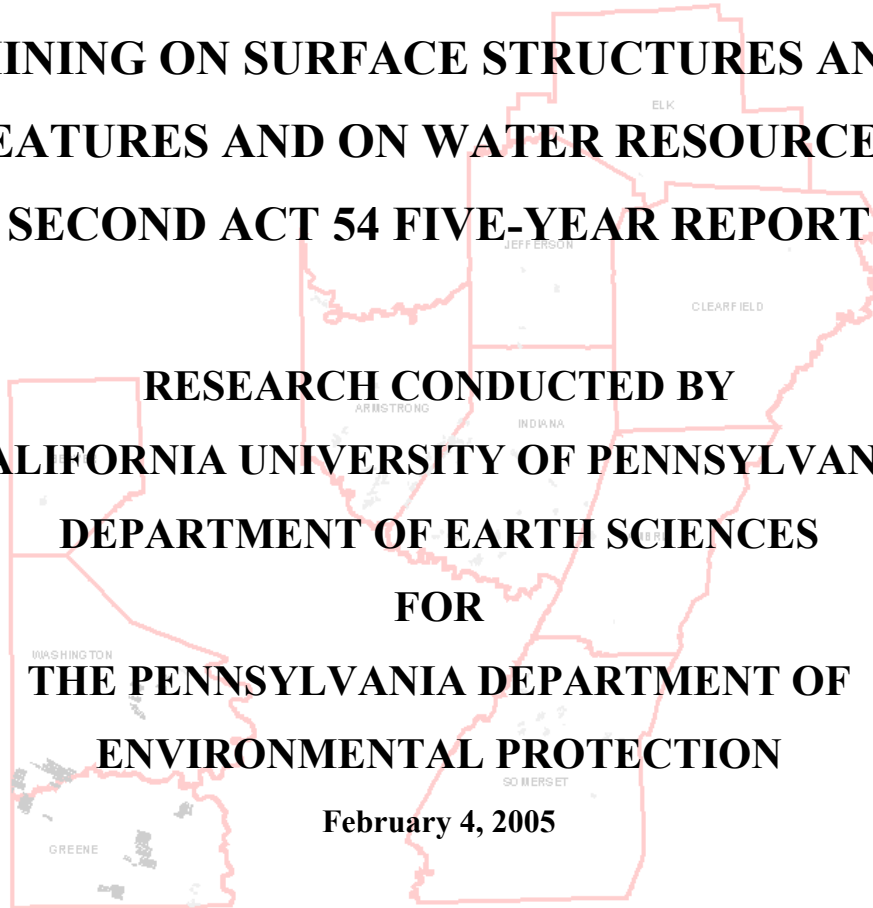


**THE EFFECTS OF SUBSIDENCE RESULTING
FROM UNDERGROUND BITUMINOUS COAL
MINING ON SURFACE STRUCTURES AND
FEATURES AND ON WATER RESOURCES:
SECOND ACT 54 FIVE-YEAR REPORT**

**RESEARCH CONDUCTED BY
CALIFORNIA UNIVERSITY OF PENNSYLVANIA
DEPARTMENT OF EARTH SCIENCES
FOR
THE PENNSYLVANIA DEPARTMENT OF
ENVIRONMENTAL PROTECTION**

February 4, 2005



CONTENTS

Section X: EFFECT OF MINING ON INFRASTRUCTURE: Impact on major Pipelines, Water Lines, Roads, and Railroads

X.A. Overview

X.B. Impacts to Major Gas Transmission Lines

X.C. Impacts on Water Lines

X.D. Impacts on Roads

X.E. Impacts on Railroads

X.F. Findings

X.G. Recommendation

A Guide to Understanding Section X-Effects of Mining on Infrastructure

- Individual plates show infrastructure for a particular mine, county, or problem area.
- Maple Creek mine had no impacted roads.
- All labeling is accurate *for the time of collection*

**Section X: EFFECT OF MINING ON INFRASTRUCTURE:
Impacts on Major Pipelines, Water Lines, Roads, and Railroads**

X.A. Overview

The University's researchers found that data on infrastructure are difficult to obtain. Agreements among utility companies and mines preclude public dissemination of knowledge about utility-mine interactions in most instances. Also, the utility companies refrain from describing incidents of subsidence covered by litigation.

The University did not get useful responses to inquiries about damage to township roads. Some promised information, but never forwarded it; others sent partial responses with a promise to send more information. For areas with longwall mines, for example, only one township responded with a specific report that included costs of repairs to an impacted road. During the assessment period, however, longwall mines undermined 15 townships and 81.39 miles of township roads.

During the assessment period, longwall mines undermined over 50 miles of major gas transmission pipelines. Yet, one major gas provider, when asked for information on impacted lines, responded to the University's inquiry with the statement that such information would require "a significant amount of research." The University's researchers understood this response as a rejection since no information has been offered. One gas company promised information, but after the floods of 2004 declared that the office staff was "behind" on the task. The best and quickest response came from the Pennsylvania Department of Transportation, which reported on state roads reportedly impacted by subsidence.

This section presents the information on gas transmission lines, public water lines, state roads, and railroads that the University was able to obtain.

X.B. Impacts on Major Gas Transmission Lines

Of the several gas companies that were investigated for the report, three reported no damage in Pennsylvania. Columbia Gas of Pennsylvania reported two impacts. The first was located in the Kirby area where 18 customers were affected by the disruption of service. Ten feet of pipe had to be replaced with an estimated cost of \$13,000. Another impacted pipeline affected one customer along Route 136. The line from the meter to the house came apart and the regulator shut down flow. The cost for this project was less than \$50. Equitable Gas reported six impacts affecting approximately 100 customers. A summary for Equitable Gas can be found in table X.1.

Table X.1. Gas transmission pipelines affected by subsidence during the assessment period.

Mine Company	Location	Nature of the Damage	Customers Affected	Measures Taken To Repair The Damage
R.A.G	Gordon Hill, Waynesburg, PA	H-116 pipeline pulled and buckled	6	Various leaks were repaired and sections of pipeline replaced
R.A.G	Waynesburg, PA	H-103 pipeline pulled and buckled	6	Blanks were temporarily set & joints of pipes were installed
CONSOL	SR 218 Spraggs, PA	D-28 pipeline pulled out of coupling (4,375' pipeline)	25	600' of 2" plastic pipe was installed and gas service was reinstated
R.A.G. Emerald	Jefferson, PA	W-1492 pipeline pulled. Gas blew for 3 hours at 8 Psi	25	K&R Services installed 3' of 8" pipeline
R.A.G Emerald	Waynesburg, PA	M-32 pipeline pulled and buckled at various locations	17	Couplings and leak clamps were temporary used & joints of pipe were installed
R.A.G Emerald	Waynesburg, PA	F-114 Pipeline pulled and buckled at various locations	48	Couplings and leak clamps were temporary used & joints of pipe were installed
CONSOL	Sharpneck Hollow, Jefferson, PA	W-2718 pipeline pulled and buckled at various locations	10	Couplings and leak clamps were temporary used & joints of pipe were installed at 3 different locations

X.C. Impacts on Water Lines

Of the several water companies that were investigated for the report, Charleroi Water Authority reported damages that occurred after the assessment period.

Southwestern Pennsylvania Water reported that during a four-week period, a one-mile section of cast-iron line broke near the Route 188 interchange (west of Dry Tavern). Prior to the break, the line acquired 16 to 18 leaks. Dilworth Mine was responsible for the break and replaced the damaged line. Dilworth also came to an agreement with Southwestern Pennsylvania Water to fix any other lines that break due to mining.

X.D. Impacts on Roads

The Pennsylvania Department of Transportation reported that of the four districts located in the area of study, only one reported no damage. District 11 reported that a section of S. R. 22/30 in the East bound lanes in Robinson Township sustained damage. District 12 reported the following damages:

Blacksville Mine/Greene County: 13.4 Miles

- S.R. 218 – Subsidence under bridge caused minor pavement damage
- S.R. 3013 – minor damage for one mile

Dilworth Mine/Greene County: 8.51 Miles

- S.R. 188 – Substantial pavement distress for one mile, box culvert repairs caused by subsidence.
- S.R. 1011 – minor damage and crack sealing approx. 8000 feet.
- S.R. 1002 – minor damage and crack sealing approx. 4000 feet.
- S.R. 1017 – minor damage and crack sealing approx. 4000 feet.

High Quality Development Mine/Washington County: 0.359 Mile

- S.R. 481 – Substantial pavement damage approx. 3-4 feet of subsidence.
- S.R. 2025 – Subsidence approx. 3-4 feet causing pavement and drainage problems.

Bailey Mine/Greene and Washington Counties: 25.89 Miles

- S.R. 3022 – Slide repaired by the mine
- S.R. 4008 – Minor damage approx. 1 mile.
- S.R. 4003 – Minor damage approx. 1 mile.
- S.R. 3001 – minor pavement damage approx. 4000 feet and one slide caused by mining.
- S.R. 4001 – Very minor damage approx. 2000 feet.
- S.R. 0021 – Minor pavement distress approx. 1 mile.
- S.R. 3045 – Virtually no damage approx. 4000 feet.

Enlow Fork Mine/Greene and Washington Counties: 25.13 Miles

- S.R. 231 – Pavement distress and approx. ½ mile slide.
- S.R. 3035 – Minor pavement distress – Mining caused several slides.
- S.R. 4014 – Minor subsidence damage.
- S.R. 18 – Minor subsidence damage.

Eighty-Four Mine/Washington County: 13.55 Miles

- S.R. 2003 – Milling and Repair
- S.R. 40 – Subsidence causing sight distance problems and removing super elevation and drainage problems. Minor pavement distress
- S.R. 1049 – Minor crack repair milling.
- S.R. 2005 – Minor crack repair milling.
- S.R. 70 – Approx. 2 miles milling and overlaying to allow proper sight distance due to subsidence and also to repair cracks and irregularities along with shoring up a structure that allows traffic under S.R. 70.
- S.R. 1005 – Overlay approx. ¾ mile.
- S.R. 136 – Replace small structure. Milling and resurfacing approx. ¾ mile.

RAG Cumberland/Greene County: 10.39 Miles

- S.R. 2003 – Minor damage, crack repair.
- S.R. 19 – Drainage problems and settlement

RAG Emerald/Greene County: 12.28 Miles

- S.R. 2011 – Moderate damage
- S.R. 2022 – Minor damage
- S.R. 19 – Substantial pavement distress approx. 2 miles
- S.R. 2003 – Minor damage, crack repairs
- S.R. 2018 – Replace small bridge with elliptical pipe.

Shoemaker Mine/Washington County: 0.829 Mile

- S.R. 3045 – Minor cracking

The University obtained very little information on township roads. For the longwall mining areas, the University received the following information.

- West Finley, with 58 miles undermined, did suffer unspecified road damages.
- Wayne has reports of damage to township roads but did not share the information with the University.
- Franklin had unspecified road damage that RAG repaired. The road supervisor reported no problems with the mining company.

- Jefferson reported unspecified damages.
- East Finley reported unspecified damages.
- Morris reported that in 2001 North Hill (Route 837) suffered \$27,000 in road damages. Enlow Mine covered the costs of the damages.
- Fallowfield reported that Truman Way was repaved after damages and, at the time of this writing, the township had not been compensated. Also Pleasant Valley Drive and Cedar Way both had compensation pending as of this writing.

Table X.2. Townships undermined by longwall mines.

MINE	TOWNSHIP	COUNTY	TOTAL ROAD MILES (All Mines Combined)
Bailey	West Finley	Washington	58
	Rich Hill	Greene	60
Blacksville 2	Wayne	Greene	71
Cumberland	Whiteley	Greene	34
	Franklin	Greene	69
Dilworth	Jefferson	Greene	40
Emerald	Franklin	Greene	69
	Whiteley	Greene	34
	Jefferson	Greene	40
Enlow	West Finley	Washington	58
	East Finley	Washington	61
	Morris	Washington	44
	Morris	Greene	58
High Quality	Fallowfield	Washington	53
Maple Creek	Fallowfield	Washington	53
	Carroll	Washington	?
	Nottingham	Washington	?
	Somerset	Washington	?
Mine 84	North Strabane	Washington	53
	South Strabane	Washington	50
	Amwell	Washington	71
Shoemaker	West Finley	Washington	58

X.E. Impacts on Railroads

CSX reported damage in Washington County at mile post 34-36. CONSOL's longwall mine was responsible for the damage. No information was provided about measures taken to repair the damage.

X.F. Findings

Obtaining information from public utilities on the effects of subsidence on infrastructure is a chancy endeavor at best. Public utility companies appear to be reluctant to provide information about their interactions with mine operators. Local government agents, such as township employees appear to be slow to respond to requests for information about township roads damaged by mine subsidence.

No public authority appears to apply GPS or any other specific locator to identify segments of damaged infrastructure, making mapping of damaged features only an approximate enterprise.

X.G. Recommendation

The PA DEP should establish a reporting protocol with public utilities and with township and county authorities that includes the cooperative exchange of specific information about subsidence. Such information should include costs of repairs or replacement and exact location of any subsidence impact.

The Pa DEP should establish a reporting protocol with the Pennsylvania Department of Transportation that will enable any future Act 54 researchers to identify the extent and specific locations of damage to Commonwealth roads.