

Reconnaissance of Coal-Slurry Deposits in Indiana

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Indiana Geological Survey
Bloomington, Indiana



IGS Web Report

A screenshot of a web browser window displaying the "Reconnaissance of Coal-Slurry Deposits in Indiana" web report. The browser title is "Reconnaissance of Coal-Slurry Deposits in Indiana - Windows Internet Explorer". The address bar shows the URL: http://igs.indiana.edu/survey/projects/Coal_Fines/index.cfm. The page content includes the Indiana Geological Survey logo, navigation links (Geology, GIS/Maps, About us, Related Sites), and a search box. The main heading is "Reconnaissance of Coal-Slurry Deposits in Indiana" by Denver Harper, Chris Dintaman, Maria Mastalerz, and Sally Letsinger, dated August 1, 2007. The report includes an "INTRODUCTION" section discussing coal mining history and CSDs (coal-slurry deposits).

http://igs.indiana.edu/survey/projects/Coal_Fines/index.cfm 2

Definitions

Spoil = displaced overburden

Gob = coarse-grained refuse

Slurry (tailings) = fine-grained refuse



Objectives

Map areal extents of coal-slurry deposits

Estimate thicknesses

Calculate volumes

Collect preexisting chemical analyses

Statistically analyze chemistry values

"Loss of slurry or fines in washeries...is a step in the march of progress and eventually some method of utilization will be found."

- Coal Age, 1936

Mapping – Data Sources

Historical aerial photographs

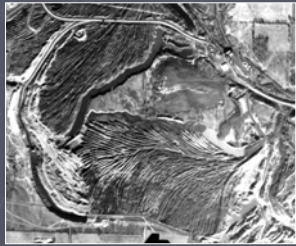
Dates: 1937 to 1980

Source: IGS archive (160 photos)

Digital Orthophoto Quarter Quads (1998)

National Agricultural Imagery Program (2003)

Indiana Orthophotography Project (2005)



Mapping – Feature Identification

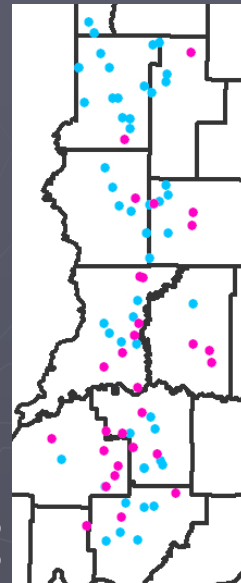
Coal-preparation plants



Old Ben No. 2
2003

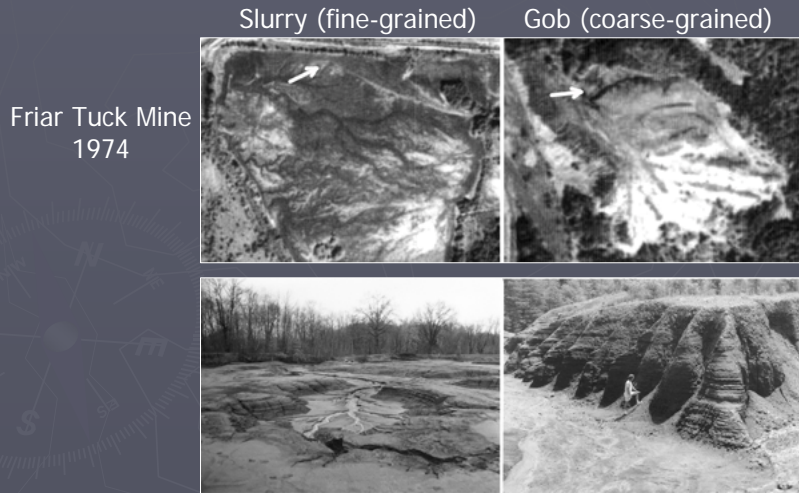
Tecumseh
1953

Pre 1978 ●
Post 1978 ●

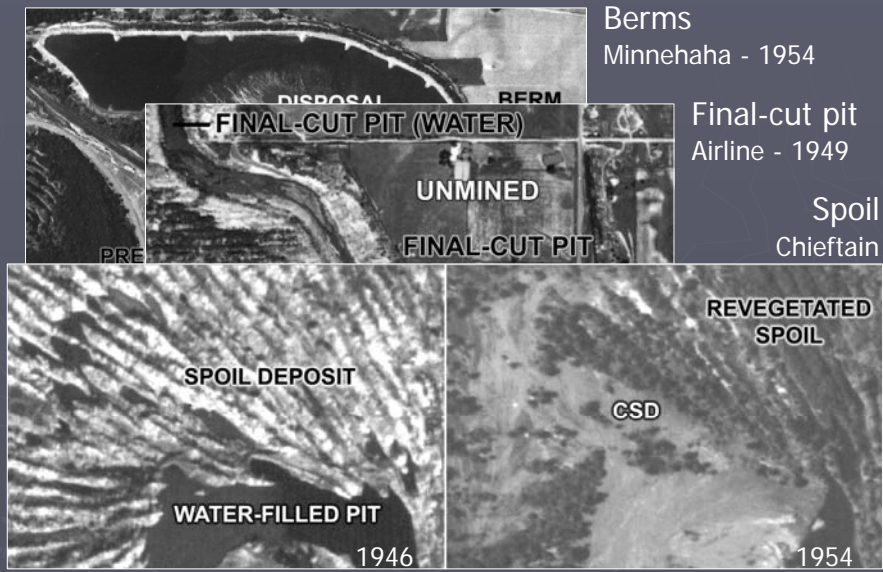


Mapping – Feature Identification

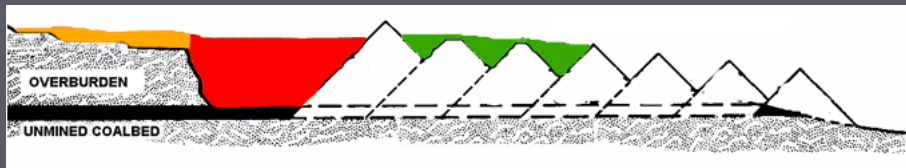
Coal slurry deposits



Mapping – Depositional Settings



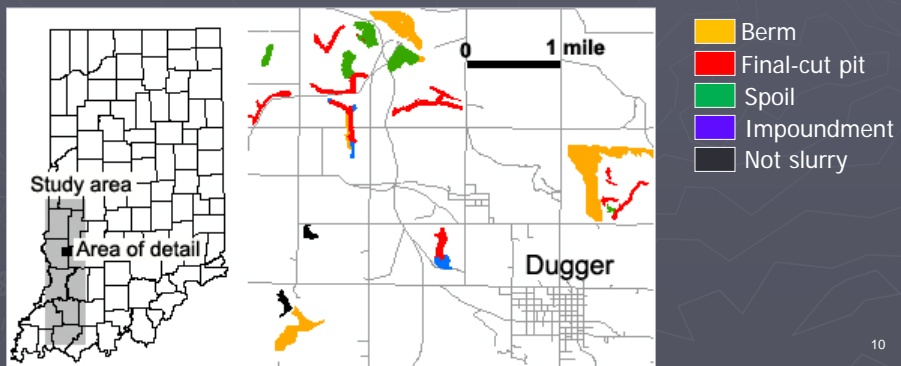
Mapping – Complex Histories



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Results – Areal Extents

Area (acres)	
Berms	1,213
Final-cut pits	764
Spoil deposits	788
Total	2,765



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Thickness Estimates – Data Sources

Digital Line Graphs (USGS)

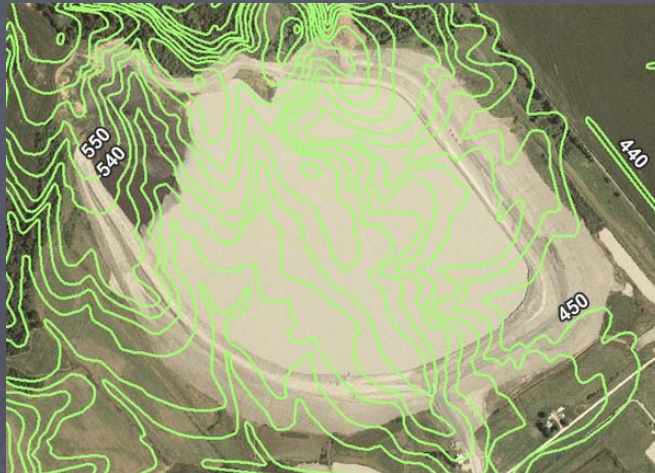
Coal Mine Information System (IGS)

National Coal Resource Data System (USGS)

Historical aerial photographs

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Thickness Estimations - Berms



Air Quality No. 1
2003

(NOTE: Active operation.
Impoundment not yet
filled. Not included in
final calculations.)

Elevation of top of
berm ~ 545 ft

Elevation of bottom
of impoundment
~ 445 ft

Total height of
Impoundment
~ 100 ft

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Results – Thickness Estimations

Thickness Estimates (feet)		
	Range	Average
Berms	0 to 54	10 to 14
Final-cut pits	0 to 125	38 to 56
Spoil deposits	0 to 49	6 to 8

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Results – Volumetric Calculations

Volumetric estimates (million cubic yards)	
Berms	29 to 39
Final-cut pits	56 to 86
Spoil deposits	9 to 12
Total	94 to 136

"...volume of mapped CSDs represents from 22 to 69 million tons of recoverable coal. This compares with an earlier estimate made by Miller and Eggert (1982) of about 20 million tons."

- Final Report

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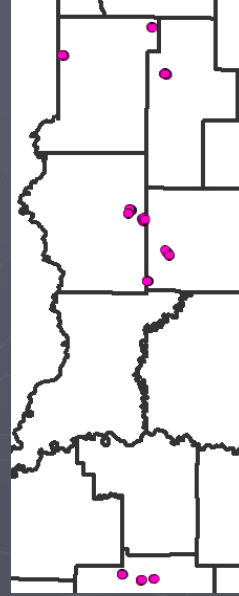
Chemical Characterization

Mine sites – 10
Drill holes – 93
Samples – 473

Collection dates – 1970s through early 1980s

Analyses

Sulfur (weight percent, as received)
Ash (weight percent, as received)
Btu per pound (as received, moisture- and ash-free)



Selected statistical values for 473 individual samples of coal slurry

AR: as-received; MAF: moisture- and ash-free; wt %: weight percent

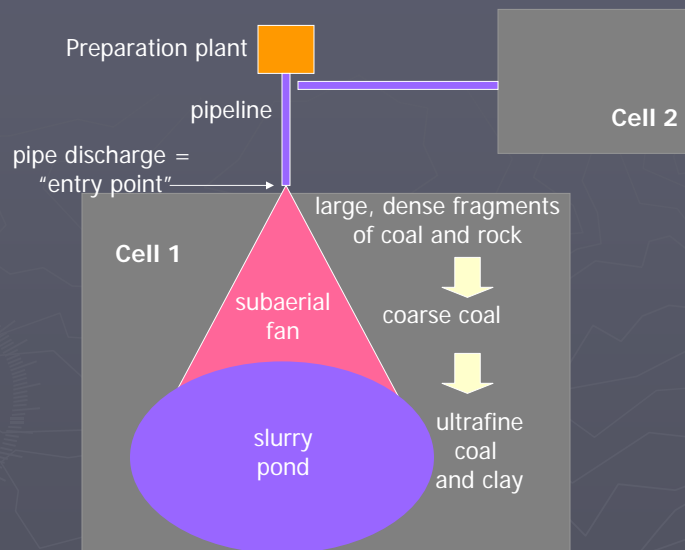
	Ash, AR (wt %)	Sulfur, AR (wt %)	Btu/lb, AR	Btu/lb, MAF
Minimum	5.6	0.4	1069	3725
Maximum	76.8	23.7	11720	24975
Average	32.2	4.0	7095	12849
Mode	26.7	2.8	7540	13210

Selected statistical values for samples from various mine sites

AR: as-received; MAF: moisture- and ash-free; wt %: weight percent

Mine	ID_IGS	No. of drill holes	No. of samples	Ash AR (wt %)	Sulfur AR (wt %)	Btu/lb AR	Btu/lb MAF
Minnehaha	D3	18	74	20.2	2.2	6893	13680
Green Valley	B4	9	23	20.9	5.1	9780	13305
Otter Creek	B1	4	4	26.7	2.6	8893	13025
Friar Tuck	D4	9	37	28.1	2.1	8092	13663
Buckskin	K3	7	17	29.0	2.7	8589	12873
Chinook	C1	14	81	30.5	3.2	5577	13310
Lynnville	K1	6	36	35.0	4.3	8150	13344
Tecumseh	K2	4	28	35.9	8.9	7168	11942
Airline	E3	11	99	42.4	4.4	7143	12657
Hawthorn	E4	11	55	45.2	5.8	6608	11920
SUM		93	454				
AVERAGE				31.4	4.1	7689	12972

Slurry Disposal



"...a manmade prograding fan-delta system"
-- Eggert, Miller, and Irwin (1980)

Chemical Trends

Spatial trends –

Mixed results. See final report.

Historical trends –

Overall quality can not be predicted on basis of the age of the preparation plant.

Source coal beds –

Overall quality can not be predicted on basis of the coal beds that were processed.

Type of mining –

Overall quality in slurry deposits produced from underground mines might be somewhat better.