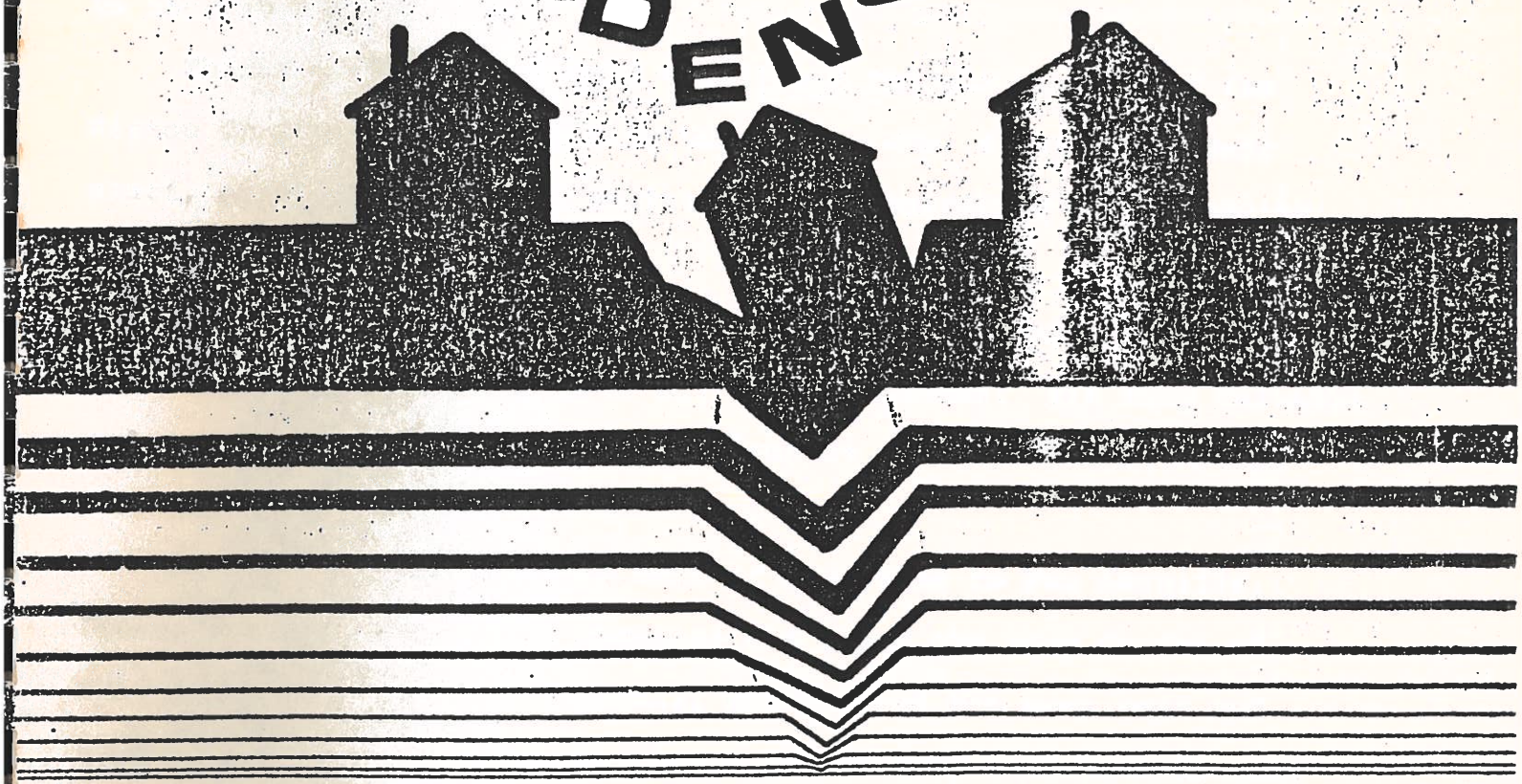
PICTOU COUNTY UNDERMINING & SUBSIDENCE STUDY



JANUARY 1981

PICTOU COUNTY DISTRICT PLANNING COMMISSION

ACKNOWLEDGEMENTS

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The completion of this report would not have been possible without the gracious assistance of Mr. Nordau Goodman. His many valuable and constructive comments while the report was in the draft stage were most appreciated.

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CHAPTER ONE - INTRODUCTION

1.1 Problem Statement

The past coal mining activities in Pictou County, particularly in the areas of Westville, Stellarton and New Glasgow have left a legacy of abandoned mine shafts and tunnels. Although records of many of the mines are held by the Provincial Department of Mines, and many individuals well acquainted with the mines still live in the area, there has not been any effort to compile this information into a readily useable form.

Over the years, a number of residences and other structures have been damaged or destroyed as a result of the caving in of an abandoned mine tunnel. Frequently, often in the spring, reports of either the sudden collapse or subsidence of what had been presumed to be firm earth are heard. Fortunately, these incidents are usually on undeveloped lands.

The existence of these mine tunnels and workings in a populated area may pose some hazard to existing structures as evidenced by past experience. The lack of knowledge about what areas are prone to collapse or 'subsidence' handicaps municipal government in their efforts to responsibly manage new development.

Starting in 1978 and continuing to the present, the five Town Councils and the Pictou County Council began the process of preparing Municipal Development Plans. Involved with this is the need to acquire the background information necessary to develop a data base for the six municipalities. Part of the

background information required is the physiography and geology (including the mining history) of the area between the two towns of Westville and Stellarton.

A common occurrence in the Westville/Stellarton area is land subsidence due to collapse of underground (and abandoned) coal workings. There existed no single source of information detailing all areas mined. The information was available but not in one place at one time nor had its accuracy been checked.

Before work on Municipal Development Plans for these towns could commence and recommendations could be made concerning where development should or should not be permitted, there was a need to know what areas were prone to subsidence.

The effort and time associated with such a study was considered too great for the Pictou County District Planning Commission to undertake "in house". Accordingly, an application was made to Young Canada Works for a grant to cover the cost of the study.

Following the approval of the grant, the study was commenced under the supervision of the planning staff of the Pictou County District Planning Commission. Field work was conducted over the four month period May to August 1979. Principal staff at this stage were Carl Baillie, a second year engineering student and Jinni Benson, a final year planning student. The writing and editing of the report, the drafting of the many maps and cross-sections and, particularly, the review of study findings with local knowledgeable residents consumed more than an additional year of Planning Commission staff time.

1.2 Study Objectives

This report is intended to explore the areas in Westville and Stellarton which have been undermined within a depth of 500 feet (152 meters) of the surface.

It is also intended to record the levels of mining, the perimeter of the workings, to outline the geological strata associated with each working and to indicate areas of known subsidence.

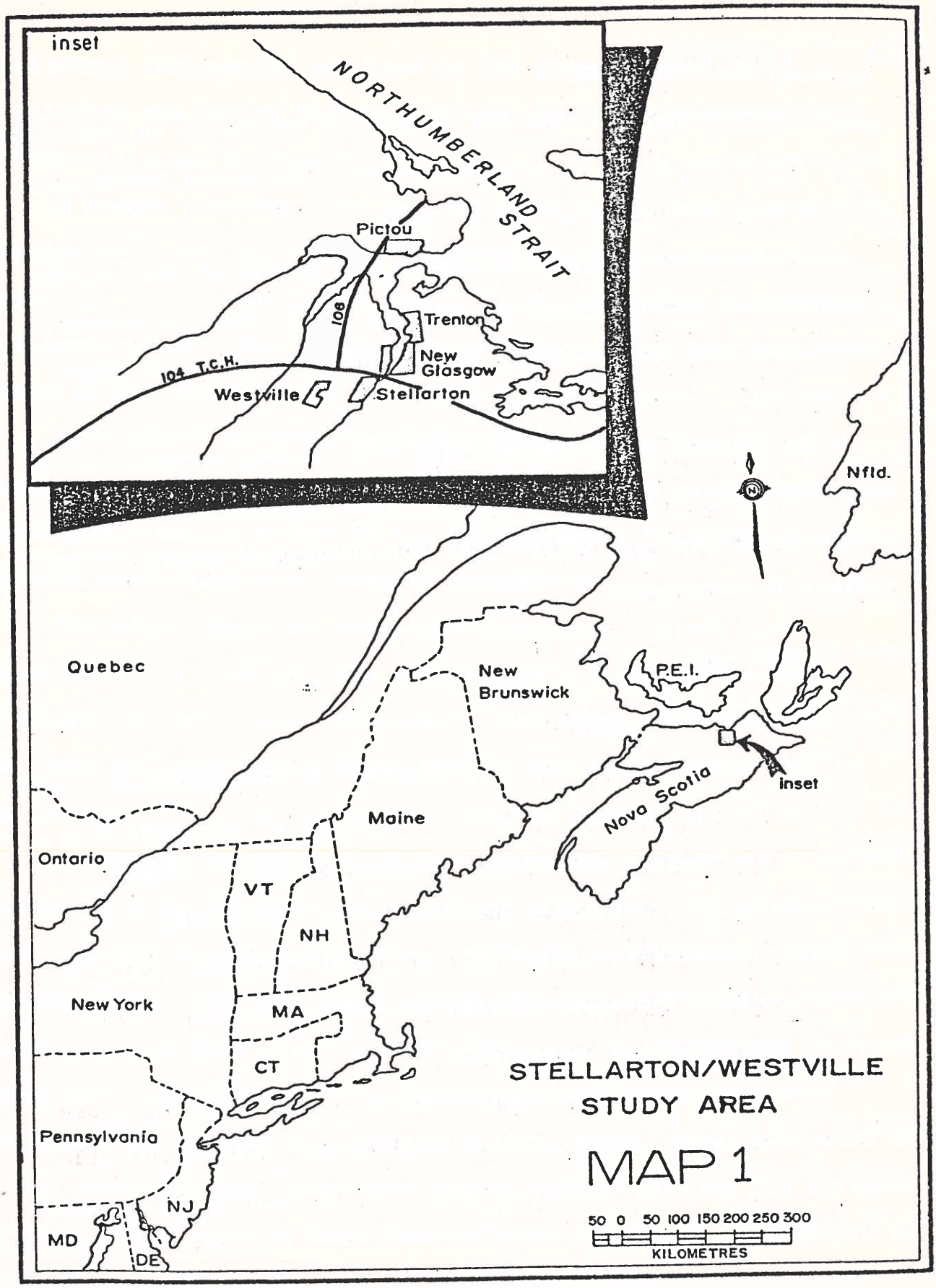
An attempt will also be made to correlate areas of known subsidence and similar geological structures with a view to assessing future subsidence risk for undermined areas not yet subject to subsidence.

1.3 Study Site

1.3.1 General Study Area

This report deals with the Stellarton and Westville areas of Pictou County located on the north shore of mainland Nova Scotia. The general study area is shown on Map 1. More specifically, it deals with the Pictou Coal Field which is comprised of the Westville, Stellarton and Thorburn areas of Pictou County. This report deals only with the coal bearing areas of Westville and Stellarton.

The coal field lies about 9 miles inland from the shore of Northumberland Strait and just beyond the head of the tidal water of the East River, at which point the Town of Stellarton is located.


inset
NORTHUMBERLAND STRAIT
Pictou
104 T.C.H.
106
Trenton
New Glasgow
Westville
Stellarton
Nfld.
Quebec
New Brunswick
P.E.I.
inset
Nova Scotia
Maine
Ontario
VT
NH
New York
MA
CT
Pennsylvania
NJ
MD
DE
STELLARTON/WESTVILLE
STUDY AREA
MAP 1
50 0 50 100 150 200 250 300
KILOMETRES

The Town of New Glasgow is situated on the northern boundary of the coal field and lies approximately half-way between the eastern and western extremities of the coal field.

The details of the study site are shown on Map 2. Details and maps of the Stellarton and Westville mines may be found in Appendix C (Stellarton area Mines) and Appendix D (Westville area Mines.)

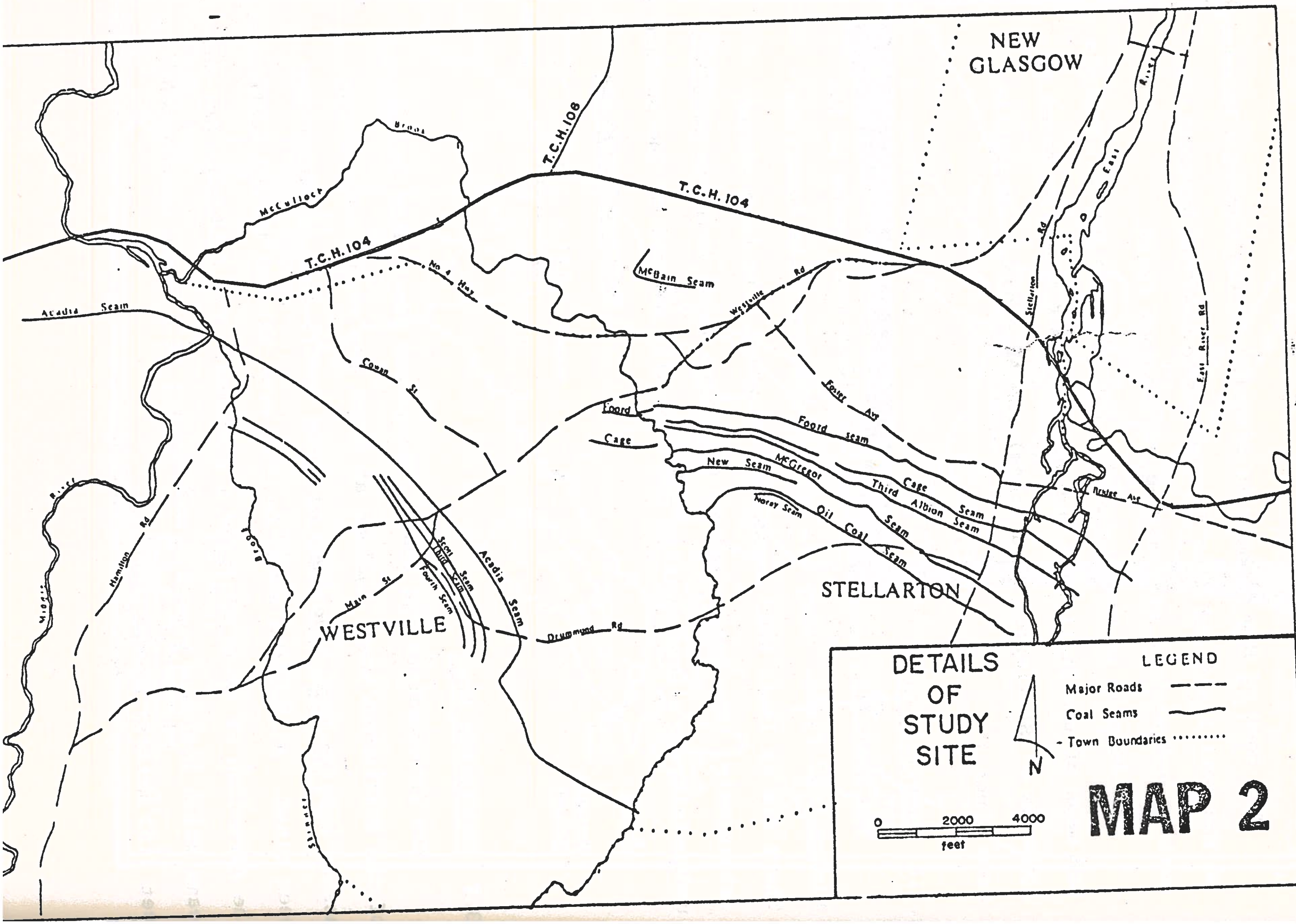
1.3.2 Westville Area

The Westville area contains the oldest coal seams in the Pictou Coal field. They are part of the Westville formation. There are at least four seams, two of which have been worked extensively. The following are the seams which indicate possible undermining to a depth within 500 feet (152 meters) of the surface.

Seam	Average Thickness
Acadia	12' - 17'
Scott	12' - 18'

1.3.3 Stellarton Area

The intermediate age coals, designated the Albion formation of the Stellarton area, include at least ten seams (with thicknesses ranging from five feet to forty feet), five of which have been mined. All of the seams in this area thicken to the northeast, the direction of their dip into a syncline. The following are the seams which indicate possible undermining to a depth within 500 feet (152 meters) of the surface.


NEW GLASGOW
STELLARTON
WESTVILLE
T.C.H. 104
T.C.H. 108
McBain Seam
Westville Rd
No 4 Hwy
Cowan St
Foster Ave
Foord Seam
Cage Seam
Third Albion Seam
McGregor Seam
New Seam
Norey Seam
Oil Coal Seam
Foord
Cage
Acadia Seam
Scott Seam
Third Seam
Fourth Seam
Main St
Drummond Rd
Hamilton Rd
Stellarton Rd
East River Rd
East River
Bridge Ave
McCulloch
DETAILS OF STUDY SITE
LEGEND
Major Roads
Coal Seams
Town Boundaries
N
0 2000 4000
feet
MAP 2

Seam	Average Thickness
Foord	22' - 34'
Cage	12' - 20'
Third	8' - 17' 6"
MacGregor	9' - 5' 6"
New Coal	4'6" - 10'

1.3.4 Mine Workings Discussed

The following is a list of mines dealt with in this report:

PICTOU COALFIELD

Location	Mine	Seam[s]	Dates	Production	Peak Year & Tonnage	
Stellarton	Allen	Foord/Cage	1908-1951	5,245,466	1927 -	230,273
Stellarton	Albion	Main/Deep/Cage/Foord/Third/MacGregor	1867-1942	8,218,986	1915 -	283,275
Stellarton	Acadia #1	Acadia	1920-1925	265,836	1923 -	94,073
Stellarton	Acadia #7	Cage/Third	1936-1947	625,909	1941 -	97,937
Stellarton	MacGregor/Albion	MacGregor/Fleming	1912-1957	3,242,644	1951 -	248,367
Westville	Acadia Colliery	Acadia	1867-1920	12,747,274	1920 -	529,641
Westville	Intercolonial/ Drummond Mines		1867-1976	15,357,840	1908 -	315,590
Westville	Intercolonial/ Drummond #1	Main/Westville	1923-1969	2,691,687	1940 -	85,254
Westville	Intercolonial/ Drummond #2	2nd/Scott/Westville	1923-1976	3,801,226	1947 -	124,547
Westville	Intercolonial/ Drummond #5	Main/Westville	1920-1945	649,693	1920 -	34,534
Westville	Black Diamond		1888-1891	109,439	1889 -	34,015
Westville	Wadden	Main	1946-1953	17,538	1947 -	3,134

A synopsis of local mining history is contained in Appendix E.

1.4 Methodology

1.4.1 Introduction

Before beginning the project it was necessary to familiarize staff with the study area. After meeting with local miners and former miners to discuss what areas were undermined and what areas in Westville and Stellarton had previously experienced subsidence, an initial map was drawn locating known mined areas. The Department of Mines in Stellarton and Halifax were contacted and the process of collecting accurate undermining information was begun.

The Department of Mines in Stellarton had on file a number of old blueprints of the workings, the majority of which had been reduced to a scale of 1:400. A few of the blueprints were at a scale of 1:100. All mapping had to be changed to the working scale chosen.

Base mapping was established at a scale of 1:5000 as this was available through the Commission in both property and contour mapping. An error factor was recognized between Department of Mines base mapping and the study's base mapping. This factor was corrected mathematically while working with each mine. When composite map of the mines were drawn, they were adjusted to be accurate to the scale of 1:5000.

Many of the mines in the Westville, Stellarton area were mined prior to the 1900's. Much of the documentation of these mines is not keyed to known landmarks nor was it keyed to geodetic information. Through a series of cross checks and field work the exact locations of the mines involved were established and from these fixed points the outer parameters of the workings could be established.

As a result of this initial analysis it was determined that, regardless of overlaying geological structure, subsidence was not a problem where the level of mining closest to the surface was at a depth greater than 500 feet below the surface.

1.4.2 Field Work

At this stage rough field maps were drawn establishing a uniform dip* of 23^0. Calculations were made to determine points on the surface where depth to undermining was 100', 200', 300',

* The Pictou Coalfields are synclinal. The uniform dip established is for the northeasterly tending slope which forms the southern portion of the basin and which lies to the south of a series of faults across the basin which dictated the northern boundary of most of the mine workings.

400' and 500'. Fieldwork was then undertaken in Stellarton and Westville beginning at the entrance of the shafts and checking areas first from the mouth of the slope to 100' depth then areas, encompassing each successional 100 feet in depth to a final area where the depth of the first level of mining was 500 feet. Incidence of subsidence was noted on the field map along with a description of depth, frequency, surrounding topography and approximate age. Approximate age of subsidence was determined by comparing vegetation in and around the subsidence as well as noting any changes in direction of growth of vegetation.

We realized that a user needing accurate information about the undermining in an area would not have enough information from such a map. The next step was to cut an imaginary line (a section) through the earth and on a graph locate where each level of mining was. This graph would then show how the coal bed travelled under the earth and how far down it was to the mined coal bed. As can be seen on Map (2) the coal field area is not rectangular but gently curved. To make the graphs as useful as possible, we took these sections along the curve of the workings.

The Department of Mines, Stellarton, has on record blueprints of all of the areas mined. Frequently depths from sea level are indicated on the blueprints along with degree of slope by which depths can be calculated. On one or two of the older blueprints neither depths nor slopes were given; therefore, depths were calculated using assumed dip of the bed and distance from a report done by the Department of Mines which gave an in-depth report of the economic geology of Pictou County.

1.4.3 Detailed Mapping

The final six weeks of the project entailed detailed mapping of the mines. Geological data was researched to establish the dip of the coal beds. This information was necessary for establishing relative depths for mines where neither degree of slopes nor depths were known. Graphs were prepared showing slopes of the mines, giving distance in meters from surface and distance between beds. This information was cross checked between known data from Department of Mines and data from geological studies. Boreholes which would give stratatographic data for areas studied were also plotted. These boreholes are shown in the cross sections not as exact representations but as indications of stratagraphic conditions present in area mined. The results of the detailed mapping and cross-section diagrams are included together in Appendix A.

CHAPTER TWO - STUDY RESULTS

2.1 Introduction

As a result of the initial analyses, the following determinations were made:

2.1.1 Stellarton Mines

The Allan Mine is a single level working with the majority of the workings below 500 feet. Only those areas within 500 feet of the surface were examined.

The Burnt workings, which work the Foord Seam only, are discussed as one mine. There are no records available for these mines which pre-date 1880 and all information given in the sections of these mines are based on calculations of the probable location of the seam given known stratographic information.

The Cage workings are represented separately because, while they interlink with the Foord workings, very little is known about exact depths or slope of the mine. Based on geological data and the underlying coal seams, a projection was made as to the probable slope and dip of the seam. These figures were tied in wherever possible with one or two pieces of known data.

For more detailed geological information, reference may be made to Appendix B. A more detailed analysis of the Stellarton Area mines can be found in Appendix C.

2.1.2 Westville Mines

The mine workings in Westville, namely the Drummond, the Acadia and the Black Diamond, are shown together on Map A-7 (see Appendix A). Only those areas of these mines within 500 feet of the surface are shown. A more detailed analysis of the Westville mines can be found in Appendix D.

2.2 Causes of Past Subsidence

The following factors causing past subsidence were determined

1. Old workings (pre 1900 such as the Burnt workings and Foord workings in Stellarton) were causing re-occurring subsidence and had not "settled".

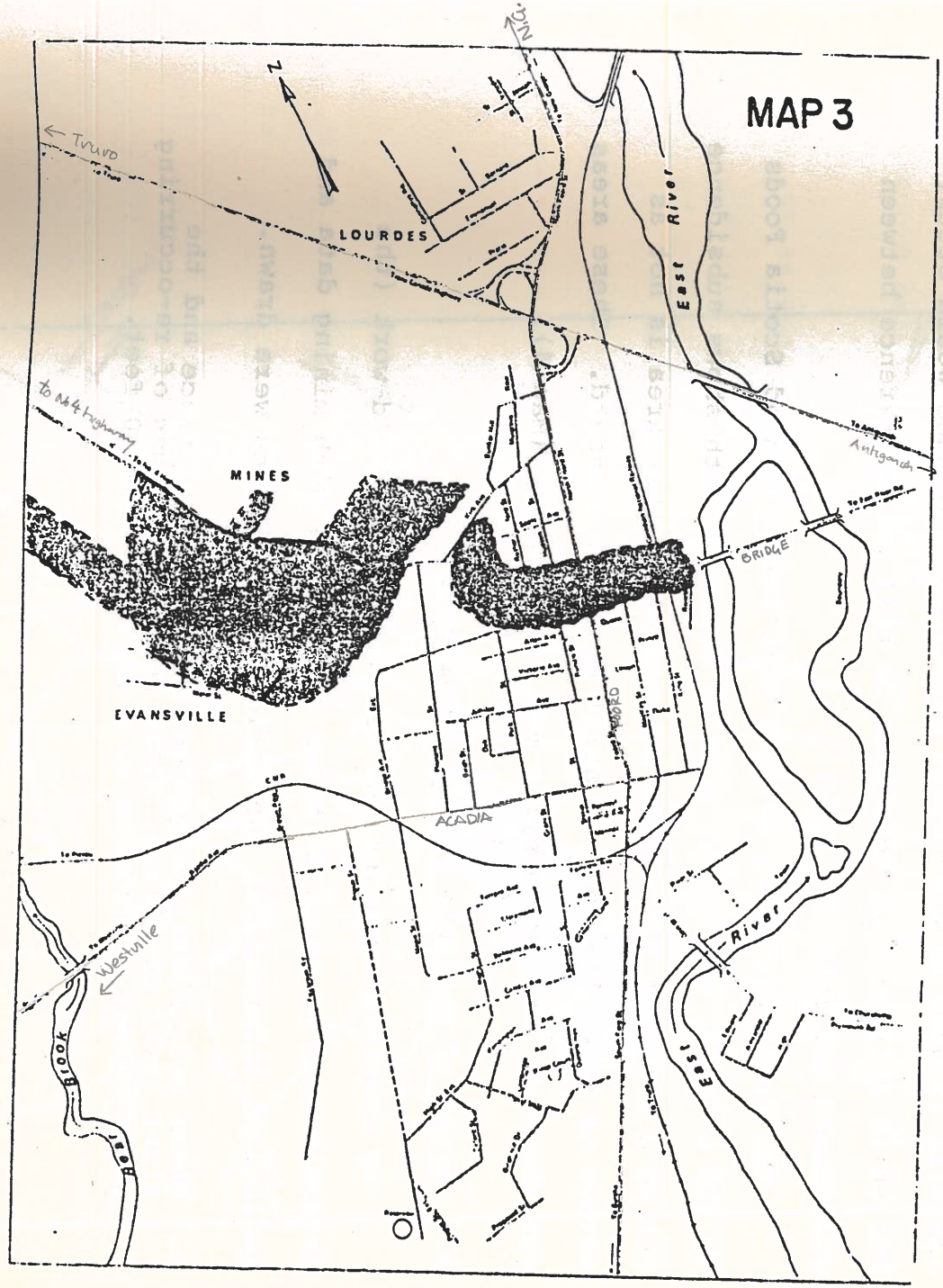
2. Areas with coal close to the surface (within 250 feet) were frequently "bootlegged" after the mine closed. These areas experienced a greater frequency of subsidence.

2.3 Areas of Known Subsidence

2.3.1 Stellarton

The Old Foord Working is the cause for the majority of subsidence in the populated area of Stellarton. An area stretching from the river between Bridge Avenue and Foster Avenue past the area which has been reclaimed by the Department of Mines experienc frequent subsidence.

The area to the south of Foster Avenue from the Department of Mines reclamation site to about the intersection of Foster Avenue with Westville Road, also experiences severe subsidence. This is due to the fact that the area has a shale bedrock geology underlain by a minimum of four levels of mining within 500' of the surface. This area is shown on Map 3.



PICTOU COUNTY
UNDERMINNING & SUBSIDENCE
STUDY

STELLARTON

AREAS OF KNOWN
SUBSIDENCE

Source: Field Work

scale:

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COMMISSION

2.3.2 Westville

There is little subsidence in populated areas of Westville. The Black Diamond Mine causes the subsidence near the C. N. R. line. However, because the mine has a roof of sandstone and sandstone/shale mine subsidence beyond Black Diamond Road is negligible.

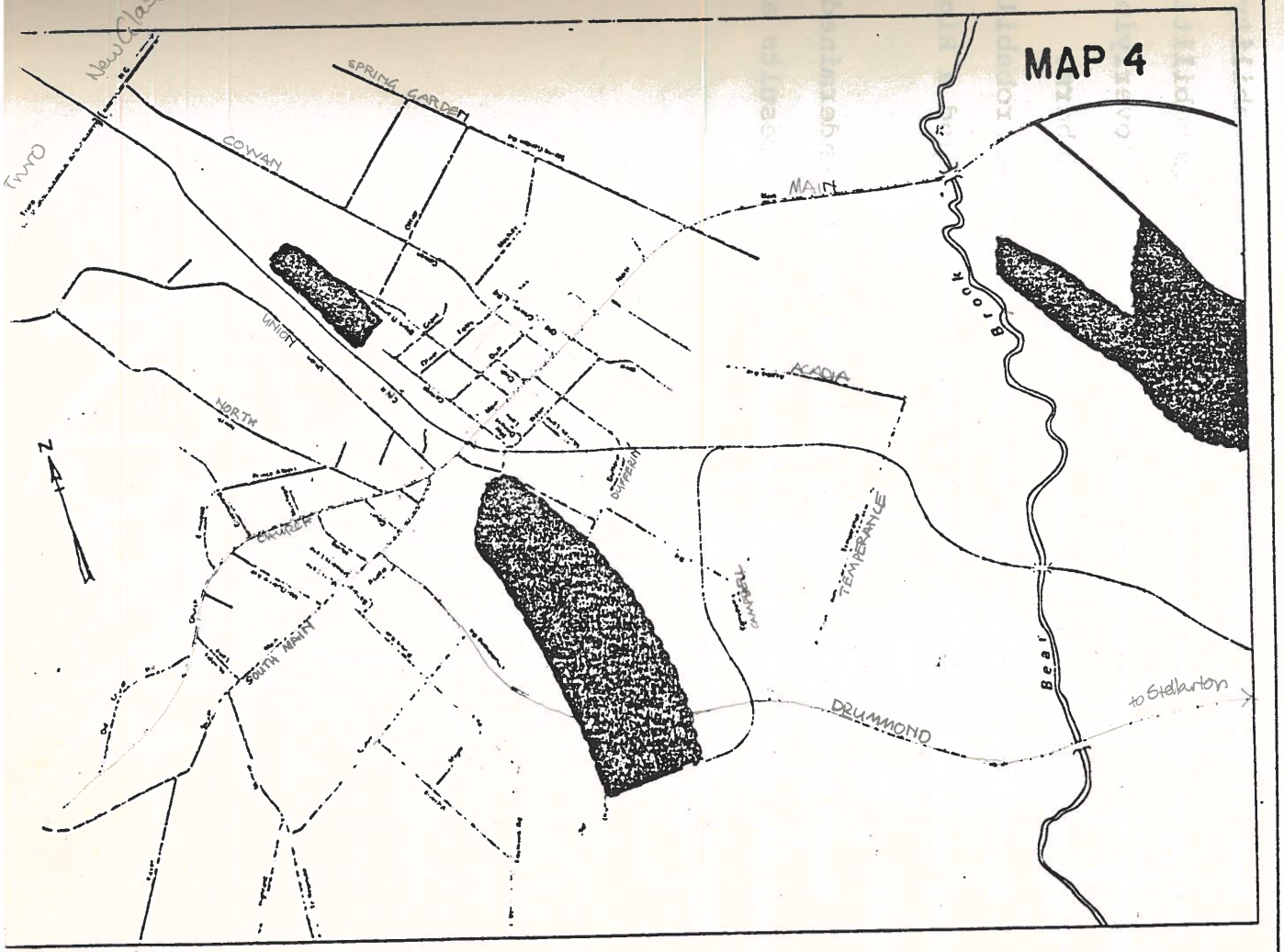
It is difficult to attribute all the depressions between the road and the rail line to subsidence. History shows that much of that area was bootlegged and at least a few of the holes showed signs of being bootleg pits. There were, however, a number of areas which gave indications of subsidence. The coal-waste landfill is over an area where probable subsidence would occur, but it is difficult in this area to tell the difference between subsidence and settling fill.

The area stretching between Main Street behind Scotia Foods to the C. N. R. and either side of Drummond Path shows subsidence out to a depth of 250'. The subsidence in this area is not as severe as in Stellarton but still presents a hazard. These areas are shown on the accompanying map of Westville (Map 4).

2.4 Areas of Probable Future Subsidence

By cross-referencing the results of our field-work (the determination of areas of known subsidence) with mining data and geological information, the following hypotheses were drawn.

A. Where only shale was present between the surface and the first level of mining, there were indications of re-occurring and frequent subsidence to a depth of 300-350 feet.



PICTOU COUNTY
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STUDY

WESTVILLE

AREAS OF KNOWN
SUBSIDENCE

Source: Field Work

scale:

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DISTRICT
PLANNING
COMMISSION

B. Where more than one level of mining at depths of less than 500 feet from the surface were present and where only shale was present from the surface to the first level of mining and between the next level of mining there was an indication of severe and re-occurring subsidence to a depth of 300-350 feet.

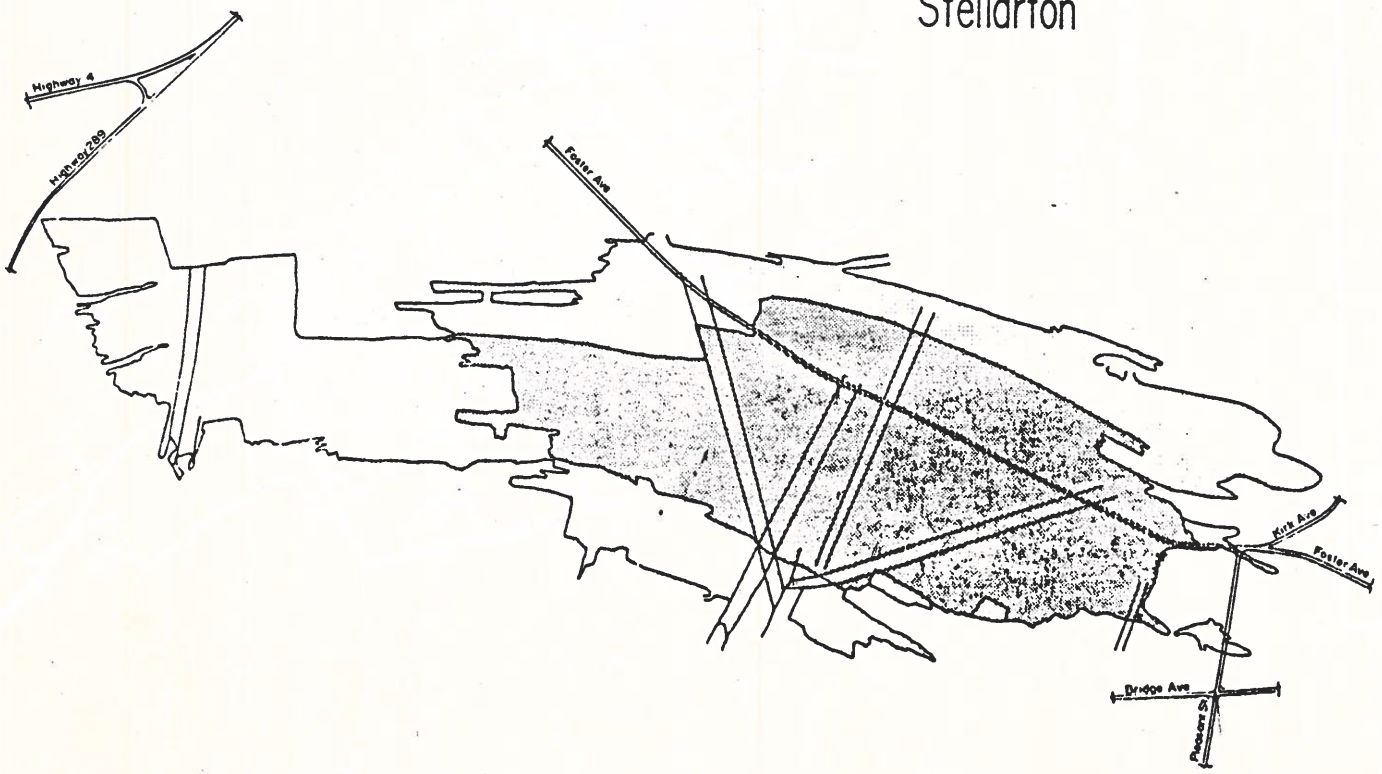
C. Where sandstone was present between the surface and the first level of mining whether there was one or more levels of mining, there was an indication of severe subsidence to a depth of 100' occasional subsidence to a depth of 200' and no evidence of subsidence hazard beyond that level.

Each of these hypothesis was assigned a probability relative to the potential for future subsidence. The probabilities were based on the competency of the roof structures (overlying strata) to support the weight of material above the chambers.

Hypothesis A above was assigned a Moderate Probability rating while Hypotheses B and C were both assigned a High Probabili rating.

These probabilities were assigned to the undermined areas mapped for both Stellarton and Westville. The results are shown on Maps 5 and 6 respectively.

MAP 5
Stellarton



PICTOU COUNTY
UNDERMINING & SUBSIDENCE STUDY

AREAS OF PROBABLE SUBSIDENCE

legend;
high probability
medium probability

SCALE
0 100 200 400
metres

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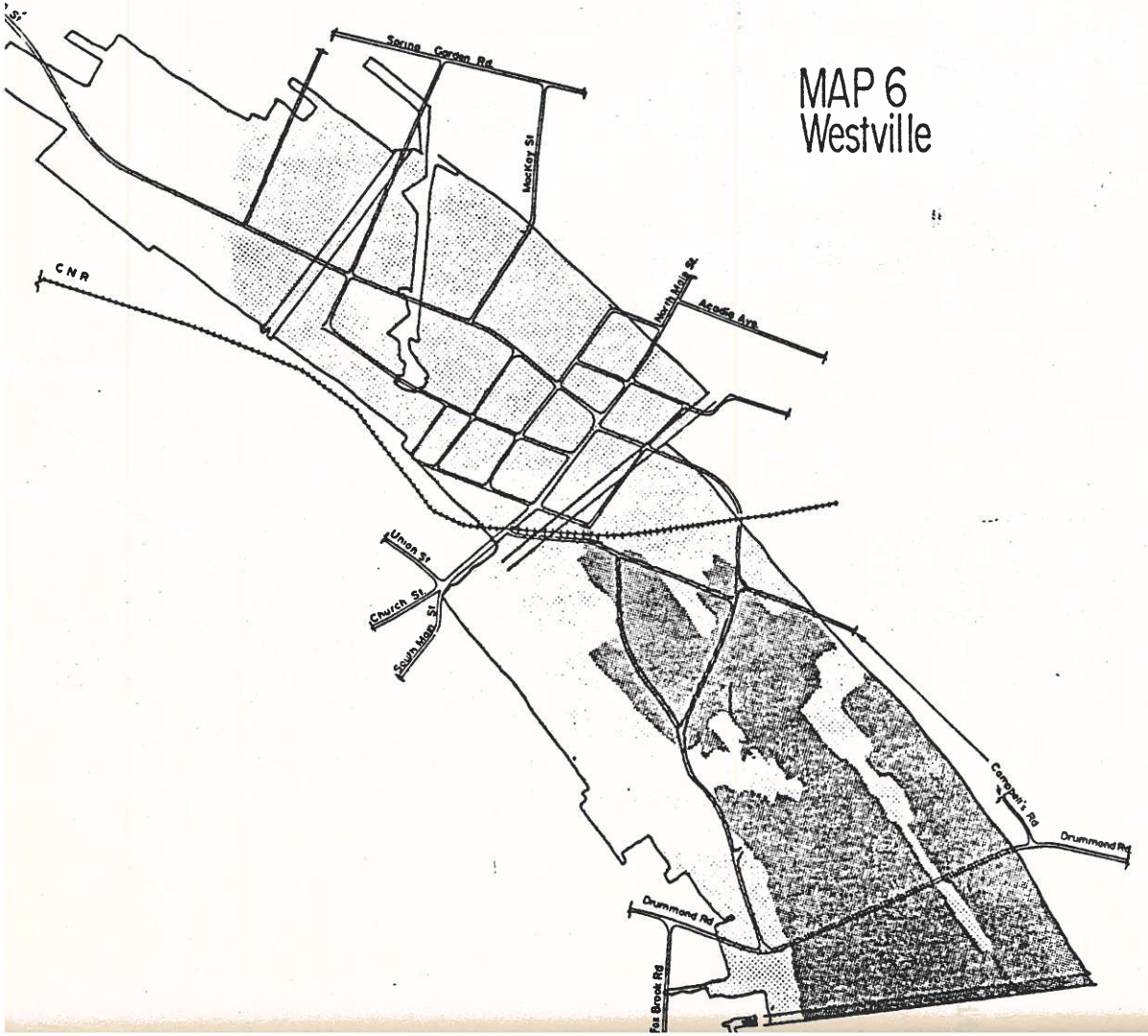
MAP 6
Westville



PICTOU COUNTY
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AREAS OF PROBABLE SUBSIDENCE

legend;
high probability
medium probability

SCALE
0 100 200 400
metres

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APPENDIX A

DETAILED MAPPING

APPENDIX A

DETAILED MAPPING

This section contains the detailed mapping and cross-sections produced by the study team. This detail work served two functions. Firstly, it was used (in the case of the detailed maps of the old mine workings) to determine the areas for detailed field investigation. Secondly, the cross-sections were used to establish the hypotheses dealing with the causes of the varying degrees of subsidence and to project the degree of probability of future subsidence.

Included in this section are two composite maps (Maps A-1 and A-6) of Stellarton and Westville area mines respectively. These maps indicate the total areas mined to a depth within 500 feet (162 meters) of the surface. The shading on these maps show where one or more levels of mining occur in an area. For example, for the Stellarton map by overlaying the blueprints of all the workings for Stellarton, it was possible to ascertain where two levels of mining, within 500 feet or 162 meters of the surface, occurred at the same time.

The maps immediately following the composite maps of Stellarton and Westville indicate where, on the composite map, sections were taken and diagrammed. On each of these maps a grid system is shown. The horizontal lines, lettered A, B, C and so forth indicate the

section lines corresponding to the Figures following each map. The numbers 1, 2, 3 and so forth correspond with the horizontal scale of the respective Figures.

In addition, on Map A-2, there is an additional section, lettered S, which runs at right angles to the main sections. This section is reproduced in Figure A-1.

As noted each Figure reproduces one section. The sections correspond to the letter code (A, B, C as noted earlier) while the stations (1, 2, 3 and so forth) correspond to the cross section lines indicated on the maps. By locating the area under study on a section (letter code line) and determining which station or stations (number code) the area falls near, the depths of mining in the study area can be determined. By following these steps, one can determine the number of seams mined in a given area, the approximate depth from the surface to the first level of mining and the distances between mining levels.

Included with most of the sections is a core sample record. The core samples are taken from records of bore holes on file with the Department of Mines. Accurate surveyed locations may be obtained by referring to the Department of Mines Annual Reports. The core sample shown on a section diagram are chosen because they are the most representative sample available for the given area and are not meant to be an exact statement of the geology of that line.

MAP A-1

PICTOU COUNTY
UNDERMINING & SUBSIDENCE STUDY

STELLARTON COMPOSITE MAP

LEVELS OF UNDERMINING WITHIN 500' OF SURFACE

- ONE LEVEL
- TWO LEVELS
- THREE LEVELS
- FOUR LEVELS
- TWO LEVELS-ONE LEVEL UNDER 500'

A - 3

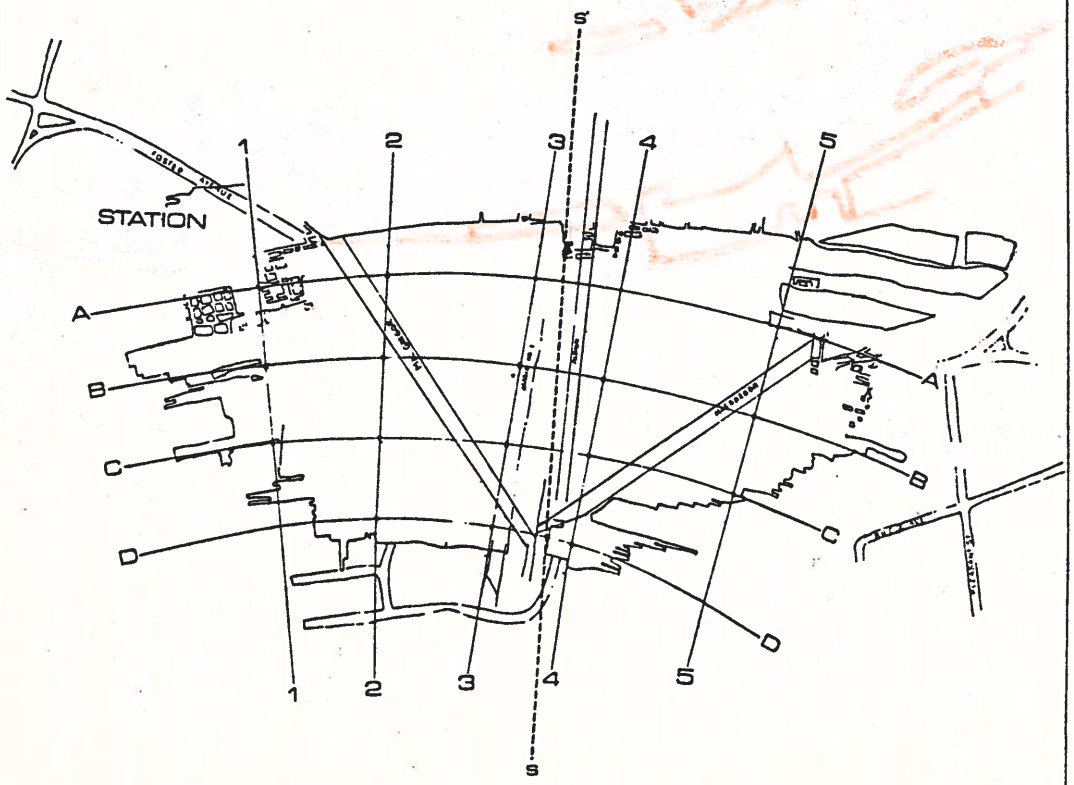
SOURCES:

SCALE: 1/14200

Prepared by

PICTOU COUNTY DISTRICT PLANNING COMMISSION

MAP A-2



PICTOU COUNTY
UNDERMINING & SUBSIDENCE STUDY

MINE WORKINGS SHOWN:
MacGREGOR
ACADIA
ALBION

OUTLINE OF WORKINGS WITHIN 500' OF SURFACE

REFERENCE MAP FOR CROSS SECTION OF GEOLOGY STELLARTON COALFIELD

SECTION LINE
STATION

SOURCES: COMPOSITE MAPS OF WORKINGS

SCALE: 1/14,200

metres

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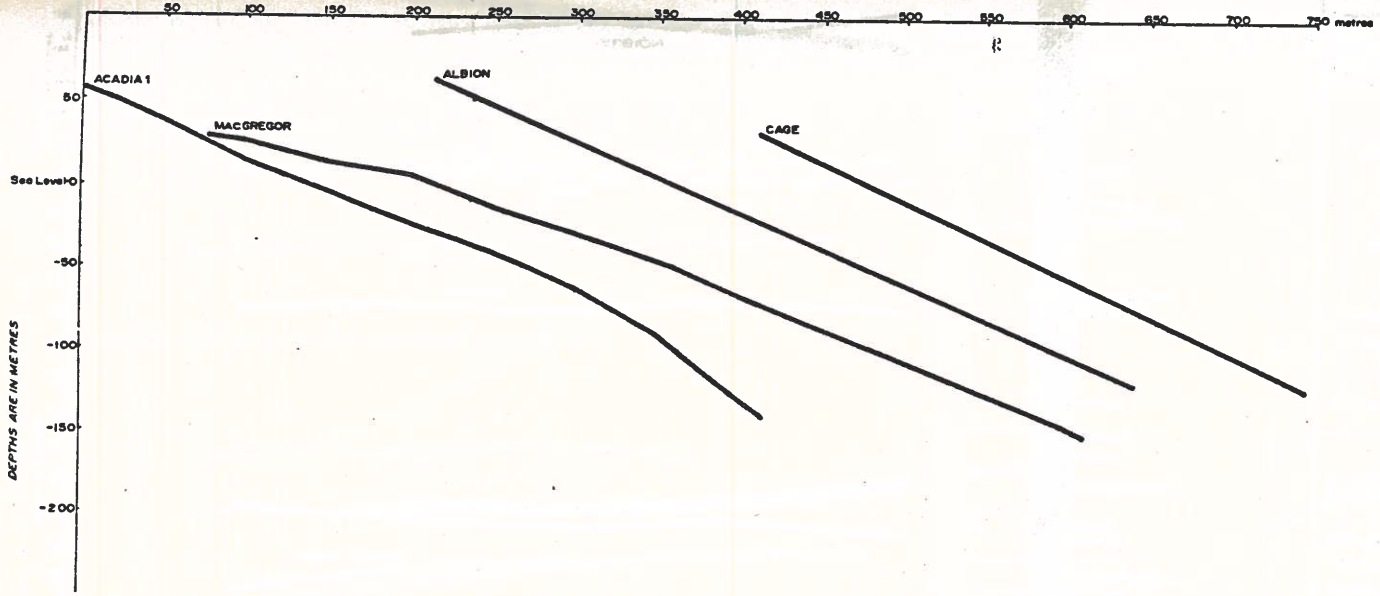

PICTOU COUNTY
UNDERMINING & SUBSIDENCE
STUDY

FIG.A-1 (SECT.S, MAPA-2)

COAL SEAM ——

SOURCES BORE HOLE RECORDS 4314, 4335, 4336.
CO-ORDINATES FOR BORE HOLES ARE ON
FILE WITH DEPARTMENT OF MINES
STELLARTON, N.S.

Prepared by:

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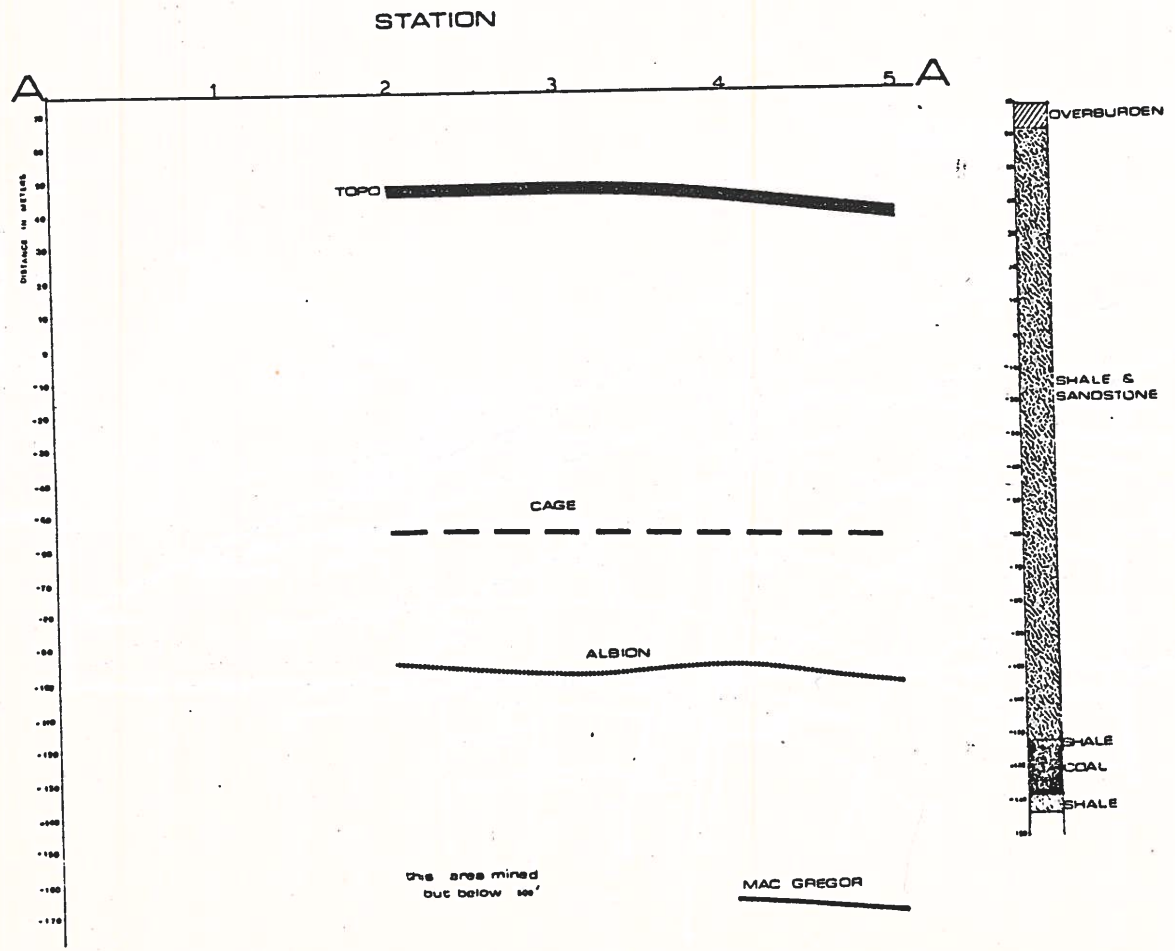
COMMISSION

A - 5



PICTOU COUNTY
UNDERMINING & SUBSIDENCE STUDY

FIG. A-2 (SECT. A, MAP A-2)

BORE HOLE GEOLOGY

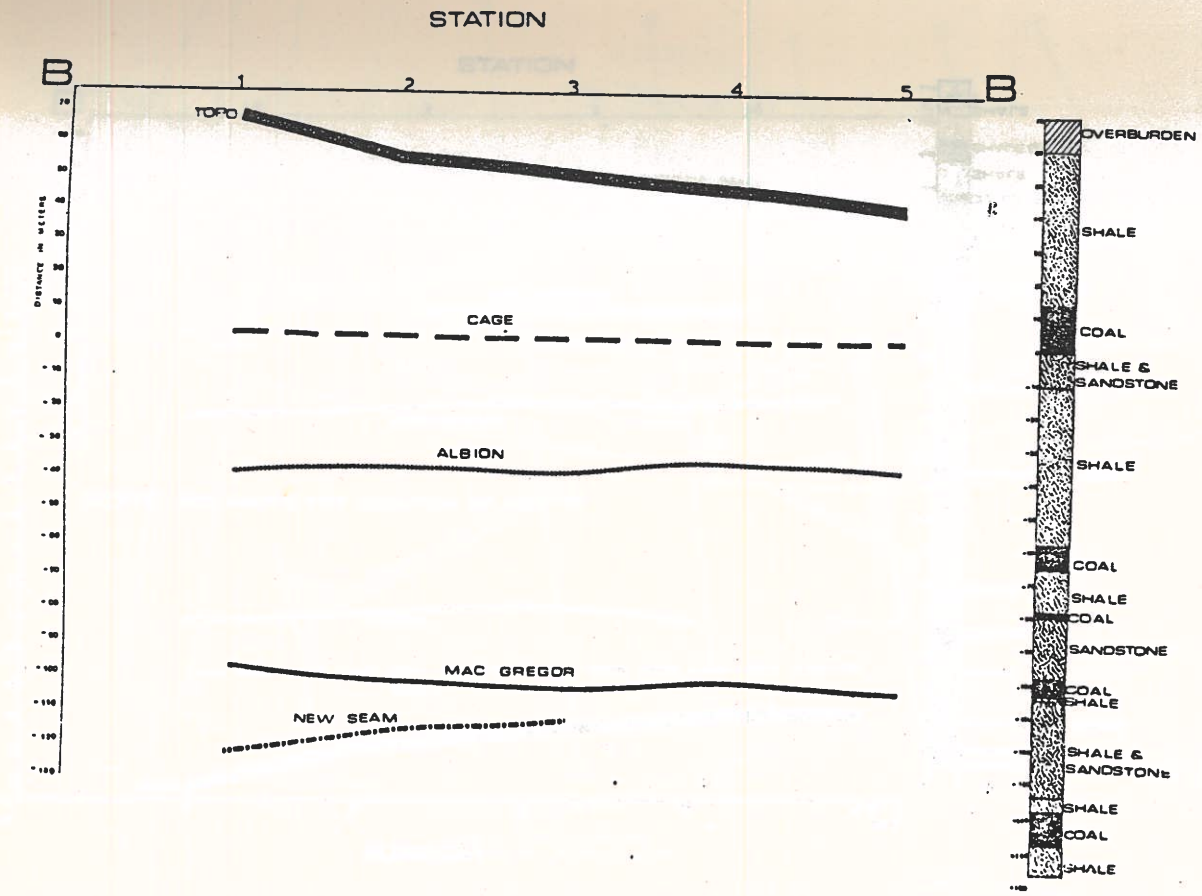
- OVERBURDEN
- SHALE & SANDSTONE
- SHALE
- COAL

TOPO — SURFACE TOPOGRAPHY

SOURCES: BORE HOLE RECORDS 0439
CO-ORDINATE FOR BORE HOLES ARE ON
FILE WITH DEPARTMENT OF MINES
STELLARTON, N.S.

Prepared by:

PICTOU
COUNTY
DISTRICT
PLANNING
COMMISSION



PICTOU COUNTY
UNDERMINING & SUBSIDENCE STUDY

FIG. A-3 (SECT. B, MAP A-2)

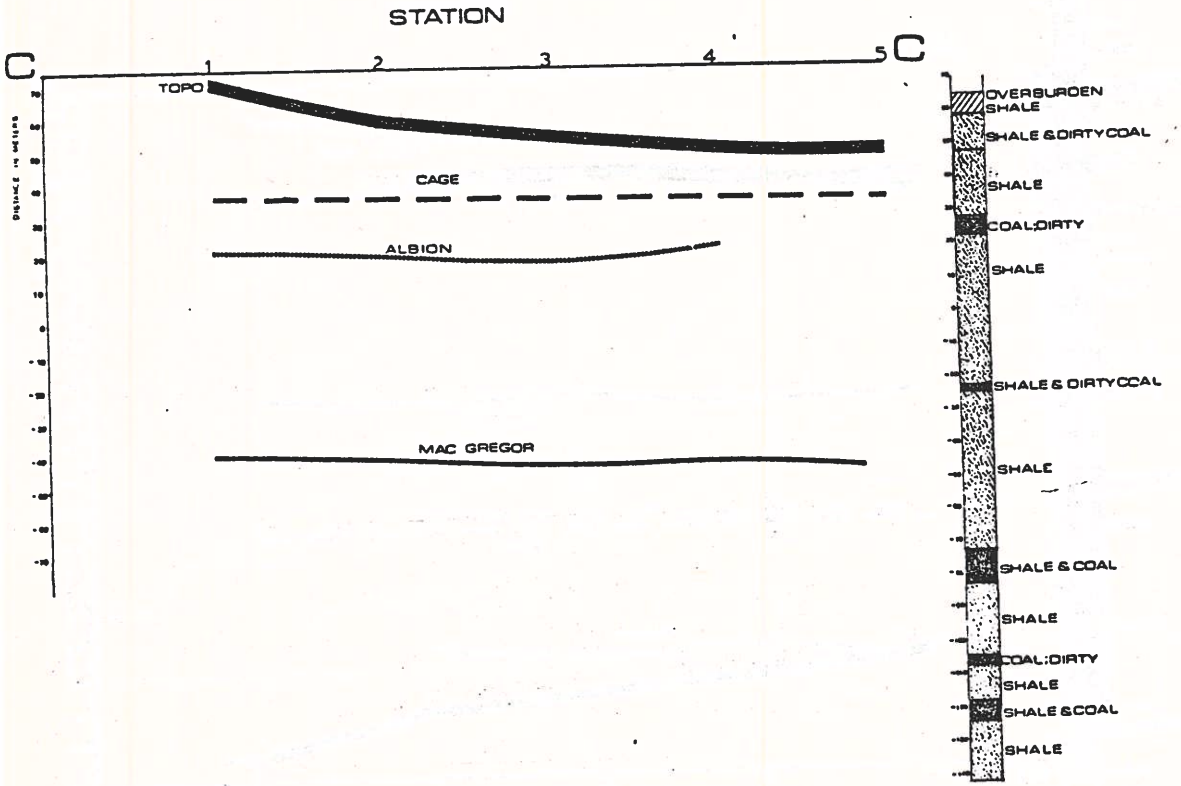
BORE HOLE GEOLOGY

- OVERBURDEN
- SHALE & SANDSTONE
- SHALE
- SANDSTONE
- COAL
- TOPO — SURFACE TOPOGRAPHY

SOURCES: BORE HOLE RECORDS & DEPT. CO-ORDINATE FOR BORE HOLES ARE ON FILE WITH DEPARTMENT OF MINES STELLARTON, N.S.

Prepared by:

PICTOU COUNTY DISTRICT PLANNING COMMISSION



PICTOU COUNTY
UNDERMINING & SUBSIDENCE STUDY

FIG.A-4(SECT.C,MAP A-2)

BORE HOLE GEOLOGY

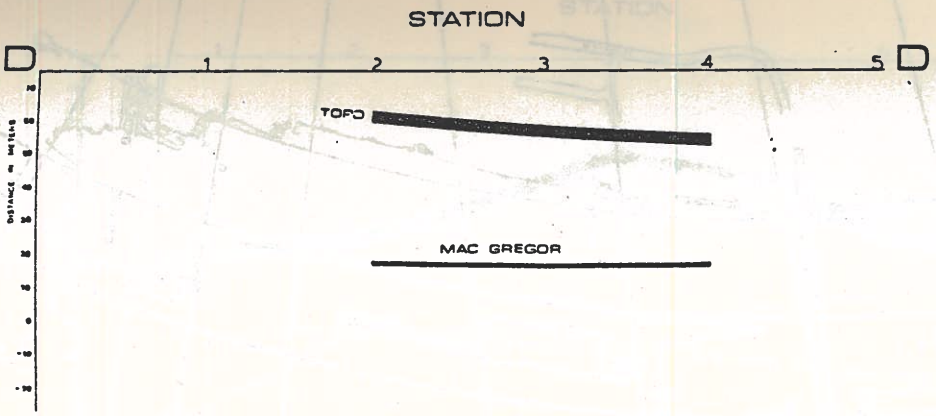
- OVERBURDEN
- SHALE
- COAL

TOPO — SURFACE TOPOGRAPHY

SOURCES: BORE HOLE RECORDS 6497
CO-ORDINATE FOR BORE HOLES ARE ON FILE WITH DEPARTMENT OF MINES, STELLARTON, N.S.

Prepared by:

PICTOU COUNTY DISTRICT PLANNING COMMISSION



NOTE: SEE MAP 3 FOR LOCATION OF LINE "D"

PICTOU COUNTY
UNDERMINING & SUBSIDENCE STUDY

FIG. A-5 (SECT. D, MAPA-2)

TOPO SURFACE TOPOGRAPHY

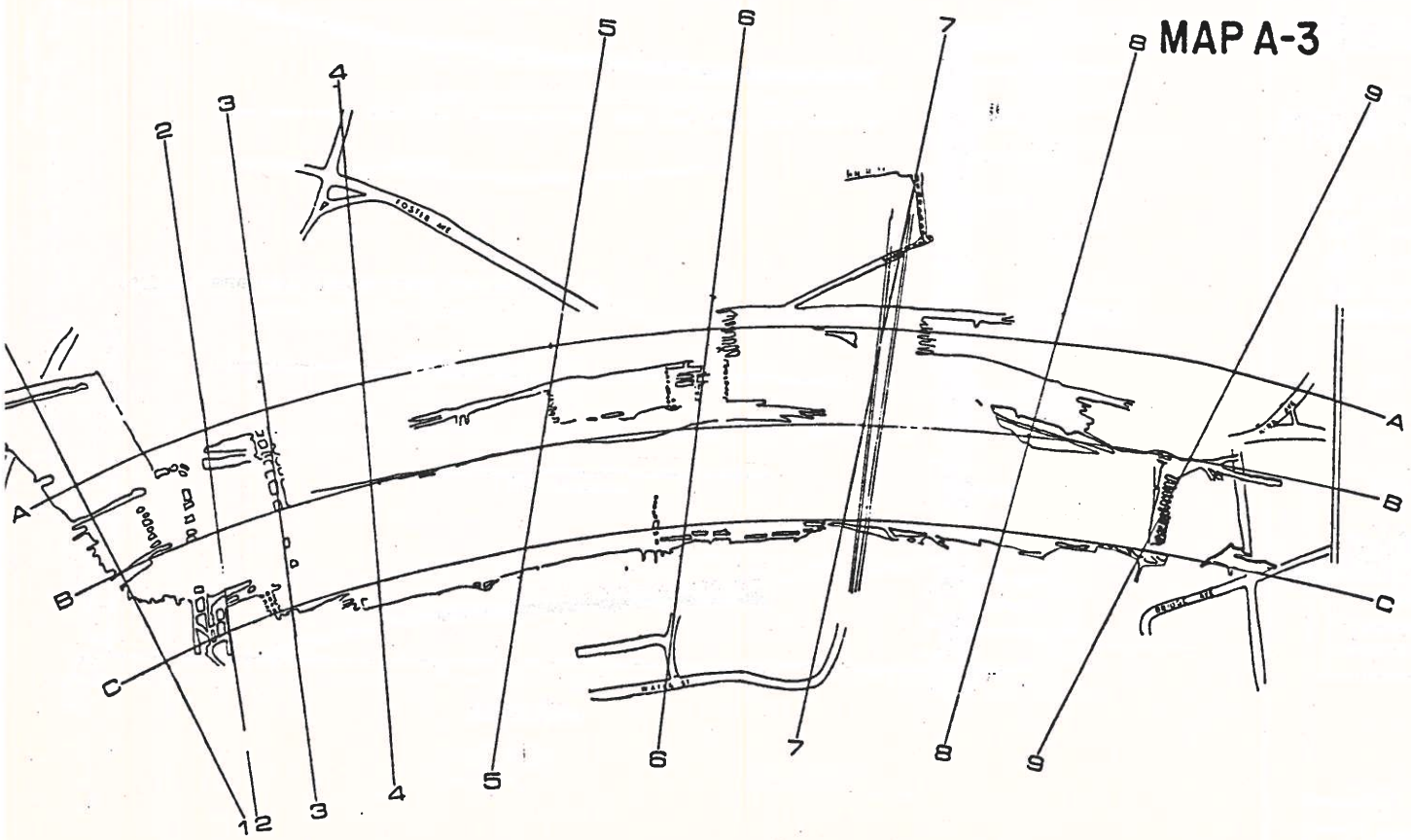
SOURCES:

SEE MAP 3

Prepared by

PICTOU COUNTY DISTRICT PLANNING COMMISSION

MAP A-3



PICTOU COUNTY
UNDERMINING & SUBSIDENCE STUDY

CAGE
ACADIA #7

OUTLINE OF WORKINGS WITHIN 500' OF SURFACE

REFERENCE MAP FOR CROSS SECTION

SECTION LINE
STATION

SOURCES: COMPOSITE MAPS OF WORKINGS

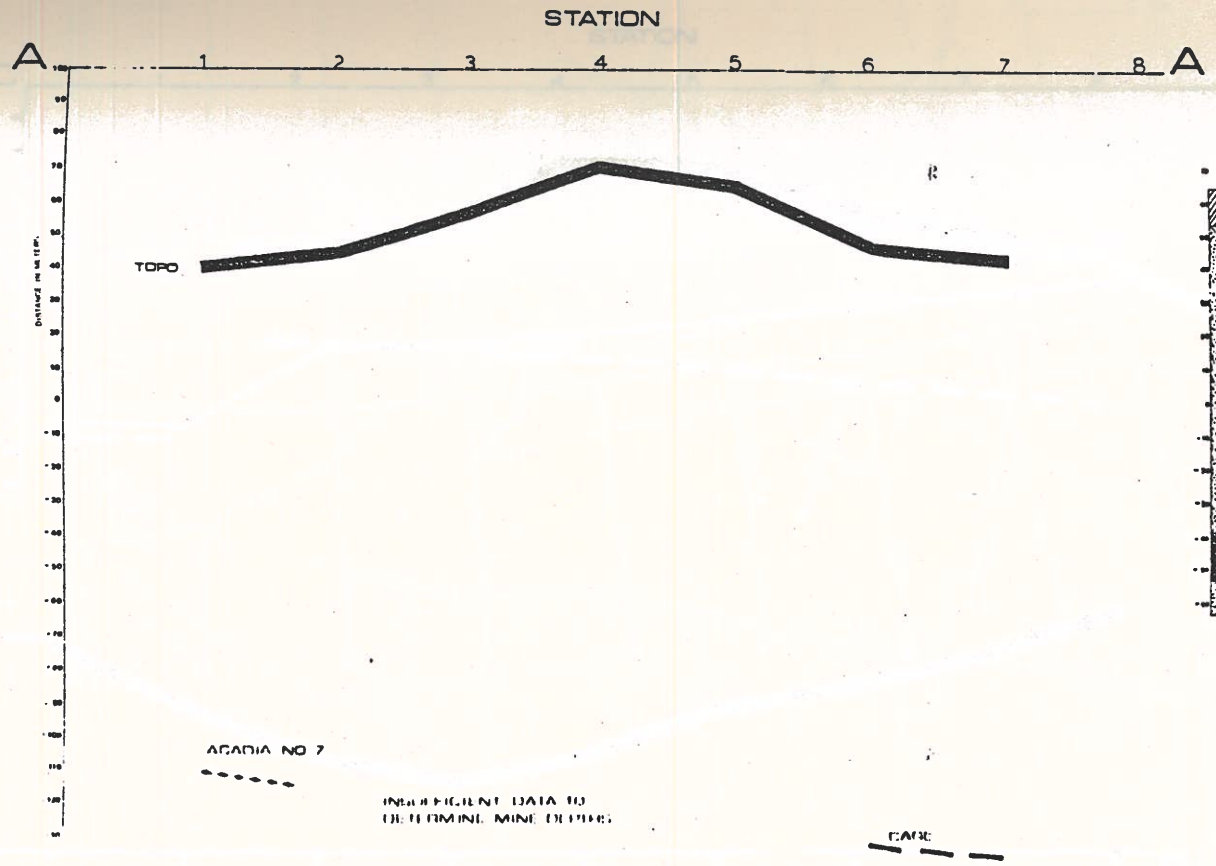
SCALE: 1/14,200

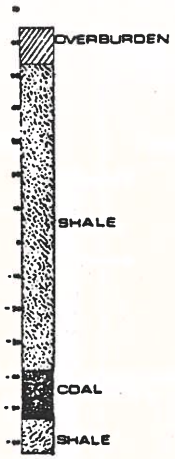
metres

PREPARED BY:

PICTOU COUNTY DISTRICT PLANNING COMMISSION

A - 10





PICTOU COUNTY
UNDERMINING & SUBSIDENCE STUDY

FIG. A-6 (SECT. A, MAPA-3)

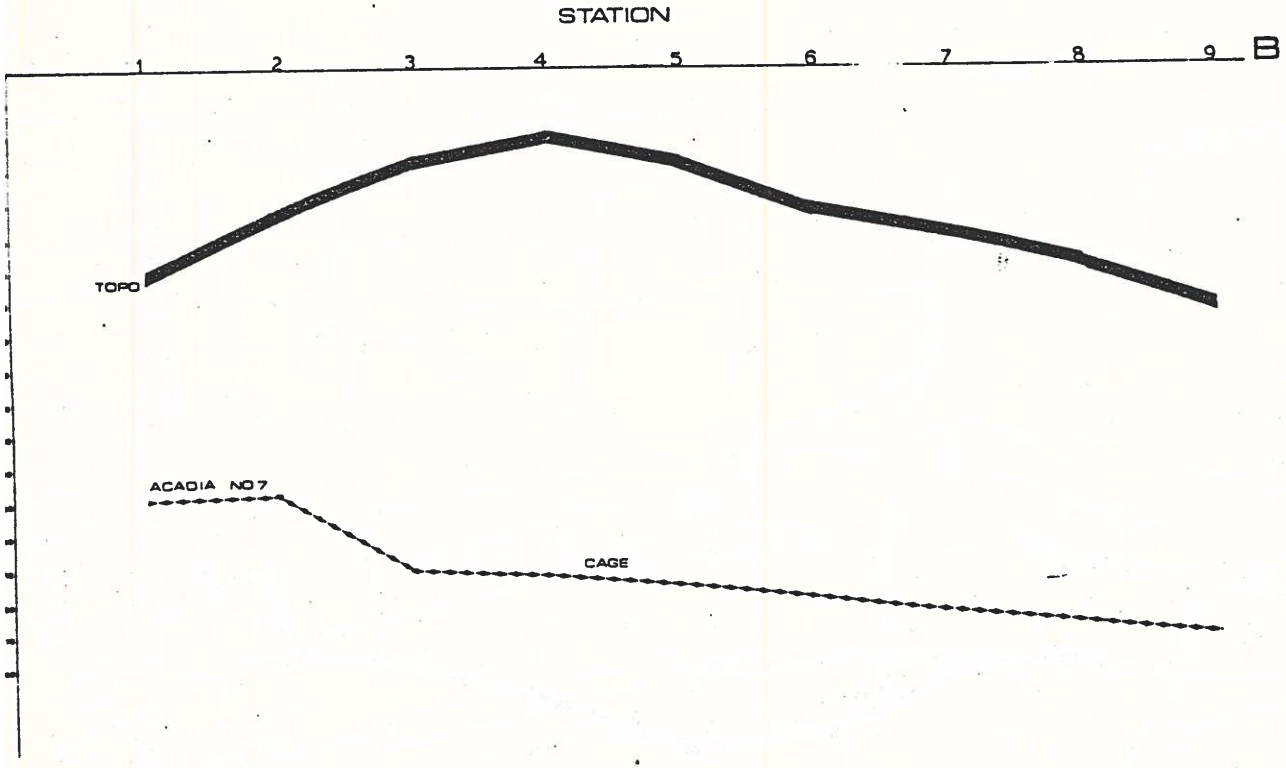
BORE HOLE DATA

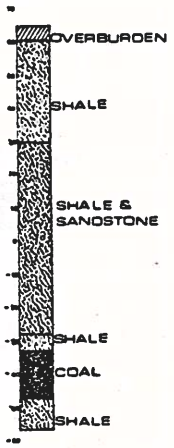
- OVERBURDEN
- SHALE
- COAL
- TOPO — SURFACE TOPOGRAPHY

SOURCES:

Prepared by:

PICTOU COUNTY DISTRICT PLANNING COMMISSION





PICTOU COUNTY
UNDERMINING & SUBSIDENCE STUDY

FIG. A-7 (SECT. B, MAP A-3)

BORE HOLE DATA

- OVERBURDEN
- SHALE
- SANDSTONE
- COAL

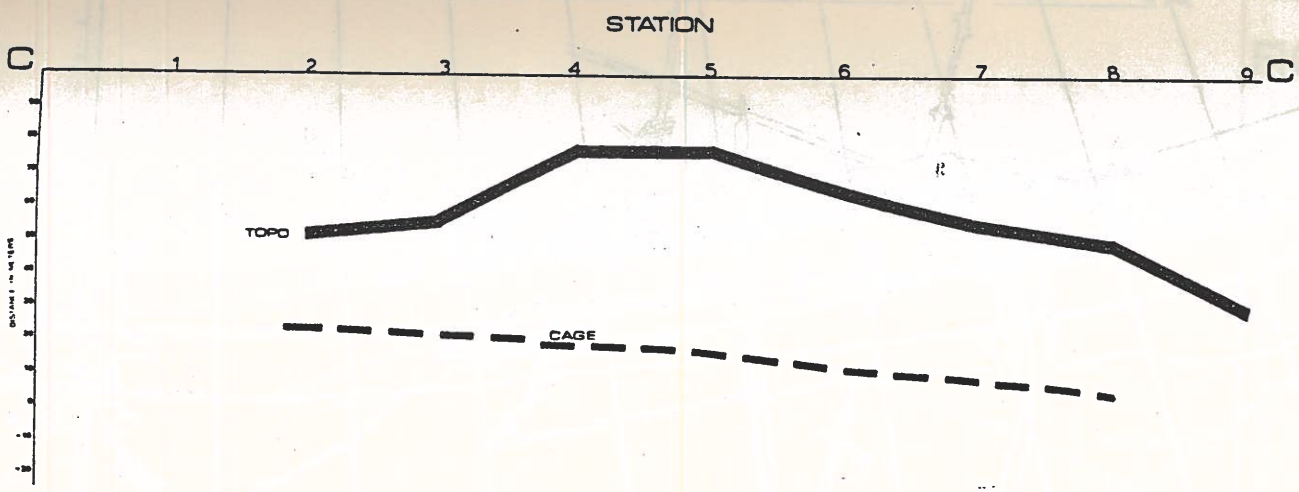
TOPO — SURFACE TOPOGRAPHY

A - 12

SOURCES: BORE HOLE RECORD 8378
CO-ORDINATE FOR BORE HOLE ARE ON FILE WITH DEPARTMENT OF MINES, STELLARTON N.S.

Prepared by:

PICTOU COUNTY DISTRICT PLANNING COMMISSION



PICTOU COUNTY
UNDERMINING&SUBSIDENCE STUDY

FIG. A-8(SECT.C,MAPA-3)

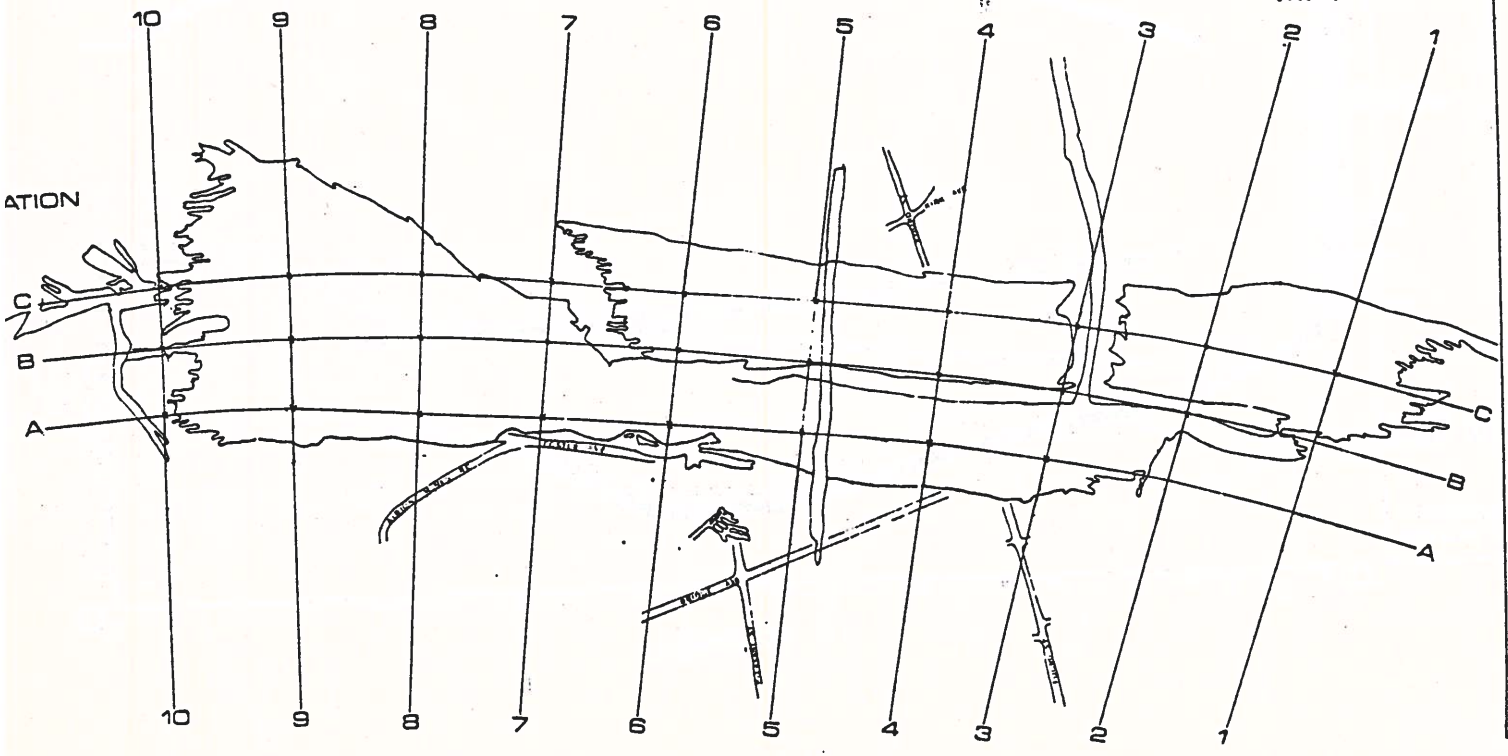
TOPO ▬ SURFACE TOPOGRAPHY

SOURCES:

Prepared by:

PICTOU
COUNTY
DISTRICT
PLANNING
COMMISSION

MAP A-4



PICTOU COUNTY
UNDERMINING & SUBSIDENCE STUDY

BURNT WORKINGS

OUTLINE OF WORKINGS WITHIN 500' OF SURFACE

REFERENCE MAP FOR CROSS SECTION

SECTION LINE
STATION

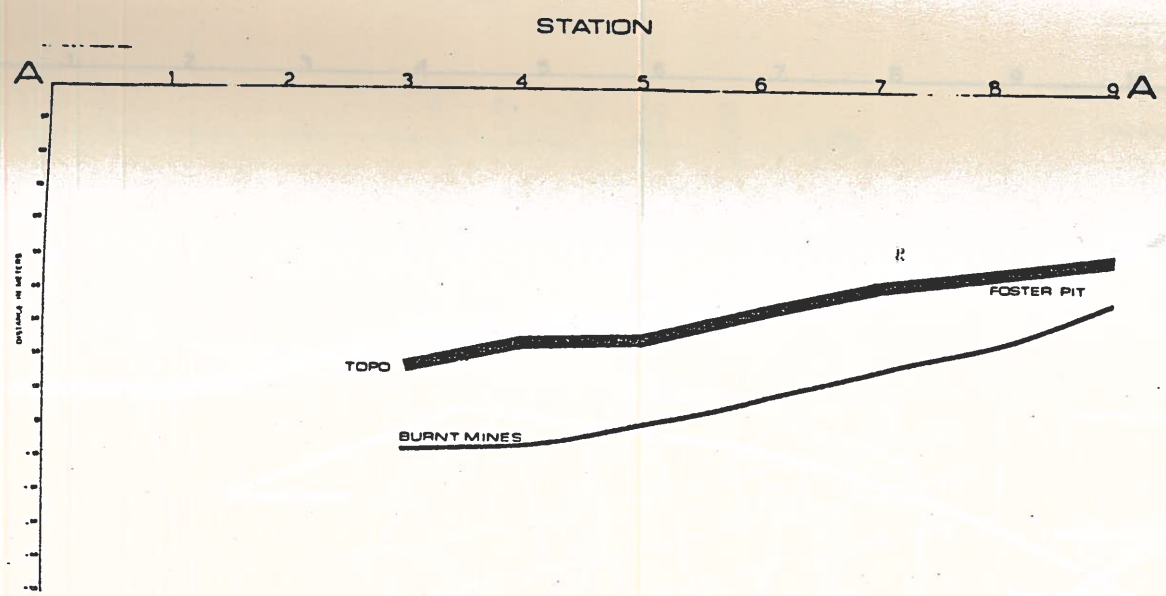
A - 14

SOURCES: COMPOSITE MAPS OF WORKINGS

SCALE: 1/14,200

PREPARED BY:

PICTOU COUNTY DISTRICT PLANNING COMMISSION



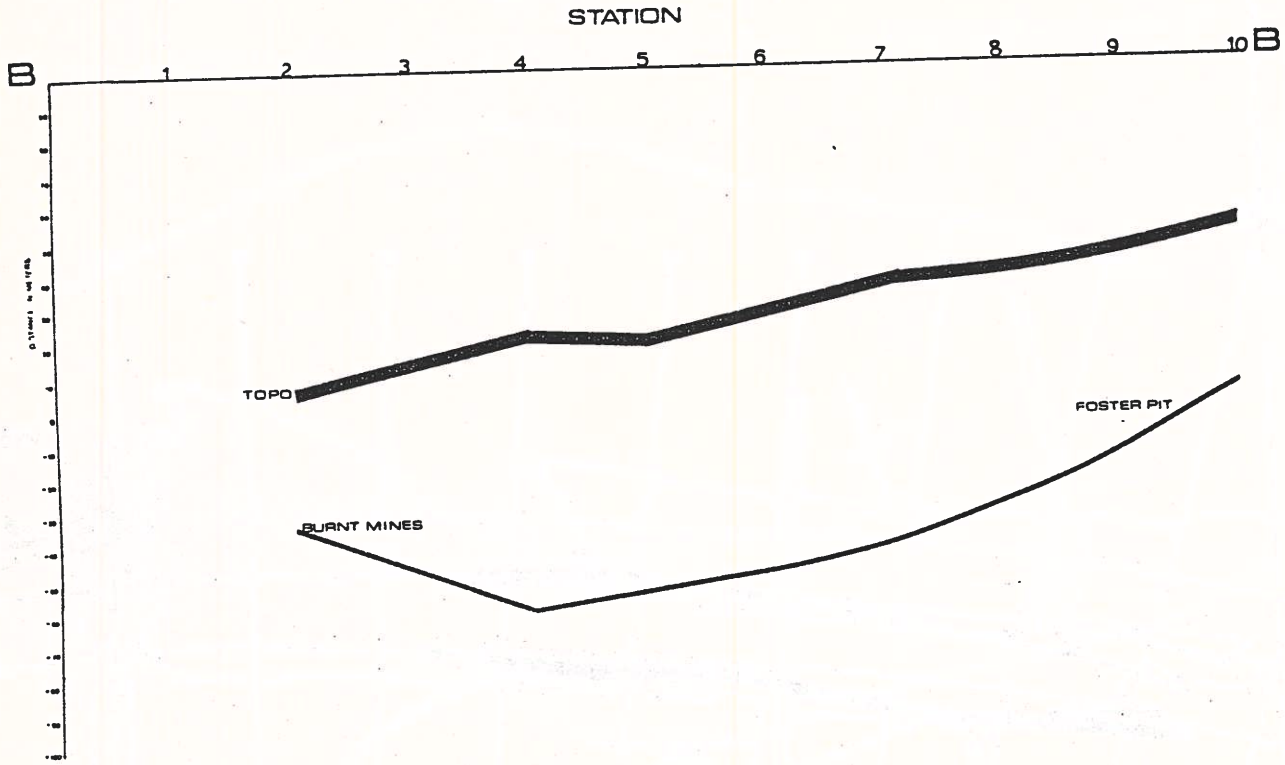
PICTOU COUNTY
UNDERMINING & SUBSIDENCE STUDY

FIG.A-9(SECT.A,MAPA-4)

TOPO SURFACE TOPOGRAPHY

SOURCES:

PICTOU COUNTY DISTRICT PLANNING COMMISSION



PICTOU COUNTY
UNDERMINING & SUBSIDENCE STUDY

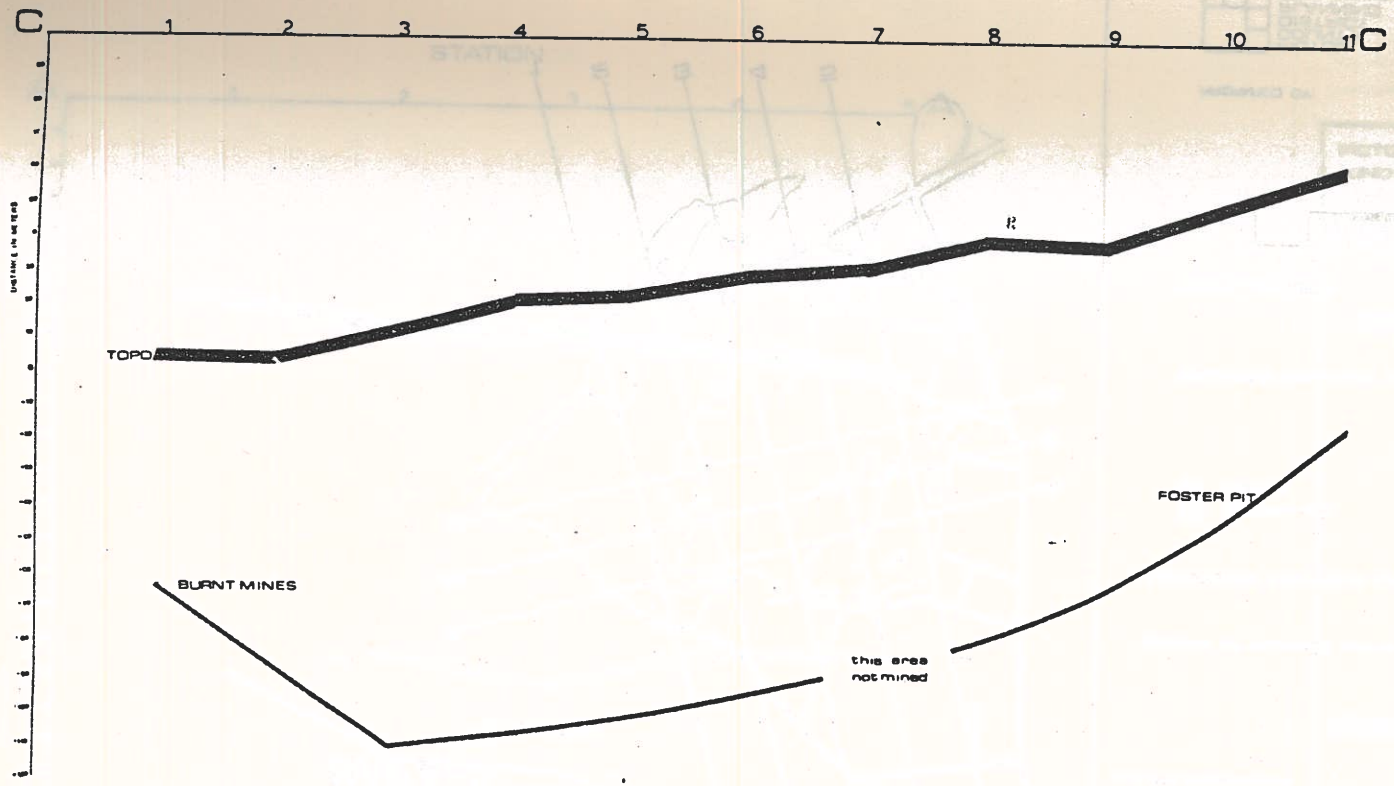
FIG.A-10(SECT.B,MAPA-4)

TOPO SURFACE TOPOGRAPHY

SOURCES: DEPT OF MINES & RESOURCES;
GEOLOGY DEPARTMENT,
ANNUAL REPORT
DEVCO ARCHIVES.
NOVA SCOTIA ARCHIVES.

Prepared by:

PICTOU COUNTY DISTRICT PLANNING COMMISSION



PICTOU COUNTY
UNDERMINING & SUBSIDENCE STUDY

FIG.A-II(SECT.C, MAPA-4)

TOPO ▬ SURFACE TOPOGRAPHY

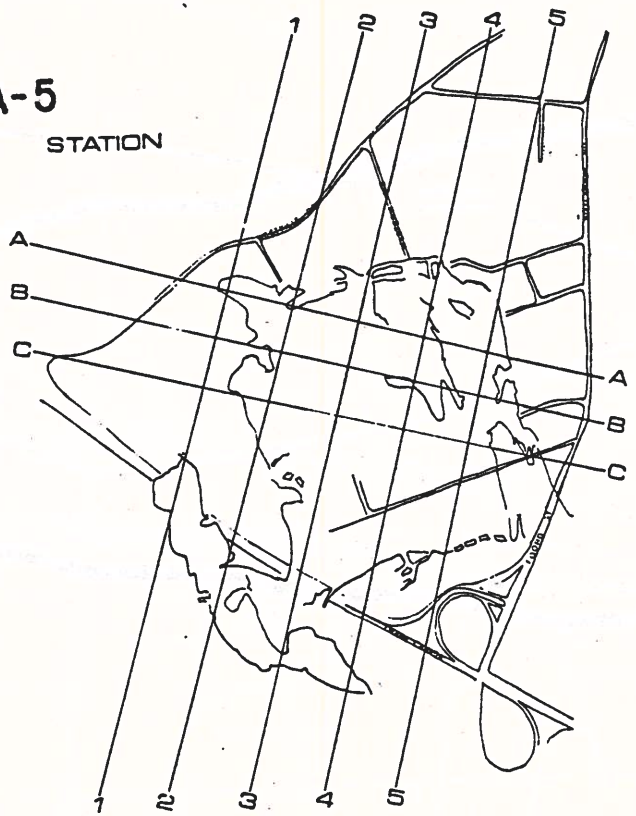
SOURCES: DEPT. OF MINES & RESOURCES
GEOLOGY DEPARTMENT
ANNUAL REPORT
DOSCO ARCHIVES
NOVA SCOTIA ARCHIVES

Prepared by:

PICTOU COUNTY DISTRICT PLANNING COMMISSION

MAP A-5

STATION



PICTOU COUNTY
UNDERMINING & SUBSIDENCE STUDY

ALLAN WORKINGS

OUTLINE OF WORKINGS WITHIN 500' OF SURFACE

REFERENCE MAP FOR CROSS SECTION

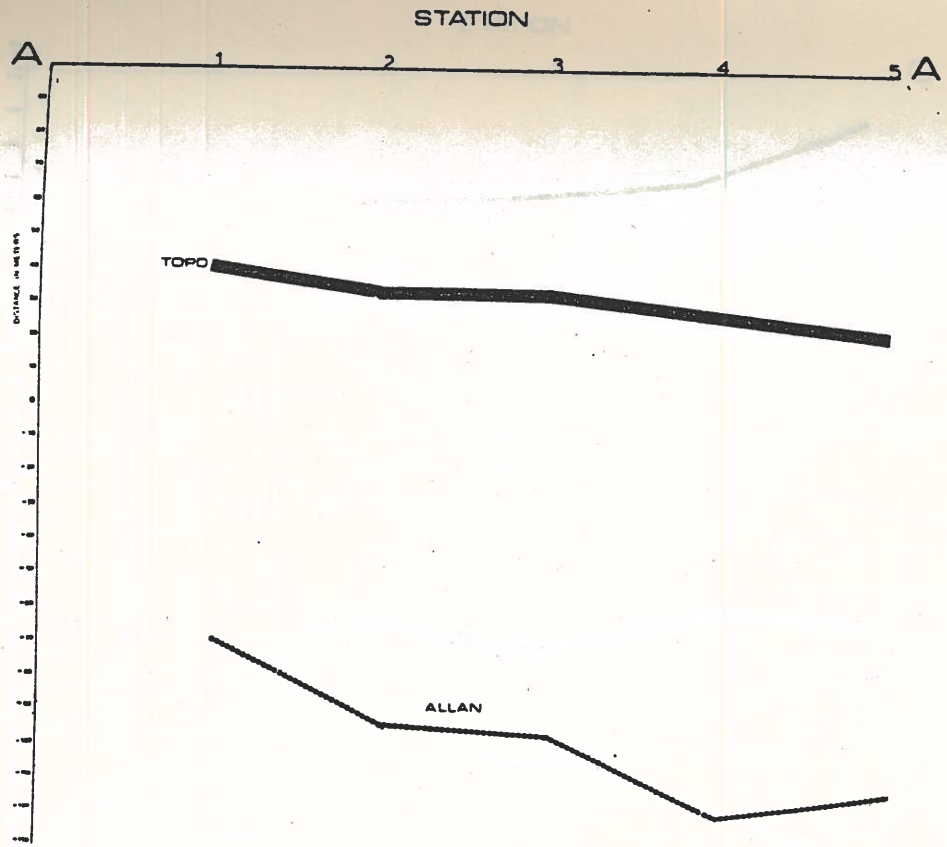
SECTION LINE
STATION

SOURCES: COMPOSITE MAPS OF WORKINGS

SCALE: 1/14,200

PREPARED BY:

PICTOU COUNTY DISTRICT PLANNING COMMISSION



PICTOU COUNTY
UNDERMINING & SUBSIDENCE STUDY

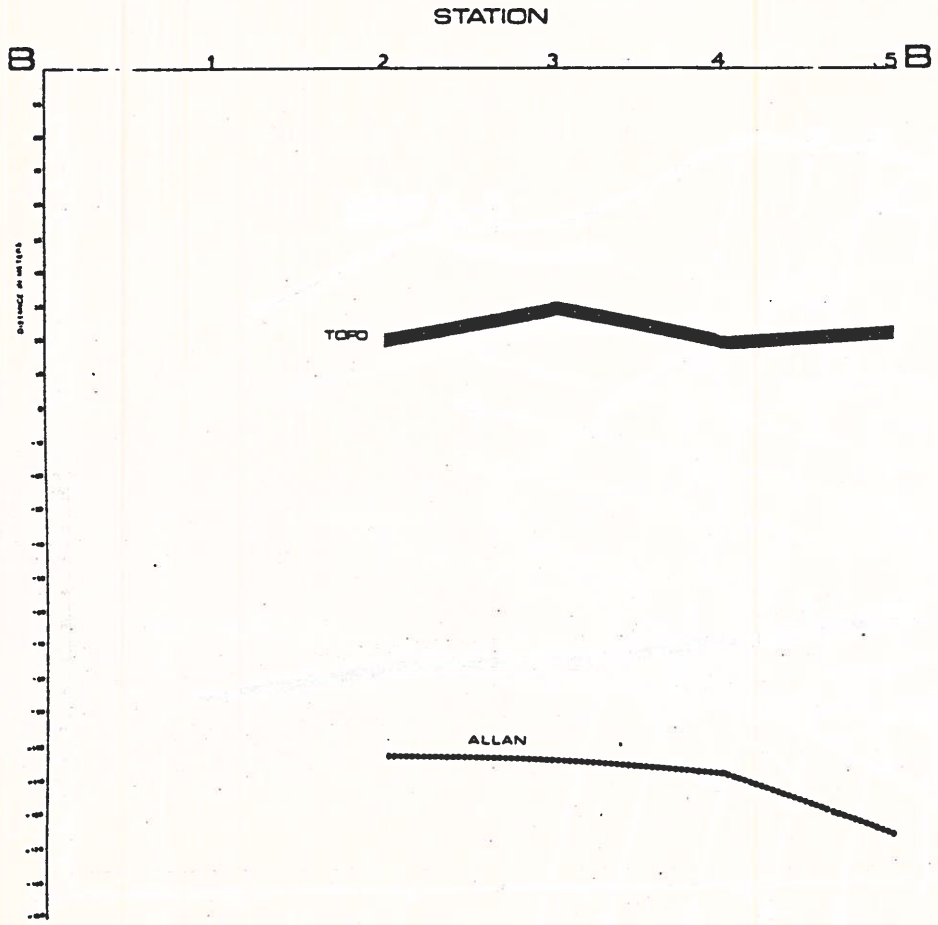
FIG. A-12 (SECT. A, MAP A-5

TOPO ▬ SURFACE TOPOGRAPHY

SOURCES: DEPT OF MINES & RESOURCES
GEOLOGY DEPARTMENT
ANNUAL REPORT
DEVCO ARCHIVES
NOVA SCOTIA ARCHIVES

Prepared by:

PICTOU COUNTY DISTRICT PLANNING COMMISSION



PICTOU COUNTY
UNDERMINING & SUBSIDENCE STUDY

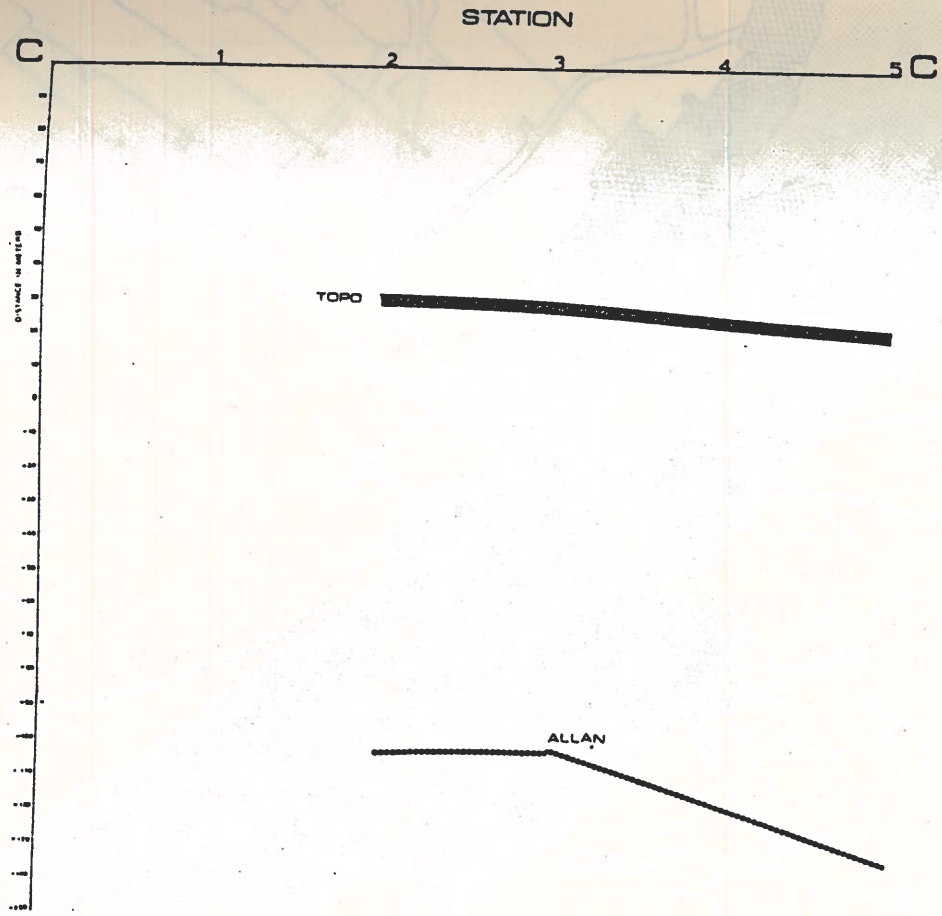
FIG. A-13(SECT. B,MAPA-5)

TOPO ■■■ SURFACE TOPOGRAPHY

SOURCES:

Prepared by:

PICTOU COUNTY DISTRICT PLANNING COMMISSION



PICTOU COUNTY
UNDERMINING & SUBSIDENCE STUDY

FIG.A-14(SECT.C,MAP A-5)

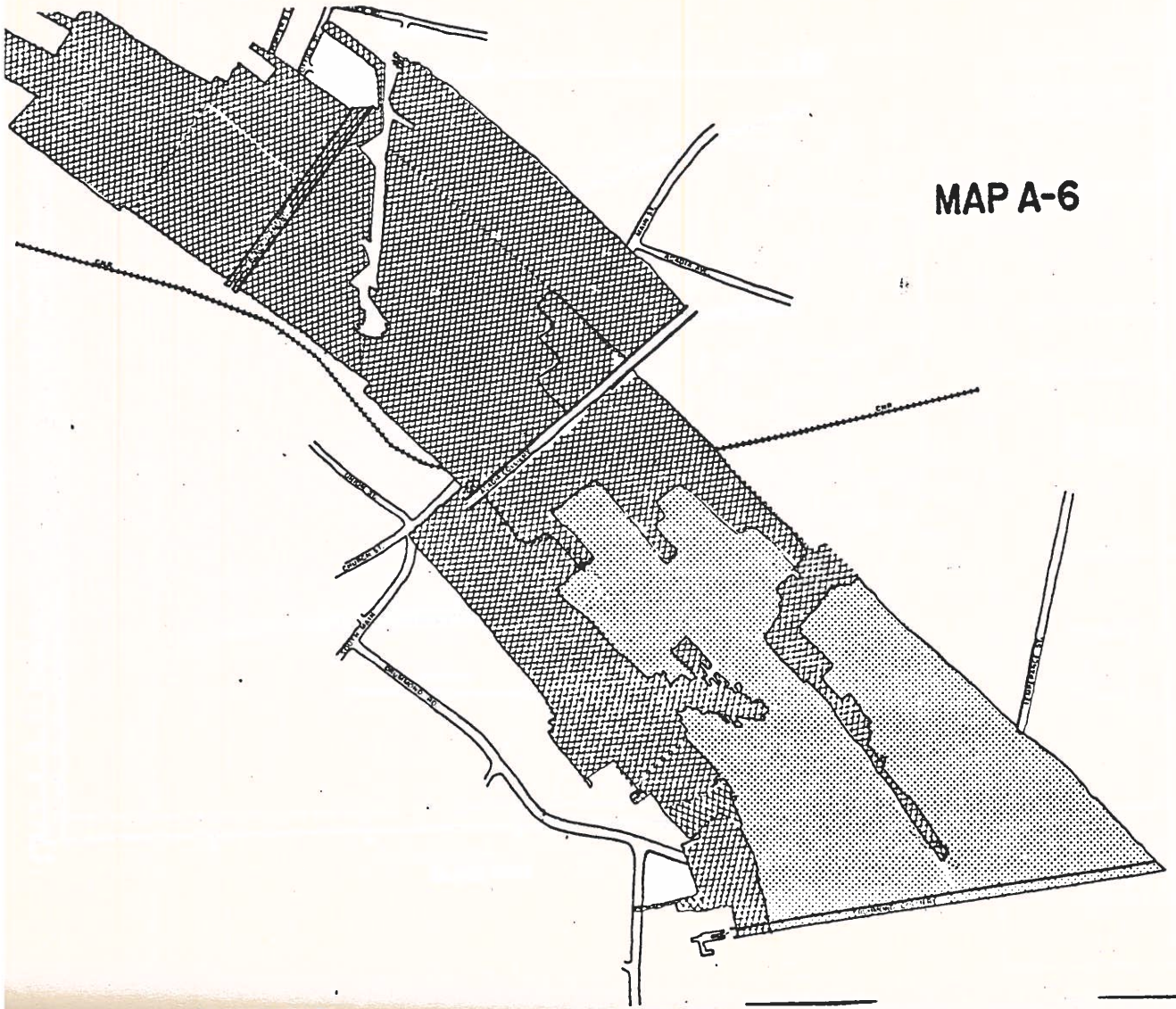
TOPO ▬ SURFACE TOPOGRAPHY

SOURCES: DEPT. OF MINES & RESOURCES GEOLOGY DEPARTMENT ANNUAL REPORT DEVCO ARCHIVES NOVA SCOTIA ARCHIVES

Prepared by:

PICTOU COUNTY DISTRICT PLANNING COMMISSION

MAP A-6



PICTOU COUNTY
UNDERMINING & SUBSIDENCE STUDY

WESTVILLE COMPOSITE MAP

LEVELS OF UNDERMINING WITHIN 500' OF SURFACE

- ONE LEVEL
- TWO LEVELS

SOURCES:
- DEPT OF MINES & RESOURCES GEOLOGY DEPARTMENT ANNUAL REPORT
- DEVCO ARCHIVES
- NOVA SCOTIA ARCHIVES

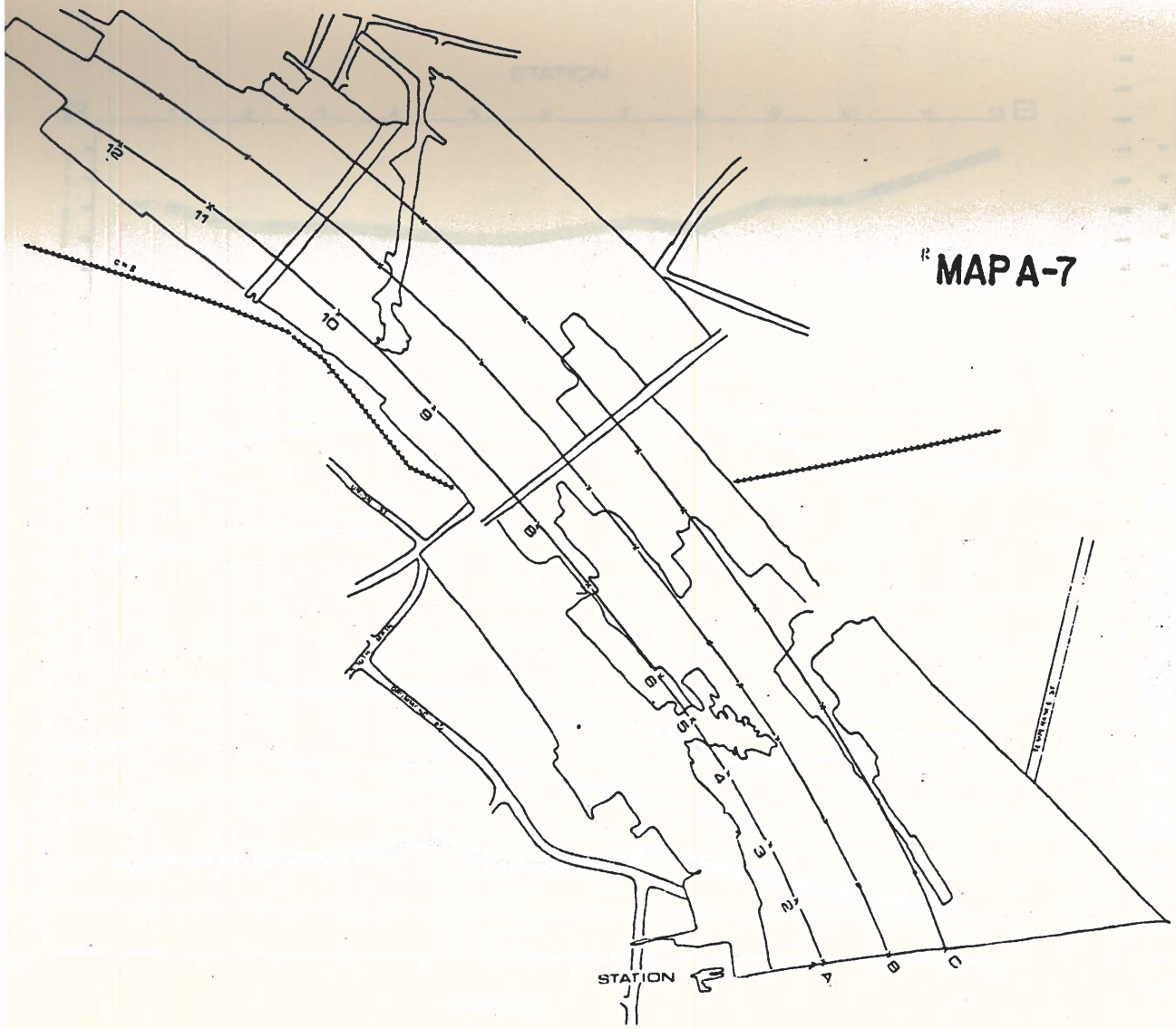
SCALE: 1/14,200

0 200 400 metres

Prepared by:

PICTOU COUNTY DISTRICT PLANNING COMMISSION

MAP A-7



PICTOU COUNTY
UNDERMINING & SUBSIDENCE STUDY

MINE WORKINGS:
DRUMMOND COLLIERY
ACADIA COLLIERY
BLACK DIAMOND

OUTLINE OF WORKINGS WITHIN 500' OF SURFACE

REFERENCE MAP FOR CROSS SECTION

SECTION LINE
STATION

SOURCES: COMPOSITE MAPS OF WORKINGS

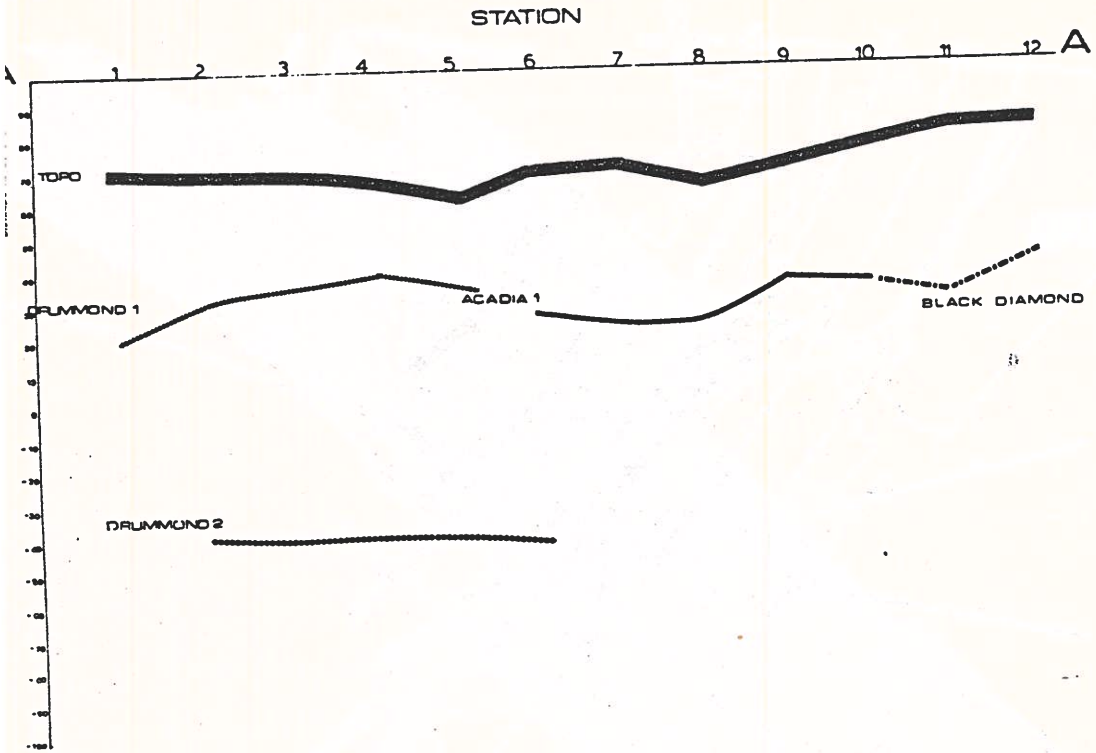
SCALE: 1/14,200

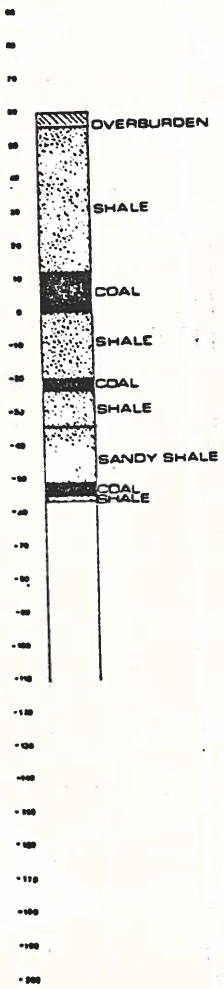
metres

PREPARED BY:

PICTOU COUNTY DISTRICT PLANNING COMMISSION

A - 23





PICTOU COUNTY
UNDERMINING & SUBSIDENCE STUDY

FIG.A-15(SECT.A, MAPA-7)

BORE HOLE DATA

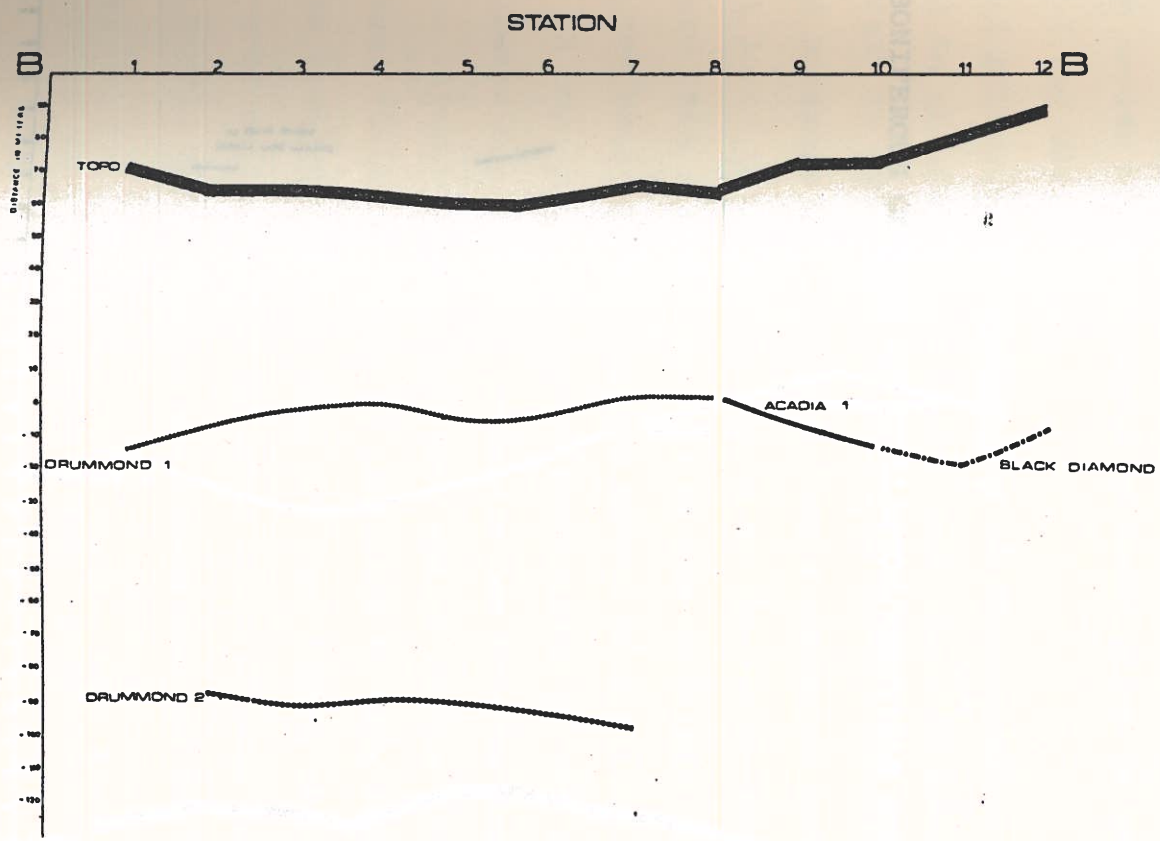
OVERBURDEN
SHALE
COAL

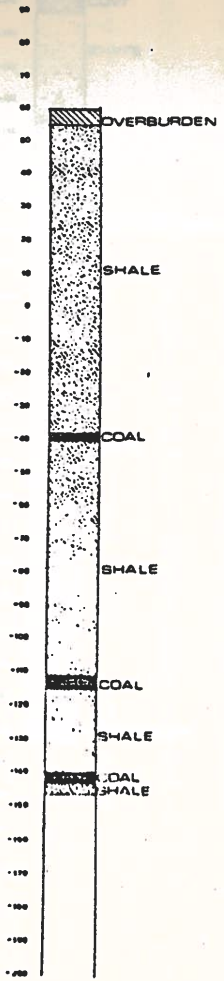
TOPO SURFACE TOPOGRAPHY

SOURCES:

Prepared by:

PICTOU COUNTY DISTRICT PLANNING COMMISSION





PICTOU COUNTY
UNDERMINING & SUBSIDENCE STUDY

FIG.A-16 (SECT. B, MAPA-7)

BORE HOLE DATA

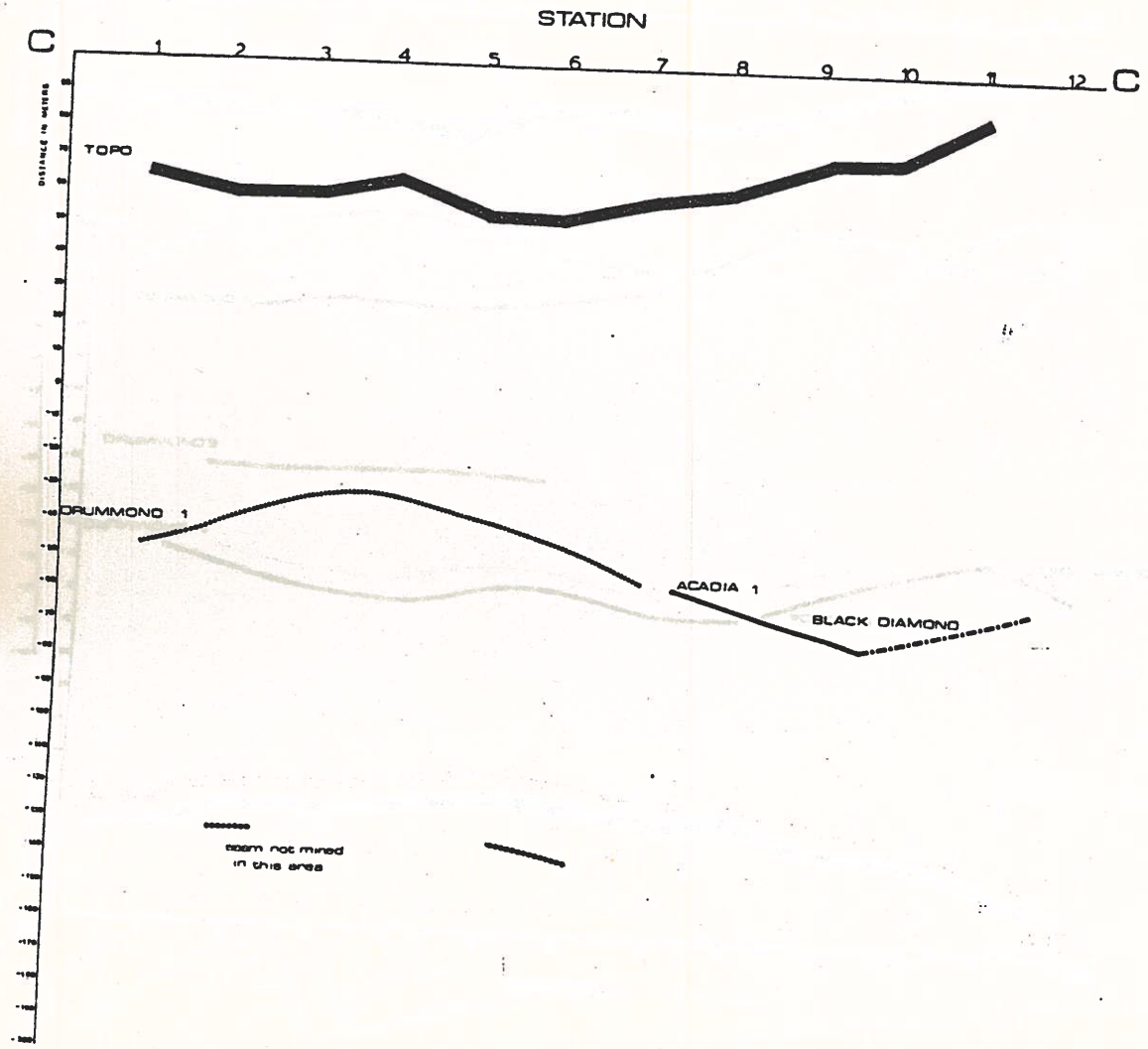
OVERBURDEN
SHALE
COAL

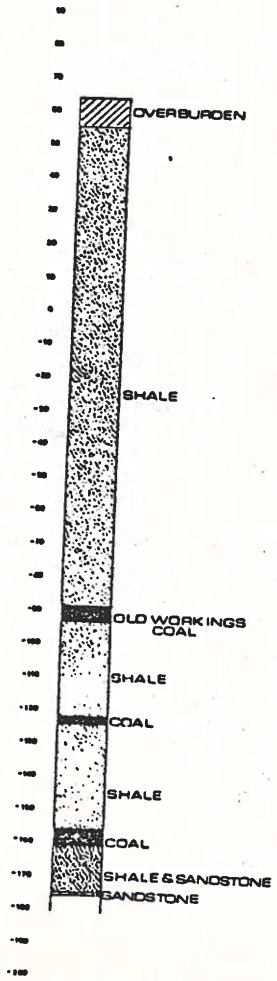
TOPO SURFACE TOPOGRAPHY

SOURCES:

Prepared by

PICTOU COUNTY DISTRICT PLANNING COMMISSION





PICTOU COUNTY
UNDERMINING & SUBSIDENCE STUDY

FIG. A-17 (SECT. C, Map A-

BORE HOLE DATA

OVERBURDEN
SHALE
COAL

TOPO SURFACE TOPOGRAPHY

SOURCES: DEPT OF MINES & RESOURCES
GEOLOGY DEPARTMENT
ANNUAL REPORT
UNIVERSITY ARCHIVES
NOVA SCOTIA ARCHIVES
BURT HOLE RECORD #363

Prepared by:

PICTOU COUNTY DISTRICT PLANNING COMMISSION

APPENDIX B

CARBONIFEROUS GEOLOGY OF STELLARTON/WESTVILLE AREA

APPENDIX B

CARBONIFEROUS GEOLOGY OF STELLARTON/WESTVILLE AREA*

Stellarton series is the name chosen to designate all the economically productive coal-measures of the Pictou coalfield. The series over lies the Cumberland series disconformably and overlaps unconformably upon the Canso series. Conglomerates are confined mainly to the eastern half of the area, and are pebble-conglomerates derived in large part at least from erosion of Ordovician and Silurian rocks that lay to the southeast. The Stellarton series for convenience of description is subdivided into Division I and Division II.

Division I presents some difficulty in stratigraphic interpretation. It is included in the Stellarton series provisionally because no discernible break in sedimentation could be found within it or between it and Division II. Evidence from a number of bore-holes indicates that lower coal-bearing strata of the Albion member of Division II were laid down in one part of the coalfield at the same time as upper red beds of the Plymouth member of Division I in another part. A bore-hole drilled for examination of the core revealed no discernible break of sedimentation between dominantly red beds of the Plymouth member and dark shales of the underlying Westville member. This bore-hole is estimated to have reached a stratigraphic horizon not more than 600 feet higher than that of the Acadia coal seam. A stratigraphic break of some magnitude is present on Middle River between the Cumberland and Stellarton series.

* Source: Bell, W. A., The Pictou Coal Fields, Nova Scotia, Geological Survey of Canada, Memoir # 225, 1940.

Division I

Strata belonging to Division I can generally be distinguished from strata of Division II due to the prominence of red beds at the base and the top of the former. No fossils for which age diagnosis can be made have yet been secured in Division I strata.

Three members have been identified within Division I. These are:

a) Skinner Brook member; mainly red, and red mottled with grey, sandstone and shale; negligible coal.

b) Westville member; grey, coal-bearing; minor amount of sandstone, and few red beds.

c) Plymouth member; mainly red, and red mottled with grey, sandstone, mudstone, and shale; not coal-bearing.

The most important of these (in terms of coal production) is the Westville member (b above). Data on this coal bearing member is present below.

Westville Member: This member is differentiated to include grey, coal-bearing strata of Division I. Its basal limit is the top of the Skinner Brook, dominantly red strata, which, not being a stratigraphic horizon, may lie from 150 feet to 650 feet stratigraphically below the Acadia coal seam. So far as known the base is stratigraphically highest in the area of the Culton pit and lowest in the area of the Drummond and Acadia Collieries, for a bore-hole put down from No. 8 level in the Scott pit of the Drummond Colliery first encountered red strata at a horizon computed to lie 635 feet below the Acadia coal. In a bore-hole put down from the bottom of the Black Diamond furnace pit, mottled red and grey sandstone were cut at 365 feet stratigraphically below the Acadia seam.

All that is known about the upper limit of the Westville member is the evidence furnished by the bore-hole drilled at Stellarton in 1938. The drill penetrated the first main body of grey shales at a vertical depth of 796 feet. This horizon, assuming approximate uniformity of direction of northerly dip for the strata cut, is computed to lie about 1,450 feet stratigraphically below the horizon of the Oil Coal seam of the Albion member of Division II. It lies at a computed vertical distance of about 1,125 feet above the Acadia coal, and on the same assumption of uniformity of dip this horizon, which is at that place the top of the Westville member, would be about 1,070 feet stratigraphically above the Acadia coal.

In the vicinity of Westville the Westville member is not exposed, but is cut by bore-holes and mining operations. Only one bore-hole penetrated red beds of the underlying Skinner Brook member. This was drilled from No. 8 level in the Scott pit and reached red strata at a horizon about 635 feet stratigraphically below the Acadia coal. From this and other bore-holes put down from Drummond, Acadia, and Black Diamond workings, the strata below the Acadia coal after corrections are made for dips is as follows:

	Feet
Acadia Coal seam	
Grey shales and sandstones	183-231
Scott coal seam	9- 18
Grey shales and sandstones	86-112
Third coal seam	7- 9
Grey shales and sandstones	101
Fourth coal seam	6to7
Grey shales and sandstones	170 maximum

Strata above the Acadia coal were cut by trial pits and bore-holes in the early days of coal exploration. Hartley (Logan and Hartley, 1869, page 80) recorded that a bore-hole 990 feet in a direction south 67 degrees west from the Drummond colliery cut 170 feet of black shale above the Acadia coal, and that pits sunk northeast of Acadia Colliery passed through black shale containing thin bands of light grey, arenaceous shale. Pits farther west cut black, arenaceous shale, containing bands of carbonaceous and argillaceous shale. He reported also that the Acadia Colliery airshaft passed through barren, black and brown, carbonaceous and argillaceous shale, in which were occasional bands of dark arenaceous shale and several thin bands of light and dark grey, laminated sandstone Poole (1895, page 286) recorded that the pumping pit, Drummond passed vertically through 326 feet of black and grey argillaceous shale, whereas sandstone beds were encountered a little more than a mile to the northwest during the sinking of the Black Diamond furnace-pit.

Division II

Division II strata are generally distinguished by the almost total lack of red beds. Fossil evidence indicates a Westphalian C age for uppermost member, a probable Westphalian B for the lowermost member.

Strata of Division II have been divided into the following three members:

a) Albion member; grey, coal-bearing, mainly dark shales; few and mostly thin sandstones.

b) Coal Brook member; grey, mainly dark shales; coal negligible; few and thin sandstones.

c) Thorburn member; grey, coal-bearing, with local pebble-congolmerates and many sandstones, intercalated with dark grey shales.

Although the members are well differentiated as lithological units in some parts of the coalfield, in others they grade and interfinger into one another, and no boundaries suitable for mapping could be established.

Albion Member: This member includes all the major coal seams of Stellarton district. Its upper limit is arbitrarily chosen as the top of the Foord coal seam because this coal is everywhere overlain by a thick group of grey sediments that are practically barren of coal. But its contact with the underlying Plymouth member cannot be expressed by an arbitrary choice of any stratigraphic horizon. For west, south, and southeast of the Albion mine, strata of the Albion facies interfinger with red beds of Plymouth facies. In the central area coal seams are most abundant, are thicker and of higher quality. In the bordering areas the coal seams are few and depauperated, and intercalated red beds reached horizons near or above that of the Third coal seam of the Albion group.

A general section of strata of the Albion member, mainly complied from bore-hole records, is as follows:

	Feet
Foord coal seam	35 to 2
Grey shale and sandstone	200 to 100
Little and Cage coal seams	40 to 0
Grey shale and sandstone; one or two local, thin coals	150 to 85
Third coal seam	14 to 0
Grey shale and sandstone (includes Purvis and local coal seams)	170 to 85
Fleming coal seam	9 to 0
Grey shale	20 to 5
MacGregor coal seam	15 to 0
Grey shale (includes local coal seams)	70 to 60
New coal seam	11 to 0
Grey shale and sandstone	127 to 85
Oil Coal seam	5 to 0
Grey shale	40 to 25
Noray coal seam	7 to 0
Grey shale and sandstone	65 to 25
Coal	21 to 0
Grey shale and sandstone	75 to 50
Coal and shale	28 to 0
Grey shale and sandstone	47+
Coal	5 to 0
Grey shale and sandstone	75+
Coal and shale	20 to 0
Grey shale and sandstone (one or two local thin coals)	125+
Coal and shale	40 to 0
Grey shale and sandstone	38+
Coal and shale	23 to 0
Grey shale and sandstone	67+

Outcrops of the Albion member occur on Coal Brook and on McCulloch Brook, but they are so few and poor that they give little information. On Coal Brook the Third coal seam is partly exposed north of the brook, 900 feet southwest of the highway bridge of the road that runs from Stellarton to the Alma road. The main coal exposed is overlain by 12 feet of rusty weathering, blackish grey shale and this by 5 feet of shaly coal that has a roof of ferruginous, grey shale, carrying ironstone bands. In the channel of the brook, 660 feet upstream from the bridge, is an outcrop of grey sandstone, carrying stigmarial rootlets, East of the bridge and also on the western side of the road for 500 feet is a burnt outcrop of the Foord coal seam, which here dips about 20 degrees in a direction south 64 degrees east.

Coal Brook Member: This member comprises grey and blackish grey strata, almost barren of coal, that lie between the coal-bearing Albion and coal seam and its summit may be conveniently placed as the base of the McBean coal seam of the Thorburn member. This arbitrary definition of boundaries excludes all coal except a seam, not over 3 feet thick, that lies about 520 feet above the Foord coal seam, and several very thin coal seams, lying not more than 260 feet below the McBean coal.

The dark shale facies predominates in an area running eastward from the Albion mine up McLellan Brook valley to a line about midway between Steep and Shale Brooks. On Coal Brook the stratigraphically lowest outcrop of shale is about 60 feet above the Foord coal seam, but records of old mine shafts, e.g., the Dalhousie pits, indicate that dark shales are present down to the Foord seam.

On McCulloch Brook, 200 to 300 feet upstream from the Pictou branch of the Canadian National Railways, hard, grey siltstones, weathering an ochre-yellow, stand vertically. They are inferred to be close to a fault that trends about north 54 degrees west. Although the bedrock is concealed farther north there are numerous old pits on some of the coal seams. A large number are on the Cage coal seam, and in a few of them the coal is partly exposed.

In recent years the Cage coal seam in this district has been mined in the Acadia No. 7 Colliery. Three bore-holes between this colliery and the Westville road cut Albion strata. The most easterly, 625 feet in a direction north 63 degrees west from the colliery, is seemingly separated from the other two by a north-westerly trending fault, whereby the coal seams west of the fault have been downthrown and offset to the south. In bore-hole No. 73, Acadia Coal Company, 1,475 feet in a direction north $65\frac{1}{2}$ degrees west from the colliery, the Foord and Cage coal seams have greatly deteriorated in quality. The strata that lie above the Foord seam have a thin band of conglomerate. In bore-hole No. 72, Acadia Coal Company, 970 feet in a direction south 58 degrees west from bore-hole 73, the Cage seam is thought to be the first one cut. At 150 feet below the Cage seam, bands of red shale were met, and several such were drilled to the bottom of the hole, which was 375 feet stratigraphically below the Cage seam. These red strata, some of them mottled with grey, show that the Albion facies in this part of the coalfield has intercalated beds of the Plymouth facies, a relation that exists also in the area immediatedy north of MacGregor Mountain.

APPENDIX C

MINES OF STELLARTON

APPENDIX C

MINES OF STELLARTON

ACADIA COAL COMPANY LIMITED
Acadia No. 1 Mine (Abandoned)

This Acadia No. 1 was situated in the Albion district. This seam underlies the MacGregor Seam, which was primarily operated through crossmeasure tunnels from the MacGregor Slope. In 1919 the slope in the Acadia No. 1 Seam was put through to the surface.

The coal, where worked, reached a maximum thickness of 10 feet, but near the surface and toward the west the thickness and quality of the coal deteriorated steadily.

This mine was closed in March 1921 due to trade depression, but was reopened in August 1922 and continued to operate until 1924 when it was again closed due to lack of demand for coal.

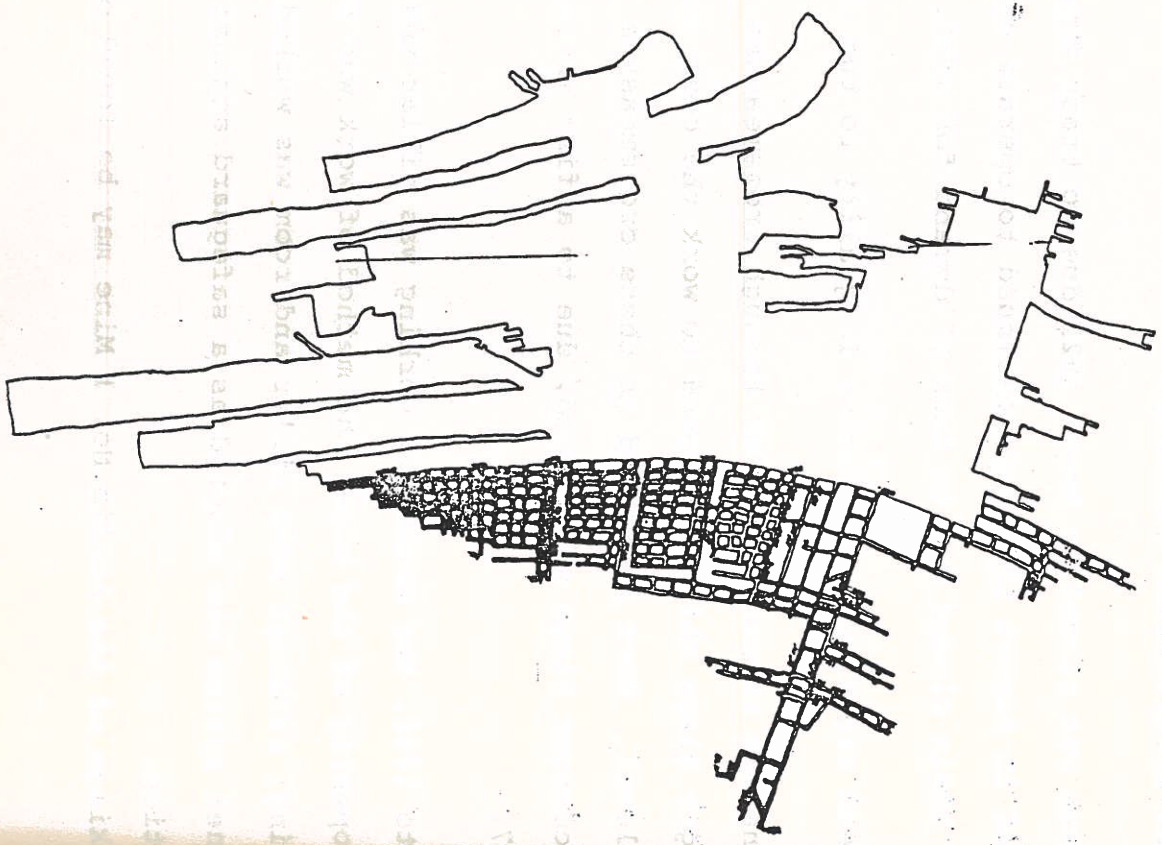
This seam was slightly inferior in quality to the overlying seams.

The mine was reopened in 1940 through crossmeasure tunnels from the MacGregor Slope which were used to work the coal to the deep of No. 4 level. Work continued in these crossmeasure tunnels until the MacGregor Slope was closed, due to a fire in Cassidy's Sinking in 1957.

Prior to 1940, the method of working was pillar and room. Following this later opening of the mine, the method of work was principally longwall advancing, although some pillar and room was worked. In each case the panel system was adopted as a safeguard against spontaneous combustion.

The workings of the Acadia No. 1 Mine may be found on Map C-1.

NOTE : Details of Workings Incomplete



PICTOU COUNTY
UNDERMINING & SUBSIDENCE STUDY

MINE WORKINGS;
ACADIA COAL COMPANY
Acadia No.1 Mine (Acadia No.1 Seam)

MAP C-1

Orientation not known

SCALE
0 100 200 400
metres

Prepared by,
PICTOU COUNTY DISTRICT PLANNING COMMISSION

MacGregor

The MacGregor was opened as part of the Albion Colliery in 1880. This mine was opened by the Acadia Coal Company. Three seams were worked from the MacGregor. They were the MacGregor, Fleming and the Acadia No. 1. The MacGregor and Fleming were taken from the one slope. The Acadia No. 1 was mined through crossmeasure tunnels near the foot of the MacGregor Slope.

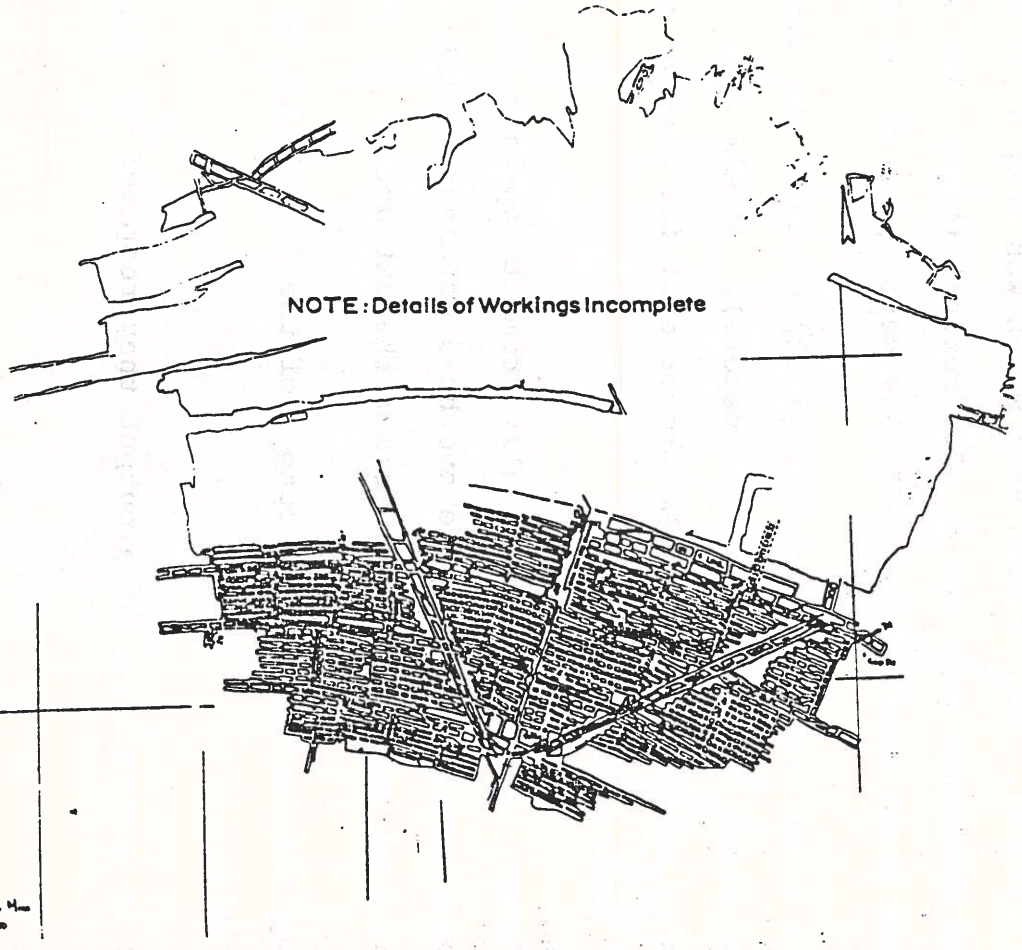
The MacGregor Seam ranged in thickness from 12' (3.6 meters) to 20' (6.1 meters). The Fleming Seam which was only 5' (1.5 meters) above the MacGregor Seam was 7' (2.1 meters) thick. The Acadia No. 1 (New Seam) ranged from 4'6" (1.4 meters) to 10' (3.0 meters).

All three seams mined have an average dip of 23°. The length of the MacGregor Slope was 4,830' (1472.2 meters). At the foot of this slope the Fleming was joined to the MacGregor coal for a total thickness of 24' (7.3 meters) of coal.

The MacGregor was worked continually from its opening until 1921, when they stopped work to permit the overhead workings in the Albion Mine to be advanced sufficiently to permit the extraction of the MacGregor.

By closing the MacGregor, the output of the Albion district dropped considerably.

In order to increase the mine output they reopened the MacGregor in 1929.



PICTOU COUNTY
UNDERMINING & SUBSIDENCE STUDY

MINE WORKINGS;
ACADIA COAL COMPANY
ALBION COLLIERY (MacGregor workings)

MAP C-2

SCALE

metres

Prepared by:

PICTOU COUNTY DISTRICT PLANNING COMMISSION

Before the reopening in 1929 the method of mining used was room and pillar.

Thereafter, the method used when conditions allowed was advancing long-wall.

This mine again carried on a steady operation until 1957 when a fire in the underlying Acadia No. 1 caused the closure of the mine. Prior to the closure practically all the workable coal had been recovered from all three seams on the MacGregor Colliery.

Map C-2 shows the workings of the MacGregor Mine.

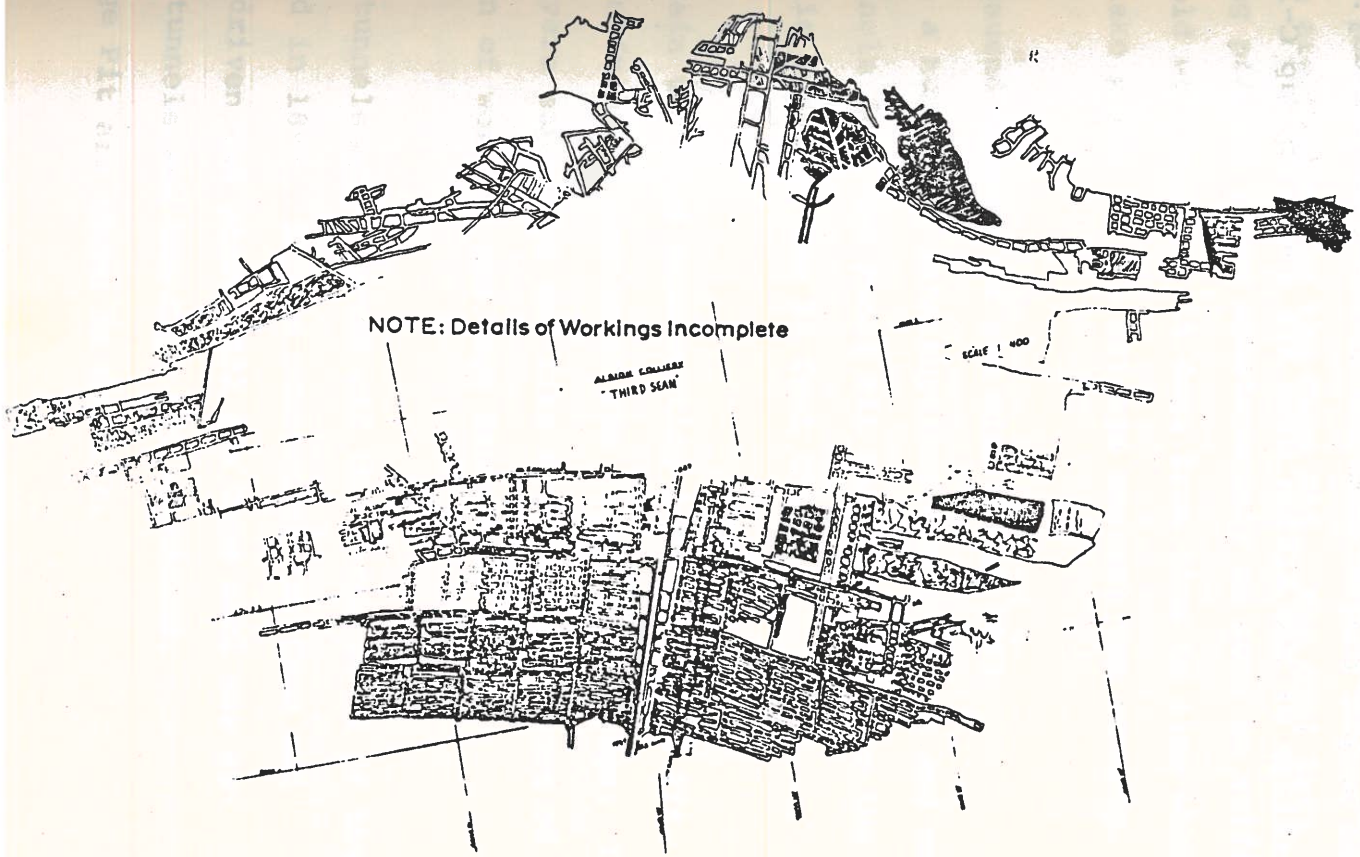
ALBION MINE

The Albion Mine was opened in the year 1880 with the intent of working the Foord, Cage and Third Seams. This mine was owned by the Acadia Coal Company. The slope was driven in the Third Seam with an average gradient of 23° and a length of 4800' (1463 meters). The other seams were won with cross tunnels. In this area, the Foord, Cage and Third Seams had thicknesses up to 35' (10.7 meters), 24' (7.3 meters) and 18' (5.5 meters) respectively. All of the seams worked were of good quality coal and when the output was mixed it made an excellent fuel.

All three seams in this area deteriorated to the westerly direction. The Foord Seam was split by numerous bands of inferior coal. The Third Seam had diminished in thickness and quality. When the workings were stopped in the Cage Seam, it had been reduced to 6' (1.8 meters) of clean but inferior coal. The strata between the Third and the Cage also diminished towards the west varying from 107' (32.6 meters) to 53' (16.1 meters).

The coal in the Albion Mine was mined on a panel system mostly by room and pillar, but in the later years the advancing longwall method was used.

This mine was very prone to spontaneous combustion, so to minimize the danger, the panel sections were protected by fire stoppings which were set up as soon as the section was completely mined. The maintenance of the stoppings added considerably to the cost of production. Due to severe ground



PICTOU COUNTY
UNDERMINING & SUBSIDENCE STUDY

MINE WORKINGS;
ALBION MINE (Third Seam)

MAP C-3

SCALE
0 400 800 1600
metres

Prepared by:
PICTOU COUNTY DISTRICT PLANNING COMMISSION

movement in both the roof and the pavements of the seams worked, the timbering had to also maintained which added even more to the production costs. In July of 1955, the Albion closed due to their deposits being exhausted. During July of that year, 553 tons were produced daily. Before this the output ranged from 800 to 900 tons per day. The workings of the Albion Mine are shown on Map C-3.

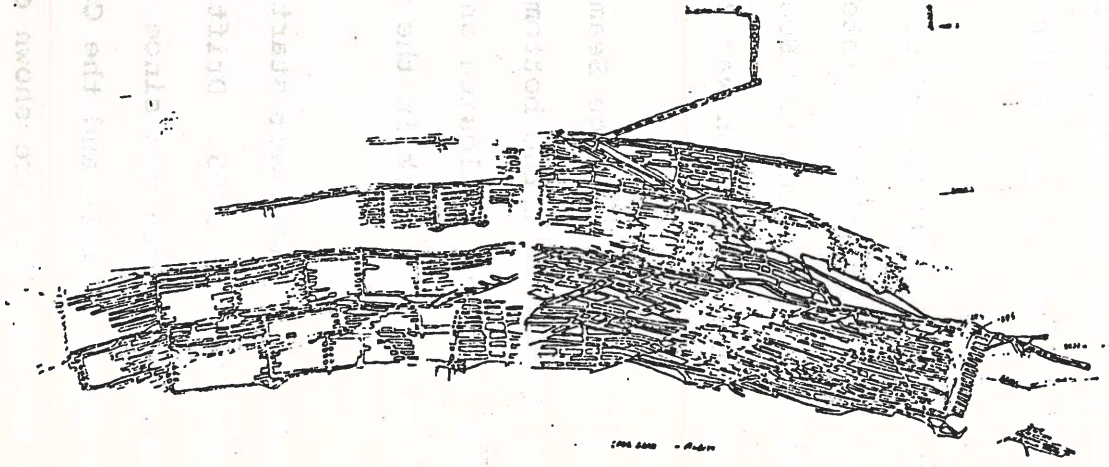
ACADIA COAL COMPANY LIMITED
Cage Pit (Abandoned)

The Cage Pit, one of the Dalhousie pits, was deepened to the Cage Seam and operation started in 1852. The workings of the mine extended along the crop of the Cage Seam to the west until the area of inferior coal was reached. Throughout the area wide rooms were driven and in some places the pillars formed by the rooms were drawn. There is no coal left in the area worked by the Cage Pit. The coal left in the form of standing pillars fires spontaneously as soon as sufficient oxygen gets into the old workings, as it does from time to time when falls to the surface take place in the drivage nearest the outcrop.

An explosion in 1858 caused closure of the mine until 1864. Thereafter, there were a number of interruptions due to fires and explosions. In 1875 tunnels from the Foord Pit were completed to the Cage Seam, which in this location was 20 feet thick.

In 1876 in order to drain the Cage Seam working into the Foord Pit, new tunnels were driven from the bottom of the Cage Pit workings. On November 12, 1880 a severe explosion and fire caused the closure of the Cage Pit and suspension of work in the Cage Seam until 1888.

In 1891 a new pair of tunnels were started off the north level of the Foord Pit and completed in 1895. Drifts connecting the Cage and Third Seams were also driven and since 1892 the Cage coal was extracted through these tunnels and the Cage Pit abandoned. The workings of the Cage Pit are shown on Map C-4.



PICTOU COUNTY
UNDERMINING & SUBSIDENCE STUDY

MINE WORKINGS;
ACADIA COAL COMPANY
CAGE WORKINGS (Cage Seam)

MAP C-4

SCALE
0 400 800 1200
metres

Prepared by:
PICTOU COUNTY DISTRICT PLANNING COMMISSION

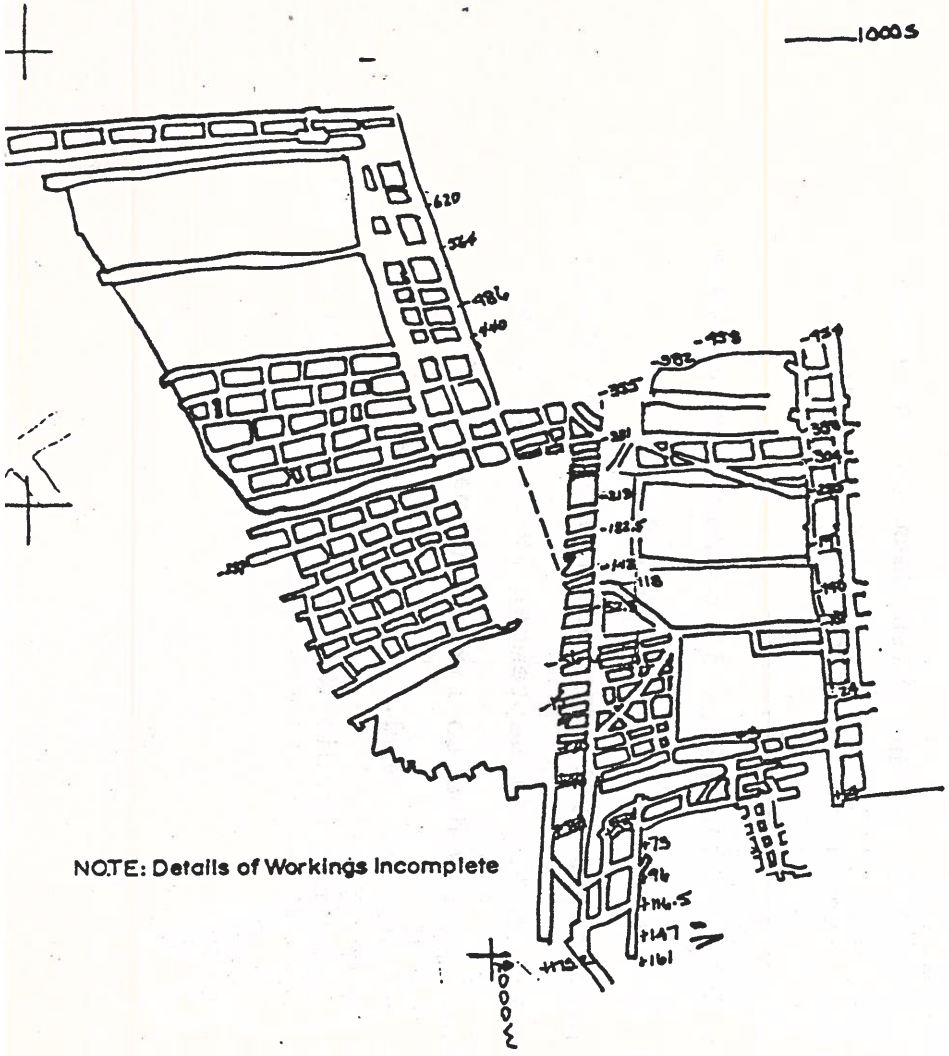
ACADIA No. 7

The Acadia No. 7 (Moss Mine) Mine was owned by the Acadia Coal Company and it broke surface for the mine in 1936. It was located in the Albion Colliery area 4000' (1219 meters) west of the Albion Slopes near the Town of Westville. The slope was opened to work the Cage and Third Seams. The slope had an average dip of 23° and ran a distance of 1900' (579 meters). The coal taken from this mine was of good quality, with the average thickness for the Cage and Third Seams being 12' (3.6 meters) to 20' (6.1 meters) and 8' (2.4 meters) to 18' (5.5 meters) respectively.

The upper parts of this mine were worked on a room and pillar system. In 1937 a section of longwall was developed and worked in the Third Seam on the east side of the mine. From this point on most work done in the mine was advancing longwall.

During the life of the mine, it produced an average of 400 tons of coal a day, with a peak year in 1941 in which they produced 97,937 tons and a lifetime production of 625,909 tons of coal. In September 1947, the mine ceased operations partly due to fires and partly due to the deposit coming to an end.

The workings of the Acadia No. 7 Mine are shown on Map C-5.



NOTE: Details of Workings Incomplete

PICTOU COUNTY
UNDERMINING & SUBSIDENCE STUDY

MINE WORKINGS;
ACADIA COAL COMPANY
ACADIA No. 7 WORKINGS (Cage & Third Seams)

MAP C-5

Orientation not known

SCALE
0 100 200 400
metres

Prepared by;

PICTOU COUNTY DISTRICT PLANNING COMMISSION

ACADIA COAL COMPANY, LIMITED
ALLAN MINE

The Allan Mine was operated by means of shafts. The shafts for this colliery were sunk at Lourdes, in 1904, on the outskirts of the town of Stellarton in Pictou County.

No. 1 Shaft was 1240 feet deep to the Foord Seam, with intermediate landings at 476 feet and 962 feet respectively, from which cross measure tunnels intersect the seam. No. 2 Shaft, 22 feet x 10 feet was 1008 feet deep and had one intermediate landing. This shaft was the upcast shaft for the mine.

When the colliery closed in 1951 only the Foord Seam was being worked, although in past years the Cage and Third Seams have also been worked in this colliery but these workings were discontinued through the deterioration in the quality of these two seams. During its life this mine produced 5,493,831 long tons of coal.

The Foord Seam contained approximately forty feet of clean coal without any dirt partings. The coal was bituminous and firm in texture. It was an excellent house and steam coal, and of good coking quality.

The roof of the seam consisted of a weak shale which when exposed required heavy timbering.

The inclination of the seam varied from 0° to 75° and the measures were heavily faulted and badly contorted.

The seam was gassy and liable to spontaneous combustion, and the method of work adopted was mainly pillar and room, developed on a panel system, with provisions for closing off each panel if the necessity arose. In 1931 advancing longwall was developed to a limited extent and several longwalls were worked off No. 15 south levels in the Foord sinking between 1932 and 1939. One longwall on the west side off 350 balance was still in operation when the colliery closed in 1951 due to fires on the 350 balance and No. 15 south level off the Foord sinking.

The lowest workings in the mine had in 1938 reached a depth of 1811 feet, or a total depth from the surface of 1851 feet.

Since the mine's opening in 1904 and up to the date of closure in 1951, this colliery had an unenviable reputation for spontaneous fires and explosions, some resulting in loss of life. The most disastrous occurred at 5:45 p.m. on January 23rd, 1918 and caused the loss of eighty-eight lives. Available records do not indicate the cause of this explosion, although our records show that in all eight explosions occurred in this colliery as well as a large number of fires due to spontaneous heating.

The year and the severity of the disaster relative to loss of life are indicated on the next page.

Explosions - Allan Mine

1914	Dec. 20	Two lives lost
1918	Jan. 31	Eighty-eight lives lost
1924	June 30	Two lives lost
1929	Feb. 10	Explosion occured Sunday Extensive damage but no loss of life
1932	Sept. 5	No loss of life
1935	Apr. 16	Seven lives lost
1942	Apr. 30	No lives lost
1950	Apr. 28	No loss of life

The Allan Shaft workings are shown on Map C-6.

PICTOU COUNTY
UNDERMINING & SUBSIDENCE STUDY

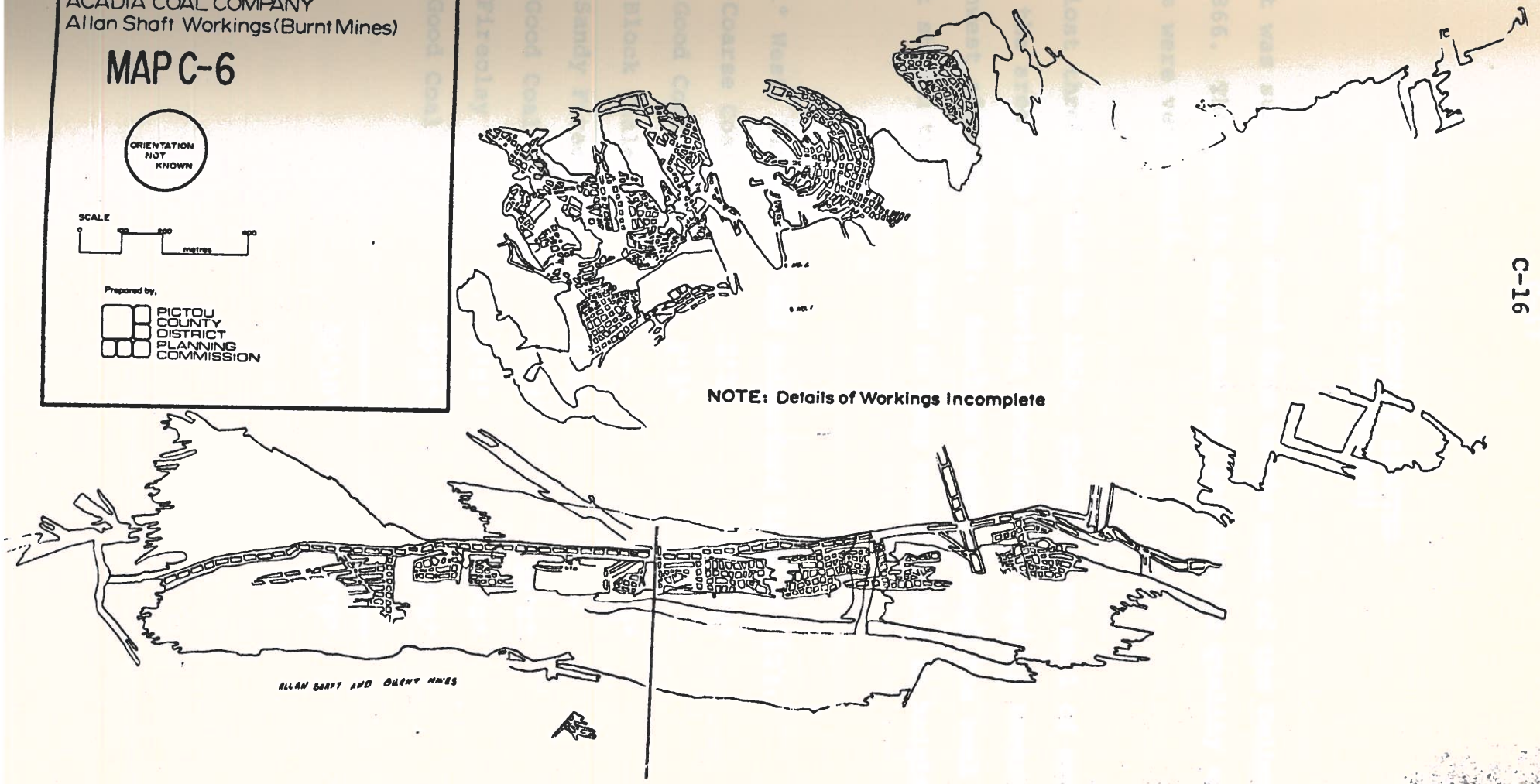
MINE WORKINGS;
ACADIA COAL COMPANY
Allan Shaft Workings (Burnt Mines)

MAP C-6

ORIENTATION NOT KNOWN

SCALE
0 100 200 400
metres

Prepared by,
PICTOU COUNTY DISTRICT PLANNING COMMISSION



NOTE: Details of Workings Incomplete

ACADIA COAL COMPANY LIMITED
Foster Pit (Abandoned)

The Foster Pit was sunk in the Foord Seam to the west of the Dalhousie workings in 1866. The coal in this area was inferior in quality and the operations were very small.

The mine was lost through a fire in 1869. There was no coal of economic value left in the area, the coal having deteriorated rapidly toward the West and Northwest of this field. Sections taken through the coal in the Foster Pit showed the Foord Seam to vary considerably in height as shown.

Borehole at 61° West, 11° South, and Rutherford 1870, P. 123:

Coarse Coal	2'3"	4'0"
Good Coal	2'3"	-
Block Shale	-	1'0"
Sandy Fireclay	1'1"	-
Good Coal	8'9"	10'0"
Fireclay	2'9"	3'0"
Good Coal	19'9"	23'0"
	36'10"	41'0"

APPENDIX D

MINES OF WESTVILLE

APPENDIX D

MINES OF WESTVILLE

Drummond # 1

The Drummond No. 1 coal mine was opened in 1867 with the driving of two slopes 28 (8.5 meters) feet apart. The Drummond No. 1 was owned by the Intercolonial Coal Company and lies 3,450 feet in the direction south 33° east from the Acadia Slope in Westville. The Drummond worked the Acadia Seam which had an average thickness of twelve to seventeen feet and was worked at an average dip of 16°.

They carried on both room and pillar operations and longwall operations. The longwall operations were mainly done in the lower levels. In the later years of the mines operation, the work mainly consisted of a retreating process of robbing the pillars.

The greatest deterioration of the coal seam was found in the most southerly workings near the No. 4 slope. The coal in general was of excellent quality with 1.2% sulfur and 12.6% ash.

The peak year in terms production for this mine came in 1940 when they took out 85,254 tons of coal.

By the time the mine came to a close in the early 1960's, they reached 8,600 feet (2,621 meters) along the main slope and about 2,700 feet (822 meters) vertically down.

The workings of Drummond #1 may be found on Map D-1.

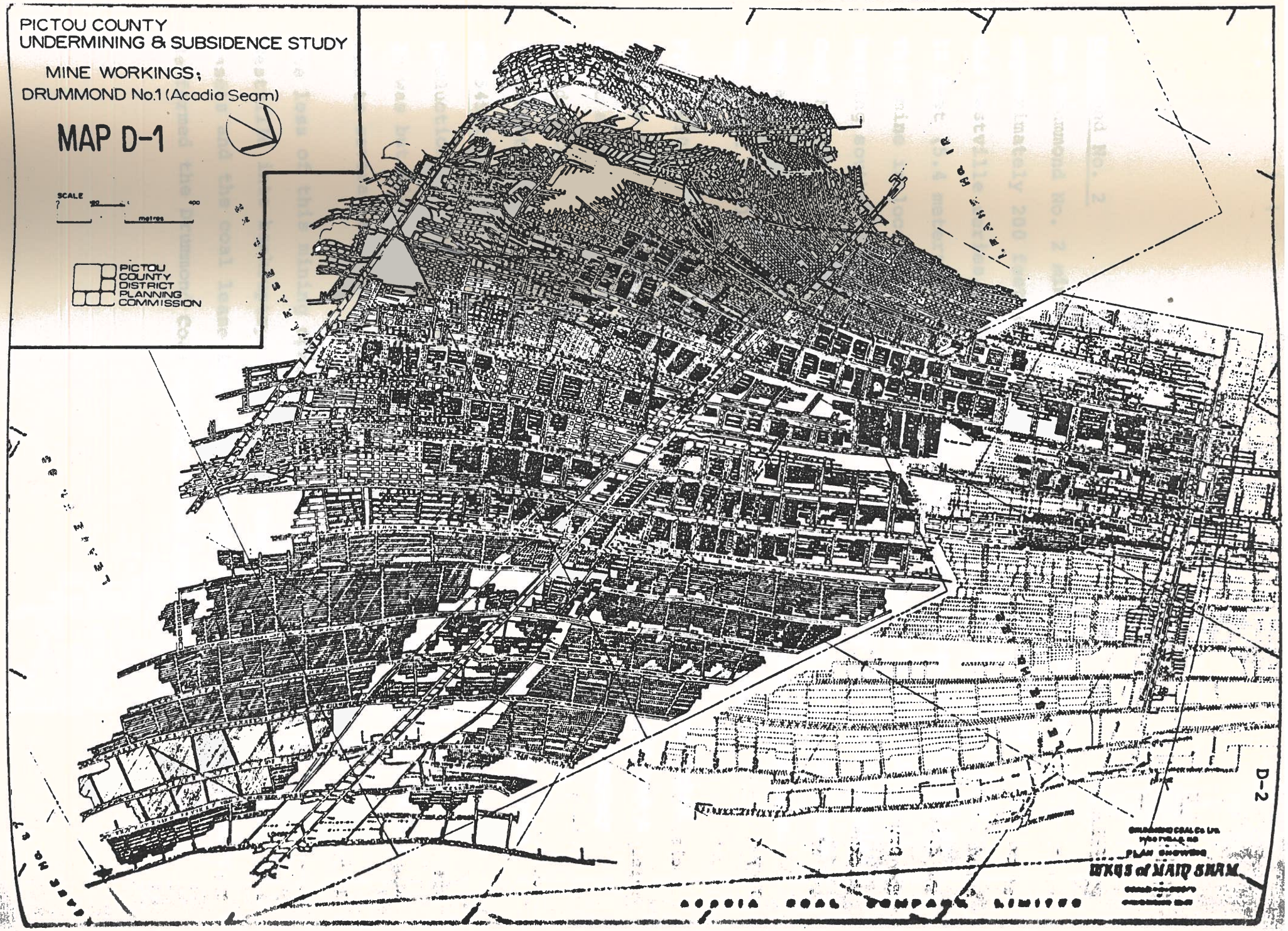
PICTOU COUNTY
UNDERMINING & SUBSIDENCE STUDY

MINE WORKINGS;
DRUMMOND No.1 (Acadia Seam)

MAP D-1

SCALE
0 200 400
metres

PICTOU
COUNTY
DISTRICT
PLANNING
COMMISSION



Drummond No. 2

The Drummond No. 2 mined the Scott Seam, which is the seam approximately 200 feet (60 meters) below the Acadia Seam in the Westville series. The Scott Seam was 12 feet (3.6 meters) to 18 feet (5.4 meters) thick and the Drummond slope ran at a dip of 21°. This mine is located in Westville and the slope has a magnetic bearing south 77° 21° east. This mine was owned by the Intercolonial Coal Mining Company who worked it for 63 years. The Scott coal seam was a good quality coal but not as good as that of the Acadia Seam. The Scott has 1.5% sulfur content and a 20.9% ash content.

From 1890 until 1927 all coal taken from the Scott Seam was taken out the use of a pit, known as the Scott pit. The Scott pit was a shaft approximately 200 feet (60.9 meters). In 1927, the company decided to cut a slope. The dip of the slope was at 36.6° and 1350 feet (411 meters) long. This slope struck the Scott coal seam at 545 feet (166 meters) below surface. Their peak year for production came in 1947 when they produce 124,547 tons of coal. It was but six years later that the Intercolonial Company pulled out due to several reasons.

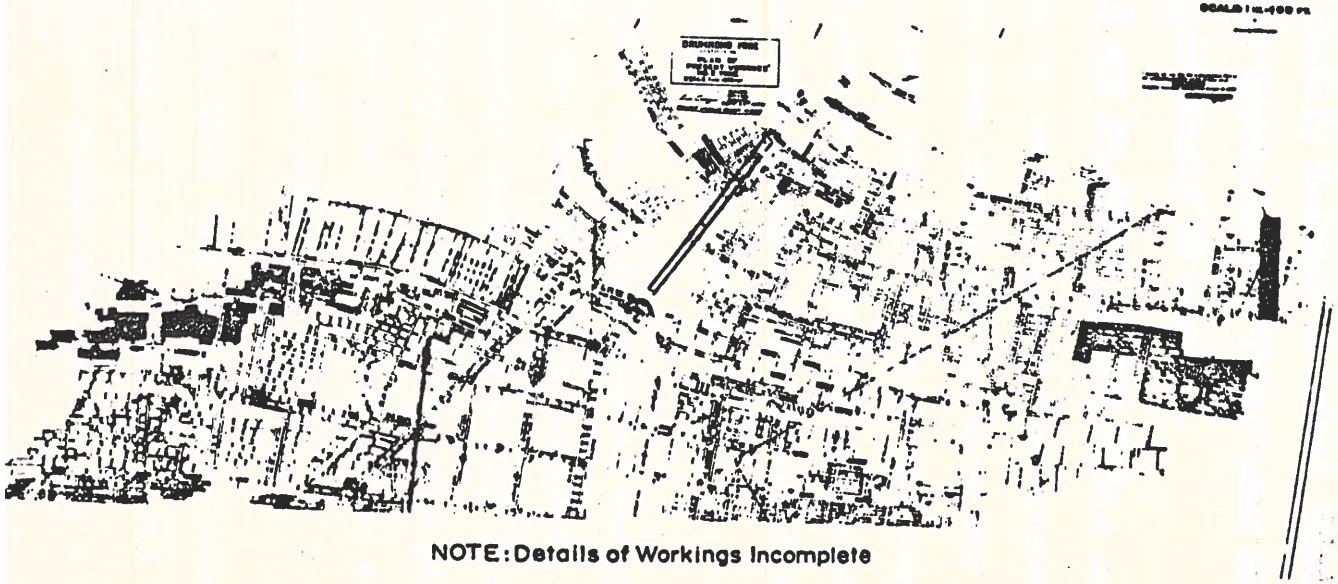
The loss of this mining operation would have put the town of Westville into bankruptcy. Then Henry Thompson took over the fixed assets and the coal lease from the Intercolonial Coal Mining Company. He formed the Drummond Coal Company which continued to mine coal.

DRUMMOND COAL Co. Ltd.
WESTVILLE N.S.

PLAN SHOWING

WORKS of No 2 MINE

SCALE 1 in. = 400 ft.



NOTE: Details of Workings Incomplete

PICTOU COUNTY
UNDERMINING & SUBSIDENCE STUDY

MINE WORKINGS;
DRUMMOND No. 2 (Scott Seam)

MAP D-2

SCALE

Prepared by:

PICTOU COUNTY DISTRICT PLANNING COMMISSION

D-4

One of the reasons the Intercolonial Company dropped out of coal mining was due to the change in public consumption from the use of coal to the use of oil. To cope with this shift in demand, the Drummond Company cut its work force from 380 men to 100 men.

The company is still in operation as of today and are removing some pillars from old workings and in addition they are mining a virgin area in the southerly part of the workings. This area was previously thought to be too severly faulted to mine. Their production has now gone down to approximately 15000 tons and the work force is down to approximately 40 workers.

The workings of Drummond No. 2 may be found on Map D-2.

Acadia No. 5

The Acadia Colliery was opened in 1866 across from the post-office in Westville. The slope had a magnetic bearing N 72° 45° east. They were mining the Acadia Seam which has an average thickness of 12 (3.6 meters) feet, 17 (5.1 meters) feet and the slope ran at a dip of 26°. This seam consisted of excellent coal with a sulphur content of 1.2% and a ash content of 12.6%. Although it was an excellent coal it had a 7" dirt parting 9 feet from the pavement. Due to the little moisture in the mine it was very dusty and had to be sprinkled twice a week.

The Acadia Coal Company owned the Acadia mine until 1914 when the company abandoned it in a move to centralize all the output from the Stellarton district. When they abandoned the mine the slope was about 5000' (1524 meters) long ten feet wide at the top and eight feet at the bottom, 200 men were employed underground and 70 on the surface. The Acadia Coal Company had extracted 2,369,713 long tons of coal during its 48 years of operation.

Two years later the Intercolonial Coal Mining Company was granted permission to work the mine by the Nova Scotia Government. The work carried on by the Intercolonial Company was mostly recovery work. They worked areas previously worked by taking out pillars and mining bottom coal. The peak year of their operation came in 1920 when they mined 34,534 tons of coal.

Before the closure of the mine in 1945 this mine had produced an excellent quality of coal for some 80 years. Then in 1953 the old Acadia Mine was sub-let to William Wadden who for nearly a decade

carried on a pillar-drawing operation, withdrawing 17,538 tons of coal.

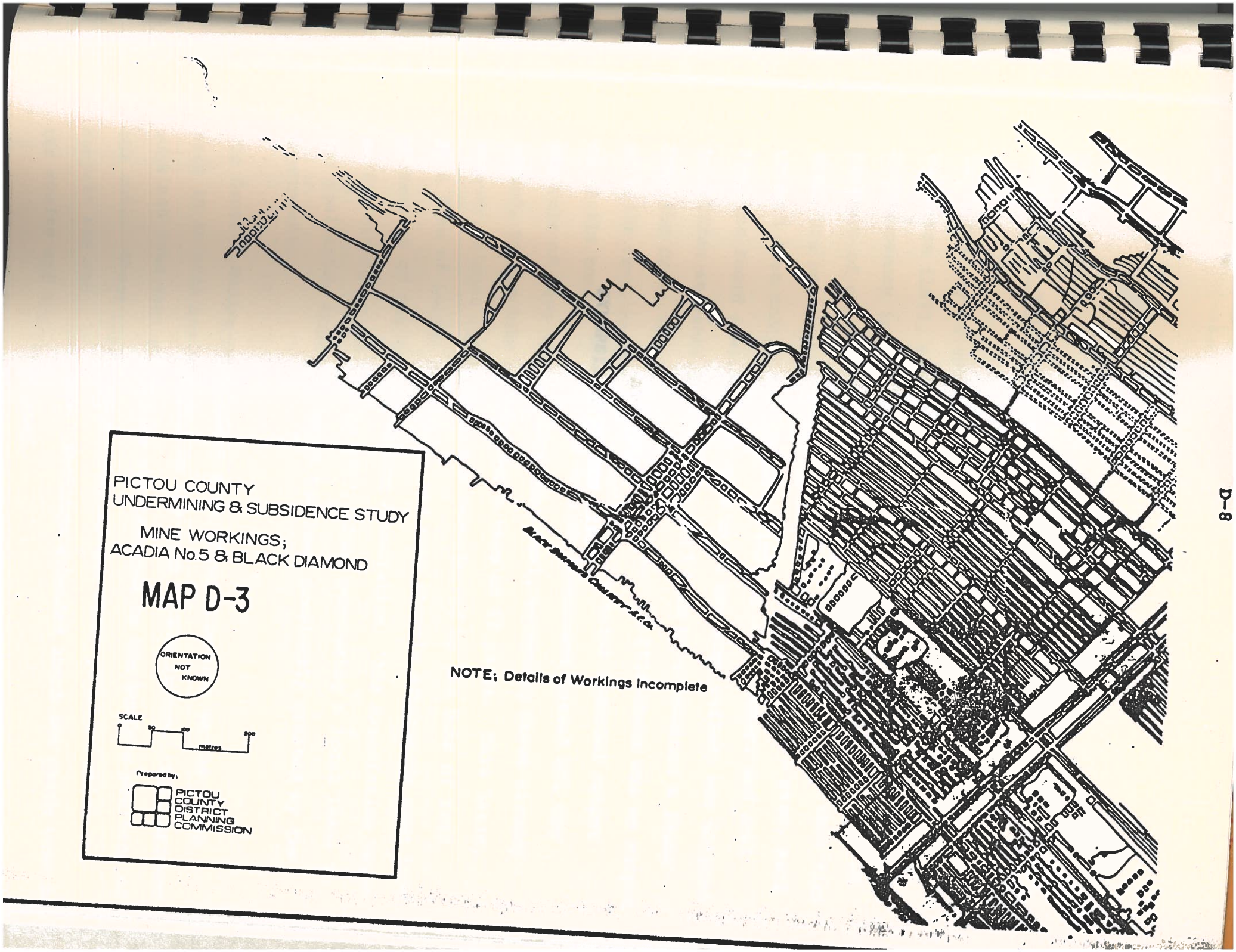
BLACK DIAMOND

The Black Diamond Coal Mine is located 2100 feet (640 meters) N 40° W from the intersection of Main Street, Westville and the Canadian National Railroad.

In 1864, Mr. French sunk the Black Diamond slope in the Acadia seam. In the same year, he incorporated the Nova Scotia Coal Company which in 1866 - 1867 worked the Black Diamond Mine. In 1875, they hit a heavy fault and the coal was deteriorating. In fear of losing money, they closed the mine.

In 1887, the Black Diamond Company obtained the right to mine the coal in the area of the Black Diamond Mine. They opened the mine with plans to develop the western part of the workings. They had a work force of forty-one men and four boys. Their plan for development did not come through. In their last year of work, they simply withdrew pillars. The mine closed in 1891 after producing very little coal.

The workings of Acadia No. 5 and Black Diamond may be found on Map D-3.


PICTOU COUNTY
UNDERMINING & SUBSIDENCE STUDY
MINE WORKINGS;
ACADIA No.5 & BLACK DIAMOND
MAP D-3
ORIENTATION NOT KNOWN
SCALE
0
50
100
200
metres
Prepared by;
PICTOU COUNTY DISTRICT PLANNING COMMISSION
NOTE; Details of Workings Incomplete

APPENDIX E

SYNOPSIS OF MINING HISTORY

APPENDIX E

SYNOPSIS OF MINING HISTORY

In "A History of the County of Pictou, Nova Scotia", by George Patterson (1877, page 198) it is stated that coal was discovered in Pictou county in 1798 by the Reverend Mr. McGregor. Although the presence of coal in the county may have been known before that time there are no records of its having been mined. A small seam, said to be 3 feet thick, was worked in 1807 by John MacKay, and coal from the Foord seam, or Big seam as it was then called, was shipped to Halifax as early as 1815. In 1817 Adam Carr obtained a lease from the Crown to mine and export coal. In 1818 there was an output of 7,474 tons, and to 1825, inclusive, a total recorded output of 41,314 tons. In 1825 the British Government leased all the minerals of Nova Scotia, including coal, excepting those already leased, to the Duke of York for a term of 60 years. This lease, however, almost immediately was transferred by the Duke of York to a firm of London jewellers, and very shortly afterwards came into possession of the General Mining Association. The Association began active mining operations in 1827, after purchasing a local lease in the Stellarton district, which had been previously granted by the Government.

The General Mining Association gave first attention to the Foord seam in an area now included in the town of Stellarton. The earliest workings consisted of shallow shafts close to the surface position of the coal. These shafts were known as the Store pits, of which the deepest was about 200 feet. Workings extended about 800 yards west of the shafts and 200 yards east.

By 1829 GMA had completed a railway six miles long, connecting the mines to the loading wharf at Abercrombie. It is worthy of note that the first steam locomotive on the American continent ran on this line. Fires in these workings in 1832, 1834, and again in 1839, led to their abandonment, and the old workings are commonly referred to as the Burnt mines. A barrier of 30 yards of coal being left in front of the old workings, a fresh series of shafts, known as the Bye pits, were sunk. The deepest of these was 451 feet. Levels from them extended about 1,000 yards to the east and 1,200 yards to the west, from which slants, or inclines running oblique to the direction of dip, were driven northwesterly and northeasterly. These pits likewise were affected by several explosions and fires, particularly in the years 1861, 1863, and 1867. As a result of the 1867 fire the workings were closed, and since that time have been known as the Crushed mines.

In 1850 the Dalhousie pits were sunk a short distance beyond the western faces of the Store and Bye pit workings. The Dalhousie easterly levels were necessarily short, but the westerly extended 1,000 yards. A down slant was driven northwesterly from the pit bottom for 1,200 yards. In the easterly levels of these pits as well as in the whole of the Store and Bye pits only the top coal, 12 to 14 feet thick, was mined because the bottom coal was considered to be of poorer quality and locally was referred to as dirty or coarse. But in the west Dalhousie levels the seam had so improved in quality that it was worked to its full height, which gave a working face of about 28 feet of coal. A large part of the

Dalhousie pits was lost by creep in 1864, although coal was worked updip from the crushed zone (or to the rise, as the miners say) until 1872 when the pits were abandoned.

With the sinking of the Dalhousie pits attention was directed to the mining of coal from the underlying Deep seam (now called the Cage seam). A shaft of the Dalhousie group was extended downward to the Cage coal, which it reached at a depth of 300 feet. Cage pit levels were driven only 700 feet easterly, for the coal was found to be coarse and broken in that direction, but westerly levels were driven 1,800 yards. Down slants were driven to the northwest from the pit bottom. In 1872 a part of the Cage pit workings was shut off on account of fire.

In 1866 the Foster shaft (450 feet deep) was sunk to the Foord seam a short distance west of the Dalhousie workings. Levels, however, were carried only a few yards westward, for the coal showed deterioration again in that direction. The Forster pit had a short life, for it took fire in 1869 and was closed the following year. The sinking of the Foord shafts to the Foord seam also began in 1866. They were located north of the Bye pits, and the hoisting shaft reached the coal at a depth of 840 feet. Workings were confined at first to the upper part of the seam, but following an explosion in 1869 the shaft was extended a farther 40 feet into the bottom coal, from which levels were again established in the top coal, 7 to 18 feet thick. In 1880 an explosion and fire brought about the closing of the Foord pit.

A further advance in coal recovery was made in 1881 when the Third and MacGregor seams were opened, the Third by slopes driven in the coal from the surface and the MacGregor in the first instance, by a shaft and down slants. In the Third seam workings a fire in 1887 was followed by fire and explosion in 1888, but the mine was reopened in 1889 and the fire walled off.

In the course of these explorations connections were made between various pits in the Foord seam, and a tunnel was driven between the Foord and Cage seams. The explosion in the Foord pit workings in 1880 was thereby projected into the Cage pit workings and resulted in their closure as well.

From 1827 to 1880 the coal raised from the Foord and Cage seams combined amounted to roughly 6,000,000 tons.

Up to 1866 the method of working was by horse roads from which rcoms were driven off in the coal. Subsequently, self-acting inclines or balances were driven from the levels up the coal in the direction of the dip, and from these balances rooms or bords were driven off on either side at intervals of about 150 yards. Pillars of coal, 8 to 10 yards wide, were left standing between the bords. Steam engines for hoisting, etc., were introduced as early as 1828, and the first railway from the mines to tidewater was under construction in 1834 and in operation in 1836. Thus the first steam engine in the province and the first steam locomotive in Canada are credited to the coal industry of Pictou.

In 1856 the monopoly of the General Mining Association was abolished, and by agreement they retained an area of only 4 square miles in the Pictou field.

In 1849 the rights of the minerals were vested in the Colony of Nova Scotia and in 1857 the original lease of the General Mining Association was abrogated. As part compensation for loss of their original rights, the General Mining Association was permitted to select and retain certain limited areas and amongst these four square miles were retained surrounding the town of Stellarton.

It had been the intention of the General Mining Association to work the iron deposits as well as the coal and a blast furnace was erected at the Albion Mines and iron ore was sent in from the Springville district. Their efforts at iron smelting proved unsuccessful and the project was soon abandoned.

The freeing of adjoining areas was a stimulus to active prospecting. J.D.B. Fraser of Pictou opended up the Oil Coal seam, or the Stellar seam as it is sometimes called, by means of two slopes, 215 and 204 feet long, respectively, and shipped some of the product to Boston. On distillation it furnished gas of high illuminating power and 60 to 120 gallons of oil to the ton. Oil had been obtained locally from this coal by distillation as early as 1852. What looked like a promising industry ended abruptly shortly after the discovery of crude oil by drilling in Pennsylvania in 1859. Fraser also acquired the Carmichael lease west of the Albion area and organized the Acadia Coal Company, which began mining the

MacGregor seam by slope from the surface. In 1865 the Acadia seam in the Carmichael area was discovered. Credit for the discovery has been assigned by some to Jas. Fraser of Mount William, by others to Truman French, a native of New England. This discovery was soon extended by John Campbell, who traced the seam to the southeast. As a result, mining of the Acadia seam began in three areas. The Acadia Company put down slopes and established the Acadia mine. Mr. John Campbell sold his rights to a Montreal company, the Intercolonial Coal Mining Company, which sank two slopes in 1868 and initiated the Drummond Colliery. In 1864 Mr. French, after explorations that included the driving of an adit (known as French's tunnel) and the sinking of the Black Diamond slope, transferred his rights to the Nova Scotia Coal Company, and the Nova Scotia Colliery was established in the Black Diamond area.

The old Acadia mine since its inception has been free of serious accidents; but in 1873 there was a serious explosion in the Drummond Colliery, which resulted in the loss of sixty lives. The colliery was reopened, however, the same year. Both collieries were located in excellent coal and have been successfully operated until recent time. Much poorer coal was found to lie westward and northward of the Black Diamond area and southward and eastward of the Intercolonial area. The Culton district, lying in the latter area southeast of the Drummond Colliery, was subjected to early exploration (in 1865) by the Montreal and Pictou Company but the quality of the coal (2 to 6 feet thick) was not such as to bring profit to the operators.

In the meantime prospecting had been carried on east of East River. Shafts and bore-holes sunk to the Foord seam near its outcrop proved great deterioration of this seam to the southeast, and operations were unprofitable. The overlying Stewart seam, with 3 feet of coal, was opened up by a slope, and north of it a short slope was driven in the Richardson coal seam (2 feet 9 inches thick) by the Crown Brick Coal and Pottery Company. These two seams are now believed to be one and the same. In the vicinity of Merigomish road, at the eastern outskirts of New Glasgow, several coal seams were opened up by the Montreal and New Glasgow Coal Company and others, but they were never worked extensively, partly on account of the thinness of the two main seams discovered, viz., the Fraser (or Foster) seam and the Lawson (or Kirby) seam, each about 4 feet thick, but chiefly on account of faults and small areal distribution in the axial region of the Allan syncline.

Discoveries by the McBean Brothers in the present Thorburn District were more encouraging, and led finally to the formation of the Vale Coal and Iron Manufacturing Company, which began operations in the McBain seam (8 feet thick) in 1872. This McBean Colliery was closed in 1889 on account of fire. In 1883 a slope was started in the overlying Sixfoot seam (known also as the Greener seam) and the Vale Colliery was established.

Coal, with a stated maximum thickness of 14 feet, though of poor quality, was found and explored in the St. Lawrence area northeast of the Vale Colliery. In 1867 the Montreal and Pictou Company undertook further explorations in this area. But the poor quality

of the known coal and the disturbed condition of the measures in this area discouraged extensive exploration.

The Marsh district was first developed by the Pictou Mining Company, which sank slopes in the Captain and the MacKay seams. The narrow synclinal structure of this part of the field greatly restricted the area of working.

In 1872 the General Mining Association sold their mining rights in Pictou county to the Halifax Coal Company, and in 1886 the Acadia, the Vale, and the Halifax Companies amalgamated to form a new Acadia Coal Company.

In 1887 the Nova Scotia Coal Company transferred its rights in the Black Diamond area to the Black Diamond Company, which , however was absorbed by the Acadia Coal Company in 1891.

In 1888 the English slope, 2,800 feet long, was sunk in the Cage seam, a few hundred yards east of the Cage pit.

In the Albion mines area coal production from 1881 to 1894, as a result of the closing of the Foord and Cage pits, came entirely from the Third and MacGregor seam. It amounted to 1,589,924 tons. The McBean Colliery at Thorburn from its inception in 1872 to its close in 1889 produced about 1,151,280 tons.

In 1890 the Third seam slope, 4,822 feet long, was connected by a drift 250 feet long to the Cage seam, and this tunnel was continued to the so-called Fourfoot seam, which was actually an upper part of the Cage, being separated by only 6 to 8 feet of strata. Later, drifts were run to the Foord seam, so that the Third seam slope provided an entry to three seams, viz., the the Third (11 feet), the Cage (11 feet 6 inches to 15 feet), and the Foord (27 feet). The MacGregor seam (9 to 12 feet thick) is overlain by 5 feet of strata and then by an upper coal called the Fleming seam (4 feet), and a MacGregor slope, 4,978 feet long, was sunk to provide access to both. In 1917 tunnels were driven from the MacGregor seam to the underlying New seam (7 feet thick), and two slopes were driven up the New seam to the surface in 1918.

Developments in the Drummond Colliery since 1890 include mining of coal from the underlying Scott seam (8 to 12 feet). Somewhat previously, tunnels had been driven to connect this seam with the Drummond No. 2 slope. In 1894 two slopes were driven from the bottom of a fan shaft, which met the Scott seam at a depth of 226 feet, to intersect these tunnels. New entrance to the Scott seam workings was later effected by driving inclines from the surface at the Drummond Colliery. The inclines were driven in rock down to the Scott coal and were continued by slopes in the coal to meet former workings. This work was completed in 1927. The greatest depth reached in the Acadia seam was that of the Drummond main slope (No. 1) 8,200 feet long. The maximum slope

length in this seam in the Acadia was 5,000 feet. Both the Drummond and Acadia slopes were driven well beyond the inferred surface position of the hypothetical McCulloch fault, which was previously believed to separate the Westville and Albion districts.

In the Albion mines district a new mine to gain entry to the Foord, Cage, and Third seams north of the abandoned Foord pits was begun in 1905 by the sinking of the two Allan shafts.

The main hoisting shaft, No. 1, with a total depth of 1,458 feet, reached the top of the Foord at 1,200 feet and the Cage at 1,412 feet; No. 2 shaft, 350 feet north of No. 1 and 1,008 feet deep, reached the Cage seam at 962 feet. These shafts were connected in the Cage seam by two semicircular roadways. No. 1 shaft was practically on the axis of the synclinal basin, whereas No. 2 was on the northern limb. The maximum thickness of the Foord seam, 45 feet, was found on the north side of the basin, where the dips were generally irregular and high, 30 to 50 degrees. The Third seam was connected with the Allan workings by tunnel. In 1918 there was a serious explosion in the Allan mine with a loss of 88 lives, and the shafts were not reopened until the following year. In 1924 there was another explosion with a loss of 4 lives and again a third one in 1929 fortunately free of human loss.

In 1901 the Nova Scotia Company opened up the MacKay seam east of East River at the Marsh Colliery. Two slopes reached the bottom of the synclinal basin at 2,804 feet. This mine was finally closed in 1909. In 1920 the Milford Coal Mining Company, sub-leases from the Acadia Coal Company, started a new slope in the MacKay seam of the same basin, to the west of the Marsh workings. This mine was soon closed, reverted to the Acadia Company and was named Acadia No. 6.

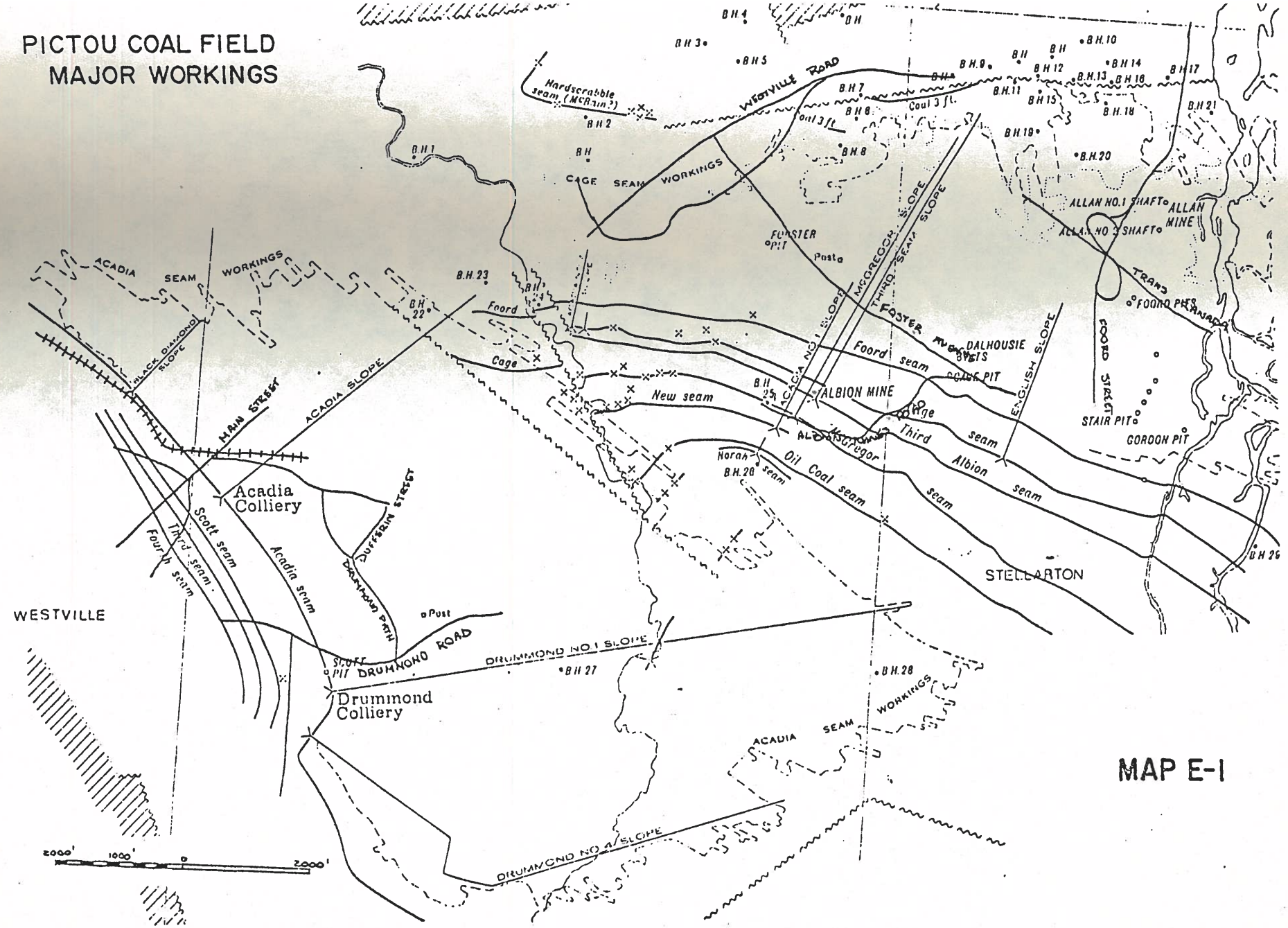
In 1916 the Captain seam in the Marsh basin was opened by the Milford Coal Company. This mine likewise reverted to the Acadia Company in 1920 and was called Acadia No. 4.

The Greenwood Coal Company in 1916 began mining the Sixfoot seam at Greenwood by means of a slope 1,800 feet long, and the same company in 1928 sank an exploratory slope on the MacKay seam near the positionof an old slope that was known as the MacGregor. The Greenwood Coal Company closed its mine at Greenwood in 1931, having worked out the coal there, and began operations in the Marsh area in land sub-leased from the Acadia Coal Company. It first mined the MacKay seam, and when coal reserves were nearing exhaustion turned its attention to the Captain seam.

In 1919, the Acadia Coal Company was purchased by the Nova Scotia Steel and Coal Company and thus came into the merger of the British Empire Steel Corporation in 1921.

Mining continued sporadically in many different mines into the 1900's with most operations ceasing by 1960. The only presently operating mine is the Drummond Mine in the Westville Area.

Much of the information contained in this synopsis is from the book "The Pictonian Colliery" by James M. Cameron, published by the Nova Scotia Museum. Map A-1 provides details of some of the more major workings described above.


PICTOU COAL FIELD
MAJOR WORKINGS
WESTVILLE ROAD
Hardscrabble seam (MCR 3m?)
Coal 3 ft.
CAGE SEAM WORKINGS
FOSTER PIT
Post
McGREGOR SLOPE
THIRD SEAM SLOPE
ALLAN NO.1 SHAFT
ALLAN NO 3 SHAFT
ALLAN MINE
TRANS CANADA
FOORD PITS
FOORD STREET
STAIR PIT
GORDON PIT
ACADIA SEAM WORKINGS
BLACK DIAMOND SLOPE
MAIN STREET
ACADIA SLOPE
Foord
Cage
Foord seam
COAL PIT
DALHOUSIE STREETS
ENGLISH SLOPE
ALBION MINE
New seam
Third seam
Albion seam
Oil Coal seam
Norah seam
McGregor
STELLARTON
Acadia Colliery
Scott seam
Third seam
Fourth seam
Acadia seam
DUFFERIN STREET
DRUMMOND PATH
WESTVILLE
DRUMMOND ROAD
SLOPE PIT
DRUMMOND NO 1 SLOPE
Drummond Colliery
DRUMMOND NO 4 SLOPE
ACADIA SEAM WORKINGS
2000' 1000' 0 2000'
MAP E-1