II. Summary and Conclusions

Introduction

The Department has prepared this report in accordance with its mandate under the Bituminous Mine Subsidence and Land Conservation Act (BMSLCA). The report reflects the results of an intensive data review, collection and analysis effort spanning most of 1998. Relevant information in Department files was supplemented by direct survey of all groups expected to have useful information – the owners of properties that may have been undermined, the mine operators, and the organizations responsible for infrastructure such as roads, municipal facilities, and natural gas pipelines. In addition, the Department reviewed two reports of topical interest for context. They included a 1998 report published by the Audubon Society of Western Pennsylvania: *An Investigation of High Extraction Mining and Related Valley Fill Practices in Southwestern Pennsylvania;* and the 1996 Penn State Report, *Longwall Coal Mines: Pre-Mine Monitoring and Water Supply Replacement Alternatives.*

BMSLCA provides for claims resulting from mining to be resolved between the mine operator and the property owner. Although the law allows for Department involvement, it is based on the premise that many claims can, and will, be settled without Department intervention. Under these circumstances, the Department has always recognized the importance of outreach – contacting property owners who may be affected by underground mining to educate them on the law and to explain their rights. There are several examples of these efforts: the Department has developed and distributed a fact sheet on the amendments to BMSLCA; has developed a computerized presentation with detailed information on topics related to underground mining and the law for use at meetings between the Department and the public; and has appointed two surface subsidence agents to monitor activities above active longwall-mining operations. The appointment of the surface subsidence agents is particularly noteworthy. The agents monitor subsidence events on a concurrent basis and are able to act as ombudsmen to property owners and mine operators. Pennsylvania's Department of Environmental Protection is the first regulatory agency, federal or state, to appoint agents whose only responsibility is to perform these functions.

The report includes information from different sources so that a complete picture can be presented. One ancillary benefit is that, in some cases, the Department was able to correlate and verify the same data obtained from more than one source. As was to be expected, the range of data collected varied depending on the element being considered. For example, the valuable contributions of the surface subsidence agents started in 1997. Reporting requirements for most damages were instituted June 13, 1998, after regulations were approved by the Environmental Quality Board. Mine operators cooperated with the Department in responding to data requests; however, it is possible that some submissions may not represent a complete record simply because the information was never maintained. These facts make the information derived from the property owners' survey extremely valuable in developing a more complete record.

The report covers the period from August 1, 1993 to August 31, 1998. One perspective on the report is that it presents a snapshot, taken at the end of the report period, of the status of

the issues addressed. As is discussed in more detail in Section IV of the report, BMSLCA provides for as much as a three-year period for the final resolution of some claims. The report presents information on claims that are still pending, and also discusses ongoing Department investigations associated with some of these. Consequently, the Department intends to develop and publish a supplement to this report later in 1999. The supplement will include any new information derived from the Department's investigations, and will incorporate any related information that is obtained as a result of publishing this report.

Early sections of the report present background information that the reader may find useful in understanding the context for the results. Topics such as the legislative and regulatory history of BMSLCA, the history of mining operations in the geographical area addressed in the report, important geologic and hydrologic considerations, and a review of the potential impacts from underground mining are presented. Next, the report describes the sources that were used during the effort, discusses the surveys conducted by the Department, and presents details on the responses received. The final sections of the report focus on the actual impacts identified – in the areas of water supplies, structures, infrastructure, surface land, and streams. A discussion of the broad trends that the Department has associated with these impacts is presented below.

Conclusions

- Some of the cases evaluated by the Department merit further investigation; additional results related to these efforts will be presented in a supplement to this report later this year. However, based on the information evaluated to date, the Department has concluded that mine operators are complying with the 1994 changes to BMSLCA. For the most part, they are replacing water supplies and repairing or compensating for subsidence damage to the structures covered by the act. There is no evidence of resistance toward complying with the expanded requirements.

- Many property owners are benefiting from the 1994 amendments. The requirements to replace impacted water supplies and to repair or compensate for damage to dwellings and other surface structures have provided solutions to many problems that had no regulatory remedy prior to 1994.

- The majority of property owners whose claims had achieved final settlement appeared to be satisfied with the resolution of their claims. Small groups of property owners (25 in the case of water supply impacts and 22 in the case of structure damage) expressed dissatisfaction with the resolution of their claims. In general, the dissatisfaction of this group of property owners was related to their view that they had received less than they had prior to mining – less water, or decreased quality, or insufficient compensation for structure damage. Many of these property owners appeared to be taking the opportunity to express their general dissatisfaction with the law through their responses to the Department's property owners' survey, since only eight had filed formal complaints with the Department.

- The Department's evaluation has identified voluntary agreements as an important tool. They are frequently used by mine operators and property owners in the settlement of claims for water supply impacts and structure damage. The Department's surface subsidence agents have also noted the use of premining agreements in their inspection areas. Only seven property owners reported having confidentiality clauses in their agreements with mine operators.

- Many claims are being settled between the mine operator and property owner without Department involvement, as anticipated by BMSLCA. Of the 373 claims associated with water-supply incidents that have been reported as fully resolved, property owners consulted the Department in 98 cases – approximately 25% of the total. For structure damage, the ratio is even lower. The 36 property owners who consulted the Department about structure damage claims represented 20% of the 179 claims that were fully resolved.

- The Department's view on the need for outreach has been substantiated. Forty-three of the property owners who responded to the Department's questionnaire indicated that they had not previously told anyone about their problems. As a result, the Department is evaluating additional efforts it can make to educate property owners who have been affected or are likely to be affected by mining.

- The information gathered for this report revealed a number of cases that deserve further inquiry or investigation by the Department. The Department plans to conduct follow-up investigations on all new cases that were discovered through Department surveys and on cases that did not appear to be on course to resolution. The Department also plans to make follow-up inquiries on cases where circumstances are unclear and on a random sample of cases where determinations of "no liability" were reached without direct Department involvement. The Department will provide updated information regarding these cases in the supplement to this report.

- The Department believes that, in practice, Pennsylvania's program is as effective as its federal counterpart in dealing with subsidence damage and water supply impacts. This view is based on the fact that the federal Office of Surface Mining (OSM) has conducted intensive oversight on cases of interest handled under the Act 54 amendments. OSM has not identified any areas where it concluded that Pennsylvania's implementation should have been different because federal requirements were not satisfied.

- Since this is the first report prepared under the 1994 amendments, many reported claims are still in the resolution stage. Mine operators are allowed three years to permanently resolve water supply claims and six months to resolve structure damage claims. As a result, many claims are still at an interim stage of disposition. Eight years is needed for a complete evaluation of a full five-year implementation of the new provisions of BMSLCA. In recognition of the importance of this issue, the Department proposes to develop the next full report earlier than the end of the next five-year period. This new report would, at a minimum, cover the five-year period from August 1994 to July 1999,

and would be prepared at the end of the following three-year period needed for the permanent resolution of water supply claims.

- Although this report satisfies the requirements of BMSLCA, it does not address some concerns raised by the Audubon Society in its study of impacts associated with longwall mining. In conjunction with the federal Department of Energy, the Department has started work on an evaluation of one aspect of these unanswered concerns - the effect of mining on land productivity. The Department intends to evaluate other concerns, such as the socioeconomic issues raised by the Audubon Society, even though the socioeconomic concerns go beyond the scope of BMSLCA. These findings will be presented in the next full report.

Summary of Observations

Observation Regarding the Nature of Mining that Occurred during the Study Period

Mining took place on nine different coal seams during the five-year period extending from August 1993 to August 1998. Seventy-four mines extracted coal using room-and-pillar extraction techniques. An additional ten mines employed longwall-mining technology.

Coal seams in the bituminous coal field tend to be flat lying to gently inclined. This causes mines to extend workings horizontally over broad areas. It is estimated that approximately 7,770 acres (3144 ha) were mined annually during the study period. Of this total, 4920 acres (1991 ha) annually were attributable to longwall mines and 2850 acres (1153 ha) annually to room-and-pillar mines.

Observation Regarding the Nature of Areas Undermined during the Study Period

Mining occurred primarily outside of urban or suburban areas. There were, however, some small, developed areas scattered over various mines. While mining generally took place beneath rural areas, the number of reported damages suggest that many of these properties had been improved to include structures and water supplies.

The study area has a well-developed network of roads and gas transmission pipelines and mining extends beneath these features in many places. There is also a certain amount of overlap between mining and the many public water supplies that serve small communities throughout the study area. Mining also interfaced to a limited extent with the area's overlying rail network. There was no mining beneath any state park and only one case where mining extended beneath a county park.

Observations Regarding the Effects of Mining on Nearby Water Supplies

Mining had various effects on nearby water supplies. In some cases mining occurred with no apparent effects while in other cases there was some type of reported impact. Information compiled for this report revealed 251 cases where mining occurred within 200 feet of a property and had no apparent effect on the property's water supply. There were also 533 cases where effects were reported. Some of these impacts occurred on properties where mining was farther than 200 feet from the property boundaries.

Mining affected water supplies in a variety of ways including diminution, contamination, breakage of pumps or piping, and caving of the well bore. There were also scattered reports of taste, odor, and methane problems associated with mining. Diminution was by far the most frequently reported type of impact. Approximately 85% of the reported cases involved either diminution alone or diminution in association with another type of impact. There were also some reports of water supplies returning to their premining condition after being affected.

Observations Regarding the Restoration and Replacement of Water Supplies

For the most part, mine operators are complying with the water supply restoration and replacement provisions of the law. In 221 cases the mine operator had reportedly replaced the property's affected water supply. In another 33 cases the water supply problem had been resolved through some form of compensation. There were also 83 property owners on temporary water at the close of the study period awaiting the final resolution of their water supply problems. This latter group of cases was within the three-year time period allowed by law for final corrective action to be implemented.

There were 119 cases where mine operators did not take action to restore or replace water supplies because they did not believe their mining was responsible for the water supply problems reported by the property owner. The Department was involved in 65 of these cases and came to the same conclusion. The data that was available for this report was not sufficient to enable the Department to fully categorize and tabulate the reasons for claim denial. More detailed information would be available only if the property owner had contacted the Department to request an investigation of a claim denial. However, in the Department's experience, reasons for claim denial may include a determination that the problem existed before mining, a finding that the problem is unrelated to mining, or a finding that the condition is within the expected range of local or seasonal variation. There were, however, several reported cases where mine operators provided temporary water or a replacement water supply even though they did not believe their mining was the cause of the problem.

There were also 77 cases that were listed as unresolved at the time of reporting. These cases cover a variety of circumstances. Thirty-two of these cases involved claims that had not been previously reported by property owners prior to completing the Department's questionnaire. In another 27 cases the reported information was not sufficient to enable the Department to determine the status of claim resolution. The remaining cases fell into one of three categories. Some of these were cases that were on the way to being resolved. Some involved situations where the mine operator had attempted resolution but failed to resolve the problem or satisfy the

property owner. There were also four cases where property owners reported receiving no assistance from the mine operator without offering further explanation.

The Department recognizes the need for follow-up inquiries or investigations on some of these cases. Plans are to investigate all newly reported cases and all cases that did not appear to be on course to resolution. The Department also intends to conduct follow-up inquiries on all cases where circumstances are unclear and on a random sample of cases where determinations of no liability were reached without direct Department involvement. Updated information relating to these cases will be presented in a supplement to this report.

Observations Regarding the Effects of Mining on Overlying Structures

There were 280 properties that reportedly had some type of structure damage due to mining. There were 245 reports of damage to dwellings making them the most frequently damaged class of structures. Garages and barns were respectively second and third on the list of primary structures damages with counts of 68 and 29. There were also reports of damage to seven commercial buildings and one church.

There were also reports of damages to a wide variety of appurtenant structures. These included driveways, patios, decks, porches, pavilions, sheds, septic systems, fences, swimming pools, retaining walls, silos, ponds, and various other buildings.

Most of the damages were associated with longwall mining although there were quite a few associated with room-and-pillar mining. As was to be expected, many of the incidents of damage observed by the Department's surface subsidence agents were associated with structures situated over longwall panels. However, in a separate assessment, the Department found that 291 of 477 properties with subsidence-prone structures had no reports of damage.

Observations regarding irreparable damage were somewhat conflicting. Responses to the property owners' survey indicated that 22 structures had been irreparably damaged. The reports could not be definitively confirmed since many of these incidents were resolved through agreements or by compensation. However, the Department is familiar with nine of the structures and would not have judged any of these to be irreparable. There was also one report of damage to a church because the measures for protection against material damage were not fully effective. As required by law, this structure was repaired and returned to full functionality.

Observations Regarding Repairs and Compensation for Structure Damage

Mine operators are for the most part accepting their statutory responsibility to repair damage to listed structures or to compensate the owners of those structures for the damage. Reports for 149 properties indicated that structure damages had been repaired or compensated. Two-thirds of all resolved claims were reportedly settled through compensation or agreement. In the other cases, the mine operators arranged for the necessary repairs to be made.

There were 28 cases where mine operators were unwilling to repair or compensate for damage because they did not believe their mining caused the subsidence damage. In 18 of these

cases, the Department was consulted by property owners and came to the same conclusion. The collected data was insufficient to allow a summary of the reasons for claim denial. Based on the Department's experience, structure damage claims may be denied for several reasons. In some cases the damage is found to have occurred prior to the start of the mining activity. In other cases the damage may be due to some other problem such as structural defects, drainage problems, or the effects of expanding or shrinking soils.

The remaining 101 structure damage cases had not attained final resolution. Thirty-nine of these cases appeared to be on course to resolution but were still in the pending stage at the close of data collection. In 19 of the cases mine operators made attempts or offers to resolve the claims with results that were unsatisfactory to the property owners. Twenty of the cases were based on reports that were insufficient to allow determinations of claim status. Another 14 cases involved claims that were not previously reported to the Department or the mine operator. In the remaining nine cases the property owners reported receiving no assistance on their structure damage claims without providing a reason or further elaboration.

As in the case with water supplies, the Department believes that some of these cases deserve further inquiry or investigation. Plans are to investigate all newly reported cases and all cases that did not appear to be on course to resolution. The Department also intends to conduct follow-up inquiries on all cases where circumstances are unclear and on a random sample of cases where determinations of no liability were reached without direct Department involvement. Updated information relating to these cases will be presented in a supplement to this report.

Observations Regarding Effects on Land and Streams

The Department compiled information on 195 damage reports relating to surface land. There were also 25 incidents where stream flow was reportedly altered as a result of underground mining. Some of these 25 incidents may be the result of duplicate reports. As part of its ongoing evaluation, the Department will determine how many of these cases are duplicates.

In terms of effects on surface land, the most frequently reported impacts were ground cracks. One hundred and forty-one cases, approximately 70%, were related to ground cracks. Second on the list of reported effects, but with much less frequency, were incidents of flooding and impaired drainage. Landslides, sinkholes, and bumps comprise the remaining types of reported effects. The collected information did not provide a clear picture of the extent to which mine operators are repairing land damage.

Reports of effects on streams were far less frequent than other types of reported effects. There were 16 reported incidents among the records in the claims database and property owners' questionnaires. There were also nine incidents reported by the Department's surface subsidence agents. The degree of overlap between the observations of the surface subsidence agents and other reports could not be determined without more detailed investigations. Most reports concerned either flow diminution or ponding along subsided channel segments. A few cases also involved the diversion of a stream from its former course. There was one report of remedial action among the 25 cases; it is not clear whether any of the other cases warranted remedial

action. The regulations reserve remedial action for situations where streams are perennial (flow year round) and effects are significant enough to impair stream uses.

As indicated by these observations, there is a need for the Department to conduct follow-up investigations in many of these cases. The Department is proceeding to investigate all reported incidents involving effects on streams and many reported incidents involving effects on surface land. The Department will focus land damage investigations on properties where structure damage or water supply matters are also being investigated and on properties where there are specific reports of residual land damage. The findings of these investigations will be included in the supplement to this report.

Observations Regarding Effects on Public Services

The Department's survey of agencies that operate and maintain roads, public water systems, and public sewer systems revealed few reported impacts. Reports of road damage included incidents of cracking, buckling, and settlement. There were no reports of any damage to publicly-owned water or sewer lines.

Reports relating to damaged roads revealed that in many cases mine operators either provided labor and materials to repair the damages or reimbursed the road authority for all or part of the repair work even though they were not obligated to do so under BMSLCA. The responsibility for repairs is determined by property rights law, not through BMSLCA. Of the 39 townships responding to the Department's survey, eight reported impacts to township roads that were associated with mining. Only one township reported having to bear the full cost of repair.

Observations Regarding Impacts on Gas Pipelines

The Department was able to contact all five natural gas transmission companies and six local distribution companies operating in the area of interest. None of the companies reported any incidents resulting in a hazard to human safety. In addition, reports of interruptions to customer service as a result of the undermining of natural gas pipelines were scattered. One hundred and forty-three customers were reported to be affected over the five-year study period. Finally, although several companies commented that they had not been compensated for measures implemented to protect their lines, it was clear that this issue was typically resolved in accordance with the property rights of the respective companies.

Observations Regarding Federal Oversight

In practice, Pennsylvania's subsidence damage repair and water supply replacement provisions appear to be as effective as federal counterpart requirements. Since July 28, 1995, OSM has assumed authority to enforce federal program requirements in cases where Pennsylvania's program fails to provide a remedy that meets the requirements of federal law. To date, OSM has not invoked this authority on any claim arising from mining after August 21, 1994 (the effective date of the Act 54 amendments). OSM involvement has been limited to overseeing the resolution of claims attributable to pre-act mining and passing other reports of subsidence damage and water supply impacts on to the Department.

Observations Regarding Various Issues Raised in Audubon Report

While this report satisfies the requirements of Section 18a of BMSLCA, it does not address some issues raised in the Audubon Society's 1998 report, *An Investigation of High Extraction Mining and Related Valley Fill Practices in Southwestern Pennsylvania*. These unanswered concerns relate to issues such as mining's effect on land productivity, property values, local economies and the tax base. These matters were not addressed because the Department found that information needed for their assessment is generally unavailable.

The Department is looking at various options for obtaining the information needed to assess these additional concerns. As an example, the Department has arranged for the U.S. Department of Energy to examine vegetation above several longwall panels through remote sensing techniques. This work will be done later in 1999. The Department also plans to conduct or arrange for similar studies to address other socioeconomic concerns raised by the Audubon Society even though these concerns are beyond the scope of BMSLCA. The Department will include any relevant findings from these studies in the next full report.