X. Impacts on Water Supplies in the Study Area

Water Supplies near Active Mining

The Department used the six-month mining maps to identify 774 properties that had water supplies and mine workings within 200 feet (61m) of their outer boundaries. The owners of these properties were part of the group targeted by the property owners' survey. The Department did not presume that all these property owners would experience water supply impacts; however, it considered their water supplies near enough to mining to deserve a closer look.

Although the method used to identify the survey group provides a reasonable range of surveillance, the Department recognized that water supply impacts sometimes occur at greater distances from mining. To account for this, the Department placed advertisements and press releases in area newspapers soliciting input from all property owners who had water supply impacts caused by underground mining. The Department also gathered information on reported impacts from the mine operator survey and individual claims recorded in the claims database.

In reviewing the survey results, the Department noted that 251 property owners from the initial target group returned questionnaires indicating no water supply impacts due to mining.

Number of Water Supply Impacts Reported

The number of water supplies affected by underground mining was determined from several sources, including the claims database (containing information on filed claims and information obtained through the mine operator survey), the property owners' survey, and the federal Office of Surface Mining (OSM). By combining information from these sources, the Department developed summary statistics on water supply impacts that occurred during the study period. All data sources included reported impacts that occurred prior to the start of the study period. In preparing the information summaries for this section, the Department attempted to limit consideration to those impacts that occurred within the study period and were attributable to a mine that operated during the study period.

Based on these data sources, the Department identified 533 reports of water supply impacts on individual properties. The Department decided to use the property as the unit of measurement for two reasons. One reason is that most cases involved a single water supply and a single property. In addition, for those cases involving impacts on more than one water supply, many questionnaires and claim records lacked information on the specific number of affected water sources.

Types of Water Supply Impacts

Many of the water supply reports included information that was sufficient to determine the nature of impacts. Impacts generally fell within one of three categories – diminution (loss or reduction in flow), contamination, and other damage. The category "other damage" includes breakage of pumps or piping, caving of the well bore, and damages that were not specified on claim records and questionnaires. Table X.1 provides a breakdown of the damages associated with the 533 reported water supply cases. Since many reports involved more than one type of impact various combination categories were used to display the information. As indicated by the results, diminution is the most frequently reported type of impact.

Table X.1
Types of Impacts on Water Supplies

Type of Impact	Number of Reports	Percentage
Diminution	372	70%
Diminution and contamination	49	9%
Contamination	48	9%
Other damage	22	4%
Diminution and other	20	4%
Contamination and other damage	11	2%
Diminution, contamination and other damage	11	2%
TOTAL	**533**	**100%**

Relation between Type of Mining and Water Supply Impacts

For most claims, it was possible to relate the impacts to either a longwall mining operation or a room-and-pillar mining operation. The results of this analysis are presented in Table X.2. As indicated by the results, more cases of reported water supply impacts were associated with longwall mining operations. Claims associated with room-and-pillar mines did, however, constitute 41 percent of those reported. It is important to note that the classifications in Table X.2 relate to entire mining operations as opposed to individual areas within mines. As discussed in Section VI, longwall mines include areas where coal is extracted in room-and-pillar patterns. In many cases, these areas may be of considerable size. Similarly, some room-and-pillar mining operations extract pillars in certain areas resulting in planned subsidence. The information in Table X.2 does not distinguish mining type below the level of the total operation.

Table X.2
Type of Mining vs. Water Supply Impacts

Type of Mining Operation	Number of Claims	Percentage
Longwall	310	58%
Room-and-pillar	219	41%
Undetermined	4	1%
TOTAL	**533**	100%

Impacts Versus Distances from Mining

In certain cases it was possible to relate reported impacts to the distance of closest mining. This analysis was performed using records for 332 water supplies that were reportedly impacted by underground mining. These water supplies were located on properties within the group of 533 properties discussed earlier in this section. The analysis was limited to those water supplies for which sufficient information was available to enable evaluation. The results of this analysis are shown in Table X.3 along with information on mine type and whether or not the operator accepted liability or was found liable by the Department.

Table X.3
Distances Between Mining and Reported Water Supply Impacts

Distance from Mining	Longwall			Room-and-pillar			All Mines		
	Number		%	Number		%	Number		%
	Total	Liable		Total	Liable		Total	Liable	
0 - 500 ft 0 - 152 m	163	139	85%	101	78	77%	264	217	82%
501 - 1000 ft 152 - 305 m	9	7	78%	17	8	47%	26	15	58%
1001 - 2000 ft 305 – 610 m	11	4	36%	17	1	6%	28	5	18%
>2000 ft >610 m	3	0	0%	11	0	0%	14	0	0%
Totals	**186**	**150**	**81%**	**146**	**87**	**60%**	**332**	**237**	**71%**

Status of Reported Cases Involving Water Supply Impacts

The Department also reviewed the latest information on each of the 533 reported water supply impact cases to determine the current status or disposition of the claims. This analysis was based on information compiled from the claims database and property owners' survey. Although comparable information was available in both data sources, there were differences in the level of detail. For example, property owner responses typically indicated the means of water supply replacement while claims records simply indicated that a permanent supply was provided. After compiling this information, the Department established nine categories of claim

resolution or disposition. These categories are shown in Table X.4 along with the respective number of claims that fall into each one. The table also relates claim status to the type of mine that was associated with the reported problem.

Table X.4
Status of Reported Water Supply Claims at the Close of Study Period

Current Status	Cases by Mine Type				% of Total
	Longwall	Room-and-pillar	Not known	Total	
Completed					
Permanent water supply reestablished	130	89	2	221	41%
Mine operator not liable	39	79	1	119	22%
Settled by agreement or compensation	28	4	1	33	6%
Total completed	*197*	*172*	*4*	*373*	*69%*
Pending resolution					
Property owners on temporary water	77	6		83	16%
Claim not previously reported	8	24		32	6%
Status unclear from available information	17	10		27	5%
Resolution attempted but problems remain	4	5		9	2%
Resolution pending	5	0		5	1%
No corrective action or compensation offered	2	2		4	1%
Total pending resolution	*113*	*47*		*160*	*31%*
TOTAL	**310**	**219**	**4**	**533**	**100%**

The largest number of cases fell within the category "permanent water supply reestablished." This category included situations where mine operators drilled new wells, deepened existing wells, repaired damaged pumps and piping or connected affected property owners to public water systems. It also includes ten cases where water supplies recovered naturally. The majority of the resolutions involved drilling a new well or deepening an existing well. There were 19 cases where the reported resolution was achieved by connecting the property to a public water supply system and there may have been others that were not documented.

There were 119 cases in which the mine operators believed they were not liable for water supply impacts and took no steps to remedy the problems. The Department was involved in 65 of these cases and arrived at the same determination. The Department is making follow-up inquiries on a random sample of cases in which it had no prior involvement to ascertain that no liability exists.

Another large category consisted of the cases that were pending resolution with the property receiving water from a temporary source. In these cases mine operators had provided

holding tanks and arranged for bulk water delivery. These cases were viewed as being at an interim stage of resolution.

There were 33 cases that had been settled through compensation or agreements between mine operators and property owners. These cases were regarded as being at the stage of final resolution.

Another group consisted of 32 claims that had not previously been reported to either the mine operator or the Department. This group came entirely from the property owners' questionnaires. The Department is treating these questionnaires as officially reported claims and is conducting follow-up investigations in all cases.

In 27 cases, the available information was insufficient to determine the status of claim resolution. Most of these involved property owners' questionnaires or claim records containing data fields that were blank or contained sketchy remarks. The Department is making follow-up contacts with property owners and mine operators to determine the actual status of these cases.

There were also nine cases where mine operators had made attempts at claim resolution but had not completely resolved problems or resolved problems to the property owners' satisfaction. These included situations where replacement supplies yielded water of insufficient quality or quantity. Some cases also involved dissatisfaction with the increased cost of operating and maintaining the replacement water supply. There was also one case where a property owner had accepted an agreement offered by the mine operator but was unable to develop a suitable replacement water supply. The Department is conducting follow-up investigations to track the resolution of these cases.

There were five cases that appeared to be on their way to permanent resolution with no mention of temporary water. Some on these involved claims that had just been reported to mine operators in late 1998. Other simply involved remarks indicating that negotiations were underway or that a permanent replacement water supply was under development.

There were four reports involving cases where property owners reported receiving no assistance from mine operators after reporting their claims. These cases could not be matched with reports in the "mine operator not liable" category. The Department is making follow-up contacts with property owners and mine operators to determine the actual circumstances involved in each of these cases.

In most cases claim resolution is taking place strictly between the mine operator and the property owner. The Department has only been involved in 139 of the cases listed in this section.

Property Owners' Comments Regarding Claim Resolution

The Department also reviewed property owner questionnaires to gain a sense of property owner satisfaction with the resolutions to their claims. Not surprisingly, in many cases where claims were denied, the property owner expressed dissatisfaction with the mine operator, the Department, or both. That subset of property owners who were still on temporary water could not comment on the final resolutions of their claims because the final resolutions were still pending.

There were 94 questionnaires on which property owners checked "yes" to the question relating to settlement of water supply problems. Of those, 69 property owners went on to indicate that they were satisfied with the resolution of their claims. The remaining 25 individuals indicated that they were dissatisfied with the resolution of their claims. The reasons for dissatisfaction included:

- Failure to reestablish premining quantity of water
- Failure to replace all supplies that were impacted
- Failure to reestablish premining quality
- Increased cost associated with operating and maintaining replacement water supply
- Replacement water supply has taste or odor problems

Department records show that only four of these property owners had contacted the Department prior to expressing dissatisfaction through their responses in the property owners' survey.

Availability of Premining Survey Data

As the final area of investigation, the Department looked at the extent to which mine operators were conducting premining surveys to establish the baseline yield and quality of water supplies. This evaluation was performed on those questionnaires and claim records that pertained to impacted water supplies. Only those records indicating that a survey was performed were counted as having premining surveys. All others were counted as having no premining survey. Based on this evaluation the Department determined that of the 533 properties with reported water supply impacts, 326 had premining survey results for some or all of the affected water supplies.

Observations of Surface Subsidence Agents

Department inspectors reported some general observations based on their twelve months of fieldwork in areas where longwall mining was conducted. Of the 57 water supplies they have examined, all showed some mining-related impacts. Both quality and quantity impacts were observed. Recovery occurred in four cases, although one case involved a spring that emerged at a new location. The inspectors noted that quantity problems tend to be more persistent in water supplies situated on hilltops and valley flanks.

For the cases where they observed impacts, the inspectors generally found that mine operators were acting in a timely manner to provide temporary water. Sixteen of the affected water supplies were replaced by drilling new wells and ten were replaced via connections to a public water supply system. In four cases, treatment equipment was installed to address quality-related impacts and in one case the property owner received additional compensation to cover treatment costs. One case was settled according to the terms of a premining agreement. The remaining cases were pending final resolution at the close of the study period.

The inspectors also noted the emergence of methane gas as a problem in areas that are undergoing longwall mining. Mine operators are now analyzing water supplies for methane and, in some cases, installing methane detectors in homes that are considered at risk to methane accumulations.

The inspectors also discovered three cases where property owners had been on temporary water for a period exceeding three years. One case was resolved and two remained pending at the close of the study period.