

XIII. Impacts on Surface Land in the Study Area

Surface Areas that were Undermined

Plate 2 shows the permit areas of all the mines that operated during the study period. Within those permit areas, it is estimated that approximately 39,000 acres (15,790 hectares) were actually undermined. Unlike structures and water supplies, the land cannot be subdivided into distinct units for purposes of counting or tabulation. Figures are therefore presented based on observable impacts, such as ground cracks, landslides, and areas that flood as a result of mine subsidence. This section presents impacts based on reported incidents that occurred within the study area during the study period.

Number of Land Damage Claims Reported

The number of land damage incidents was determined from information in the claims database and information obtained through the property owners' survey. Based on these sources, the Department identified 195 reports of damage to surface lands.

The Department also analyzed claims to determine the type of damage reported. Table XIII.1 provides a breakdown of claims by type and mining method. Ground cracks were by far the most frequently reported type of land damage. Flooding was the second most frequently reported type of damage. Flooding includes both recurring inundation of subsided land along streams and accumulation of water in upland surface depressions. There were five reported incidents of land movement that may be classified as slips or landslides. One reported incident concerned a compression bump or raising of the land surface. Among the reports dealing with ground cracks and sinkholes there were three that specifically mentioned sinkholes.

Land damage was found most often in association with longwall mining. One hundred fifty-four or 79% of the total reported incidents occurred over longwall mines. Thirty-eight incidents were associated with room and pillar mines and there were three reports of damage that could not be tied to specific mines or mining methods. Ground cracks, sinkholes, flooding and drainage problems were reported in association with both mining methods. Landslides, slips and compression bumps were reported only in association with longwall mining.

**Table XIII.1
Land Damage Claims by Type and Mining Method**

Type of Impact	Type of Mining			Total
	Longwall	Room-and-pillar	Not known	
Ground cracks or sinkholes	106	33	2	141
Flooding or drainage problems	35	5	1	41
Landslides or slips	12	0	0	12
Compression bumps	1	0	0	1
Total	154	38	3	195

Resolution of Land Damage

In many cases, reports were unclear regarding the resolution of land damage. On the property owners' questionnaire, the question on resolutions was written to cover both land and structure damage. As a result it was difficult to determine if a negative response pertained to land or structure damage. In addition, there were 19 responses indicating that damages buildings or property had been replaced with no mention of the treatment of land damage. There were also 22 cases where the land damage occurred on a property covered by an agreement or other form of compensation arrangement. There were, however, 39 reports affirming the repair of land damage and 9 reports indicating that land damage had not been repaired.

Observations of Surface Subsidence Agents

The Department's surface subsidence agents reported several observations regarding land damages associated with the longwall mines in their inspection district. The inspectors found that ground cracks are the most frequently observed impacts. These cracks are more prominent in areas where the mining is less than 300 feet (91 m) below the surface. The cracks may be up to 6 inches (15 cm) wide with depths up to 15 feet (4.5 m). The cracks are widest at the surface and taper with depth. In areas where mining is deeper, the cracks tend to be less prominent with widths ranging from less than one inch (2.5 cm) to three inches (7.6 cm) and depths in of three to four feet (0.9 to 1.2 m). The inspectors noted that some of the cracks heal, but many cases require repair using excavating equipment. They also reported that some cracks might go undetected in certain types of terrain.

The inspectors also reported observing other impacts, including compression bumps near the centers of longwall panels, slips or slumps along hillsides, and ponding along subsided stream segments. The inspectors have also observed several of the reported impacts being remedied through grading and excavation.