

## **IX. Sources of Information and Data Collection for Evaluating Impacts**

### **Introduction**

The Department recognized that outreach efforts would be needed in order to gather important relevant information. The amendments to the Bituminous Mine Subsidence and Land Conservation Act (BMSLCA) provide for cases of mine subsidence damage and water supply impacts to be settled between property owners and mine operators without the need for Department involvement. Accordingly, on a routine basis only a fraction of all the incidents ever come to the attention of the Department. Most of those that are reported concern claims where the cause of damage or means of resolution is in dispute. In addition, the amendments provided no mechanism for gathering information on land, structures and water resources that were undermined without incident.

The Department used a number of sources to gather information on mining-related impacts and claims resolutions that occurred during the study period. One important source of information was the six-month maps and permit applications filed in the Department's McMurray district office. Equally important was the large amount of information obtained from four surveys that the Department conducted specifically for this report. These surveys targeted the operators of study period mines, property owners, pipeline operators, and public service providers in areas undermined during the study period. Supplementary information was also derived from the Department's mine subsidence insurance database, surface subsidence agents' reports and records compiled by the U.S. Office of Surface Mining (OSM).

The Department also reviewed two recent reports relating to effects of underground mining. These reports were prepared by the Audubon Society of Western Pennsylvania and the Pennsylvania State University.

The following subsections contain detailed descriptions of the various information sources that were used in preparing this report.

### **Six-month Mine Maps and Notification Letters**

The six-month maps and notification letter files were fundamental components of the Department's data collection efforts. These sources aided the Department in identifying the properties that were undermined during the study period and the owners of those properties. This information was basic to building and linking the various databases described later in this section and to surveying the owners of properties that were undermined.

The six-month mine maps are prepared by mine operators every six months. The maps show the area where mining is proposed for the next six-month period and the area where mining occurred during the previous six-month period. The maps show underground mining features such as pillars, longwall panels, completed areas and abandoned areas and details such as dates of mining and the elevations of mine workings. The maps also show structures and features that

exist on the land surface. These include dwellings, public buildings, churches, schools, hospitals, utility lines, garages, barns, sheds, silos, roads, railroads, gas wells, oil wells, water wells, streams, lakes, ponds, dams and public parks. The structures are identified by numbers that correspond to inventory lists in the permit files. The maps also show property boundaries and property ownership. The maps are filed in the Department's McMurray district office.

The notification letters are copies of the letters mine operators send to property owners and residents notifying them of the intent to mine. These letters are required by section 10 of BMSLCA. The regulations require mine operators to provide copies of these letters to the Department as a means of verifying compliance with the law. The copies are retained in files in the Department's McMurray district office. The notification letters were used to obtain the mailing addresses of property owners in areas that were undermined. This information was crucial to the Department's efforts in surveying property owners.

### **Permit Applications**

Permit applications provided important sources of much of the supplementary information found in this report. The applications provided details such as mining methods, years of operation, history of operations, and mine locations. Permit applications also contained structure and water supply inventories that were useful in determining the type, use and ownership of these features.

### **Six-month Mine Map Database**

The six-month mine map database was created to store information for use in this and future five-year reports. It was also designed to track notifications that mine operators are required to send to property owners and residents in accordance with section 10 of BMSLCA.

The six-month mine map database contains information derived from six-month mine maps, permit applications and notification letters. The current version includes information transferred from earlier Department databases and information derived from the Department's 1998 data collection initiatives. The database contains records pertaining to approximately 13,000 surface properties situated over underground permit areas. Many of these are records of properties that were undermined prior to the study period or properties that will be undermined sometime in the future.

In early 1998, the Department initiated a concerted effort to identify all properties that were situated above or adjacent to study period mining. The Department viewed this effort as crucial to several aspects of this study. First, it would enable the Department to build a database that would serve to correlate reported impacts with individual properties. Second, it would yield the names of property owners that would ultimately become the target group for the property owner's survey. Finally, it would enable the Department to identify those properties with structures, water supplies or other improvements for closer study.

After identifying the mines that operated during the study period, the Department proceeded to review all six-month maps associated with each of those mines. During this review, the Department identified all properties, structures and water supplies that were situated above or within 200 feet (61 m) of study period mining. The Department used a 200-foot (61 m) distance as the limiting factor. Structures were classified as dwellings, barns, garages, churches, schools, commercial buildings, public buildings and “other structures” (such as sheds, corncribs, pavilions and camps). Water supplies were classified based on their association with nearby structures. Placement categories included residential, agricultural, business, other and unknown.

After identifying the properties, structures and water supplies, the Department proceeded to determine their owners from records in the permit files. Subsequently, addresses of the property owners were determined from files containing copies of the notification letters.

The Department also reviewed the information on the six-month maps to determine if the depicted mining was likely to result in subsidence and if that subsidence was likely to affect any overlying structures. In making this assessment, the Department used a 15-degree angle of draw, a value that has generally proven practical for use in Pennsylvania.

As these and other details were gathered, Department staff entered the information into the six-month map database. The database contains information on:

- address of the surface property owner
- coal mine activity permit number for the underlying mining activity
- map sheet reference numbers for locations from the six-month mine maps
- the type of structures on the surface property
- the type of water supplies on the surface property
- the type of uses of water supplies on the surface property
- the date surface properties were undermined
- the identity of surface properties that had longwall mining within 200 feet (61m) of their boundaries
- if overlying structures on the surface property were likely to experience subsidence
- if public water is available for the surface property

A more detailed description of the fields in the six-month mine map database is presented in Appendix C, Figure C.1

### **Claims Database**

The claims database is a collection of information relating to the reported effects of recent underground mining. The three types of features addressed are water supplies, structures and land. The information in the database relates to claims filed by landowners and claims reported by coal operators.

Claims that are filed by landowners are received at the McMurray district office by telephone or letter. A landowner may alternatively file a claim directly with the coal operator. The coal operator then reports these claims to the McMurray district office. Information is recorded in the database as it is submitted to the McMurray district office.

The database has been structured to accommodate a range of very detailed information on each claim. The data collection effort is intended to enable the Department to focus on the rights of the landowner and the responsibilities of the coal operator. Basic information is recorded to characterize the claim itself, the landowner, the property, the coal operator, the mining activity, key dates, and other relevant circumstances. In addition, the database is used to record information so that the Department can determine whether all of the provisions of BMSLCA have been satisfied. A detailed description of the key fields in the database is presented in Appendix C, Figure C.2.

Until 1997, the contents of the database related primarily to claims filed by property owners. From that time forward the Department began adding information obtained through the survey of mine operators. This effort greatly expanded the amount of information in the database.

### **Survey of Mine Operators**

As part of data collection, the Department surveyed the operators of all mines that were active during the study period to obtain information on the number and types of claims they had received. This proved to be a major source of information regarding mining-related impacts on structures and water supplies. Mine operator responses were extremely useful in preparing this report given that many claims had been settled between mine operators and property owners without Department involvement.

The survey targeted 38 mine operators who collectively operated the 84 mines listed in Appendix C, Table C.1. The Department began the survey in June 1997 by distributing claim report forms. The forms were designed to receive detailed information regarding the nature of each reported impact, its relationship with mining and the manner of disposition or settlement. The forms are the same as those used by the Department to record the results of its investigations. The forms are presented in Appendix C, Figure C.3. The Department also sent follow-up letters to promote participation in the survey and assist mine operators in completing the forms. Copies of the letters are included in Appendix C, Figure C.4.

### *Response of Mine Operators*

By the close of the study period, the Department had obtained responses from all 38 operators. Since May 11, 1998, operators have filed reports on ongoing basis. The information obtained through the survey was entered into the claims database where it could be queried and sorted for analysis.

Twelve of the operators completed survey forms detailing the subsidence damage and water supply impact claims they handled between August 21, 1994 and the close of the study period. Twenty-six operators responded by saying that they received no claims during this time interval. The survey responses provided information relating to land, water or structure impacts on 333 properties.

### **Survey of Property Owners**

Another important source of information was the property owners' survey that the Department conducted between July and October 1998. The survey was designed to obtain information directly from the property owners in areas that were undermined between August 1, 1993 and August 31, 1998. Like the mine operators' survey, the property owners' survey provided information on many claims that were settled without the Department's knowledge or involvement. In addition, the property owners' survey provided a unique source of information on properties that were undermined without experiencing any noticeable impacts.

The property owners' survey was conducted by mailing questionnaires to the owners of properties located above or near areas where mining occurred during the study period. The Department also made follow-up telephone calls to many people who did not return questionnaires in order to gather additional responses. The text of the questionnaire that was used for the survey is included in Appendix C, Figure C.5. The survey included 27 questions that were designed to elicit information on various aspects of property owners' observations and experiences. The primary areas of inquiry included:

- Did mining cause damage to the land or structures?
- Did mining affect the water supply?
- Did the mine operator conduct surveys to determine the condition of the structures and water supply?
- Did the mine operator repair damage in a satisfactory manner or provide adequate compensation to cover the damage?
- Did the mine operator restore or replace the water supplies so as to leave the property with a viable source of water?
- Was any structure damaged to the extent that it had to be replaced?
- Are property owners being pressured into signing agreements specifying the terms of settlement?
- Are agents of the mine operators and the Department treating property owners in a fair and respectful manner?

The Department took several steps to ensure that the questionnaire would be understandable and easy to use. Drafts were provided to the Citizens Advisory Council, the Barry Group<sup>1</sup> and the Department of Community and Economic Development (DCED) Office of

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<sup>1</sup> The Barry Group is a professional marketing firm located in York, Pennsylvania. The company provides consulting services to the Department's Mine Subsidence Insurance program.

Press and Marketing for review and comment. The Department used many of the recommendations in developing the final version of the questionnaire.

The Department selected the target population using information in the six-month mine map database. The target population consisted of those property owners who had active mine workings beneath their properties or within 200 feet (61m) of their property boundaries during the study period. Property owners were included without regard to the type of mining that was conducted beneath or adjacent to their properties. The Department included owners of unimproved properties as well as owners of properties with structures and water supplies to ensure that properties with land damage alone would not be overlooked.

In developing the final survey population, the Department decided to exclude mining interests that turned up as property owners. The Department reasoned that mining interests were covered by the mine operators' survey discussed earlier in this section. The Department was also forced to drop several other property owners from the survey list because they had no available mailing addresses.

The first batch of questionnaires was mailed on July 7, 1998. A total of 1023 property owners recorded in the six-month maps database as of early June were sent questionnaires. The Department took several steps to encourage property owners to complete and return the questionnaires. Self-addressed postage-paid envelopes were provided. The Department issued a press release encouraging property owners to respond to the survey and to request questionnaires if they had a mining-related problem and were missed by the mailing. Advertisements were placed in the *Washington Observer Reporter*, the *Indiana Gazette* and the *Greensburg Tribune Review*. Copies of the advertisements and press release are included in Appendix C, Figures C.6 and C.7. Because of these efforts, there was a good response rate for the initial mailing and an additional 35 people contacted the Department to request questionnaires.

After completing the first mailing, the Department made preparations for a second. This mailing was planned to reach several groups. The first was the group of additional property owners identified through further evaluation of the six-month map database. Another group was developed to provide a second survey opportunity to those property owners who had not responded to the first mailing. Finally, the Department identified new addresses for property owners whose questionnaires had been returned as undeliverable by the US Postal Service. This mass mailing was conducted on August 17, 1998 and targeted 1157 property owners.

From the start, the Department recognized that there would be a need for a third survey at the very end of the study period. This survey was necessary to include those people whose properties were added to the six-month map database between early June and August 31, 1998. Mine operators continued to submit six-month maps while the survey was underway and these maps identified newly undermined properties. As a result, the Department conducted a third mass mailing targeting 56 property owners whose properties had been undermined during the intervening period. These surveys were mailed in September 1998.

As noted above, 35 people called to request survey questionnaires. Most of these were individuals who had not been identified for inclusion in the first mass mailing. In some cases,

the Department noted that the person making the request owned a property that was undermined prior to the start of the study period. The Department provided questionnaires to all individuals who requested them even when it was apparent that the individual wished to report damages that occurred prior to the study period. Responses of individuals who did not satisfy the qualification requirements have not been included in the results applicable to the study period; however, the Department has retained these responses in its files for reference.

Each questionnaire included a toll-free telephone number for recipients to call if they had any questions. The toll-free number was also included in the press release and paid newspaper advertisements. Department staff fielded 64 calls in regard to the questionnaire. Most of the calls concerned requests for questionnaires. Two people called to complete their questionnaires by telephone. Several people called to request assistance in completing the questionnaire. Two people called to request information about when their properties would be undermined. Two people questioned if they should complete the questionnaire because mining had not yet advanced close to their water supplies or structures. Three people called to describe their experiences with recent and past mining. One person called to inquire if survey results would be kept confidential. Several people called to request time extensions for completing their questionnaires. Several people also called with questions relating to surface mining and abandoned mining.

After concluding the three mass mailings, the Department decided to undertake the final step of calling those property owners who had not returned survey questionnaires. In planning this effort, the Department identified 295 property owners who had structures that were considered "likely to subside" or had mining within 200 feet (61m) of their water supplies. Telephone numbers were located for 201 of these property owners. The telephone survey was conducted on November 23 and 24, 1998. A portion of the calls was conducted during the evening of November 24 to ensure that the maximum number of property owners would be reached.

#### *Response of Property Owners*

The three mailings undertaken by the Department had respective closure dates of July 31, September 4 and October 5. However, questionnaires were received and accepted up to November 16, 1998. Submissions received after November 16 have been retained in Department files for use in future reports. Altogether, the Department mailed a total of 2236 questionnaires. This total includes duplicates because of the follow-up mailings to property owners who had not responded to the first mailing. After accounting for these duplicates, a total of 1603 individual property owners were identified on the list for questionnaires mailed. One hundred and sixty-five of the 1603 questionnaires were returned by the US Postal Service as undeliverable. Consequently, the Department was able to establish some level of contact with 1438 property owners.

The Department received completed questionnaires by mail from 694 of the 1438 property owners that it was able to reach. In addition, as described above, the Department conducted a telephone campaign directed at the high-interest group from the non-respondents and was successful in contacting 114 more property owners. Eighty-five of these property

owners provided at least partial responses to the telephone interview. (Sixty property owners provided responses sufficient to enable questionnaires to be fully completed). Through these efforts, the Department was able to obtain a total of 779 responses from mail and telephone contacts. This result represents a response rate of 54% of the 1438 property owners contacted. A summary of these details is presented in Table IX.1.

**Table IX.1**  
**Property Owners' Questionnaires: Distribution, Delivery and Responses**

County	Property Owners			Percentage Response
	Identified <sup>1</sup>	Contacted	Responses <sup>2</sup>	
<b>Greene</b>	546	465	244	52%
<b>Washington</b>	327	304	180	59%
<b>Armstrong</b>	298	275	163	59%
<b>Indiana</b>	227	211	99	47%
<b>Somerset</b>	104	98	46	47%
<b>Jefferson</b>	70	59	33	56%
<b>Cambria</b>	15	14	8	57%
<b>Allegheny</b>	7	5	4	80%
<b>Clearfield</b>	6	6	2	33%
<b>Butler</b>	3	1	0	0%
<b>Westmoreland<sup>3</sup></b>	0	0	0	NA
<b>TOTAL</b>	<b>1603</b>	<b>1438</b>	<b>779</b>	<b>54%</b>

<sup>1</sup>One hundred and sixty-five of these could not be delivered by the U.S. Postal Service

<sup>2</sup>From mail and telephone contacts

<sup>3</sup>No undermined properties were identified in Westmoreland County although one mine had a permitted area in that county.

Although most of these questionnaires contained usable information, some did not. There were 39 responses that fell into this category. Some of the submissions were completely blank. Others included comments indicating that the respondent either did not wish to respond or did not know about the conditions on his or her property. Absentee property owners and executors of estates were typically not able to report on the conditions of their properties.

There was also a subset of questionnaires that contained complete information, but addressed problems that occurred prior to the study period. There were 24 responses that fell into this category. These questionnaires contained information on 22 prior water supply impacts and 14 incidents of prior structure damage. Some of these reported incidents dated back to the late 1970s. As the Department had expected, some of these responses came from the group of people who requested questionnaires but were not part of the target survey group. Others came from owners of properties that were undermined during the study period. It is likely that people in this latter group experienced problems associated with earlier mining in the same mines over which they now reside.



There was also a group of questionnaires that provided no information on mining-related impacts because the property owners had signed agreements with confidentiality clauses. Seven questionnaires fell into this category.

The survey identified many people who reported no mining-related impacts despite having mining within 200 feet (61m) of their properties. There were 385 survey responses indicating no reported problems. This figure excludes questionnaires that contained no usable information or were subject to confidentiality agreements. It is notable that at least 35 of these 385 cases concerned properties that had longwall mining within 200 feet (61m) of their boundaries. A summary of these statistics is presented in Table IX.2.

**Table IX.2**  
**Nature of Property Owner Survey Responses**

<b>Category</b>	<b>Number</b>	<b>Percentage</b>
No impact from mining	385	49%
Reported some type of impact	324	42%
Blank, no interest, didn't know	39	5%
Reported pre-study period impact	24	3%
Confidentiality Agreement	7	1%
<b>Total</b>	<b>779</b>	<b>100%</b>

Information obtained from the property owners' survey was entered into a database at the Department's Harrisburg office. The database is a version of the six-month map database that was modified to receive the property owners' input and correlate that information with information obtained from the six-month mine maps.

### **Survey of Public Facility Operators**

As part of the data collection effort, the Department mailed a questionnaire to municipal water and sewer authorities, local governments, and Pennsylvania Department of Transportation (PennDot) engineering districts. The purpose of the mailing was to obtain input regarding mining-related damage to roads, municipal water systems and municipal sewerage systems. The target audience for the mass mailing was public service providers with facilities immediately overlying or contiguous to underground mines that were active during the five-year period. This group was selected based on proximity to active underground operations and therefore had the potential for impacts due to mining-induced surface movements and related damage.

The survey was conducted using a questionnaire that was designed to solicit information on the location of any structure or facility damaged by underground mining and manner in which the case was settled. The questionnaire consisted of five questions and a space for additional comments or information. (A copy of the survey form is included in Appendix C, Figure C.8). The survey specifically addressed issues including; the description and location of the damaged

structure or facility, the nature of the damage, the use of damage minimization measures, the nature of repairs and the party who covered the costs of repairs or damage minimization measures.

The Department mailed questionnaires to 188 targeted agencies on August 10, 1998. Replies were requested by August 31, 1998. In addition to providing postage-paid return envelopes, a site was established on the Department's web page to allow for direct electronic responses.

#### *Response of Public Facility Providers*

The Department received 77 completed questionnaires, while an additional 8 were returned by the Postal Service as undeliverable. The questionnaires returned reflect a response rate of 43% of the 180 delivered. The results are discussed in a later section: *Impacts on Major Pipelines, Roads and Public Facilities*.

### **Survey of Gas Pipeline Operators**

The Department also conducted a survey of gas pipeline operators within the study area. The nation's natural gas transportation system consists of two major groups of pipelines – interstate natural gas pipelines and local distribution pipelines. Interstate natural gas pipelines are used to transport natural gas from the producing areas to the regions where the gas will be consumed. These interstate pipelines, also referred to as transmission lines, are regulated by the Federal Energy Regulatory Commission because they are used in interstate commerce. Local distribution companies, more commonly referred to as utility companies, are involved in delivering natural gas to retail customers. The Public Utility Commission regulates Pennsylvania's local distribution companies.

The Department identified local distribution companies and transmission companies operating in western Pennsylvania by consulting with the Public Utility Commission and the Pennsylvania Gas Association. The list included six utility companies and five transmission companies. All 11 companies were included in the survey group.

The survey was conducted using questionnaires that solicited information on subsidence impacts related to the undermining of gas pipelines. Specific information requested included a description of any natural gas pipelines that had sustained damage or disruption of services due to mining-induced land settlement; details of any damage minimization measures taken; a description of service disruption and customers affected; and the measures taken to repair any damage. Companies were asked to limit reports to incidents occurring after August 1, 1993. A copy of the questionnaire is included in Appendix C, Figure C.9.

### *Response of Gas Pipeline Operators*

The five transmission companies and six local distribution companies were contacted during August and September 1998. All 11 companies submitted responses. Two of the transmission companies and two of the local distribution companies reported no impacts from mining. The results of the submissions received by the Department are presented in a following section titled: *Impacts on Major Pipelines, Roads and Public Facilities*.

### **Mine Subsidence Insurance Database**

In addition to the claims database described earlier in this section, the Department maintains an inventory of subsidence damages associated with structures covered by Mine Subsidence Insurance (MSI) policies. This inventory is a part of the MSI database residing on the Department's mainframe computer and could contain subsidence incidents included in or excluded from the claim database. To provide an accurate accounting of these subsidence incidents in this report, the databases were compared. The results of the comparison are included in a later section: *Impacts on Structures in the Study Area*.

### **Observations of Surface Subsidence Agents**

Another source of information is the documented observations of Department surface subsidence agents. In August 1997, the Department assigned two field inspectors to reconnoiter areas above active longwall mines. (It is believed that Pennsylvania is the first state in the country to dedicate staff to this function). These inspectors meet with area residents to advise them of the protections provided by BMSLCA and assist in the settlement of damage claims. During the course of their work, these inspectors observe first-hand the effects of mining as it passes beneath fields, streams, water supplies, structures, and pipelines. They also observe the interactions between property owners and mine operators and how mine operators are handling water supply and damage claims.

These reports are extremely important, even though they address only the longwall mining areas and cover only the last year of the study period. Their importance lies in the fact that they represent the observations of Department staff. Consequently, the information that they include provides a means of direct verification of other sources of information.

### **Federal Office of Surface Mining Records**

In compiling information for this report, the Department also consulted with OSM. Since February 1998, OSM has been conducting its own survey of property owners in mining areas. As of October 21, 1998, OSM had distributed 1854 survey forms to property owners overlying 49 underground mines. Ten property owners responded to OSM's survey indicating that they had subsidence damage or water supply impacts.

OSM provided the Department with a list of the 10 claims obtained through this effort. Only one claim related to damage that occurred within the study period. This claim was previously recorded in Department records. Although this effort did not yield any additional information, it was an important step in ensuring that no available data source was overlooked.

### **Other Reports**

Department staff also reviewed other recent reports that deal with mining-related impacts in a comprehensive manner. These 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.*”

The Audubon Report was prepared to “take a comprehensive and unbiased look at the impact of longwall mining” and to present issues for further investigation. The report examines various areas of study ranging from the damages to homes and loss of water supplies to impacts on overlying streams, woodlands and property values. It also includes a study of the emotional effects on area residents who had experienced or were anticipating subsidence damage. The report draws from the current technical literature and experience of its various authors. The Department viewed the report as a good source of topics that deserve further discussion and possible investigation.

The Penn State Report was prepared to “further the understanding of the longwall mining impacts on surface structures and water resources in southwestern Pennsylvania.” It presents a comprehensive description of the hydrologic setting, the availability of groundwater for water supply development and the way in which longwall mining affects the groundwater resource. It also presents many options for replacing groundwater-based supplies that are affected by underground coal mining. The report is based on current technical literature and the authors’ vast experience in studying Pennsylvania’s water resources and mining-related effects on those resources. This report was used as an authoritative source of information on hydrologic impacts associated with high-extraction mining.