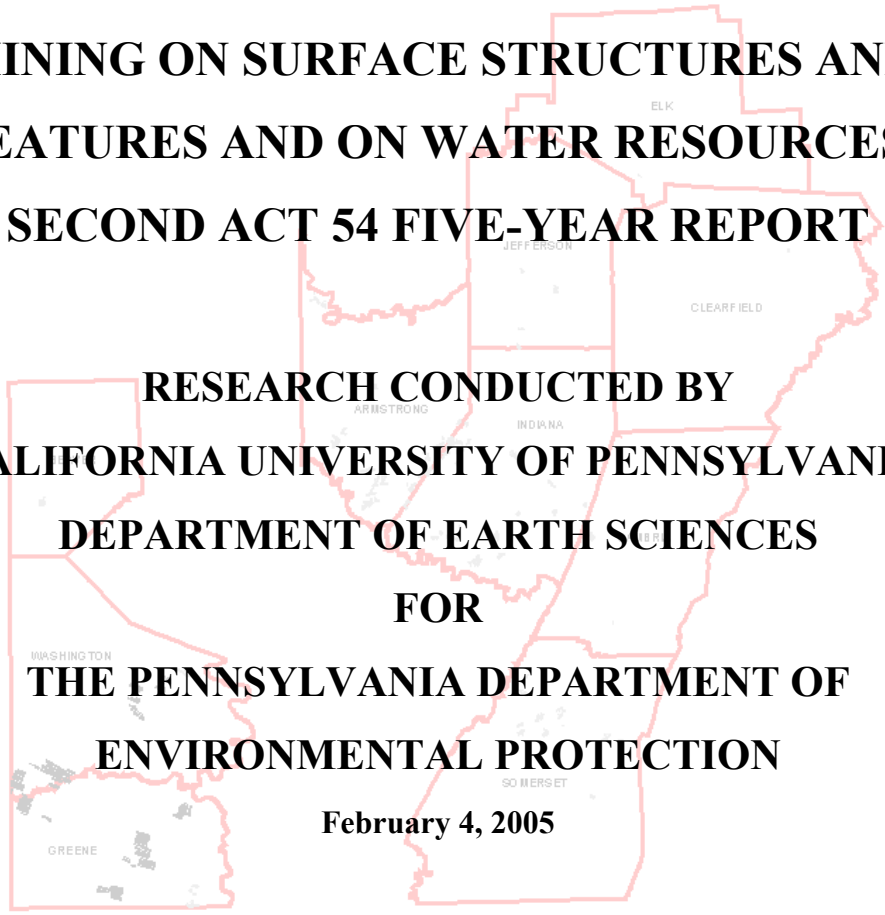
THE EFFECTS OF SUBSIDENCE RESULTING FROM UNDERGROUND BITUMINOUS COAL MINING ON SURFACE STRUCTURES AND FEATURES AND ON WATER RESOURCES: SECOND ACT 54 FIVE-YEAR REPORT



RESEARCH CONDUCTED BY

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Section IX: EFFECT OF MINING ON LAND

IX.A Overview

Generally, many land problems are cracks (or fissures) and bumps that occur during or shortly after longwall mining commenced beneath a property. Fissures and bumps could, however, open over a period of three or more years. Changes in elevation also occur, particularly with the passage of a longwall panel during which the land surface moves in a wave at the mining "front." Such a wave produces not only tensional cracks, but also compressional features. Tilting of the land also occurs. Longwall mining is not the only cause of land problems. Room-and-pillar mines also have associated land problems.

Through an examination of the BUMIS files, the University's researchers found 60 reported land problems whose occurrence fell within the assessment period. Of the dozens of active mines, only a relatively small number were associated with land damage. Property owners whose land overlies 13 active mines reported land damage to the California District Mining Office.

Discovering the exact number of land problems beyond those reported is difficult. In reading through the California District Mining Office reports on investigations of streams, for example, the University's investigators encountered a description of Tributary 32511 to Dunkard Fork that mentions compression bumps (see VII.L). There is no mechanism by which the University could relate that observation to one of the 60 land "problems" (fig. IX.1). Other, unobserved, incidents of land deformation caused by subsidence could exist—and most probably do exist.

IX.B. Land Problems by Type of Mine

BUMIS files contained a record of 60 land problems that could be classified by type of mine. Most of the problems were associated with longwall mining.

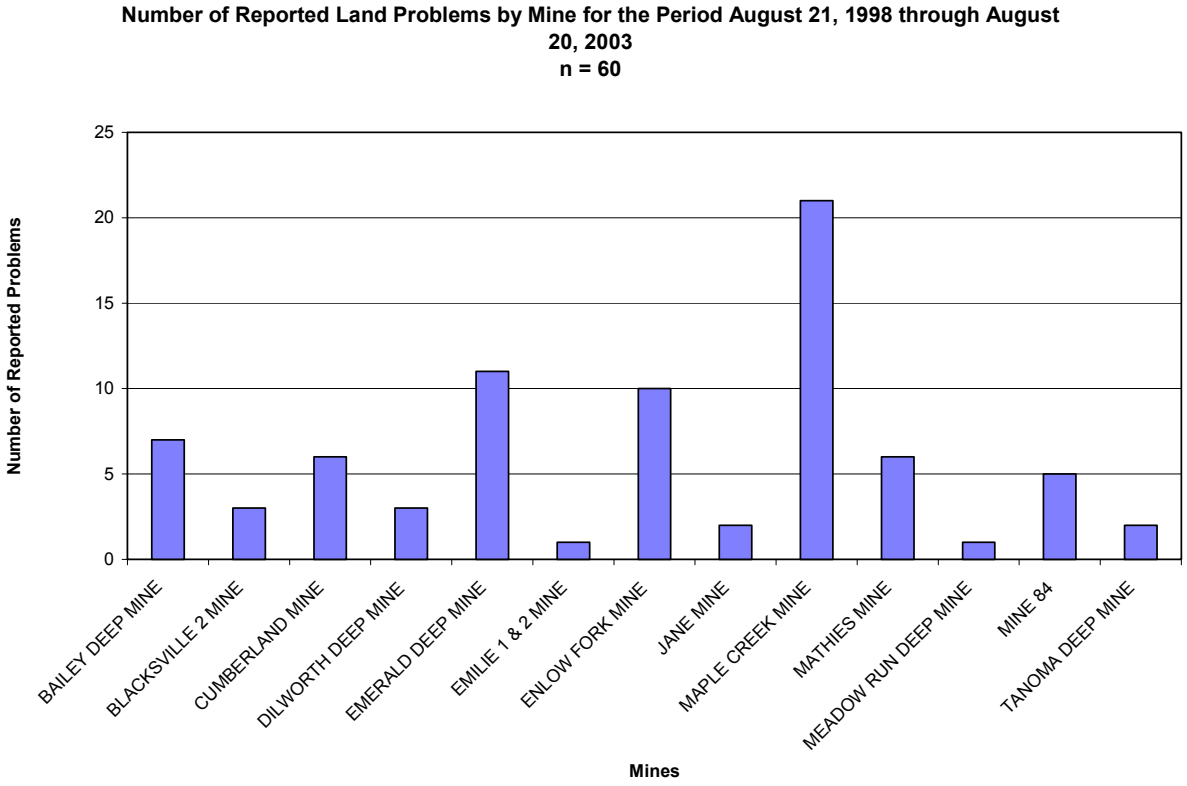

Figure IX.1. Reported land problems per mine for the assessment period.

These problems are not limited to one type of mining, as figure IX.2 reveals. The category of "unspecified" is an artifact of the BUMIS record, but the names of the mines in figure IX.1 enable the reader to infer the mine type. Bailey Deep Mine, for example, is a "longwall," whereas Jane Mine is a "room-and-pillar."

Full-retreat mining caused three reported land problems during the period. Figures IX.3 and IX.4 reveal that a single mine encompasses more than one type of mining. Maple Creek is an example of a mine operating with more than one method. As might be expected, most of the land problems over Maple Creek are attributed to the longwall mining. In total, Maple Creek is associated with 15 land problems, or 25% of the total land problems reported during the assessment period.

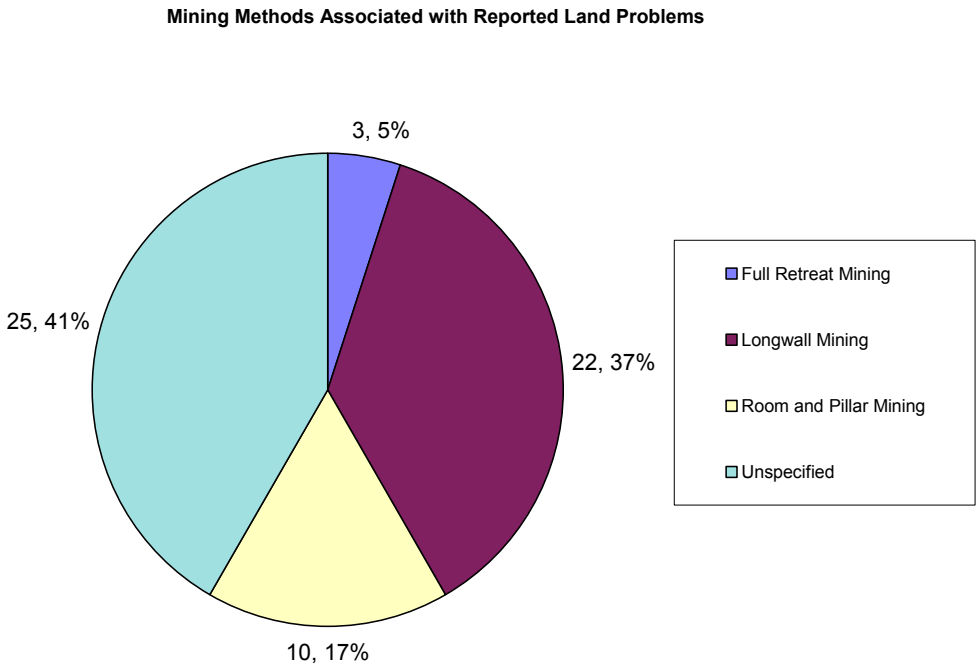

Figure IX.2. Mining methods can be inferred from the mine name in figure IX.1, but the record in BUMIS does not incorporate the information for 41% of the land problems.

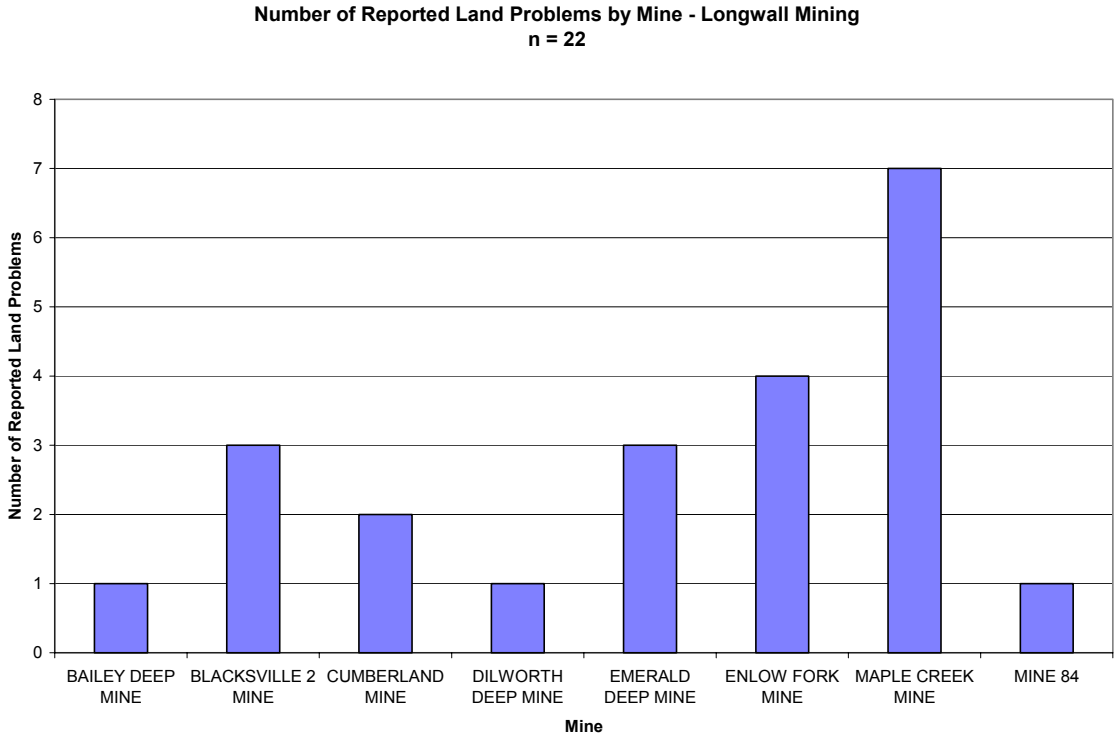

Figure IX.3. Longwall mines that are associated with land problems.

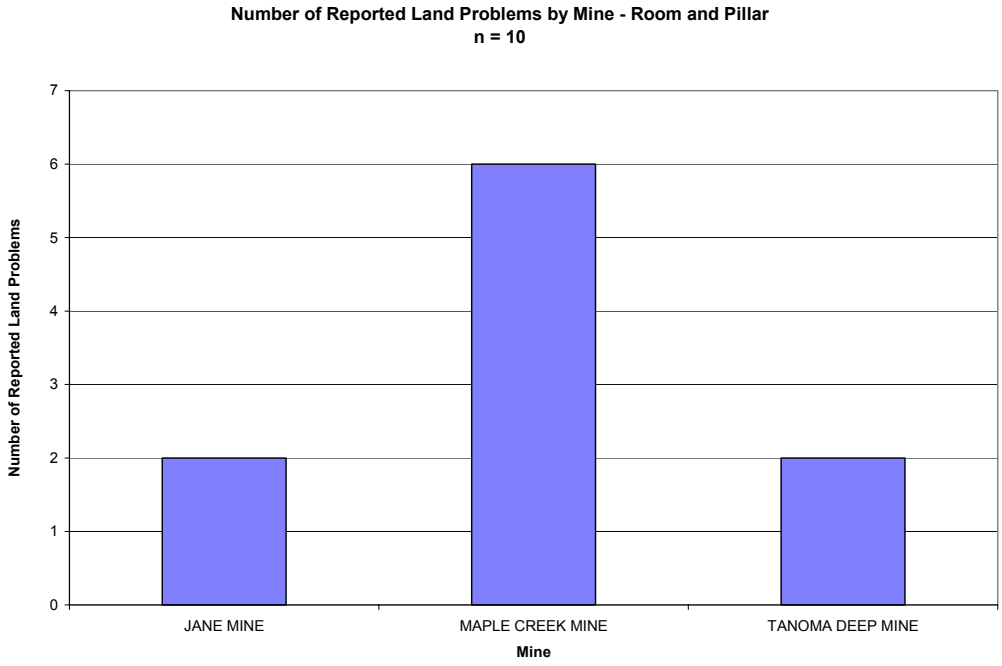

Figure IX.4.

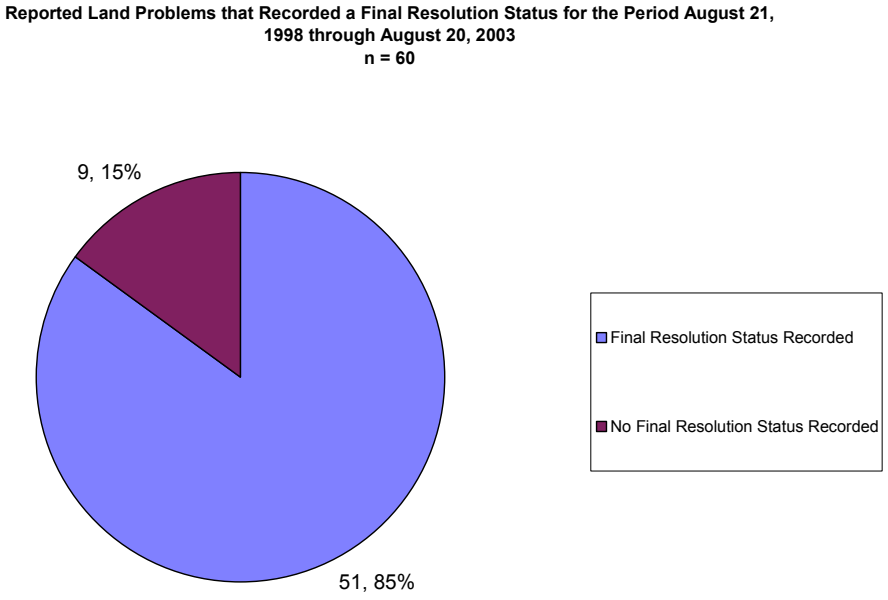

Figure IX.5. Resolution Status of Land Damage Claims

Figure IX.5 reveals that most of the land problems have been resolved; however, 9 problems remained unresolved as of this writing. Of the 51 resolved land problems, only 32 were fully documented in BUMIS, as the following pie diagram shows.

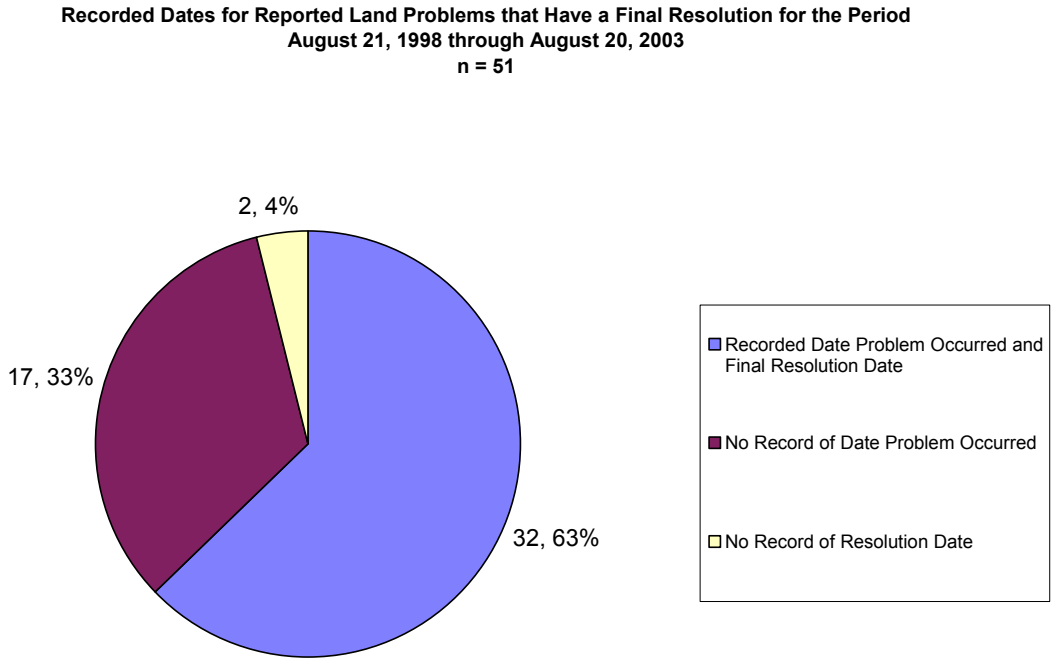

Figure IX.6. This diagram covers the 51 land problems for which there has been a resolution. BUMIS files do contain the date of occurrence and the date of resolution for all reported land problems.

The University's researchers looked at the mechanism by which a resolution was reached for land problems that occurred during the study period. Because not all problems had complete records in BUMIS, the researchers looked for four criteria for inclusion: 1) a specified final resolution status; 2) a record of the date the problem occurred; 3) a record of the final date of resolution; and 4) the date the problem occurred had to precede the date of the final resolution. The reason for this commonsense last designation, is that BUMIS contains, possibly through typographical error, resolution dates that precede problem dates. Only 32 land problems met the criteria. Also, as noted elsewhere in this report, the date of the problem is often the date a faxed report is received by the California District Mining Office, a date that is not necessarily the same as the date of first occurrence.

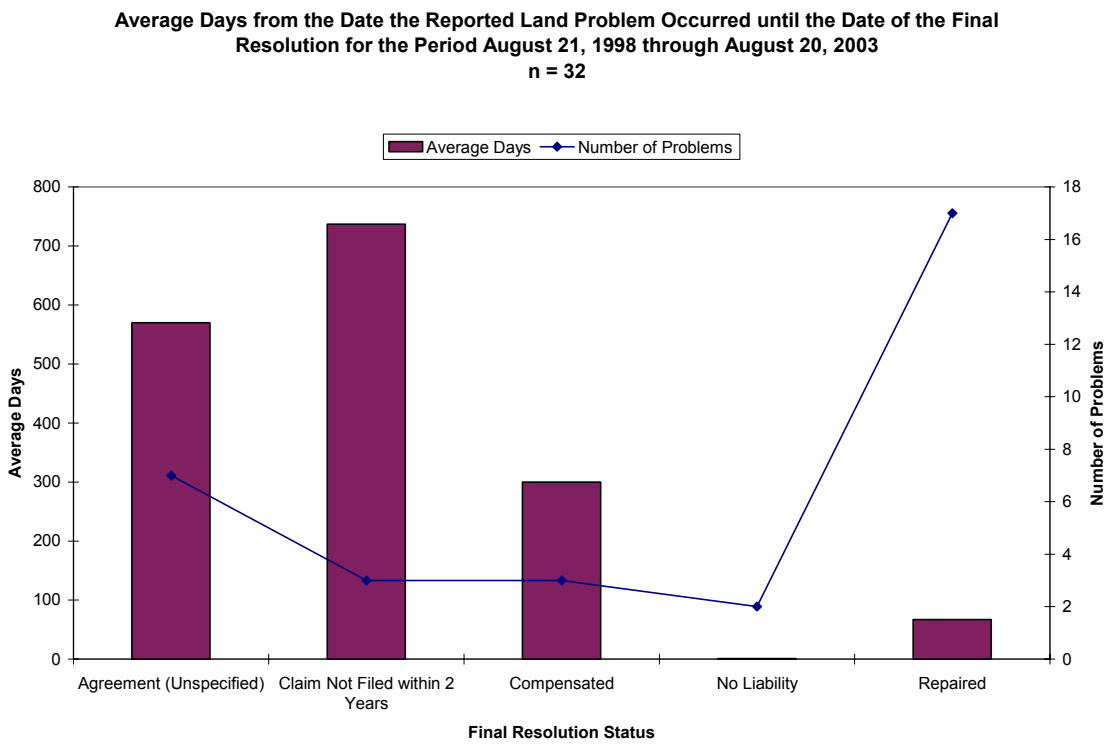

Figure IX.7. Average days for final resolution of land problems.

The following graph depicts one of the problems generated by inadequate record-keeping. Of the 51 reported land problems that specify a final resolution status, 49 of them have a recorded date when the California District Mining Office received notice as well as a date for a final resolution. The next graph looks at the 49 for which both initial and end dates are available. During the time frame of this report one resolution was accomplished when the coal operator purchased the property 455 days after the California District Mining Office received the official notification that a problem had occurred. Seven of the reported problems were resolved as "no liability," and those seven took an average of 144 days for such a determination.

The fastest resolution time was associated with repair: Twenty of the land problems were repaired 83 days on average after the California District Mining Office received notification via a faxed report. It should be noted that, in the instance of a company's

purchasing the property, other variables may play into the time taken to reach a resolution, such as the occurrence of water loss or structural damage problems.

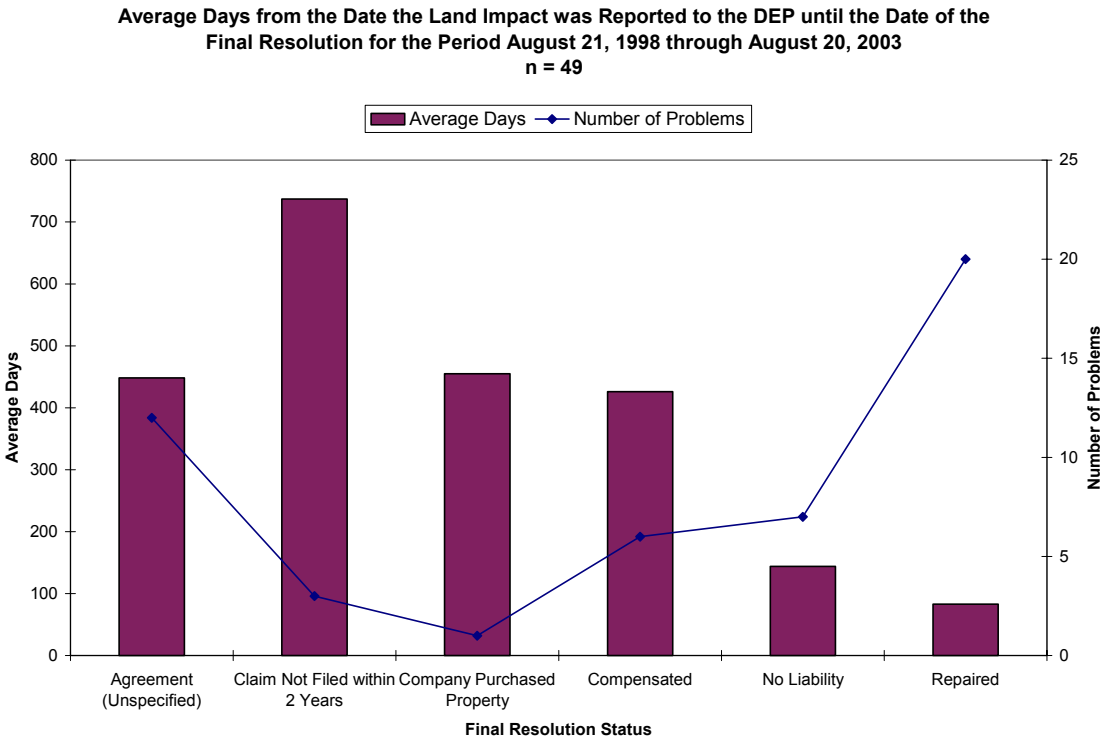

Figure IX.9. For the 49 land problems for which both a date of notification and a date of resolution are recorded, the average days till resolution depended upon the mechanism for resolution. Those property owners who had their land problems repaired had the shortest average wait time for final resolution.

One of the problems associated with the data on land damage attributed to underground mining is that the official records do not indicate the distance to mining for most of the reported land problems. Figure IX.10 shows that less than 1/3 of the instances of land damage had a "distance to mining" recorded in BUMIS.

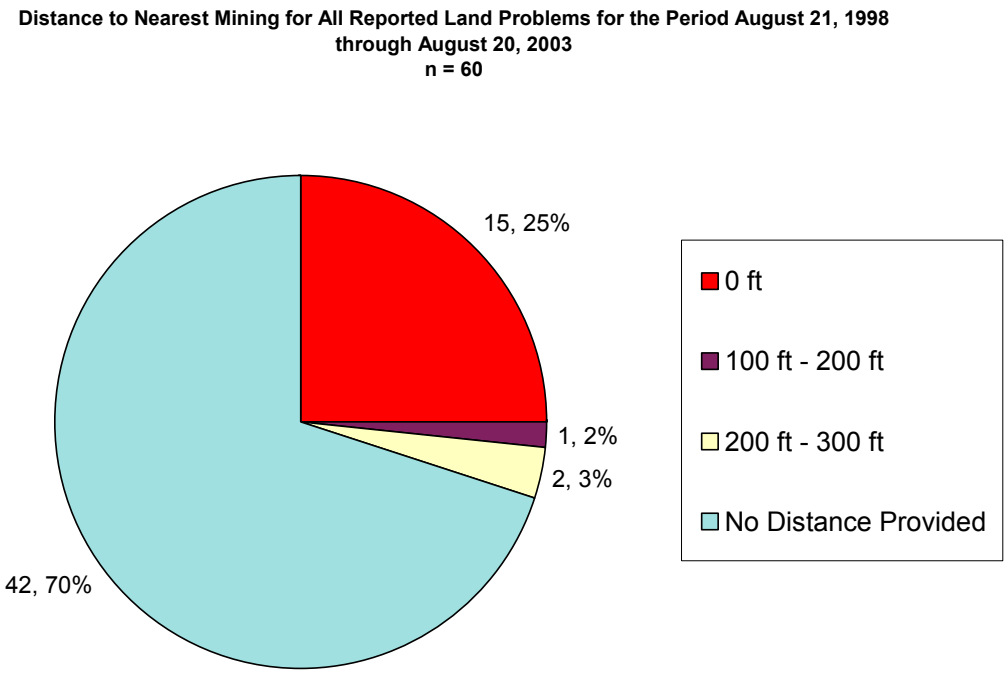

Figure IX.10. BUMIS files contained no "distance to mining" for 42 of the reported land problems. "No distance to mining" apparently, but not necessarily, indicates that a property was directly undermined.

IX.C. Findings

Some land problems were observed by surface subsidence agents of the California District Mining Office, but were either not recorded in the Bituminous Underground Mining Information System or recorded in paper files. In such instances, the land problems were not cross-referenced with the faxed reports of land damage, making correlation of accidentally discovered land deformation and both faxed reports of land problems and land claims difficult, if not impossible to achieve.

IX.D. Recommendation

Land problems that are observed in the process of other investigations should be recorded and cross-referenced with the faxed reports of land damage, making correlation of accidentally discovered land deformation possible.