of an ore body" should be used in its narrowest sense, i.e., while an ore body is being initially developed, or development or exploration work is being conducted as an extension of a currently producing mine. Where mining occurs along a mineralized zone and production and development are indistinguishable as separate activities, the standard must be applied as it would to a producing mine. See MSHA Program Policy Manual Volume IV.

Under 30 CFR §57.11050(b):

In addition to separate escapeways, a method of refuge shall be provided for every employee who cannot reach the surface from his

working place through at least two separate escapeways within a time limit of one hour when using the normal exit method. These refuges must be positioned so that the employee can reach one of them within 30 minutes from the time he leaves his workplace.

Inspectors are required to inspect second escapeways. Specifically, the GIPH provides:

Inspectors should confirm that the primary and secondary escapeways from an underground mine are properly designated on a mine's escape and evacuation plan required by 30 CFR §57.11053. Inspectors should also confirm that the primary and secondary escape routes are regularly inspected by the mine operator or his representative and marked as required by 30 CFR §57.11051. Inspectors are responsible for traveling all designated escapeways during every regular inspection to verify that they are passable and can effectively function in a mine emergency.

GIPH Ch. 5, pg. 39. Further, Inspectors must ensure that refuge areas or chambers are noted on the mine's escape and evacuation plan as required by 30 CFR § 57.11053 and that refuge chambers or areas meet the requirements of 30 CFR §57.11052. See GIPG Ch. 5, pg. 40; see *also* PIB09-09 Re-Issue P07-04 - Clarification of Requirements of Title 30 Code of Federal Regulations §57.11050 Escapeways and Refuges.

ii. Findings of Fact

All inspection reports except for the first one in October 2011, which was a surface only inspection, contained remarks on the 4000-49B that the inspectors reviewed all applicable escape and evacuation plans. Inspectors did not find violations regarding the plan during inspections prior to the accident.

On August 27, 2013, the Operator submitted the mine's most recent escape and evacuation plan to the Rocky Mountain District. The District reviewed the plan on August 30, 2013 and did not find any deficiencies. The plan outlined escape procedures in the event of an emergency and the plan map showed the location of a "refuge chamber" in the Revenue Level Tunnel, just outby the Monogahela Drift. The plan stated that "during the rehab and development phases we will use refuge chambers to meet MSHA compliance. Once we are in the mining/production phase we will have secondary escapeways both in the Yellow Rose Drift and in the Monogahela Drift."

As discussed earlier in this report, the Revenue Mine had removed ore from the Yellow Rose, Virginius, and Monogahela Drifts during the development work. The Operator was developing raises off the Yellow Rose Drift through the ore body and in November 2013, development had progressed in the Yellow Rose Drift to just inby crosscut 8, about 2,800 feet from the Drift mouth. The Operator was developing a second opening to the surface at crosscut 8 in the Yellow Rose, which would serve as a second escapeway when completed.

The refuge area in the Revenue Level Tunnel was located approximately 7,000 feet into the mine, just outby the Monogahela Drift opening. It was designated as “refuge chamber” on the mine map submitted with the August 2013 escape and evacuation plan. According to the plan, the “refuge chamber” was one that had been used to satisfy MSHA’s requirements from the 1980s and was being refurbished and outfitted for use.

Inspectors documented inspections of the Revenue Tunnel refuge chamber during two (July 2013 and October 2013) of the four regular underground E01 inspections. Specifically, during the July 2013 regular E01 inspection, the inspector stated in his notes that “Refuge Chamber – backboard, water, oxygen, food, first aid, sanitary supplies – OK – phone – OK.” During the regular E01 inspection conducted in October 2013, the inspector documented “Virginius LR (lunch room),¹¹ Refuge Chamber – water, air, first aid, food, O₂.” Inspectors did not issue any enforcement actions for violations involving the refuge area/chamber during the inspections.

Following the November 17 accident, the AI Team issued withdrawal orders to the Operator because the refuge area near the Monogahela Drift was not constructed so that it could be made gas tight and it was not furnished with waterlines, suitable hand tools, or stopping materials. The AI Team also cited the Operator for not providing a second escapeway or refuge for the Yellow Rose Drift and for the Mill and Crushing Gallery areas of the mine, and a withdrawal order was issued for not marking the escape route.

iii. Conclusions and Recommendations

The Review Team concluded that a refuge should have been provided during development of the mine and that inspectors should have inspected for refuges in the Yellow Rose Drift during the July 2012 and October 2012 regular E01 inspections. The Review Team believes that because the Operator was developing

¹¹ There is only one refuge area in the Revenue Tunnel, but it appears inspectors referenced it in different ways.

raises off the Yellow Rose Drift and developing a second opening to the surface at crosscut 8 in the Yellow Rose, that the Operator was required to have a refuge area until the escapeway was completed in order to comply with §57.11050(a).

Though inspectors documented inspections of the refuge area during the July 2013 and October 2013 regular E01 inspections, and documented review of the escape and evacuation plan on the MSHA Form 4000-49B, the AI Team issued citations/orders for violations involving the refuge area in the Revenue Level tunnel and lack of a second escapeway.

The Review Team concluded that the standards and policies on second escapeways and methods of refuge allow for different interpretations. The Program Policy regarding the enforcement of §57.11050 does not clearly specify the refuge requirements for mines developing secondary escapeways and during exploration/development. Based on interviews with Rocky Mountain personnel, the Review Team concluded that the District believed the mine was in rehabilitation and/or development mode and therefore, did not yet require a secondary escapeway in the Yellow Rose Drift. Further, the District believed the refuge area in the Revenue Tunnel met the requirements of the standard.

The Review Team concluded that the inadequacies with the existing refuge cited by the AI Team likely did not exist during the last regular inspection. The Review Team based this on the elapsed time between the last E01 inspection and the heavy use of the refuge area during the accident recovery efforts.

The Review Team recommends that the Administrator for MNM provide clarification on enforcement responsibilities related to second escapeways and refuges. The clarification should address regulation requirements for locations of refuge areas for mines developing a second escapeway, including whether methods of refuge are required during exploration/development. Further, the Review Team recommends that the Administrator develop training for inspectors in refuge requirements and the inspection of refuge areas.

E. Training

i. Requirements

Under 30 CFR Part 48, mine operators are required to submit training plans to MSHA for approval. Inspectors are required to review training records during their regular inspections. Specifically,

Inspectors shall review required mine operator and/or contractor documentation regarding mandatory health, training, and safety regulations. Documentation and/or forms which are required to be reviewed and noted by the inspector during every regular inspection include, at a minimum, the items listed on MSHA's inspection forms (Forms 4000-49 A, B, C, and D). Reviews of required on-site documentation should go back to the previous regular inspection conducted by MSHA.

Training records, and injury, illness, and employment reports shall be verified by inspectors by reviewing on-site documentation and discussing it with random miners and mine management to assure that this documentation is correct. Conversations with miners or mine management regarding significant issues found during this review should also be documented.

GIPH Ch. 5, pg. 46.

ii. Findings of Fact

The Review Team determined that during regular E01 inspections of the Revenue Mine, inspectors reviewed MSHA training forms. Inspectors documented the number of miners employed at the mine on the MSHA Form 4000-49A and the number of Certificates of Training (MSHA Form 5000-23) they reviewed during each of their inspections on the MSHA Form 4000-49B.

At the time of the October 2011 E01 inspection, the mine was in the process of reopening and had six employees. The inspector determined the miners were not trained and issued a withdrawal order for the miners at the site. The inspector also issued citations to the Operator for failing to submit a training plan, failing to submit legal identification forms, and failing to notify MSHA of the status change at the mine.

The Review Team also determined that a representative from MSHA's Educational Field Services (EFS) monitored and presented training to Revenue Mine employees in June, October, and November 2013. EFS did not indicate any concerns regarding the training.

Additionally, on November 13, 2013, while at the Revenue Mine on an unrelated E16 spot inspection, an MSHA inspector attended a training session during which he discussed miners' rights and provided the miners with handouts. While at the training

session, miners asked the inspector to look at underground work areas at the mine on the following day. He set up a meeting off-site for any miner to come to talk to him about conditions at the mine. No miners attended the off-site meeting. The next day, the inspector travelled underground to work areas at the Mill area and spoke with miners about complaints.

During the post-accident E16 spot inspection, the AI Team issued seven withdrawal orders for training violations involving untrained and/or inadequately trained miners. These orders included violations of all relevant sections of 30 CFR Part 48, including New Miner training under 30 CFR §48.5 (thirteen miners affected) and §48.25 (seven miners affected); Experienced Miner training under 30 CFR §48.6 (twenty-four miners affected) and §48.26 (one miner affected); Task training under 30 CFR §48.7 (all miners employed affected); and Annual Refresher Training under 30 CFR §48.8 (four miners affected).

Some of these miners were employed at the Revenue Mine at the time of the regular inspection in October 2013.

iii. Conclusion and Recommendations

Based on the Review Team's review of regular E01 inspection reports for the Revenue Mine, inspectors reviewed training plans and records as required under the GIPH. When the MSHA inspector identified training violations during the October 2011 E01 inspection, he issued the required withdrawal order and issued citations for the training violations.

Despite adhering to the GIPH procedures on review of training materials, the AI Team identified a number of training violations during the post-accident E16 inspection.

The Review Team concluded the GIPH provides guidance for inspectors to review documentation of training, but does not contain procedures for inspectors to verify that training was actually completed. The Review Team recommends that the Administrator for MNM consider providing additional guidance to inspectors on determining if training was conducted through discussions with miners about how they are trained to perform their job, to perform specific tasks, or when and where they last received training.

F. Mine Status

Mine status refers to whether a mine is active, intermittent, temporarily idled, or abandoned. A mine's status determines the number of regular, complete inspections MSHA is required to conduct each year. Under the policies in effect during FY 2013, underground producing mines operating full-time for a full fiscal year were designated "active" and received four complete inspections each fiscal year. Underground mines in "intermittent" status received two inspections each fiscal year.¹² See GIPH Ch. 5, pg. 29.

i. Requirements

Under 30 CFR §50.30(a) an operator is required to report employee work hours for each calendar quarter to MSHA using the Quarterly Employment and Production Report (MSHA Form 7000-2). The report is due within fifteen days after the end of the quarter.

In the Rocky Mountain District, the staff assistant runs a report detailing the work hours information for each mine approximately 30 days after the end of the quarter. The staff assistant forwards this report to the Field Office Supervisors. The Field Office Supervisors are responsible for updating the mine status for each mine within the Field Office's jurisdiction. The MNM Administrator issued guidance, effective October 1, 2011, for determining mine status classifications as follows.

To classify as "active," a mine must meet all of the following criteria:

- For the four most recent quarters, the mine's work hours each quarter are greater than 15% of the sum of all four quarters.
- For the four most recent quarters, the sum of hours is greater than 1,560 total man hours.
- For the four most recent quarters, each quarter must have reported hours.

To classify as "intermittent," mines must meet criteria 1 and either criteria 2 or 3:

1. For the four most recent quarters, the sum of hours is greater than 200

¹² MSHA Metal and Nonmetal revised their procedures as a result of the early findings of the Accountability Review Team and now inspects all underground mines a minimum of four times per year.

total work hours.

2. For the four most recent quarters, one quarter's hours are less than or equal to 15% of the sum of the four quarters.
3. For the four most recent quarters, one or more quarters has no hours reported.

ii. Findings of Fact

The table shows the hours reported for the Revenue Mine in Calendar Year 2012 and Calendar Year 2013. All of the data below is calculated as reported in Calendar Year quarters.

Revenue Mine Employment Hours Reported				
	Q1	Q2	Q3	Q4
Calendar Year 2012	2,311	8,833	20,361	34,995
Calendar Year 2013	46,453	48,512	55,992	53,519

Revenue Mine status at end of June 2013

The mine did not meet all of the requirements in the Mine Status Criteria guidance to designate it in active mine status. Revenue Mine's third quarter 2012 hours (20,361), were less than 15% of the sum of the four quarters. The mine did meet criteria 1 and 2 in the guidance for intermittent status, and therefore, the Field Office Supervisor properly designated the mine to be in intermittent status.

The active status criteria 1 calculation for Revenue Mine at the end of June 2013 is as follows:

$$(3\text{rd Quarter } 2012 + 4\text{th Quarter } 2012 + 1\text{st Quarter } 2013 + 2\text{nd Quarter } 2013) \times 0.15$$

Or

$$(20,361 + 34,995 + 46,453 + 48,512) = 150,321 \text{ and } 150,321 \times 0.15 = 22,548$$

Revenue Mine status at end of September 2013

Based on the sum of the four most recent quarters at the end of the third calendar year quarter ending September 30, 2013, the Revenue Mine met the requirements for active status. Each quarter's hours are greater than 15% of the sum of the four

quarters. Therefore, the mine met all three criteria for active status and the Field Office Supervisor properly designated the mine as active.

(4th Quarter 2012 + 1st Quarter 2013 + 2nd Quarter 2013 + 3rd Quarter 2013) x 0.15

Or

$(34,995+46,453+48,512+55,992)=185,952$ and $185,952 \times 0.15 =27,893$

iii. Conclusion and Recommendations

Prior to the 1st Quarter FY 2014 (Oct. – Dec. 2013), the Revenue Mine was accurately designated as in intermittent status. The mine was placed in active status November 19, 2013. Based on the procedures in place at the time of the accident, mines in intermittent status required two inspections per year and the Field Office had conducted all required inspections.

VI. Additional Policy and Procedure Considerations

In conjunction with this accountability review and the recommendations for corrective actions in specific areas identified in this review, the Review Team offers additional observations that MNM may consider depending on budget considerations.

1. The Review Team recommends that the Administrator for MNM consider providing additional guidance in the GIPH for inspectors' review of ventilation plans.

An inspector's required, off-site documentation review for regular inspections includes, mine ventilation plans and mine maps (for underground mines, if available), and inspectors must document that they reviewed the plans/maps in their notes or on the appropriate MSHA form. As discussed above in section C, Metal and Nonmetal general inspection policies and procedures do not require in-mine, physical inspections, during or after the plan review process, to examine ventilation systems and evaluate the accuracy of the ventilation maps. Additionally, the GIPH does not provide detail as to how inspectors should review ventilation plans during regular inspections.

The Review Team recommends that the Administrator for MNM add additional language to the GIPH to give inspectors more guidance in evaluating ventilation plans and ventilation during underground inspections. For example,

- Check to ensure that required elements are included as required by 30 CFR §57.8520.

- Follow the air course from intakes, through the working areas, to the returns. Look for discrepancies between where the map or schematic shows air flows, and where the air would actually flow (checking for short circuits and recirculation) based on the location of ventilation control structures such as brattices, stoppings, regulators, and doors. Also check for inconsistencies in the indicated airflow rates.
 - Verify that indicated volumetric flows are consistent.
 - Inspect the surface and underground elements of the ventilation system to ensure compliance with applicable provisions of Subpart G.
 - Spot checks of airflow direction and quantity may be necessary to verify agreement between the ventilation system and the ventilation plan. Airflow direction can usually be determined without special tools or instrumentation.
2. The Review Team recommends that the Administrator for MNM review policies and procedures on supervisory review of inspection documentation and/or provide additional training to supervisors on effective review of inspection documentation.

Under the GIPH, Field Office Supervisors must evaluate inspection documentation generated by inspectors assigned to them once every six months during a fiscal year. That review must include at least one recently completed regular (mandated) inspection or investigation for each inspector. See the Metal and Nonmetal Mine Safety and Health Supervisors Handbook, AH09-III-1(1), Chapter 2, Supervisory Accompanied Reviews and Inspection Evaluations. The GIPH and MNM Supervisory Handbook do not specifically address how Field Office Supervisors are to review and evaluate inspection reports.

In the case of the regular inspections at the Revenue Mine, the Field Office Supervisor reviewed and initialed all five of the regular inspection reports. The Accountability Review Team found no documentation showing that the Field Office Supervisor identified deficiencies in the inspection reports or provided feedback and direction to the inspectors concerning the adequacy of the inspections.

To the extent supervisors are reviewing and initialing off on inspection reports, the Review Team recommends that the Administrator for MNM provide guidance in the Supervisors Handbook on comprehensive and effective reviews of inspection reports. Additionally, the Review Team recommends that the Administrator for MNM develop training for supervisors on important aspects of a comprehensive inspection report review and how to provide feedback to inspectors on inspection

report shortcomings. The Review Team suggests such training might include, as case studies, reviews and evaluations of previously submitted inspection reports.

3. The Review Team recommends the Administrator for MNM consider establishing additional supervisory visits to underground mines.

Metal and Nonmetal procedures do not require the supervisors to visit mines beyond the requirements for Field Office Supervisors to accompany each inspector assigned to them on one regular (mandated) inspection at least once each fiscal year. The Denver Field Office Supervisor completed these required Field Accompanied Reviews (FARs) in FY 2012 and FY 2013 and documented accomplishments and deficiencies in the reports. None of the FARs the Field Office Supervisor conducted were related to inspections of the Revenue Mine. The Field Office Supervisor reviewed and initialed all of the regular inspection reports for the Revenue Mine. The Review Team found no documentation showing the Field Office Supervisor identified deficiencies in the inspection reports or provided feedback and direction to the inspectors concerning the adequacy of the inspections.

The Review Team considered whether closer MSHA management attention to underground mines that are new or reopening would result in more comprehensive knowledge of those mines, giving the supervisors a better understanding of those mines when reviewing and evaluating the inspections. The Review Team recommends that the Administrator for MNM consider adding a requirement for Field Office Supervisors to visit underground mines that are new or reopening.

November 13, 2014

MEMORANDUM FOR PATRICIA W. SILVEY
Deputy Assistant Secretary for Operations
Mine Safety and Health

FROM: NEAL H. MERRIFIELD
Administrator for Metal and Nonmetal
Mine Safety and Health

SUBJECT: Metal and Nonmetal's response to MSHA's Office of
Accountability Review of Rocky Mountain District, Denver,
Colorado Field Office and Star Mine Operations, LLC, Revenue
Mine (05-03528)

Background

The Revenue Mine is an underground silver mine located in Ouray County, Colorado. It was abandoned for twenty-seven years before Star Mine Operations, LLC purchased the mining operation in October, 2011, and began rehabilitation and development work in preparation for active mining operations. On November 17, 2013, a 33-year old powderman trainee, with five weeks of experience, and a 59-year old shift supervisor, with 36 years of experience, were killed at this mine.

The Assistant Secretary of Labor for Mine Safety and Health directed MSHA's Office of Accountability (OA) to conduct an accountability review of the Rocky Mountain District and the Denver, Colorado, Field Offices' actions pertaining to the Revenue Mine. The OA recommendations and Metal and Nonmetal (MNM) responses to the OA recommendations are listed below.

The Accountability Review Team worked jointly with the Metal and Nonmetal Mine Safety and Health at the Headquarters and District levels to develop appropriate corrective actions that will strengthen supervisory and inspection processes and result in improved training of Metal and Nonmetal enforcement staff.

cc: Jay Mattos

MSHA OA Review Recommendations and MNM Responses

Recommendation #1

The Review Team recommends additional training for inspectors in the requirements of the General Inspection Procedures Handbook (GIPH) related to underground inspections, reviewing mine maps, and documenting completeness of regular underground inspections.

- The training should emphasize a thorough review of operator workplace examination records, including an evaluation of workplace conditions and mine activities, to identify areas required to be inspected.

MNM Response: *MNM agrees with this recommendation*

MNM Headquarters Division developed new training modules that addressed underground inspection documentation regarding the completeness of regular underground inspections and mine maps. The training modules focus on identifying areas required to be inspected, including reviews of operator workplace examination records.

The Administrator for MNM is reviewing policies to determine if changes/revisions to the policy are necessary.

The training modules were disseminated to all of the MNM Districts in June 2014. The instructional materials were comprised of a detailed PowerPoint presentation which was first reviewed by the Districts' top staff. The District staff personnel then conducted training with all of the field office supervisors. Following the completion of the supervisor training, each supervisor, in their respective office, conducted a training session with all of their inspectors in the field offices. Each supervisor documented the attendees for the training session.

Recommendation #2:

The Review Team recommends that the Administrator for MNM review the training provided to inspectors and supervisors regarding barricaded and abandoned areas and to revise the training as needed. Supplemental training should be provided for inspectors and supervisors focusing specifically on the inspections, evaluations, and documentation of abandoned workings and barricaded areas.

MNM Response: *MNM agrees with this recommendation*

The Administrator for MNM reviewed training regarding barricading and abandoned areas to determine if changes are necessary.

MNM Headquarters Division developed training modules that addressed inspections of barricaded and abandoned areas. The training modules were disseminated to all of the MNM Districts in June 2014. The instructional

materials were comprised of a detailed power-point presentation which was first reviewed by the Districts' top staff. The District staff personnel then conducted training with all of the field office supervisors. After the completion of the supervisor training, each supervisor, in their respective office, conducted a training session with all of their inspectors in the field offices. Each supervisor documented the attendees for the training session.

Recommendation #3:

The Review Team recommends that the Administrator for MNM review the training associated with hazard recognition in underground mines and, where necessary, provide additional focused training for inspectors in hazard recognition at underground mines.

MNM Response: *MNM agrees with this recommendation*

The Administrator for MNM has reviewed the current training regarding hazard recognition in underground mines and determined that changes are necessary to this program. Each MNM District is providing revised training on underground inspection procedures to all inspectors. The training will be provided by District Specialists and will be conducted in each field office. The training will address hazard recognition for underground mines, in general, and specifically address the underground mines assigned to the field office.

Recommendation #4:

The Accountability Review Team recommends additional training for inspectors regarding the documentation requirements in the GIPH.

MNM Response: *MNM agrees with this recommendation*

MNM Headquarters Division developed training modules that addressed citation and order documentation, inspection note-taking and inspection report documentation, including BATF inspection requirements.

The training modules were disseminated to all of the MNM Districts in June 27, 2014. The instructional materials were comprised of a detailed PowerPoint presentation which was first reviewed by the Districts' top staff. The District staff personnel then conducted training with all of the field office supervisors. After the completion of the supervisor training, each supervisor, in their respective office, conducted a training session with all of their inspectors in the field offices. Each supervisor documented the attendees for the training session.

Recommendation #5:

The Review Team recommends that the Administrator for MNM review the explosives training provided to inspectors and supervisors and provide supplementary training for inspectors and supervisors in the requirements of

the GIPH regarding inspections of explosives storage facilities/magazines, associated records, and observations of blasting practices.

MNM Response: *MNM agrees with this recommendation*

The Administrator for MNM reviewed the explosives training provided to inspectors and supervisors and determined additional training was necessary.

MNM Headquarters Division developed training modules that addressed inspection of explosives storage facilities/magazines, records and observation of blasting practices through a detailed PowerPoint presentation. The training modules were disseminated to all of the MNM Districts in June 27, 2014. The instructional materials were comprised of a detailed PowerPoint presentation which was first reviewed by the Districts' top staff. The District staff personnel then conducted training with all of the field office supervisors. After the completion of the supervisor training, each supervisor, in their respective office, conducted a training session with all of their inspectors in the field offices. Each supervisor documented the attendees for the training session.

Recommendation #6:

The Review Team recommends that MSHA should revisit its MOU with BATF to determine if the agency should continue to provide the service it currently provides to BATF.

MNM Response: *MNM agrees with this recommendation*

MSHA is in the process of updating the MOU with BATF. The draft MOU is currently being reviewed by BATF staff.

Recommendation #7:

The Review Team recommends that the Administrator for MNM explore the possibility of revising policies and procedures to provide for in-mine physical reviews of ventilation as part of the District reviews of the ventilation plans and maps. The in-mine portion of the review could be conducted as part of the E01 inspections. The procedures could specify the items to be reviewed during the in-mine physical evaluation. This list of reviewed items could be retained along with the plan documentation.

MNM Response: *MNM agrees with this recommendation*

The Administrator sent a memorandum to all Districts on July 7, 2014 requiring that an annual mine site visit must be conducted for each ventilation plan submitted as required by 30 CFR 57.8520. The in-mine visit will include verification that all information required in subparts (a), (b)(1) through (b)(10), (c), (d), and (e), shown on the plan, is accurate, and a determination that the mine's ventilation system meets the requirements of 30 CFR Subpart G – Ventilation.

MNM has developed a Standard Operating Procedure (SOP) for conducting Ventilation Plan/Map reviews. The SOP will be discussed with the NCFLL prior to implementation.

Recommendation #8:

The Review Team recommends that the Administrator for MNM develop training specific to mine maps and evaluating ventilation systems for incorporation into inspector and supervisor training. The Administrator for MNM should consider the need for additional non-management personnel with the training and background needed to review underground mine ventilation and maps.

MNM Response: *MNM agrees with this recommendation*

The MNM Administrator will review and consider if there is a need for additional personnel with background and training to review underground mine ventilation and maps.

MNM Headquarters Mine Safety and Health division will develop a detailed training program ensuring the inspectorate is well versed on the requirements of 57.8520, subparts (a), (b)(1) through (b)(10), (c), (d) and (e), and in determining if the mine's ventilation system meets the requirements of 30 CFR Subpart G – Ventilation.

Additional training will be developed ensuring that the inspectors and supervisors are proficient in evaluating maps and ventilation systems.

Recommendation #9:

The Review Team recommends that the Administrator for MNM provide clarification on enforcement responsibilities related to second escapeways and refuges. The clarification should address regulation requirements for locations of refuge areas for mines developing a second escapeway, including whether methods of refuge are required during exploration/development. Further, the Review Team recommends that the Administrator develop training for inspectors in refuge requirements and the inspection of refuge areas.

MNM Response: *MNM will review the current policy and procedures to determine if additional clarification regarding enforcement responsibilities on second escapeways and refuges is necessary.*

MNM Headquarters Division developed training modules that address enforcement responsibilities related to second escapeways and refuges. The training modules were disseminated to all of the MNM Districts in June 2014. The instructional materials were comprised of a power-point presentation which was first reviewed by the Districts' top staff. The District staff personnel then conducted training with all of the field office supervisors. After the completion of the supervisor training, each supervisor, in their respective office, conducted a

training session with all of their inspectors in the field offices. Each supervisor documented the attendees for the training session.

MNM Headquarters Mine Safety and Health division will develop a training program ensuring the inspectorate is well versed on the requirements and inspection of refuge areas.

Recommendation #10:

The Review Team recommends that the Administrator for MNM consider providing additional guidance to inspectors on determining if training was conducted through discussions with miners about how they are trained to perform their job, to perform specific tasks, or when and where they last received training.

MNM Response: MNM Administrator will review the current policy to determine if additional guidance is necessary to be incorporated into the GIPH.

Recommendation #11:

The Review Team recommends that the Administrator for MNM consider providing additional guidance in the GIPH for inspectors' review of ventilation plans.

The Review Team recommends that the Administrator for MNM add additional language to the GIPH to give inspectors more guidance in evaluating ventilation plans and ventilation during underground inspections.

MNM Response: *MNM agrees with this recommendation*

MNM Administrator will review the current guidance in the GIPH to determine if changes, additions or revisions are necessary.

See response to Recommendation #7 above.

Recommendation #12:

The Review Team recommends that the Administrator for MNM review policies and procedures on supervisory review of inspection documentation and/or provide additional training to supervisors on effective review of inspection documentation.

The Review Team recommends that that the Administrator for MNM provide guidance in the Supervisors Handbook on comprehensive and effective reviews of inspection reports. Additionally, the Review Team recommends that the Administrator for MNM develop training for supervisors on important

aspects of a comprehensive inspection report review and how to provide feedback to inspectors on inspection report shortcomings.

MNM Response: *MNM agrees with this recommendation*

The Administrator for MNM will review the current policies and procedures in the MNM Supervisors Handbook relating to the supervisory review of inspection documentation to determine if changes/additions are necessary.

MNM will develop a detailed training program ensuring the supervisors are well versed on performing a comprehensive inspection report review and providing the proper feedback to the inspectors.

Recommendation #13:

The Review Team recommends the Administrator for MNM consider establishing additional supervisory visits.

MNM Response: MNM agrees with this recommendation

The MNM Administrator directed that field office supervisors with underground mines in their travel area must visit new underground mines and reopened underground mines.

The MNM Administrator sent a memo to all District Managers on July 7, 2014 informing them that all field office supervisors must visit new underground mines and any reopening underground mining operations.