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KEYSTONE COAL MINING V. SOL (MSHA)
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FEDERAL MINE SAFETY AND HEALTH REVIEW COMMISSION

OFFICE OF ADMINISTRATIVE LAW JUDGES
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FALLS CHURCH, VIRGINIA 22041

IN RE: CONTESTS OF RESPIRABLE) Master Docket No. 91-1
DUST SAMPLE ALTERATION)
CITATIONS)
)
KEYSTONE COAL MINING CORP.,) CONTEST PROCEEDINGS
Contestant)
v.) Docket Nos. PENN 91-451-R
) through PENN 91-503-R
SECRETARY OF LABOR,)
MINE SAFETY AND HEALTH) Citation Nos. 9860247
ADMINISTRATION (MSHA),) through 9860299
Respondent)
) Docket Nos. PENN 91-1176-R
) through PENN 91-1197-R
)
) Citation Nos. 9862821
) through 9862842
)
) Urling No. 1 Mine
) Mine ID 36-04852
)
SECRETARY OF LABOR,) CIVIL PENALTY PROCEEDINGS
MINE SAFETY AND HEALTH)
ADMINISTRATION (MSHA),) Docket No. PENN 91-1264
Petitioner) A.C. No. 36-04852-03757D
v.)
) Docket No. PENN 91-1265
KEYSTONE COAL MINING CORP.,) A.C. No. 36-04852-03758D
Respondent)
) Docket No. PENN 91-1266
UNITED MINE WORKERS) A.C. No. 36-04852-03759D
OF AMERICA (UMWA),)
Representative) Docket No. PENN 92-182
of the Miners) A.C. No. 36-04852-03778D
)
) Docket No. PENN 92-183
) A.C. No. 36-04852-03779D
)
) Urling No. 1 Mine

DECISION

Appearances: Douglas N. White, Esq., Stephen D. Turow, Esq., and Richard L. Gilman, Esq., Office of the Solicitor, U.S. Department of Labor, Arlington, Virginia, for the Secretary of Labor; R. Henry Moore, Esq., Stanley R. Geary, Esq., and Heather A. Wyman, Esq., Buchanan Ingersoll, Pittsburgh, Pennsylvania, for Keystone Coal Mining Corp.; Barry A. Woodbrey, Esq., Washington, D.C., for the United Mine Workers of America.

Before: Judge Broderick

STATEMENT OF THE CASE

On April 4, 1991, the Secretary of Labor (Secretary) issued 53 citations to Urling Number 1 Mine (Urling) of the Keystone Coal Mining Corp. (Keystone) alleging violations of the mandatory standard in 30 C.F.R. 70.209(b). On June 7, 1991, the Secretary issued an additional 22 citations for violations of the same standard. Each of the citations charges that "the weight of the respirable dust cassette . . . has been altered while the cassette was being submitted to fulfill the sampling requirements of Title 30 C.F.R. Parts 70, 71 or 90. Observation of the filter surface indicates that a portion of the dust had been removed." The filters cited on April 4, 1991 were submitted on various dates between September 20, 1989 and December 4, 1989. The filters cited on June 7, 1991 were submitted on various dates between January 3, 1990 and May 15, 1990. For each of the violations charged on April 4, 1991, the Secretary sought a civil penalty of \$1,800; for each violation charged on June 7, 1991, he sought a penalty of \$1,500. At the closing argument after the trial in this case, counsel for the Secretary stated that he now seeks a penalty of \$5,000 for each violation.

The citations issued to Urling are part of the more than 5,000 citations issued to approximately 800 coal mines in 1991. Following substantial pretrial discovery, all pending cases were consolidated for the trial of issues common to all cases. The common issues trial was conducted from December 1, 1992 to February 22, 1993. (Footnote 1)/ The common issues decision, promulgated July 20, 1993, selected Urling for a mine-specific trial and stayed all other pending cases. Contests of Respirable Dust Sample Alteration Citations, 15 FMSHRC 1456 (1993). The Urling mine is operated by Keystone, which is a wholly owned subsidiary of Rochester and Pittsburgh Coal Company (R & P). The dust

1/ Transcript citations to the common issues trial will be prefixed by CIT, as CIT Tr. ____.

sampling program at all the R & P mines, including Urling, was conducted by R & P's Environmental Safety Department which was located in a central laboratory.

A written stipulation was submitted and received at the commencement of the mine-specific hearing on November 30, 1993. The Secretary offered testimony from a number of miners and former miners of Keystone; Robert A. Thaxton, MSHA supervisory industrial hygienist who initially determined that the citations should be issued; Dr. Virgil A. Marple, an expert in the field of aerosol particle technology who testified in the common issues trial; Paul S. Parobeck, Chief of the Instrumentation and Analytical Branch of MSHA's Pittsburgh Health Technology Center; and Dr. John J. Miller, a statistics expert who testified in the common issues trial. Keystone offered testimony from a number of Keystone personnel, including assistant foremen at Urling, certain safety personnel, and the supervisors and dust technicians at the R & P central dust laboratory; Dr. Richard J. Lee, an expert in materials characterization and analyses and environmental monitoring who testified in the common issues trial; and Dr. H. Daniel Roth, a statistics expert who also testified in the common issues trial. The United Mine Workers of America (UMWA) did not offer any witnesses or other evidence. The hearing concluded on January 6, 1994. Counsel for the Secretary and Keystone made closing arguments on the record and each has filed a written posthearing brief and a reply brief. I have considered the evidence received in the common issues trial, the evidence in the mine-specific trial involving Keystone's Urling mine, and the contentions of the parties in making this decision.

I. FACTUAL AND PROCEDURAL BACKGROUND

A. RESPIRABLE DUST SAMPLING PROGRAM

Section 202 of the Federal Mine Safety and Health Act of 1977 (Mine Act), 30 U.S.C. 801 et seq. (1988), requires each coal mine operator to take accurate samples in a manner prescribed by the Secretary of the amount of respirable dust in the mine atmosphere to which each miner in the active workings is exposed. Congress first instituted dust sampling requirements to control the amount of respirable dust to which miners are exposed when it enacted sections 201 through 205 of the Federal Coal Mine Health and Safety Act of 1969, 30 U.S.C. 801 et seq. (1976) (amended 1977). In enacting these provisions, Congress voiced the nation's concern for the "countless thousands [who] have suffered and died or presently suffer from the ravages of coal workers' pneumoconiosis -- the dread miners disease caused by the inhalation of excessive amounts of coal dust." H.R. Rep. No. 91-563, 91st Cong., 1st Sess. (1969), reprinted in Legislative History Federal Coal Mine Health And Safety Act 558 (1970).

In implementing the statutory requirements, the Secretary has promulgated regulations, 30 C.F.R. 70.201-220 (for underground mines), 71.201-220 (for surface mines), and 90.201-220 (for Part 90 miners), which require coal mine operators to take samples of the concentration of respirable dust in the active workings of the mine and to maintain the average concentration of such dust at or below prescribed levels. The concentration is determined on the basis of five valid samples from a designated occupation (or one valid sample from a designated area) during a bimonthly sampling period. Compliance by the coal industry with these requirements and the reduction in the incidence of "black lung" disease is obviously of the highest importance. Black lung is irreversible and continued exposure to respirable dust after it is contracted can lead to progressive pulmonary fibrosis and the destruction of lung tissue. (Footnote 2)/ Therefore, violations of the respirable dust limits have been determined to be of such nature as could significantly and substantially contribute to a mine health hazard (Section 104(d) of the Mine Act). Consolidation Coal Co., 8 FMSHRC 890 (1986), aff'd sub nom. Consolidation Coal Co. v. FMSHRC, 824 F.2d 1071 (D.C. Cir. 1987). Clearly, violations of the standard in section 209(b) are extremely serious violations since they compromise the integrity of the program designed to reduce respirable dust and its deadly effects.

B. COMMON ISSUES TRIAL AND DECISION

By agreement between counsel for the Secretary and counsel for the mine operators, a common issues trial involving all the consolidated cases was held. The trial began in December 1992 and was concluded in February 1993. The purpose of the common issues trial was to receive evidence and decide issues common to all the contested citations. On behalf of the Secretary, Robert Thaxton testified concerning his criteria for citing filters exhibiting abnormal white centers (AWCs) and explained why he concluded that such filters established tampering. He described his classification of the cited filters under 10 tamper codes in accordance with the physical appearances of the filters and what Thaxton believed caused those appearances. The Secretary introduced evidence concerning the handling of filter cassettes at MSHA's Pittsburgh Health Technology Center (PHTC). Scientific expert witnesses testified on behalf of the Secretary and the mine operators as to the possible and probable causes of AWCs and the effect of sampling equipment and mine dust variables on the occurrence of AWCs. They offered opinion evidence on the question whether an AWC indicates an intentional alteration of

2/ "Down through the years, Black Lung -- the disease caused by breathing respirable coal dust -- has snuffed out more lives than any of the other hazards present in mining." J. Davitt McAteer, Miner's Manual 109 (1981).

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the weight on the filter. Statistical expert witnesses testified on behalf of the Secretary and the mine operators concerning the meaning of the rates of cited AWCs in the various mines and the decline in the cited rates at different times.

My decision on the common issues trial made certain findings of fact. I found that reverse air AWCs could have resulted from intentional acts, such as blowing or otherwise directing a pulse of air into the cassette outlet or introducing a vacuum source into the cassette inlet. I found that such AWCs could also have resulted from impacts to the cassette or the sampling hose, which might have occurred accidentally during normal handling of the sampling equipment at the mines, or from snapping together the two halves of the cassette. I further found that the reverse air AWC dislodgment patterns could not have resulted from mailing the cassettes from the mines to the PHTC, or the desiccation of the filter capsules or other handling of the cassettes and capsules at the PHTC. I found that the filter-to-foil distance in the cassettes and the floppiness of the filters were factors in the susceptibility of filters to AWC dislodgments; and that the firmness or softness of the sampling assembly hose, and variables in the dust on the filter may have affected the susceptibility to AWCs. I found that on the average reverse air AWC filters showed a weight loss. With respect to filters cited under tamper codes other than those considered the result of reverse air, I found that those classified under tamper codes 5 and 9 could have resulted from intentional tampering, but those classified under codes 8 and 10 were not consistently classified or were not shown to have been likely caused by intentional acts.

On the basis of all the evidence introduced in the common issues trial, I concluded that the Secretary failed to carry his burden of proving by a preponderance of the evidence that an AWC on a cited filter establishes that the mine operator intentionally altered the weight of the filter, and that he failed to carry his burden of proving by a preponderance of the evidence that deliberate conduct on the part of the cited mine operators is the only reasonable explanation for the cited AWCs.

Those findings and conclusions are incorporated in this decision involving Keystone.

II. THE MINE-SPECIFIC TRIAL -- SAMPLING AND AWCs

A. HANDLING OF DUST PUMPS AND CASSETTES AT URLING

1. THE ESD DUST LAB

The respirable dust sampling program for Urling, as well as for all R & P mines, has been conducted by R & P's Environmental Safety Department (ESD) under the supervision of Donald Eget since 1970. During 1989 and 1990, Shawn Houck worked at the ESD

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as a maintenance and calibration technician, and Douglas Snyder worked as a dust technician assigned responsibility for sampling at the Urling mines. Three other dust technicians were assigned responsibility for sampling at other R & P mines.

Shawn Houck worked from 6:00 a.m. to 2:00 p.m., Monday through Friday. When he arrived at the lab he prepared pumps to be used by the dust technicians that day. The dust technicians arrived about 7:00 a.m., picked up the pumps and sampling assemblies, and took them to the mines for sampling on the three shifts, the first beginning at 8:01 a.m. (daylight shift). Donald Eget arrived at the lab at about 7:30 a.m. and, after being apprised as to the previous day's sampling, left at about 8:00 a.m. to pick up the pumps and samples from the previous afternoon and midnight shifts from all 13 R & P mines. Eget carried the pumps and samples back to the lab in a company vehicle. If the pumps were in a carrying box, Eget lowered the rear window of his vehicle and swung the box over the tailgate and placed it on the floor in the cargo area. He tried to avoid having the box land on the hoses but occasionally it may have done so. If Eget picked up loose pumps, he generally placed them on the floor on the passenger side or on the rear seat. He carried the loose pumps by grasping the hoses and might have carried up to half a dozen at a time. Eget was not concerned about loose pumps landing on hoses and he was sure that they did. He was not aware that this might have created a problem. Eget drove over main and secondary roads, some of which were rather rough. In 1989 and 1990, the Urling pumps were generally picked up from a hallway outside the safety director's office. Sometimes they were in carrying boxes, and sometimes they were loose. If loose, the pumps were aligned in rows parallel to the wall with the hoses out of the way. This was a traffic area, so the hoses could have been stepped on.

When Eget returned to the lab at some time between 9:30 a.m. and 11:45 a.m., he placed the pumps on a table. Other pumps might have been already there and the pumps or boxes of pumps might have landed on hoses. Eget testified that he did not handle the pumps carelessly, that he did not drop the pumps or boxes on the table, but placed them there. Other witnesses, including Houck and Snyder, testified that Eget handled the pumps roughly, briskly like he was in a hurry, and recklessly.

While Eget picked up pumps from the mines, Houck processed the pumps left from the previous daylight shift. Houck removed the sampling head and hose from each pump, cleaned the pumps, and placed them on the charging rack. He disassembled the sampling head and removed the cassette. He disassembled and cleaned the cyclone assembly, cleaned the hoses, and filled out the dust data cards. When Eget returned to the lab, Houck removed the cassettes from the sampling heads and took them to Eget's office.

Eget recorded cassette numbers from each mine, checked the dust data cards against the cassette numbers, and looked into cassette inlets and recorded the filter appearances. After Eget finished reviewing the samples, he brought them out of his office and Houck packaged them for mailing to MSHA. Cassettes from all three shifts were mailed simultaneously. Houck cleaned any remaining pumps, prepared pumps for use the next day, and did calibration and maintenance of pumps if needed until he left for the day.

The dust technicians returned from the mines to the lab after 4:00 p.m. and delivered pumps from the daylight shift. They placed their paperwork on Houck's desk, checked to see if pumps were in order for the next sampling day, and left for the day. Occasionally, dust technicians would be in the lab during the day, e.g., near the end of a bimonthly sampling period or when a section broke down at the mines. Eget left for the day at 4:00 p.m. or 5:00 p.m. after all the dust technicians phoned in or returned to the lab.

Houck testified that when he arrived at the lab, some pumps that were left by the dust technicians the previous afternoon were loose on the table and it took him 15 to 20 minutes to untangle the hoses. Many pumps were sitting on hoses. When Houck took apart the sampling assembly, it was often difficult to remove the hose from the nipple outlet on the pump. He would sometimes use pliers to pull the hose off, or double the hose to free it from the nipple, or wrap the hose around his hand and work it back and forth. Houck occasionally dropped cassettes on the floor when removing them from the sampling head or pushing in the plugs. Houck saw Eget catch the pump hoses in the office door when bringing them in. He also saw Eget accidentally drop the pumps, and strike hoses with pumps and boxes of pumps when he put them on the table.

Snyder has dropped pumps while carrying them from the Urling mine to his car or to the ESD. He has had hoses catch on the car door lock and latch, and the drawer handles in the safety office. He has dropped cassettes when pulling them from the sampling head. He has stepped on hoses and has seen others step on hoses. When carrying loose pumps, Snyder usually carried them by the hoses. He has placed pump carrying boxes on the table in such a way that hoses were caught under the box. Some hoses were difficult to remove from the pump. Snyder often had to wrap the hose through his first two fingers in order to pull it off.

The three other dust technicians testified regarding the manner in which they handled pumps. Robert Bolinger testified that when he placed pumps with the hoses wrapped around them in a carrying box, he had to push them into the box, thereby compressing the hoses on both sides of the pump. Bolinger used the trunk of his car to transport the pumps and samples and is

certain that at times he shut the trunk lid on hoses or caught the hoses on the trunk latch. When he brought them into the dust lab and placed them on the table, he impacted the hoses of other pumps. Bolinger handled the pumps roughly. Bolinger has dropped a cassette on the lab floor while removing it from the sampling head. He has also dropped the whole assembly. Herbert Gleditsch testified that before the Spring of 1990 he carried pumps by the hoses and handled them roughly. Gleditsch has caught hoses in his car door. He was not certain as to the time of these events. Thomas Hollern has snagged hoses that hang below the bottom of the pump carrying boxes. He may have closed the door of his car on hoses. He has dropped cassettes when removing them from the sampling heads. Hollern has placed pump carrying boxes on hoses lying on the lab room table.

I find as facts that the dust dislodgment patterns on the cited Urling filters could have resulted wholly or partly from the handling of the sampling assemblies by the ESD personnel described in this section. Specifically, they could have resulted from the carrying of multiple pumps by their hoses, dropping carrying boxes with pumps to the floor of a vehicle or onto a table, stepping on hoses, placing pumps on hoses, catching hoses in car doors or the office door, dropping pumps and sampling assemblies on the ground or on the floor, dropping dust laden cassettes on the floor, or otherwise impacting the hose as previously described.

2. RESPIRABLE DUST SAMPLING AT URLING

When Doug Snyder arrived at the Urling mine in the morning, he set the pump carrying box on a counter top or table. He usually brought four pumps to sample one mechanized mining unit (MMU) (a pump for each of the three shifts and one extra pump) or seven or eight pumps to sample two MMUs. The number of pumps he brought depended upon the sampling schedule, i.e., whether it was an MMU month or a designated area (DA) month, and how many sections he would be sampling. Snyder usually tried to sample two sections at a time.

Snyder collected pumps from the previous afternoon and midnight shifts left in the lamphouse or the section foremen's office, and placed them in the hallway for Eget to pick up. He took the pumps to be used for sampling on the daylight shift to the lamphouse and gave them to the miners or the section foremen. After Snyder distributed the pumps, he usually went into the mine. Snyder also distributed pumps at the beginning of the afternoon shift. Snyder left pumps with notes attached in the section foremen's desks if he was not there for the afternoon shift, and for sampling on the midnight shift.

The section foremen at Urling were certified to take respirable dust samples and were annually retrained by Snyder on the use of respirable dust pumps. Each section foreman supervised a coal production crew which was periodically sampled for respirable dust. When a crew member was sampled for respirable dust (usually the miner operator, but on occasion other crew members), the section foreman was required to examine the pump during the second and last hours of the shift to ensure that the pump was running and to check for proper flow rate.

The miners usually arrived at the Urling mine about 1/2 hour before the beginning of the shift. About 5 to 15 minutes before the shift started, miners went to the lamphouse to pick up their equipment. If sampling was scheduled they generally received pumps from Snyder or their section foremen.

Miners did not receive formal training on how to use or handle the pump, but were instructed to be careful with it and not to turn the sampling head upside down because it could spoil the sample. Miners knew that if a sample they took was invalidated they would have to carry the pump again to get another sample. The pumps were fully assembled and ready for sampling when the miners received them.

Miners wore or carried the pumps in a variety of ways, generally clipping the pump body onto their belts, clipping the sampling head onto their shirt collar, and clipping the hose onto their coveralls. Some miners ran the hose under and through the bib of their overalls. Others placed the pump body inside their coveralls. In this manner, the pump body sat between the miner's shirt and his coveralls (above the belt), the hose was tucked inside the coveralls and came out at the neck, and the sampling head was clipped to the lapel outside the coveralls. Some miners carried the pump to the section with the hose wrapped vertically around the pump body and the sampling head clipped to the nipple outlet.

The miners travelled to the working sections in mantrips. A mantrip carried four miners across on each of two seats with the mechanic and the section foreman sitting in the operator's compartment. Some miners placed their pumps, lunch buckets, hammers, and other items on top of the flat part of the battery on the mantrip, on the bumper above their feet, on the metal ledge, on the seat, or on the floor during transit to and from the section. Some miners left the sampling head attached to their collar and placed the pump body between their legs. Others continued to wear their pumps. After the mantrip ride, miners generally walked to the "kitchen" where they dropped off their lunch buckets, got their tools, and received instructions and information regarding mining conditions. Then they went to the face and mined coal.

Two types of continuous mining machines were used at Urling -- the Lee-Norse miner and the Joy miner. When using the Lee-Norse continuous mining machine, some miners wore the pump and others set the pump on top of the machine next to or inside the operator's compartment and attached the sampling head onto the canopy post. The hose was generally straight up and down in front of the miner operator. Some miners hung the whole pump on the canopy post with the sampling head attached to the nipple outlet, using wire attached to a hole in the canopy post and the clip on the back of the pump. Regardless of where the pump was set, it would stay in place throughout the shift. The Joy continuous mining machine was operated using a remote control unit. The miner sat on a bench, stood, or knelt at varying distances behind the machine. When using the Joy machine, some miners wore the pump and others attached the pump to the remote box. Miners attached the entire pump assembly to the remote box in a variety of ways. Some miners left the hose hanging in front of the remote box, while others wrapped the hose where it could not get caught.

Generally, the miner operators alternated responsibilities with their miner helpers after each cut. When the miner operator and the miner helper switched roles, the pump remained affixed to the machine or the remote box (the pump stayed with the person operating the continuous mining machine throughout the shift).

In addition to running the continuous mining machine, miners shovelled coal from the belt, rock dusted, cleaned up, checked the bits and sprays, and hung curtains. Some miners wore the pump while performing these activities. Other miners left the pump on the machine or the remote box. When miners put down the remote box, they placed it on top of the machine or bench or on the mine floor. Miners put other equipment on top of the machine also, e.g., a rock bar, hammers, pliers, bolts, and bits in a gallon bucket.

Occasionally, but not often, pumps have accidentally fallen during the shift, e.g., pumps have fallen off the remote box, and pumps have fallen off miners' belts when they were walking bent over, stooping, or shoveling. Sometimes the miners have caught the pumps (by the pump body or the hose), or the sampling head and hose clips have prevented pumps from falling to the mine floor. Sometimes pumps have detached from the hose and fallen to the floor. Other times entire sampling assemblies, including the sampling head and pump, have fallen to the floor.

Miners have snagged hoses on objects during the shift while walking in the mine. This could have pinched the hose or detached the hose from the nipple outlet. If a hose is pinched, the pump makes a sound different from its normal drone, more like a "thump." The miners testified that they have also heard this sound when riding on the mantrip and a hose is squeezed between

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two miners' bodies. The miners did not recall stepping or sitting on hoses during the shift.

Some miners turned off the pump during the shift because of its noise. The pump sounds like a "bunch of bumble bees." Miners turned off the pump for up to 5 minutes at a time to hear someone tell them something or if they heard a noise in the roof. Some miners turned off the pump for a few minutes at a time when they were stumping or pillar mining so they could listen to roof conditions. In the kitchen at lunchtime, when the miner operator and helper took their breaks together, some miners turned off the pump for the entire 1/2-hour lunch. Other miners left the pump running in the lunchroom.

Toward the end of the shift when it was time to stop mining, the miners checked to see that all the curtains were up, ventilation was maintained, and equipment was serviced if needed. Miners cleaned the continuous mining machine, changed the bits on the machine, checked water sprays, closed off the machine, cleaned off any rock that may have fallen on the heads, and cleaned coal off the heads. The crew returned to the kitchen to put away tools and pick up their lunch buckets and coats. Miners continued to carry or wear the pump while walking to the kitchen. Then the crew went to the mantrip and rode toward the elevator. The miners testified that they handled the pumps in the same manner as on the mantrip ride into the mine. If miners were wearing the pump, they left it on and if they were carrying it, they continued to carry it.

Different section foremen had different "rules" (and some had no "rule" at all) regarding who would bring the pump out of the mine at the end of a shift -- sometimes the miner brought the pump out and sometimes the section foreman brought it out. Section foremen who carried the pumps out of the mine received the pumps from the miners at various locations, e.g., at the mantrip before leaving the section, on the mantrip during transit, at the end of the mantrip ride (sometimes pumps were left on the mantrip), at the bottom of the elevator, or at the top of the elevator. Generally, the sampling head was clipped to the nipple outlet on the pump body with the hose hanging. The pumps were normally running when the section foremen received them. The section foremen carried pumps out of the mine in a variety of ways, e.g., in their hands, set on top of the battery in front of the operator's compartment on the mantrip, inside their zipped up coveralls with the sampling head outside their coveralls, or clipped to their belt with the sampling head clipped to their collar or coveralls.

When section foremen brought pumps out of the mine, they generally turned off the pumps at the top of the elevator. After getting off the elevator, the section foremen gave the pumps to Snyder (usually after daylight and midnight shifts), generally

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with the sampling head clipped to the nipple outlet. If Snyder was not there, the section foremen set the pumps on the lampman's counter or mechanic's box in the lamphouse, or took them to the section foremen's office and set them in one of the raised-lid desks with the sampling head clipped to the nipple outlet. A section foreman may have found another pump left in the desk by the section foreman from the previous shift (generally, three section foremen shared each desk). The section foremen placed other things in their desks, e.g., a hammer, thermos, lunch bucket, belt, coat, etc. Some section foremen were careful not to throw things into their desks or place things on top of the hoses. Some were not so careful. Sometimes desk lids have fallen on top of hoses that were hanging over the desk's edge.

Generally, miners were in a hurry when travelling from the mantrip to the elevator. They walked a little faster than normal, but did not run. When miners carried the pump on the elevator, the sampling head was usually clipped to the nipple outlet with the hose hanging. Some miners wrapped the hose vertically around the pump body and clipped the sampling head to the nipple outlet. Other miners wore the pump on the elevator. If Snyder was at the top of the elevator, miners handed their pumps to him as they returned to the lamphouse. Snyder put the pumps in a carrying box set either beside him on the floor or on top of the mechanic's box. If Snyder was not there, miners gave the pumps to their section foremen or set them on the mechanic's box or lampman's counter, with the sampling head clipped to the nipple outlet or the wire mesh cage above the lampman's counter or standing beside the pump body (not fastened to anything). After putting their equipment away, the miners went to the shower room and then left the mine property.

All of the miners and section foremen testified that they had never seen tampering with the pump or dust samples at Urling.

Like all underground coal mines, the environment in Urling is harsh and confined. I find as facts that the dust dislodgment patterns on the cited filters could have resulted wholly or partly from the handling of the sampling assemblies by the miners being sampled. Specifically, they could have resulted from pumps falling to the mine floor from the remote box or from miners' belts, from pumps being detached from the hoses and falling to the floor, from hoses being snagged on objects in the mine, from hoses being pinched on the mantrip, from hoses being impacted by other pumps on the lampman's counter or the mechanic's box, or from hoses being wrapped around pumps.

B. THAXTON CLASSIFICATION OF URLING FILTERS

Robert Thaxton reviewed the 75 cited Urling filters and the three filters classified as no-calls in October 1993 in preparation for his testimony at the mine-specific hearing. In

his examination of the filters, Thaxton used a lighted magnifying glass, a microscope, a ruler, and tweezers. He prepared a report which was received in evidence as G-505 and G-505A. Thaxton had previously systematically examined the same filters on two previous occasions prior to the common issues trial and had viewed them at various other times when the filters were examined by mine operators' experts. Thaxton is of the opinion that the dust deposition appearances of the filters have changed over time, some slightly and some "very dramatically." Tr. 882. In some cases the changes have affected Thaxton's ability to evaluate the filters, i.e., "to make the same call that [he] did four and a half years ago" Tr. 884. The preamble to his October 1993 report concludes: "Stated plainly, the filters do not look as they did when received in late 1989 and early 1990." G-505, p. 2. However, Thaxton did not identify any of the Urling filters which had so changed in appearance that he could not "make the same call" that he previously made.

For the purposes of testifying in this case, Thaxton divided the 75 cited filters into seven groups (A through G) in accordance with the general overall appearance of each filter. G-532. What were considered representative filters from each group were exhibited in the courtroom, and were viewed (some under a microscope) by counsel and the court.

The October 1993 report considered each of the 78 filters and indicated under which tamper code it was originally classified, and the tamper code assigned following Thaxton's March 1992 review. For each filter the report provides six "statements": the center characteristics; a comparison of the dust inside the central dislodgment to that outside; the appearance of a "keyhole"/"dagger"; the physical condition of the filter including the existence of a dimple; the general appearance of the filter deposition; and the most probable cause for the citable appearance. Thirteen of the filters were originally classified under tamper code 1, 59 under code 2, one under code 5, two under code 7, and three under code 11 (no-calls). Of the 59 under tamper code 2, seven were reclassified in March 1992 to tamper code 3. Of the "statements" in the 1993 report, the "first two . . . are the main characteristics . . . [in] making a determination of whether a filter would be cited or not." Tr. 878.

With respect to eight of the filters cited under tamper code 1, "statement 2" indicates that the dust inside the 6-millimeter ring "is lighter in approximately 1/3 of the circle, balance is nearly the same as that outside ring." In the case of one filter, the dust inside the ring is lighter in approximately one-half of the circle. Three filters are stated to have dust inside the 6-millimeter center that is "slightly lighter" than the dust immediately outside. However, filter 368209 classified under tamper code 1 is described in statement 2 as having "[d]ust

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inside 6 mm center . . . much lighter than that outside." These conclusions are inconsistent with Thaxton's testimony at the common issues trial to the effect that in tamper code 1 filters, the dust inside the central area is not essentially different from that immediately outside. CIT Tr. 181. Statement 6 is the same for all the filters classified under tamper code 1: "Most likely cause of central area disturbance is the result of a reverse flow of air such as would be produced by blowing into the cassette outlet by mouth."

In the case of 47 of the filters cited under tamper code 2, the dust in the 6-millimeter center is described as much lighter than that outside the center; seven of these were reclassified as tamper code 3 in March 1992. Two tamper code 2 filters are described as lighter within the center; six as slightly lighter, three as lighter in approximately one-third of the center circle; and one as having a center area "all nearly white." The cause of the dust disturbance in the case of all but one of the 59 filters originally cited under tamper code 2 is stated to be "reverse flow of air such as would be produced by blowing into the cassette outlet by mouth." Seven of these have an alternate cause: "or through the application of a mechanical means." The latter show a greater degree of dust removed in the central area than the other 52. The cause of the dust disturbance in filter 369204, cited under tamper code 2, is stated to be an object applied to the filter to remove dust.

Filter 324842 was cited under tamper code 5. It is described as having a 6 to 8-millimeter center with lighter dust inside the center. The most likely cause of the center area disturbance is stated to be a liquid being applied to the filter cassette.

Filters 325329 and 325635 were cited under tamper code 7. They are described in one case as having lighter dust in approximately one-third of the center circle, and on the other as having slightly lighter dust inside the center than immediately outside. In both cases the cause of the central area disturbance is stated to be reverse air flow such as would be produced by blowing into the cassette outlet by mouth.

Filters 323857, 325233, and 325613 were classified under tamper code 11 and were not cited because there was no discernible difference in the color of the dust deposited inside the center area and that outside. The distinction between some of the filters cited under tamper code 1 and no-call filters is very difficult to discern. The common issues decision described cited filters under tamper code 1 as those where the degree of dust removal in the center portion of the filter is not significantly different from that immediately outside. 15 FMSHRC at 1461. No-call filters were described as those not exhibiting "that degree of dust removal that [Thaxton] would feel

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comfortable" in citing. Id. at 1466 (quoting CIT Tr. 139). In describing the three no-call filters of Urling, Thaxton testified that the dust deposition inside the lighter ring is nearly the same as that outside the ring. Tr. 927-32.

In G-505, filter 325300 is described as having a well-defined center nearly white in color 6 millimeters in diameter in alignment with the inlet. The most likely cause of the central area disturbance is stated to be a reverse flow of air applied to the back of the filter cassette as would be produced by blowing by mouth or through the application of a mechanical means. Exhibit G-532 places filter 325300 in group G which is described as having a well-defined center disturbance from physical contact. In his testimony Mr. Thaxton stated that filter 325300 [and 369204] "have characteristics that could be classed as contact marks. That is that something may have been inserted into the inlet opening of the cassette to affect [sic] dust removal as opposed to strictly reverse air" Tr. 1004. When asked about the discrepancy in the descriptions of the cause of the dust dislodgment, Thaxton stated that

[F]ilter 325300 has the characteristics that would fit something coming in contact with the filter from being inserted through the inlet opening and also vacuuming the dust off the filter I just grouped them together for ease in discussion. That does not mean that there's any hard and fast -- all the ones in my report . . . have to be described exactly the same way as the way they're grouped.

Tr. 1007.

In the common issues decision, I noted some questions as to the coherence and consistency of Thaxton's classification of citable filters under his tamper codes, but found his overall classification sufficiently coherent and consistent for the purposes of the common issues trial. As noted above, I find inconsistencies in Thaxton's classification of the 78 filters which are being considered in this proceeding, but in general the cited filters conform to Thaxton's primary criterion: the dust inside the 6-millimeter central area generally is lighter than that immediately outside. But there are possible exceptions. For example, viewing filters 324070, 324221, 324772, 325311, 325329, and 325357, the dust in the central area, without considering the keyhole/dagger, appears to me to be essentially the same as that immediately outside the central area. Further, it is not clear that the three Urling no-call filters can be rationally distinguished from the cited filters. And it is still not clear to me whether Thaxton believes that the appearance on filter 325300 was caused by reverse air (blowing by mouth or vacuuming) or by inserting an object in the inlet to remove dust.

III. THE MINE-SPECIFIC TRIAL -- SCIENTIFIC EVIDENCE

A. THAXTON

At the common issues trial, Robert Thaxton was accepted as an expert witness in the fields of respirable dust sampling and in determining normal and abnormal patterns on respirable dust filters. I accept his judgment that the patterns on the 78 Urling filters are abnormal in that they do not conform to the normal pattern resulting from dust sampling: a dust deposition covering the filter more or less uniformly. However, I previously noted the vague and subjective classification of the filters into tamper codes, and the tenuous distinctions between some cited filters and no-call filters.

Thaxton is of the opinion that the dust dislodgment noted on the 75 cited Urling filters resulted from deliberate acts, in most cases by blowing by mouth through the cassette outlet. He bases his opinion on his review of the filters concerning which mine operators have pleaded guilty to criminal charges of tampering, on tests that he has conducted, on tests conducted by others including Dr. Marple, and on his many years of viewing normal dust deposition patterns on filters. Thaxton is of the opinion that the use of water sprays and scrubbers would have no effect on the dust deposited on filters, and would not cause the dust to be more difficult to dislodge. Tr. 4212-18.

Filter 324842, cited under tamper code 5, and filter 369204, cited under tamper code 2, are the only cited Urling filters in which according to G-500 reverse air played no part. Thaxton's conclusions that the pattern on the former resulted from a liquid "being applied" to the filter and that on the latter from some object being applied to the filter to remove dust are based on tests he performed at Mt. Hope. I have previously discussed his inconsistent conclusions as to the cause of filter 325300.

With respect to Thaxton's opinion as to the causes of the abnormal patterns, I stated in the common issues decision that his tests were nonsystematic and not conducted with scientific rigor. I further noted that he was not a disinterested witness. He has not prepared a comprehensive report explaining the rationale he has followed in ascribing causes to the dust dislodgment patterns he has described. For these reasons, although I considered and respected his opinions as to the cause of dust dislodgment patterns, I gave them diminished weight. I reaffirm that conclusion with respect to the Urling filters.

B. MARPLE

Dr. Virgil A. Marple examined the 78 Urling filters, classified them in accordance with the classification scheme devised for the common issues trial (see 15 FMSHRC at 1478-79),

and attempted to evaluate the mechanisms which created the Urling filter dislodgments following that protocol. The evaluation included "fingerprinting" or digitizing the filters to determine the diameter of the dislodgments and the relative gray values across the filters. He classified 69 of the cited filters as Marple type A-1, one as A-2, one as A-3, one as A-2 or C, two as C, and one as "other" (a water stain pattern). The three no-call filters he classified as type A-3 before he knew they were no-calls.

As a result of his experiments done for the common issues trial, Dr. Marple concluded that all type A patterns resulted from reverse air flow through the cassette. The type A-1 pattern shows less dust removed than the A-2, and more dust removed than the A-3. Tr. 1559. Marple concluded that the type C patterns resulted from inserting a vacuum tube into the cassette inlet and removing dust particles from the filter. His common issues experimental work created dust dislodgment patterns resulting from impacts to the filter cassettes which were classified as types E-1 and E-2. See G-531. In Dr. Marple's opinion the type E patterns resulted from different mechanisms than the A and C patterns shown on G-528. Tr. 1463. Dr. Marple rejected Dr. Lee's "mixed-mode" theory, discussed infra, as the cause of the Urling dust dislodgment patterns. In Marple's opinion if a mechanical impact was the dominant factor involved in causing the dislodgments, at least some of the filters would resemble Marple's E patterns. Dislodgments caused solely by reverse air may have a diffuse ring as Dr. Marple's common issues experiments showed. In Dr. Marple's report for the Keystone trial (G-508), he reached no conclusion as to whether the "liquid spot" filter 324842, classified as "other," resulted from deliberate conduct. None of Dr. Marple's experiments had produced a similar dislodgment. In his deposition prior to the Urling trial, Dr. Marple repeated that he had not reached a conclusion as to whether this dislodgment pattern resulted from a deliberate act or extreme mishandling. On cross-examination at the Keystone trial after he had learned of Mr. Thaxton's opinion that the pattern resulted from a liquid being applied to the filter, Dr. Marple found the filter to be "suspicious" and concluded that if it were accidental, the stains would have extended to the filter's edge. It appeared to him that "some kind of liquid had been put in and it could've been from something like an absorbent material stuck in the inlet and moistened, tried to lift off the particles and come back out, and continually had been left on the horizontal plain [sic] until it had dried." Tr. 1621.

Following his examination of the Urling filters and considering the experimental work previously performed, Dr. Marple concluded that the dislodgments were not created during normal dust sampling, that reverse air flow was the cause of 71 or 72 of the cited filters, that a vacuum or probe withdrawing particles caused two or three, that impacts to the

cassettes did not cause the dislodgments, and that at least 74 of the 75 dislodgments resulted from deliberate acts or extreme mishandling of the sampler.

Following receipt of Dr. Lee's report (R-2001), Dr. Marple performed a series of tests entitled vehicle/carrying case vibration tests. Ten filter cassettes loaded with 1 to 2 milligrams of laboratory generated dust were inserted in sampling heads connected to pumps and were put in a pump carrying box and placed in the cargo bed of a pickup truck. The pumps were turned off. The truck was driven 4 miles over a rough gravel road at a speed of about 40 miles per hour. Four of the hoses were taped to the box so that about 5 inches of each hose was held under the box. After the test, the filters were examined and did not show any dust dislodgment patterns. Thereafter, 10 sampling units were carried in a small unsprung steel trailer pulled by a garden tractor at about 9 miles per hour over a rough farm field road. Again no dislodgment patterns were found. The two tests were then repeated with different sampling units at higher rates of speed and under rougher conditions. One dislodgment pattern, of a type A-3, resulted from the second trailer-tractor test. Dr. Marple concluded that "it is very difficult, nearly impossible, to create a dislodgement by transporting the carrying case, with hoses underneath the case, in a vehicle." G-509, p. 5. Dr. Marple also concluded that a mixed-mode dislodgment pattern "from shocks and reverse air pulses in the hose, is a typical Type A-3 pattern . . . with dust inside and outside the 6 mm ring being about the same density." Id.

Dr. Marple considered the pump-wrap-and-throw test he performed for the common issues trial to be a mixed-mode event. He recalled that only one of the 60 filters used in the test resulted in a dislodgment pattern, of a type A-3, and he concluded that "it is extremely unlikely to create a dislodgement by impacting the hose and filter cassette due to throwing the assembly onto a table." Id. at 6.

Fifteen filters submitted to MSHA from the Urling mine in the winter of 1992-93 as part of normal compliance sampling were given to Dr. Marple to measure their threshold velocity. The measurements were performed in the same way as threshold velocities were measured in the common issues trial. The Urling samples were within the range of the mine samples measured for the common issues trial and their threshold velocities were much higher than those of the laboratory generated dust used in the vehicle/carrying case vibration tests. Since the lab dust is thus more susceptible to dislodgment, this reinforces Marple's opinion that transporting the sampling equipment by car or truck is very unlikely to result in dust dislodgments in the filters.

Dr. Marple's opinion as to the effect of water sprays on the susceptibility of dust laden filters to dust dislodgment is inconsistent. In discussing the threshold velocity of the Urling 1993 samples he testified:

Well, I don't think we really know what it is about this dust that makes mine dust more difficult to get off of the filter but it's probably something to do with the type of sprays that we are using and the wetness of the particles when it gets down on the filter.

* * * * *

I think the wetness of the particles would have a major effect which would be related back to the water sprays.

Tr. 1551. On rebuttal Dr. Marple testified:

Q. Now, is Doctor Lee right about increased water volume and pressure making deposits on filters that are less susceptible to dislodgment?

A. I don't believe so.

Q. You mean more water spray doesn't make the dust stickier?

A. That's right.

Q. Why?

A. Well, the more water spray we have, it make [sic] take out more of the particles, but the particles that penetrate through the water spray should be effectively the same independent of the amount of water So the ones that do get to the sampler have not been affected by the water sprays.

Tr. 4145. Dr. Marple further explained that the sampler collects dust particles that do not contact water droplets. He stated that if a wet particle got onto a filter it would adhere more firmly than a dry particle. He was referring to a particle to which moisture had attached at generation, not after it had become airborne. Tr. 4147-49.

C. LEE

On several occasions Dr. Richard J. Lee examined the 78 Urling filters involved in this proceeding and classified the 75 cited filters by R. J. Lee Group type. See 15 FMSHRC at

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1470-71, 1488-89. Each filter was examined under an optical microscope and some of the microscopic images were photographed and included in Lee's report. R-2001. Lee measured the diameter of the dislodgments using the optical microscope. Lee classified 43 of the cited filters in the R. J. Lee Group type 1, 24 in type 2, three in type 3, four in type 4, and one (the liquid spot filter) in type 5. He further divided the filters into six groups (A through F). The first four groups were based on the size and symmetry of the dislodgment pattern and the sharpness and dimension of the outer ring. Photographs of each group are exhibited with photographs of no-call, non-void, inspector, and Lee experimental filters for comparison. Group E are filters with dislodgments that Lee concluded were caused by handling, most likely during disassembly at the PHTC. In group F are three filters with "unique artifacts."

As noted above, Dr. Lee believed that the dust dislodgment on a number of filters (14 cited and one no-call) was caused or significantly affected by handling, most likely occurring during disassembly at the PHTC. In my common issues decision, I found that handling at the PHTC did not cause the cited AWCs. 15 FMSHRC at 1514. That finding is final and binding as to the Urling filters, and I therefore am not considering Dr. Lee's opinion insofar as it attributes any of the cited filter appearances to PHTC handling.

Lee noted that 57 percent of the Urling cited filters were classified as Lee type 1 (the dust deposit within the 6-millimeter ring has a color and density similar to the dust outside the ring), whereas 34 percent of the cited filters throughout the industry were so classified. He further noted that 17.3 percent of the Urling filters were classified by Thaxton as tamper code 1, while 12.6 percent of the cited filters industry wide were so classified. Lee's prior experiments showed that Lee type 1 dislodgments (and presumably Thaxton tamper code 1) resulted from smaller impact forces than the other types because less dust is dislodged. From these data Lee concluded that deliberate tampering did not occur, but that the dislodgments were caused by impacts incidental to the handling of the filters and sampling systems at the R & P facilities. Lee's experimental filters showed that deliberate blowing through the cassette outlet causes a sharp 6-millimeter ring, definite dust dislodgment within the ring, and a high percentage of cones and dimples. Lee observed that most of the Urling filters have very little or no dust dislodged, none had cones, and only a small percentage had possible or slight indications of dimples. Lee created dust dislodgment patterns on experimental filters by accidental impacts which patterns he believed were physically indistinguishable from the Urling filters. He further believed that the Urling filters were indistinguishable from the general no-call and non-void filters identified in the common issues trial. Lee concluded that the appearance and dimensions of the

dust dislodgment patterns on some of the Urling filters are consistent with a mixed mechanical-impact/reverse-air-pulse-by-hose-impact mode of occurrence ("mixed-mode"). Under Lee's theory, the two impacts occur almost simultaneously, within milliseconds of each other. The mechanical impact tends to dislodge dust on the outside of the 6-millimeter ring, while reverse air pulses tend to dislodge dust within the ring. Lee believed that the filters in his group B show evidence of a reverse air pulse caused by hose impact followed by a mechanical impact to the cyclone. He believed that group C show evidence of a mechanical impact followed by a reverse air pulse. Lee stated that the filters shown in Group D have such a large mechanical impact component that the effect of any reverse air pulse is minimal. In Lee's opinion the handling of the sampling assembly at the Urling mine and in the R & P dust lab created significant opportunities for impacts to the sampling head and the hose such that dust dislodgments could have occurred.

Lee criticized Marple's vehicle/carrying case vibration tests because only 16 of the 40 hoses were subjected to possible impact (four hoses were taped under the box and four tests were conducted), and the weight of the box was distributed over all four hoses -- effectively cushioning any impact on a single hose.

Dr. Lee was of the opinion that increased use of water sprays would reduce the susceptibility of filter samples to dust dislodgment.

[Water sprays] reduce the dust generation
Increased water will decrease the size
distribution [T]he first thing that will go
out are the coarser particles. The finer the dust is,
the more surface area the dust, . . . the more
difficult it will be to remove those particles

* * * * *

Q. If the purpose of water is to knock the dust out of the air, what's getting to the filter?

A. Dust.

Q. Wet dust?

A. If it's coming out of a dust generation point which has had water spray directly applied, very likely [G]enerally I think your filter is going to come out wet using more water.

On the basis of Dr. Lee's examination of the Urling filters, his comparison of the Urling filters with experimental filters and other MSHA non-cited filters, and his consideration of the mine and laboratory handling (R & P and PHTC) and the mine and manufacturing variable factors, he concluded that the dust dislodgment patterns on the Urling filters were not caused by blowing through the cassette or any other deliberate tampering.

IV. THE MINE-SPECIFIC TRIAL -- STATISTICAL EVIDENCE

A. MILLER

Dr. John J. Miller performed certain statistical analyses of data related to the citations issued to Urling and to the R & P mines and compared that data to the data for all the mines contained in the reduced analysis data set received in evidence in the common issues trial (G-235). This data set, taken from MSHA's Denver database, included all the dust samples processed between August 8, 1989 and March 31, 1992, eliminating certain classes of cassettes for which it could not be guaranteed that they had been checked for AWCs, and those from mines which had pleaded guilty to tampering. See G-227. That data was further reduced by eliminating cassettes from mines which subsequently pleaded guilty to tampering, and is referred to in this proceeding as the new reduced analysis data set. G-500.

Dr. Miller found that the overall rate of cited cassettes for Urling was about five times as large as the rate for the "other" mines (all mines in the new reduced analysis data set except those in the "R & P lab group plus Urling"). The rate of cited cassettes for R & P lab mines not including Urling (R & P lab mines") was about six times as large as the rate for other mines.

In analyzing the rate of cited samples, Dr. Miller used March 26, 1990 as the cutoff date between before and after periods. This was based on his understanding that R & P's personnel first became aware on that date that MSHA was voiding AWC samples. In the before period Urling had 74 cited samples out of a total of 173 submitted, a cited rate of 42.77 percent. R & P lab mines had 545 samples cited out of 1,219 submitted, a cited rate of 44.71 percent. The "other" mines (all the other mines) during the same period had 2,903 samples cited out of 48,690 submitted, a cited rate of 5.96 percent. The differences between Urling and other, and between R & P lab mines and other were, in Miller's opinion, statistically significant. In the after period Urling had one sample cited out of 552 submitted, a cited rate of 0.18 percent. In the after period R & P lab mines had six samples cited out of 3,187 submitted, a cited rate of 0.19 percent. The other mines in the same period had 999 samples cited out of 141,364 submitted, a cited rate of 0.71 percent. In Miller's judgment these data present overwhelming evidence that

whatever caused cited samples at Urling and R & P lab mines had a much higher rate of causation than it did in the other mines in the before and overall periods. Dr. Miller was of the opinion that the data also provide strong evidence that in the after period the rate for other is higher than the rate for R & P lab mines.

Dr. Miller concluded that the same data provide overwhelming evidence that the rates of cited cassettes are higher in the before period than in the after period. The rate shows "a sudden, dramatic, and final drop to a rate close to zero at a time very close to March 26, 1990 for the R & P Lab mines. The change is also evident in the plot for the Urling 1 Mine alone, but there is more variability in this plot." G-500, p. 15.

Dr. Miller analyzed the dates that the cassettes were manufactured as those dates related to the cited rate versus sample date. He created a data set including all cassettes manufactured on dates that cassettes used by Urling were made, and a data set including all cassettes manufactured on dates that cassettes used by R & P lab mines were made. For these cassettes, the cited rates for Urling were eight times higher than for other in the before and overall periods, a difference that Miller found overwhelmingly statistically significant. A similar result was obtained for R & P lab mines cited rates versus other cited rates. Thus, Dr. Miller concluded that manufacture date does not explain the differences in citation rates. The differences in cited rates between Urling before and after, and between R & P lab mines before and after remained when only cassettes made at about the same time were used. The citation rates were also compared for Urling and R & P lab mines samples before and after March 26, 1990 by comparing cassettes grouped into sets manufactured in contiguous time periods. In both cases, the cited rates in the before period were much larger than in the after periods. Dr. Miller again concluded that this shows that manufacture date cannot be used to explain the observed differences in citation rates.

Dr. Miller prepared a supplemental report (G-527) in response to the report of Dr. Roth. He used a statistical tool called the Mantel-Haenszel technique to analyze Dr. Roth's discussion of the relationship between four manufacturing dates (May 26, May 31, June 1, and June 2, 1989, referred to as "key dates" -- when almost 50 percent of the R & P cited cassettes were manufactured) and AWC citation rates. For R & P lab mines plus Urling samples before March 26, 1990, the cited rate for cassettes manufactured on the key dates was 49.93 percent. For cassettes manufactured on other dates it was 38.21 percent. However, for cassettes from other mines sampled before March 26, 1990, the cited rate for cassettes manufactured on key dates was 2.5 percent, while the rate for cassettes manufactured on other dates was 6.23 percent. Thus, in Miller's opinion, the

difference in cited rates cannot be explained by the properties of the cassettes manufactured on the key dates. The Mantel-Haenszel technique was used to determine the relationship between two categorical variables -- manufacture date (key date or other date) and cited status (cited or not cited). The sampling period before March 26, 1990 was divided into nine 4-week periods. However, the first period (before August 14, 1989) did not have samples used from key date cassettes, although it had cited AWCs, and therefore was not used in the analysis. The rates for key date cassettes were higher in four periods and the rates for other date cassettes were higher in four periods. The key date cassettes were predominately used in the three periods with the highest cited rates. Dr. Miller determined that the Mantel-Haenszel technique fails to show a statistically significant relationship between manufacture date class (key date vs. other date) and the cited rate. Therefore, Dr. Miller's prior conclusion was verified that manufacture date is not an explanation for cited rate, but sample date is.

B. ROTH

Dr. H. Daniel Roth plotted the bimonthly rates of AWCs from August 1989 to March 1992 for Urling, R & P lab mines, R & P lab mines plus Urling, and all non-R & P mines ("other"). He used bimonthly periods because MSHA follows a bimonthly dust sampling cycle, and because use of a bimonthly period tends to smooth out monthly variations and to compensate for small numbers of samples in any month. Dr. Roth stated that the plots show a strong trend of declining rates over virtually the entire study period. The decline at R & P including Urling is similar to the pattern of decline for all other mines. In Dr. Roth's opinion the rate of cited AWCs is statistically significantly higher before virtually any cutoff date in the study period than after that date, and not just March 26, 1990. Roth compared rates for Urling, for R & P lab mines, and for R & P lab mines plus Urling before and after the 15th day of each month from October 1989 to December 1990. R-2004, attachments E, F, and G. For each of the dates considered, Roth found the rate statistically significantly higher in the before period than in the after period.

Roth also plotted the rate of cited AWCs versus the date of manufacture of the cassettes and found that AWC rates in general were lower for cassettes manufactured on later dates than for those manufactured on earlier dates. This suggested to Roth that manufacturing variables may have been a factor in AWCs. In fact, according to Roth, the high rate of AWCs at R & P may be attributable to cassettes manufactured on four consecutive dates, May 26, May 31, June 1, and June 2, 1989. For R & P lab mines plus Urling, the rate of AWCs for cassettes manufactured on those dates ("key dates") was 49.6 percent of all cassettes used as compared to 5.8 percent on other dates of manufacture. Even though only 15.6 percent of the cassettes used at R & P lab mines

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plus Urling were manufactured on those dates, they account for 59.3 percent of the cited samples. For Urling, the AWC rates for key date cassettes was 46.9 percent as compared to 4.8 percent on other dates of manufacture. In addition, even though only 13.2 percent of the Urling cassettes were manufactured on the key dates, they accounted for 60 percent of the cited samples from the mine. Even if a comparison is made of cassettes sampled before March 26, 1990 at R & P lab mines plus Urling, the rate of AWCs for key date cassettes is 49.9 percent compared to 38.2 percent for cassettes manufactured on other dates. Roth concluded that this difference is statistically significant. In Dr. Roth's opinion, this analysis indicates something anomalous about cassettes manufactured on those four dates.

Dr. Roth did a regression analysis on weekly data from July 1989 through March 25, 1990 for Urling, R & P lab mines, and R & P lab mines plus Urling. R-2131A corrected as R-2136. Regression analysis as used here is a method of summarizing the trend of AWC rates. See 15 FMSHRC at 1520. For R & P lab mines plus Urling Roth concluded that the trend of decline over time is statistically significant. It is not so for R & P lab mines alone or for Urling, though in both cases the overall trend of decline is observed. Dr. Roth then did a weighted regression analysis to take into account the different amounts of data in the weekly periods. See R-2131B. With the weighted regression analysis, Roth found the weekly AWC rates to be statistically significantly declining throughout the before period (before March 26, 1990) for Urling, R & P lab mines, and R & P lab mines plus Urling. Roth also did a regression analysis using September 1989 as the starting date rather than July. R-2131C corrected as R-2137. Again, he concluded that the rates are statistically significantly declining.

Dr. Roth criticized Dr. Miller's use of the Mantel-Haenszel technique as inappropriate for this case. Dr. Roth stated that the Mantel-Haenszel technique is properly used to compare independent studies which provide different results. This case on the contrary exhibits, according to Roth, an arbitrary selection of data dependent on one another in a single study. To show how Miller improperly used the technique, Roth applied the Mantel-Haenszel technique to the data using four periods of 8 weeks each rather than the eight periods of 4 weeks used by Miller. He chose the 8-week periods because they more closely conformed to the bimonthly sampling periods. Following this procedure, Dr. Roth produced results which he found were statistically significant, though Dr. Miller's were not. This suggested to Roth that Miller's data were "sliced too thin." Further, in Dr. Roth's opinion Dr. Miller improperly eliminated data (30 cassettes) from July 1989 because they were not key date cassettes. Dr. Roth stated that the Mantel-Haenszel technique requires the use of all available data.

V. FINDINGS OF FACT -- DUST SAMPLING AT URLING

A. HANDLING OF PUMPS AND SAMPLING ASSEMBLIES

Training courses were given to Urling employees certified to sample for respirable dust on February 6, 1990, February 18, 1991, and May 22, 1992. R-2069, R-2070, R-2071. The training did not include any instruction or admonition as to handling pumps or sampling assemblies.

The parties stipulated that the miner operators, miner helpers, and section foremen generally were not aware of the institution of the AWC void code until at least a year after it was instituted, if at all. Stipulation 108(c). At least some of the miners and section foremen were aware, however, of an MSHA investigation of the dust sampling program at or before the time the void code was instituted. After the section foremen heard about the investigation, some of them checked the pumps more often, kept a closer eye on the pump during the shift, and brought the pumps out of the mine themselves. The miners testified that they did not make any changes in the way they handled the pumps after learning about AWCs. The evidence does not establish that the miners or section foremen significantly changed the manner in which they handled pumps and sampling assemblies because of their awareness of the investigation. I find that they did not, and that any change in dust deposition patterns on filters in Urling samples after the institution of the void code is not the result of changes in handling by miner operators, miner helpers, or section foremen.

B. CHANGES IN CONTINUOUS MINER MACHINES; INTRODUCTION OF SCRUBBER MINERS AND WATER SPRAYS

During the period from August 1, 1989 to May 31, 1990, two kinds of continuous miners were used at Urling: the Lee-Norse miners operated from controls on the machine, and the Joy miners operated from a remote control box (some Joy miners could be operated from the remote control box or from controls on the miner). The Lee-Norse miner vibrated when cutting coal, so that the sampling head attached to the canopy swayed back and forth and contacted the canopy post. I find that this could have caused or contributed to abnormal dust patterns on Urling filters.

Scrubber systems were installed on the Joy miners, being gradually phased in beginning on or before August 1, 1989. Using scrubber-equipped miners, Keystone could take cuts of coal greater than 20 feet, up to 37 feet, depending upon mining conditions. A scrubber system controls dust while mining by sucking up the dust and discharging it through a filter system. It has a discharge line that runs out of a sump and continuously dumps water on the mine floor. In addition to the water sprays

that conventional miners have, scrubber miners have blocking sprays designed to keep the air current from by-passing the exhaust of the scrubber system. A scrubber miner uses from 6 to 8 gallons per minute more water than a non-scrubber miner. As I indicated earlier, the expert witnesses disagree as to whether the use of scrubbers and water sprays has any effect on the dust deposited on the filter. I am persuaded that it does have an effect. I find that the dust deposit on filters when a scrubber miner is sampled is damper, has a higher threshold velocity, and is more difficult to dislodge. This could have been a factor in the decline in the number of AWCs in late 1989 and early 1990.

In a related matter, I find that the north sections of the Urling mine are in general wetter than the south sections and that overall the mine is wetter in 1993 than it was in 1989 and 1990. Therefore, samples taken from the north sections are less susceptible to dust dislodgment than those taken from the south, and samples taken in 1993 are less susceptible to dust dislodgment than those taken in 1989 and 1990. However, the evidence does not permit me to conclude whether these facts contributed to the decline in the number of AWCs in late 1989 and early 1990.

C. OTHER MINING CONDITIONS

The north end of the Urling mine generally has a higher coal seam than the south end, although the height may vary even within the same section. Miners have encountered binder (a layer of rock) in the coal throughout the mine, but at present there is more binder in the north end of the mine. Also at the present time, the roof in the north end of the mine is sand rock and in the south end is shale. Roof stability varies from section to section and within sections. A miner operator testified that the roof was "pretty bad" in 1989 and 1990. Tr. 334.

Over the past few years, Urling has replaced the mantrips used in the mine. The old mantrips had metal seats while the new ones have vinyl, plastic, or canvas-like seats, more leg room, and are more comfortable.

However, the evidence does not establish that the height of the coal seam, the presence of binder, the roof conditions, or the mantrip changes were related to the deposits on respirable dust samples or to changes in the character of those deposits. I find that none of these conditions contributed to the character of the respirable dust deposits on filters during the period relevant to this case.

D. HANDLING OF PUMPS, SAMPLING ASSEMBLIES, AND CASSETTES BY ESD

The only equipment changes in ESD's handling of samples in 1990 were the replacement or reconstruction of the pump carrying boxes and the addition of wire ties to the sampling heads. ESD began to use the new carrying boxes in April and May 1990. The new boxes were more square with higher sides and closed-in ends. They carried eight pumps. The old 10-pump boxes were discarded and the old four-pump boxes were reconstructed with higher sides. In the new boxes, the sampling heads were clipped to a metal rod and the pump bodies sat side by side rather than end to end. Although the hoses did not hang out of the ends of the new boxes, they still protruded below the bottom of the boxes on the sides but not as far as they did with the old boxes. Eget testified that it was very likely that hoses could get caught under the new boxes as well as the older ones. However, it was less likely that hoses would be impacted under the new boxes because of their configuration and size. In April or May 1990, the ESD attached wire ties on all the sampling heads in an effort to tamper-proof the sampling assembly. The cassette could not be removed without breaking the tie. Because these changes occurred sometime after the initiation of the void code, their significance to this case is questionable.

Eget was off work because of a back condition in April 1990. He did not pick up pumps and samples from approximately April 9 to May 10, 1990. Eget testified that he did not change the way he handled the pumps or samples after he learned of the void code. In particular, he did not change the way he lifted pumps into the back of his vehicle. Houck testified that the tangled mass of pumps and hoses on the ESD table did not change after the void code. Snyder testified that he handled the pumps more carefully, that he no longer put pumps on the mechanic's box, and that he no longer carried the pumps by the hoses. He was uncertain as to the timing of these changes. Hollern and Bolinger stated that they handled the pumps and sampling assemblies more carefully after the AWC notices. Gleditsch stated that he was more careful in handling the samples beginning in the Spring of 1990, that he discontinued carrying the pumps by the hoses, and that he no longer put the pump carrying box down roughly or caught hoses in his car door.

The evidence establishes and I find as facts that there were changes in the handling practices of ESD personnel beginning in the Spring of 1990. Specifically, Eget, who handled the sampling equipment in a rougher manner than the others, did not pick up pumps and samples from April 9 to May 10, 1990. Snyder and the other dust technicians were more careful in their handling and carrying of pumps and hoses, and, in particular, were careful to avoid hose impacts because of the MSHA dust sample investigation. These changes could have been factors in the decrease in the number of cited AWCs in the Spring of 1990.

E. CHANGES IN CASSETTES AND HOSES

1. FILTER-TO-FOIL DISTANCE AND CASSETTE MANUFACTURE DATE

In the common issues decision, I found that filter-to-foil distance varies from filter to filter. I also found that a filter cassette with a smaller filter-to-foil distance is more prone to an AWC dust dislodgment pattern than one with a larger filter-to-foil distance, and that the cited filters had a shorter filter-to-foil distance than those manufactured subsequently. (Footnote 3)/ I found that cassettes manufactured before February 13, 1990 had a much higher rate of AWC citation than those manufactured later.

Of Urling's 75 cited filters, eight filters were from the MSA 200,000 series, which were manufactured between April 20, 1988 and April 3, 1989, and 67 filters were from the MSA 300,000 series, which were manufactured between April 3, 1989 and February 13, 1990. See R-2133. Forty-five of Urling's 75 cited filters were manufactured on four "key dates," May 26 and 31, and June 1 and 2, 1989. The remaining 30 cited filters were manufactured on 12 other dates, ranging from January 21 to September 30, 1989. Id.

According to Dr. Lee, the absence of 9-millimeter-ring standoff patterns and the presence of crimping on the Urling cited filters indicates shorter filter-to-foil distances. Tr. 3874-79, R-2001. Lee stated that about 20 percent of the Urling cited filters show evidence of crimping, compared with about 6 percent in recently purchased filters. Dr. Marple disagrees that 9-millimeter rings indicate filter-to-foil distances based on his experiments for the common issues trial. Tr. 1519-20, 1578-81, G-509. Marple's tests indicated that even when filters were resting on the standoff, only 50 percent had standoff patterns. Therefore, he concluded that the absence of standoff patterns does not indicate shorter filter-to-foil distances. Marple did not address the issue of filter crimping.

The Urling cited filters came from the population of filters with shorter filter-to-foil distances. Although it is not possible to know the specific filter-to-foil distance for each of

3/ In his reply brief the Secretary argues that the charts I relied upon to find in the common issues decision that the more recent filters had a larger filter-to-foil distance also showed that they were floppier than the older ones. No expert witness supported this argument, and Dr. Marple found that the more floppy filters were associated with smaller filter-to-foil distances. The evidence related to the question whether the more recently manufactured filters were floppier than the older ones is not sufficiently clear to enable me to make a finding one way or the other.

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the cited filters, I find that the Urling cited filters more probably than not had shorter filter-to-foil distances than those manufactured subsequently. This could have been a factor in the decline in the number of cited AWCs in the Spring of 1990.

2. HOSE SOFTNESS/FIRMNESS

In the common issues decision, I found that the firmness or softness of the sampling assembly hose may be related to the formation of an AWC, and that a softer hose is more prone to an AWC dust dislodgment. I found that the firmness or softness of the hose varies from sampling assembly to sampling assembly.

Houck testified that there were differences in the softness or firmness of hoses in 1989 and 1990. He testified that hoses become more soft and are more easily removed from the nipple outlet as they age. Houck stated that detergents and hot water used to clean hoses remove the stickiness and cause hoses to grip less tightly.

Houck testified that the ESD always kept their equipment in meticulous condition. He stated that sampling assembly hoses were replaced as needed, e.g., when they started turning yellow and got soft, started slipping off the nipple outlet, or became less than 36 inches in length (hoses would be snipped to cut off pinholes created by the sampling head clip). Houck stated that after pumps 81 through 140 were taken out of service in January 1989, those hoses continued to be used on a rotation basis. He testified that in October 1989, a large batch of hoses was replaced, but thereafter hoses were replaced gradually. A small percentage of the hoses replaced in October 1989 was of a firmer type that had been used since at least 1986.

I find that the sampling assembly hoses at Urling varied in softness during any given period of time, and that the record does not clearly establish that either the AWCs or the drop off in the number of AWCs are explainable by the firmness or softness of the hoses that were used.

F. CHANGES IN MSHA CRITERIA FOR DETERMINING AWCs

Keystone argues that changes in AWC selection criteria by MSHA at or about the time the void code was instituted may explain the declining rate of AWCs. Beginning in August 1989 the PHTC examined all filter samples from all coal mines and referred those believed to be potentially citable as AWCs to Thaxton. (Beginning in April or May 1989 PHTC had been examining Peabody filters for suspected AWCs.) Except for 1 week in late August when he was assisted by another employee and until October 1989, the only person examining the filters and referring them to Thaxton was Lewis Raymond. Beginning in October 1989 other PHTC personnel who had been trained by Raymond examined filters for

AWC appearances. Some suspected AWCs were reviewed by Raymond, and others were sent to Thaxton without review. Raymond prepared a written protocol at some time in 1990 with photographs of AWC filters and normal filters. R-1404. The reviewing employees were instructed that if the dust pattern did not fall into one of the photographic examples of AWCs, it was assumed to be valid. After the void code in March 1990, Raymond began reviewing all suspected AWCs before sending them to Thaxton. Before that date Raymond sent all doubtful filters to Thaxton but thereafter he discarded filters which were abnormal in some way but not suggestive of AWCs. 15 FMSHRC at 1458-60. Keystone, adopting the argument put forth by the LDCC in the common issues trial, argues that there were inconsistencies between the criteria followed by Thaxton and Raymond in identifying AWCs. It further contends that after March 1990 "significantly fewer 'suspect' filters were sent to Thaxton for review and citation issuance. As would be expected, the number of AWCs cited . . . then dropped." LDCC brief at 23.

However, the inconsistencies between Thaxton and Raymond were not nearly as great as Keystone contends. The LDCC brief states that in a comparison session between Thaxton and Raymond, they "did not agree on any filter that exhibited an AWC appearance." LDCC brief at 19. In fact Raymond testified that they disagreed only on two such filters. Further the changes in the criteria followed by Raymond in selecting filters to send to Thaxton affected only 5 percent of the filters. 15 FMSHRC 1459. On many occasions Thaxton reviewed the PHTC referrals of suspected AWCs and was satisfied that PHTC was properly referring filters to him. Thaxton of course made the ultimate decision to cite or not in each case.

I find that the evidence does not establish that changes in AWC selection criteria by MSHA at or about the time the void code was instituted explain any decline in the rate of cited AWCs at Urling after that date.

G. OPTIONAL OPERATOR QUARTZ SAMPLES AND MSHA INSPECTOR SAMPLES

The Secretary argues that because R & P submitted optional quartz samples from which R & P would have no motive to remove dust, and none of the samples exhibited AWC appearances, this confirms his contention that the cited filters resulted from deliberate tampering. R & P submitted 75 optional quartz samples from August 1, 1989 to March 31, 1991; 11 were from Urling. R & P submitted 3,251 compliance samples from July 1, 1989 to December 23, 1990; 410 were from Urling. Thus the optional quartz samples represented approximately 2 or 3 percent of the compliance samples. None of the quartz samples were made available for inspection or comparison in preparation for this case since they were all destroyed in analysis. The persons at the PHTC who examined the quartz samples for AWC appearances were

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not called to testify. These facts make it impossible to draw any conclusions from the fact that no AWC appearances on quartz samples were noted or cited by MSHA.

During the period August 1, 1989 to May 1, 1991, seven inspector samples taken from Keystone mines (none from Urling) were found by Thaxton to have AWC appearances (one of them was classified under tamper code 11 as a no-call). The inspectors were not called to testify. I am unable to draw any conclusions from the fact that some inspector samples were found to have AWC appearances.

VI. R & P's ENVIRONMENTAL SAFETY DEPARTMENT

In his opening statement, counsel for the Secretary argued that the evidence would establish that "a person or persons at the central laboratory were deliberately tampering with the cassettes being submitted to MSHA." Tr. 14. Because all the persons who worked in the ESD dust laboratory during 1989 and 1990 were witnesses, it is important to evaluate their testimony and credibility.

Dennis Hellgren has been Director of Safety for R & P since February 1989. In that capacity he supervised Donald Eget and the ESD dust laboratory. Hellgren has been employed in the safety or training divisions of R & P since October 1976. Prior to that he worked for the Mining Enforcement and Safety Administration (predecessor of MSHA) as a training specialist for 18 months.

Hellgren was aware beginning in early February 1990 that MSHA was investigating R & P's dust sampling program. He learned that special investigators had interviewed foremen at R & P's Florence 2 mine. Hellgren contacted an MSHA special investigator on February 2 and later other MSHA officials to discuss the investigation. Other R & P foremen were interviewed. Hellgren discussed the investigation with Eget, and when he later learned that R & P was under investigation by the United States Attorney's office, he communicated that information to Eget.

After ESD personnel discovered some filters from R & P's Heshbon mine that apparently had been tampered with, the Heshbon superintendent called a meeting on May 24, 1990 to discuss the incidents. Hellgren was present at the meeting. Randy Thomas, a Heshbon miner, was also present. Thomas had been employed in the coal laboratory, adjacent to the dust laboratory in the mid-1970's. Thomas stated at the meeting that while working in the laboratory he had witnessed a dust laboratory employee, Gary Foehrenbach, directing air from an air hose into a dust sample cassette. Hellgren testified that he thought it very likely that Thomas did not see what he believed he saw 15 years previously.

Hellgren learned that Robert Anderson, now President of Keystone and prior to July 1993 Assistant Vice President of Operations for R & P, had been joking with dust technician Gleditsch about the MSHA respirable dust investigation. Hellgren asked Anderson to refrain from such kidding because the dust technicians felt harassed about the subject.

Hellgren stated that he never observed Eget, Houck, Snyder, Bolinger, Gleditsch, or Hollern tampering with respirable dust samples, nor did he authorize or instruct any of them to tamper with samples. Hellgren testified that he would not tolerate any type of tampering, and would have fired Eget if he learned that Eget was tampering. In fact, Hellgren believes Eget to be a person of integrity who would not himself tamper or tolerate tampering by his subordinates.

Donald Eget worked for R & P for more than 21 years until his retirement on December 31, 1991. He was Supervisor, Environmental Control commencing in October 1970, when the dust sampling program was instituted, until his retirement. Eget has a degree in mining engineering from Pennsylvania State University.

Eget was responsible for supervising the dust sampling program in the R & P mines. On a typical day after reporting to the dust laboratory, Eget would go to the mines and pick up the pumps with samples taken during the previous afternoon and midnight shifts. He returned them to the laboratory and with Shawn Houck prepared the samples for mailing to MSHA. Eget kept a log book for each mine, viewed each sample through the cassette inlet after removing the plug, and recorded in the log book what he saw. Eget recorded his observations as "a form of protection" in case the filter resulted in a citation so that he could later explain what he had seen in the filter. Tr. 2373. He also checked the dust data cards for accuracy.

Eget was made aware of MSHA's investigation of the dust sampling program by Hellgren prior to receiving the first AWC void notice in March 1990. Many years previously in 1978, Eget talked to an MSHA inspector and another federal official concerning an investigation of unusual dust samples at R & P. Eget testified that he never saw former dust technician Foehrenbach use an air hose to tamper with dust samples. Eget was aware of criminal prosecutions involving other coal companies for tampering with dust samples.

In April and May and again in September 1990, Shawn Houck discovered and alerted Eget to samples from the Heshbon mine which had apparently been tampered with. MSHA was notified and the samples were voided as contaminated. R & P investigated the incidents but was unable to discover the cause. The September sample had been tampered with without removing the cassette from

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the sampling head, since a wire tie had been affixed to the cassette prior to sampling and had not been removed. Eget and Houck tested a special R & P sample by injecting air into the end of the sampling hose. This resulted in a duplication of the tampered sample. Eget does not recall participating in an experiment with Houck in which they attempted to remove dust from a filter by blowing into the cassette.

Eget denied that he ever tampered with samples submitted to MSHA. He stated that he did not see any other dust laboratory employee tamper, nor would he tolerate tampering by his subordinates.

Shawn Houck worked for R & P for more than 3 years until he was laid off December 7, 1990. He was initially hired as a calibration technician and later became a dust technician. He was not certified for underground dust sampling. In 1989 and 1990 Houck's duties included preparing the dust pumps for the dust technicians; cleaning the pumps, sampling heads, and hoses; laying out the cassettes for Eget's inspection; and completing the dust data cards.

When R & P received notice of the AWC void code on March 26, 1990, Houck discussed its meaning with Eget. Houck previously had heard of the MSHA investigation of the dust sampling program when an investigator contacted Bolinger.

Houck testified that he and Eget "way before any of this ever occurred" conducted an experiment on a special cassette to see whether blowing through the outlet would result in a weight loss. No significant weight loss was detected and Houck did not consider the experiment important. Tr. 2191-93.

Houck discovered the three samples from the Heshbon mine that apparently had been tampered with, one in April, one in May, and one in September 1990. After the May incident, wire ties were affixed to the sampling heads to prevent removal of the cassette without breaking the wire. The September sample had apparently been tampered with without removing the cassette. Houck and Eget using a special test cassette forced air through the assembly hose and created a filter similar in appearance to the September Heshbon filter.

Houck denied that he ever tampered in any way with samples submitted to MSHA. He denied ever seeing anyone else tamper with the cassettes.

Douglas Snyder has been employed by R & P since May 1979, and has been a dust technician since March 1980. He has been responsible for the dust sampling at Urling since 1980. After Houck was laid off in December 1990, Snyder and the other dust technicians were responsible for cleaning and assembling the

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pumps and sampling assemblies, and filling out the dust data cards.

In February 1990, prior to R & P's receipt of the first AWC void notice, Snyder heard that MSHA investigators were conducting an investigation of white centers in respirable dust samples.

Four designated area samples taken by Snyder were cited AWCs. Snyder denied that he tampered with these samples in any way. He denied tampering with any other samples or seeing anyone else in the dust lab tamper with them.

Robert Bolinger was a dust technician at R & P for about 15 years until he retired in January 1992. At various times he was responsible for sampling at R & P's Helvetia mines (Lucerne 6, Lucerne 8, and Lucerne 9) and the Jane and Margaret 11 mines. Before he became a dust technician, Bolinger was a union miner. He was found to have x-ray evidence of black lung and worked as a Part 90 miner. In August 1989, Bolinger picked up dust samples at Urling when Snyder was on medical leave. He also picked up samples for Eget at various times.

Bolinger learned of MSHA's AWC investigation prior to R & P's receipt of the void code notice on March 26, 1990. Thomas Hollern told Bolinger that Florence mine foremen had been interviewed about dust sampling, and an MSHA investigator came to Bolinger's home looking for his son, Robert Bolinger, Jr., who was a section foreman at R & P's Emilie mine.

Bolinger denied tampering with respirable dust samples. He denied seeing any of the other dust technicians or Houck or Eget tamper with dust samples. In his testimony, Bolinger expressed some hostility toward MSHA. He stated that "the whole program . . . was a bunch of harassment by these [MSHA] people." Tr. 3069. Bolinger had been decertified once because he inadvertently put the wrong tonnage on a dust data card when an inspector was present.

Jack Szentmiklosi was employed with R & P as a miner for 23 years. He formerly was a UMWA safety committeeman. While in the mine office looking at a mine map sometime before October 1992, Szentmiklosi overheard a conversation between Bolinger and Anderson. According to Szentmiklosi, Anderson told Bolinger that he was in big trouble for tampering with dust pumps. Bolinger replied that if he fell, he would take a lot of big people with him. Szentmiklosi later asked Bolinger about the conversation. According to Szentmiklosi, Bolinger did not want to talk about it. Bolinger testified that he did not recall hearing Anderson make such a statement, and he denied making the statement to Anderson which Szentmiklosi attributed to him.

Thomas Hollern was a dust technician at R & P from early 1980 until he was laid off in October 1991. He had been with R & P since 1975. At the time Hollern was laid off he was responsible for sampling at the Heshbon and Florence 2 mines. In 1989 and 1990 he sampled at Lucerne 8 and Florence 2. Hollern had not sampled at Urling since the late 1970s. Early in February 1990 Hollern was told by foremen at the Florence 2 mine that they had been contacted by MSHA investigators concerning dust samples. He also knew of MSHA contacting Bolinger looking for Bolinger's son. Eget told Hollern of the first Heshbon tampered sample in early April 1990. Hollern talked to the miner operator and section foreman, but was unable to determine what caused the sample. Houck told Hollern of the second Heshbon tampered sample in which there was no filter paper in the cassette. The third Heshbon tampered sample showed a small hole in the filter and the wire tie attached to the sampling head was intact. Hollern never learned what caused any of these abnormal filters. Hollern testified that he has never tampered with MSHA dust samples and has never seen Eget, Houck, Gleditsch, Bolinger, or Snyder tamper with MSHA dust samples.

Herbert Gleditsch has been an R & P dust technician since April 1970. He has a bachelors degree in science education and was a school teacher before working for R & P. During 1989 and 1990 he was responsible for dust sampling in the Emilie mines, the Jane mine, and the Keystone cleaning plant. On occasion Gleditsch has picked up pumps from the Urling mine. He was aware of MSHA's investigation of R & P's dust sampling because a foreman at Jane mine had been interviewed by an investigator. Gleditsch testified that he has never tampered with dust samples submitted to MSHA, that Eget never suggested that Gleditsch tamper with such samples, and that he never saw Eget, Houck, Bolinger, Hollern, or Snyder tamper with dust samples. Gleditsch has been kidded about the dust sampling investigation. He was called "Mr. Donut" by an MSHA inspector. Tr. 2685, 2735. The kidding has upset Gleditsch.

Randy Thomas worked for R & P in the coal analytical lab for about 1-1/2 years beginning in 1976. He worked for R & P in other capacities until he was laid off in 1991. The coal analytical lab was located adjacent to the ESD in the same building. Thomas testified that in the 1970's he witnessed Gary Foehrenbach directing air into dust cassettes with an air hose. According to Thomas, when he asked why Foehrenbach was doing it, Foehrenbach said the miners put dust in deliberately, and he was blowing the excess particles out as his way of making things even. While working at R & P's Heshbon mine in 1991, the mine superintendent stated at a meeting that anyone caught tampering with respirable dust samples would be punished. Thomas then told what he had seen Foehrenbach do.

Gary Foehrenbach was employed by R & P from 1974 until he was laid off in June 1993. He worked as a dust technician from 1974 until August 1978. While a dust technician, Foehrenbach cleaned pumps and cassettes using rags and an air hose. Foehrenbach testified that when he used the air hose to clean cassettes, the plugs were in the cassette inlet and outlet. He denies ever using an air hose to remove dust from the inside of a cassette. Foehrenbach does not recall a conversation with Thomas in which he told Thomas that he was removing particles from inside cassettes.

Ray Wygonik is the Manager of Mines for Keystone. He recalls a conversation in April 1991 with R & P Vice President Anderson and Gleditsch during which Anderson joked with Gleditsch that he was in trouble because of the dust sample investigation. Wygonik sensed that Gleditsch was not taking it well and suggested to Hellgren that he tell Anderson to ease up.

Robert Anderson has been President of Keystone and Helvetia since July 1993. He was previously R & P Vice President for Operations. Anderson does not recall making the statement that Szentmiklosi said he made to Bolinger. He testified that if he did, it was in jest. Neither does he recall the conversation testified to by Wygonik. Anderson testified that he has no reason to believe that either Bolinger or Gleditsch tampered with respirable dust samples.

VII. RESPIRABLE DUST CITATION HISTORY

From September 20, 1987 to May 15, 1990, Urling received seven citations for violations of Part 70 mandatory health standards concerning respirable dust as follows:

30 C.F.R. Section	Number of Citations
70.100(a)	5
70.208(a)	2

Urling received two of these citations in 1987, two in 1988, two in 1989, and one in 1990. The total penalties paid for the seven citations was \$1,568. Urling received a total of 965 citations for all violations during this period (including the seven) for which \$227,533 was paid. See G-541.

During this same period, Keystone (including Urling) received 54 citations for violations of Parts 70 and 71 mandatory health standards concerning respirable dust as follows:

30 C.F.R. Section	Number of Citations
70.100(a)	42
70.101	1

70.207(a)	2
70.208(a)	8
71.301(c)	1

Keystone received eight of these citations in 1987, 22 in 1988, 14 in 1989, and 10 in 1990. The total penalties paid for the 54 citations was \$10,643. Keystone received a total of 4,458 citations for all violations during this period (including the 54) for which \$926,769 was paid. See G-542.

Also during this same period, R & P (including Keystone) received 239 citations for violations of Parts 70, 71, and 90 mandatory health standards concerning respirable dust as follows:

30 C.F.R. Section	Number of Citations
70.100(a)	115
70.101	11
70.202(a)	4
70.207(a)	26
70.208(a)	36
70.208(c)	6
70.209(c)	5
70.220(a)	3
70.400	10
71.100	5
71.205(b)	1
71.208(a)	5
71.220(a)	1
71.300(a)	1
71.301(c)	1
90.100	7
90.103(a)	1
90.300	1

R & P received 22 of these citations in 1987, 101 in 1988, 83 in 1989, and 33 in 1990. The total penalties paid for the 239 citations was \$42,103. R & P received a total of 8,904 citations for all violations during this period (including the 239) for which \$1,577,905.20 was paid. See G-543.

In 1988, the ESD processed 2,826 respirable dust samples to satisfy Parts 70, 71, and 90. In 1989, the ESD processed 2,248 such samples. R-2049. Less than 4 percent of R & P's respirable dust samples were cited during these 2 years preceding initiation of the void code.

The small percentage of citations and relatively modest amount of the penalties paid for violations of the respirable dust standards during the 2 years preceding initiation of the void code do not indicate a significant respirable dust citation

problem which could arguably have motivated tampering with the samples.

Furthermore, Hellgren testified that under the provisions of R & P's coal sales agreements, any penalty assessments, including assessments for respirable dust violations, were passed on to the utilities purchasing the coal.

ULTIMATE FINDINGS AND CONCLUSIONS OF LAW

I. THE STANDARD OF PROOF

The same evidentiary burden is applicable in the Keystone mine-specific case as was applicable in the common issues trial: the Secretary must prove by a preponderance of the evidence that the 75 cited Urling filters resulted from intentional tampering. I have to consider all the evidence introduced in the common issues trial and in the Keystone trial in determining whether he has carried that burden.

The parties do not disagree as to who has the burden of proof in this case or what the burden entails in principle. The essential agreement is obscured by some rhetorical fog however. The Secretary: Keystone's argument "is a brazen attempt to elevate the burden of proof well beyond the established level for civil proceedings." Secty's brief at 3. Keystone: "It is time that the Secretary's attempt to cobble together a case out of inference and innuendo be rejected." Keystone's brief at 15. Both parties cite the Commission's opinion in Garden Creek Pocahontas Co., 11 FMSHRC 2148 (1989), which laid down the following rule for burden of proof:

The Mine Act imposes on the Secretary the burden of proving the violation the Secretary alleges by a preponderance of the evidence The Commission has recognized that in certain circumstances the Secretary may establish a violation by inference Any such inference, however, must be inherently reasonable and there must be a rational connection between the evidentiary facts and the ultimate fact inferred.

Id. at 2152-53 (citations omitted).

The burden of proving by a preponderance of the evidence requires the party bearing the burden to convince the trier of fact "that the existence of a fact is more probable than its nonexistence" Concrete Pipe and Products of California, Inc. v. Construction Laborers Pension Trust for Southern California, 508 U.S. ____ (1993), 124 L.Ed.2d 539, 563 (citation omitted). To preponderate, the evidence must be sufficient to convince the trier of fact that the proposition asserted is more

likely true than not true. See, e.g., *Hopkins v. Price Waterhouse*, 737 F. Supp. 1202 (D.D.C. 1990), *aff'd*, 920 F.2d 967 (D.C. Cir. 1990); *Merzon v. County of Suffolk*, 767 F. Supp. 432 (E.D.N.Y. 1991); *Smith v. United States*, 557 F. Supp. 42 (W.D. Ark. 1982), *aff'd*, 726 F.2d 428 (8th Cir. 1984). Preponderance of the evidence means "the greater weight of evidence, evidence which is more convincing than the evidence which is offered in opposition to it." *St. Paul Fire & Marine Ins. Co. v. United States*, 6 F.3d 763, 769 (Fed. Cir. 1993) (citation omitted). Where the evidence is equally balanced "or if it cannot be said upon which side it weighs more heavily, plaintiff has not met his or her burden of proof." 557 F. Supp. at 52.

All of the evidence must be given appropriate weight, whether it be direct or circumstantial, testimonial or written, expert or lay. Circumstantial evidence may prove an ultimate fact "if upon consideration of all the circumstances revealed by the evidence [the trier of fact is] satisfied that in logic and common experience the ultimate fact is more likely than not to follow from the fact proved." *Selle v. Gibb*, 567 F. Supp. 1173, 1182 (N.D. Ill. 1983), *aff'd*, 741 F.2d 896 (7th Cir. 1984).

In the common issues trial, conflicting expert scientific evidence was introduced concerning the possible and probable causes of the abnormal filters. Conflicting expert statistical evidence was introduced concerning the meaning of the rate of cited AWCs and the decline in the rate of cited AWCs. I excluded evidence concerning mine handling practices precisely because such practices vary from mine to mine and therefore do not raise "common issues." I held that on the basis of the evidence introduced in the common issues trial, the Secretary failed to establish by a preponderance of the evidence that the cited filters resulted from intentional tampering. I left for mine-specific trials consideration of the sampling practices at individual mines and the relationship of those practices to the question of tampering.

The burden of proof remains with the Secretary throughout this proceeding. He must prove by a preponderance of the evidence that Keystone tampered with the cited samples. Keystone does not have the burden of establishing that the appearances on the samples resulted from some other cause.

II. ISSUANCE OF THE CITATIONS

The Keystone citations, like all the other citations in the consolidated cases, were issued because Robert Thaxton concluded that the dust deposition patterns on the cited filters evidenced tampering. Thaxton believed that the abnormal appearances of the dust in the center of the filters were similar to those that he had experimentally created by reverse air tests in 1983. He did further testing in 1989 after an abnormal abatement sample was

received from Peabody Coal Company. Peabody was indicted and eventually pleaded guilty to tampering with respirable dust samples. On the basis of his tests and a comparison with Peabody filters, Thaxton concluded that the abnormal appearances did not result from normal sample collection in the mines but from intentional tampering involving the introduction of reverse air into the dust laden cassette or the insertion of a foreign object designed to remove dust from the center of the filter. I previously stated that Thaxton's conclusions were not supported by systematic scientific experiments. Subsequently such experiments were performed by Drs. Marple, Rubow, Lee, Grayson, and McFarland.

I conclude on the basis of Robert Thaxton's studies that the appearances on the cited Keystone filters did not result from normal sampling in the Urling mine. Something occurred in the mine or thereafter to cause the abnormal appearances. But Thaxton's conclusions that what occurred was intentional tampering is to a considerable extent subjective. Thaxton did not prepare a comprehensive written protocol based on scientific testing relating specific appearances to different kinds of tampering. Further, the distinction Thaxton has made between the appearances of the cited filters and many of the no-calls is tenuous at best. I reject the Secretary's argument that the decision not to cite those no-calls (a decision related to Thaxton's feeling "comfortable") is "an appropriate exercise of the agency's discretion." Secty's brief at 27. Whether to charge a coal mine operator and its employees with deliberately tampering with dust samples so as to falsify respirable dust levels in the mine must be based on more objective standards. Therefore, although I accept Thaxton's determination that the appearances on the cited Urling filters were abnormal, and although I previously found that his decisions to cite were sufficiently consistent for the purposes of the common issues trial, I am not able to conclude on the basis of Thaxton's reports and testimony that the abnormal appearances on the Urling filters were caused by intentional tampering.

Keystone argues that the delay in issuing the citations prejudiced its ability to defend itself in these proceedings. In part this argument was addressed in my orders denying motions to vacate filed by Southern Ohio Coal Company and others, 14 FMSHRC 928 (1992); Utah Power and Light Company, 14 FMSHRC 1098 (1992); and Mettiki Coal Corp., 14 FMSHRC 1104 (1992). The record does not support Keystone's argument that it was prejudiced by the delay, and I reject the contention.

III. HANDLING OF THE CASSETTES AND SAMPLING EQUIPMENT
IN THE URLING MINE AND THE ESD

On the basis of my findings on page 12, supra, I conclude that the reverse air dust dislodgment patterns on the cited Urling filters could have resulted from accidental impacts to the sampling equipment, particularly the hoses, in the Urling mine during sampling or after the samples were taken. I conclude that the dust dislodgment patterns did not result from intentional tampering by miners or section foremen in the mine (nor does the Secretary contend that they did). On the basis of my findings on page 8, supra, I conclude that the reverse air dust dislodgment patterns on the cited Urling filters could have resulted from accidental impacts to the sampling equipment, particularly the hoses, while the samples were being handled by R & P's ESD lab personnel. Also, on the basis of my common issues decision, I conclude that reverse air dust dislodgment patterns on the cited Urling filters could have resulted from intentional tampering including blowing by mouth or otherwise directing air into the cassette outlet or introducing a vacuum source into the cassette inlet. 15 FMSHRC at 1515. If such tampering occurred, it must have occurred at the ESD lab by ESD employees. Therefore, in order to determine whether the abnormal dust dislodgment patterns resulted from deliberate tampering or from incidental and accidental handling of the sampling equipment, I must consider and analyze the scientific and statistical evidence, and evaluate the testimony and credibility of the ESD employees.

IV. THE SCIENTIFIC EVIDENCE -- THAXTON/MARPLE vs. LEE

Robert Thaxton is not a scientist but has probably examined more respirable dust filters than anyone in the United States. He first investigated filters exhibiting what he considered abnormal white centers in 1983, and it was his judgment that resulted in the issuance of the more than 5000 citations, including 75 to Urling, in 1991 alleging intentional tampering. Dr. Marple and Dr. Lee are scientists with impressive credentials and backgrounds. (Footnote 4)/ Each has spent considerable time and scientific expertise over the past 3 years in investigating the abnormal white center phenomenon, and its possible causes. Their conclusions differ in many respects.

After examining the cited Urling filters, Dr. Marple concluded that 71 or 72 of them resulted from reverse air flow through the cassette outlet, that two or three resulted from a vacuum source being introduced into the cassette inlet and removing dust, and one resulted from water being introduced into the filter. Marple believed his experimental filters created by

4/ There is no basis in the record to support the Secretary's assertion that Dr. Lee was a biased witness.

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reverse air were comparable to the 71 or 72 which he classified as type A, and that his experimental filters created by a vacuum were comparable to the two or three which he classified as type C. He further concluded that none of the Urling cited filters were comparable to Marple experimental filters classified as type E which resulted from cassette impact. He classified the water stain filter as other, and originally was unable to ascribe a cause to it.

Dr. Lee concluded after examining the cited Urling filters that most showed comparatively slight dust dislodgment from the central area. The dust within the central ring had a color and density similar to that outside the ring. None had cones and only a few had possible or slight indications of dimples. The dust dislodgment patterns resulting from Lee's experiments involving deliberate blowing of air in the outlet showed sharp 6-millimeter rings with definite dislodgments within the ring and a high percentage of cones and dimples. Lee determined that the Urling filters had a slightly larger diameter than those created by deliberate reverse air. On the basis of these considerations, Dr. Lee concluded that the Urling filters did not result from deliberate blowing through the cassette.

Dr. Marple disagreed with Dr. Lee that the comparatively slight dislodgments indicated smaller impact forces. Marple believed that the threshold velocity of the dust on the filter was the overriding factor in determining its susceptibility to dislodgment. On this issue I conclude that both threshold velocity and degree of impact force are important in the resulting dust dislodgment pattern.

With respect to the water stain filter, Lee stated that in his opinion it did not result from a wet cotton swab being inserted in the cassette. Lee stated that unlike Marple's experimental filters, this filter did not show any marks indicating swabbing. See 15 FMSHRC at 1478.

When Thaxton reviewed all the cited filters in August 1992, six of Urling's filters were reclassified from tamper code 2 to tamper code 3 because of the presence of cones. When Urling cited filters were examined by Thaxton in 1993 none showed cones, one was described as showing a dimple, and two as having "slight dimple[s]." Thaxton explained the absence of cones by the fact that the filter tends to relax over time, resulting in the disappearance of the cone. Lee disagreed with this conclusion because he found no indication in examining his experimental filters that the cone relaxes over time. The testimony of both Dr. Lee and Dr. McFarland at the common issues trial cast doubt on Thaxton's judgments as to the presence of cones. See 15 FMSHRC at 1493 (Lee) and 1504 (McFarland). I conclude that none of the cited filters exhibited cones at the time the citations were issued. In itself this conclusion does not mean

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that the filters were not tampered with, but it does indicate that the impact forces creating the dislodgments were relatively slight.

I conclude that the preponderance of the evidence does not show that the water stain filter (324842) resulted from deliberate tampering. I conclude that the preponderance of the evidence does not show that filter 325300 resulted from deliberate tampering. The Secretary's evidence relating to both of these filters is inconsistent and unconvincing. I further conclude that the 73 other cited Urling filters resulted in whole or in part from reverse air flow through the filter. I conclude that the reverse air impact forces were generally less than those created by deliberate blowing through the filter cassette. The dust dislodgment patterns may have been influenced by impacts to the cassettes or sampling assemblies as well as reverse air through the cassettes (mixed-mode theory of Dr. Lee).

V. THE STATISTICAL EVIDENCE -- MILLER vs. ROTH

Dr. Miller and Dr. Roth are both expert statisticians with impressive credentials. Both have published extensively in the field of statistics, and both have previously testified as expert witnesses. Using the same data they have arrived at some very different conclusions in this case. Their use of the data is different in two respects: Dr. Miller used March 26, 1990 as the cutoff date between before and after periods. Dr. Roth saw "nothing magic" about the March 26, 1990 date. Dr. Miller generally used weekly periods to compare rates of cited cassettes. Dr. Roth used bimonthly periods. With respect to the cutoff date, I conclude that March 26, 1990 is not the most logical cutoff point. If it is assumed that a change in behavior resulted from knowledge of the ongoing MSHA investigation, the evidence shows that the ESD personnel and Keystone management were aware of the investigation from early February 1990, 6 weeks or more before the notification of the void code on March 26. I am attaching to this decision as Appendix A a graph prepared by Dr. Miller (G-500, attachment A-1) and as Appendix B one prepared by Dr. Roth (R-2129B). Dr. Miller's graph shows the cited rate by week for Urling from August 1, 1989 to March 31, 1992 with a vertical line drawn at March 25, 1990. Dr. Roth's graph shows the bimonthly cited rate for Urling from September 1989 to March 1992. I agree with Dr. Roth that it is preferable to use bimonthly periods to compare cited rates because dust sampling is done on a bimonthly basis. I agree with Dr. Miller that there was a sharp decline in the cited rate on or about March 26, 1990. I agree with Dr. Roth that there was overall decline in cited rates from September 1989 to April 1990. I agree with Dr. Miller that in general the dates of cassette manufacture do not seem overall to explain the differences in the cited rate. On the other hand I agree with Dr. Roth that the fact that 60 percent of the cited Urling cassettes were manufactured on four consecutive

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working days in May and June 1989 is highly suggestive of manufacturing anomalies on those dates.

I am unable to conclude on the basis of the statistical evidence that the changes in the rates of cited cassettes at Urling establishes that a change in the behavior of Urling personnel was related to their perception of an MSHA investigation of the respirable dust sampling program at the mine.

VI. ESD PERSONNEL -- CREDIBILITY

Unlike the common issues trial this case involves allegations that specific persons tampered with the cited dust samples, namely the people employed at R & P's ESD dust lab. Because all of them testified I have had the opportunity of observing them and assessing their credibility. Credibility determinations, of course, are more complex than merely evaluating demeanor on the witness stand, steadiness of voice, eye contact, body language, etc., important though these may be. In this case credibility must take into account the extensive factual evidence related to practices in the mine and in the dust lab, the scientific evidence, the statistical evidence, and the witnesses' prior knowledge of criminal and civil sanctions for tampering.

I previously indicated that I consider the violations charged here to be very serious in that they placed in jeopardy the health of the miners including those accused of tampering. The record before me shows that a large number of mine operators and agents have pleaded guilty to criminal charges of tampering. So despite what I consider the heinousness of the practice, I recognize that miners and mine operators have tampered with and removed dust from respirable dust samples submitted to MSHA.

As a practical matter only Eget and Houck among the ESD personnel had any substantial opportunity to tamper with the samples. The dust technicians spent considerable time in distributing and collecting the pumps and travelling between the mines and the dust lab. It would have been very difficult for them to separate the sampling assemblies, remove the cassettes, and remove dust from the filters. Eget and Houck, on the other hand, spent much of their time in the lab and, in the course of their duties, removed the cassettes from the sampling assemblies. Eget examined each cassette and viewed the filter through the cassette inlet.

What would motivate (Footnote 5)/ these employees -- Eget, a mid-level supervisor, and Houck, a calibration technician employed at R & P for only 3 years, to engage in the seriously illegal conduct with which they are charged? The Secretary suggests three possible incentives: first, to avoid penalties for overweight samples; second, to avoid the irksome chore of resampling if overweight samples were submitted; and third, to avoid the "enormous potential costs associated with not achieving compliance." Secty's brief at 98. The enormous potential costs, according to the Secretary, may include reworking the mine's ventilation system, or dust suppression systems, or reducing the speed at which the continuous mining machine operates. But neither Eget nor Houck was directly involved in coal production; neither reported to a production supervisor. Neither would pay any penalty. Eget and Houck processed dust samples all day every day. Although resampling would have required additional work, it would not appear to represent a substantial burden for the ESD. The Secretary suggests that Eget had a personal incentive to tamper in that if few dust citations were issued management would be disinclined to interfere with his unsupervised control of the activities of the ESD. In themselves, these "incentives" seem very weak. Considered with the relatively small history of prior dust violations, they practically disappear. Both Eget and Houck knew that tampering was illegal. Eget at least was aware that such acts could result (and had resulted) in criminal sanctions.

I discount the testimony of Randy Thomas that he had witnessed tampering with dust cassettes at ESD some 15 years prior to his testimony. I considered his testimony even though it was remote in time to the tampering charged in this case, and weighed it in conjunction with the testimony of Gary Foehrenbach who allegedly engaged in the tampering. I conclude that Thomas misunderstood what he saw or his recollection was dimmed by the passage of time, and that what he saw was Foehrenbach using an air hose to clean sampling equipment. In any event Foehrenbach has not worked in the ESD lab for many years, and the Secretary does not implicate him in the violations charged.

I was impressed by the backgrounds of Eget and Houck and their forthrightness on the witness stand. I have carefully considered their testimony. Relying on the absence of any adequate motive for tampering, and the strong disincentive provided by their knowledge of possible sanctions for tampering, I accept as truthful the statements of each of them that he did

5/ The Secretary argues that he is not obliged to show a motive for the alleged tampering. But he is obliged to prove tampering, and motive or its absence may be evidence to show "the doing or not doing of the act." J. H. Wigmore, *The Science of Judicial Proof* 117 (3d ed. 1937) cited in *Garner, A Dictionary of Modern Legal Usage* 366 (1987).

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not tamper with compliance respirable dust samples submitted to MSHA.

I indicated earlier that the four dust technicians, Snyder, Hollern, Bolinger, and Gleditsch, would have had little opportunity to tamper with the dust samples. And only Snyder handled the Urling samples. Snyder and the three other dust technicians testified in this case and denied tampering with any MSHA samples. For the same reasons that I accept the testimony of Eget and Houck, I accept the testimony of Snyder, Hollern, Bolinger, and Gleditsch as truthful. I do not regard the testimony of Jack Szentmiklosi as affecting their credibility.

I agree with the Secretary that credibility determinations cannot be made in a vacuum. My decision to credit the testimony of Eget, Houck, Snyder, Hollern, Bolinger, and Gleditsch that they did not tamper with dust samples takes into consideration not only their testimony, but also the evidence concerning the handling of dust samples at the mine, and the expert testimony of Thaxton, the scientists, and the statisticians. I consider these credibility determinations to be of overriding importance in this decision.

ORDER

Based on the above findings and conclusions and on the entire record in the common issues trial and the Keystone trial, and considering the contentions of the parties, I conclude that the Secretary has failed to carry his burden of proving by a preponderance of the evidence that the weight of the 75 cited Urling filters was intentionally altered by Keystone.

Therefore, IT IS ORDERED

1. The captioned contest proceedings are GRANTED;
2. Citation Nos. 9860247 through 9860299 and Citation Nos. 9862821 through 9862842 are VACATED;
3. The petitions for civil penalties based on the above citations are DENIED and the proceedings are DISMISSED.
4. All other pending cases in the consolidated docket are STAYED until further order of the Commission.

James A. Broderick
Administrative Law Judge

Appendices A and B

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