

STATE OF DELAWARE  
UNIVERSITY OF DELAWARE  
DELAWARE GEOLOGICAL SURVEY

**SUPPLEMENT TO DGS SPECIAL PUBLICATION NO. 11**

INSTRUCTIONS FOR PREPARATION OF  
OUTCROP OR EXPOSURE SCHEDULES

BY

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INTRODUCTION

An outcrop is that part of a geologic formation or structure that occurs at the earth's surface. Exposures are visible parts of rock bodies and include outcrops and excavations that show geologic materials resulting from human activities such as building construction, road construction, and landscaping (American Geological Institute, 1987). This supplement describes the DGS Outcrop or Exposure Schedule (Figures 1 and 2) and the methodology for completing this schedule.

The DGS Outcrop or Exposure Schedule is designed to record information including site location and ownership (if known) and a description of the outcrop or exposure. Shallow excavations for geologic investigation such as soil pits or soil auger borings are also recorded on these schedules.

**DELAWARE GEOLOGICAL SURVEY  
OUTCROP OR EXPOSURE SCHEDULE**

DGS ID  Date Observed

Record By    
code

**GENERAL SITE DATA**

County    Quadrangle    
Kent New Sussex code  
Castle

Latitude  Longitude  Altitude

Delaware Mod. Grid  Localid  Altitude Method  A L M R

**OWNER IDENTIFICATION**

First M. I. Last

Address    
code

City State  Zip Code

Telephone Number

**LOCATION SKETCH MAP OR LOCATION DESCRIPTION**

Figure 1. Outcrop schedule, side 1.

SAMPLES, PHOTOS		DGS ID	
NOTED BY *	DEPTH INTERVAL	SYMBOL DESCRIPTION	DESCRIPTION, COMMENTS, SKETCH OF OUTCROP
<div style="border: 1px solid black; padding: 2px;">           * →         </div>	<div style="display: flex; flex-direction: column; align-items: center;"> <div style="width: 100%; height: 100%; border-left: 1px solid black; border-right: 1px solid black; border-bottom: 1px solid black;"></div> </div>		
UNITS EXPOSED _____			

Figure 2. Outcrop schedule - side 2.

## DGS OUTCROP/EXPOSURE SCHEDULE

### Outcrop/Exposure Identification

- DGSID:** Enter the DGS outcrop number assigned to the outcrop on the DGS outcrop maps located in Room 208 of the Delaware Geological Survey Building. The State is divided into 5-minute quadrangles of latitude and longitude for the purpose of numbering wells and outcrops in Delaware. The quadrangles are lettered north to south with capital letters, and from west to east with lower case letters. Each 5-minute quadrangle is further subdivided into 25 1-minute blocks that are numbered from north to south in units of 10 and from west to east in units from 11 to 55 (Figure 3). Outcrops within these 1-minute blocks are assigned consecutive lower case letters as they are scheduled. For example, outcrop number Cb41-c is the third outcrop to be scheduled in the 1-minute block 41 in the 5-minute block that has coordinates "Cb." If more than twenty-six outcrops occur within a 1-minute block, serial letters are to be prefixed by a lower case a. The authority to assign a DGS outcrop number is restricted to DGS personnel. Outcrop/exposure locations are recorded on the set of 7.5-minute topographic maps designated for that purpose located in Room 208 of the Delaware Geological Survey Building. A map showing the 7.5-minute maps is given in Figure 4.
- Date Observed:** Record the month, day, and year (MM, DD, YY) that the outcrop/exposure was observed. If the month or day are not known enter 00 in the appropriate spaces. Use leading zeros for month, day, or year values less than 10.
- Record By:** Enter the first initial, middle initial, and last name of the individual who completes the Outcrop/Exposure Schedule.
- (CODE)** Do not make any entry in (CODE).

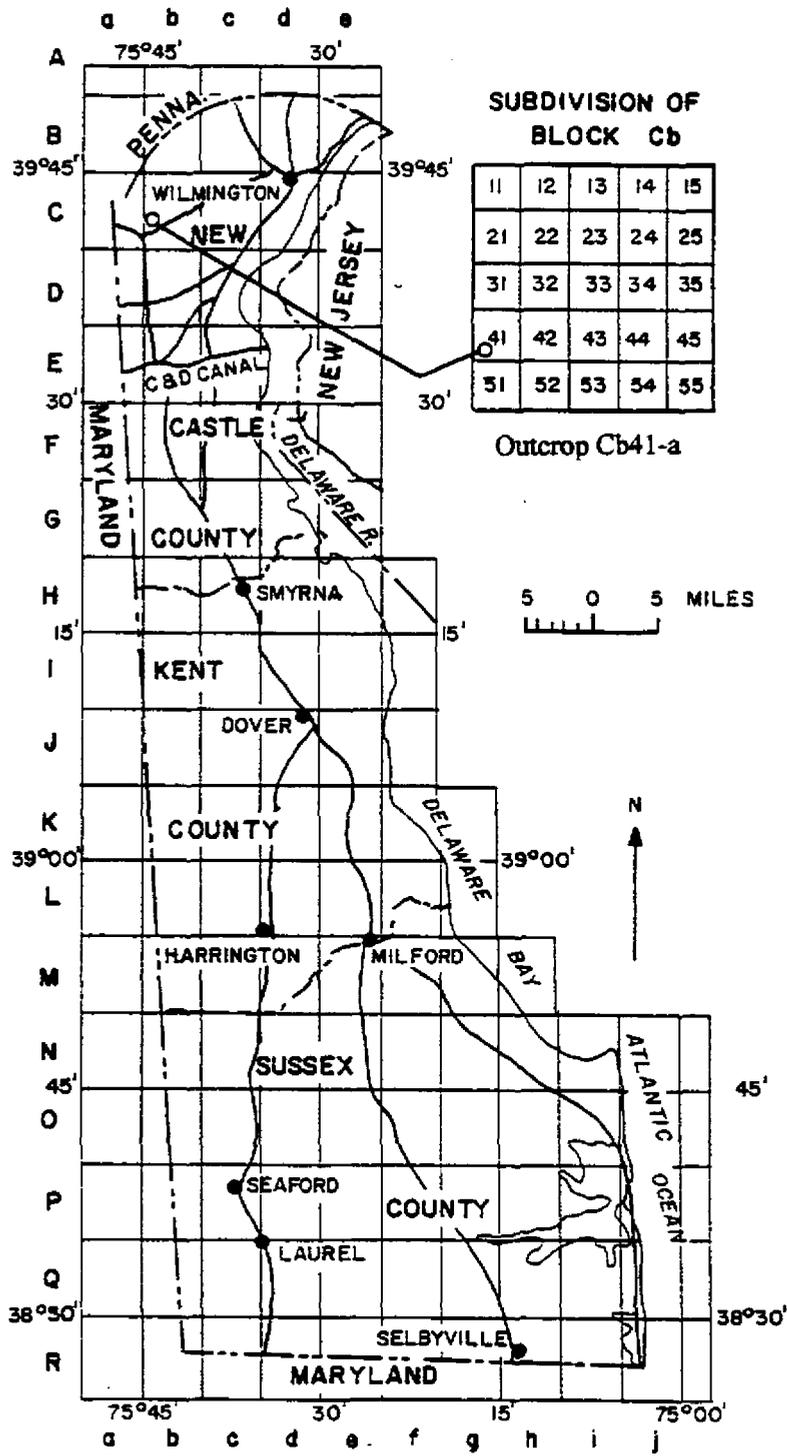


Figure 3. Map showing the outcrop/exposure-numbering system.

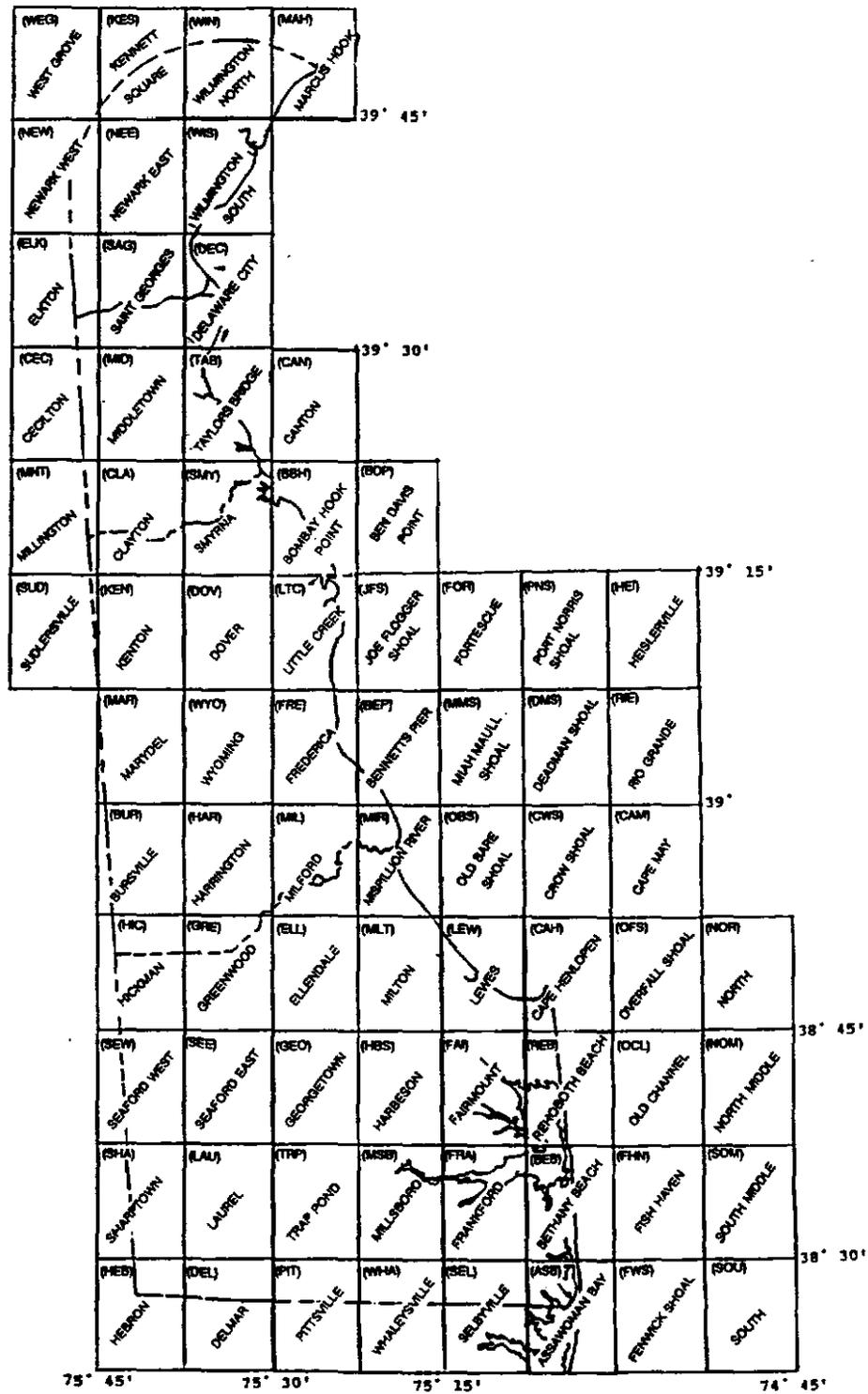


Figure 4. 7.5-minute topographic maps for Delaware and 7.5-minute blocks for offshore areas not covered by the topographic maps. Three-letter codes for each quadrangle are in parenthesis ( ).

### General Site Data

County: Circle the appropriate code on the Outcrop/Exposure Schedule to indicate the county in which the outcrop/exposure is located. The codes are:  
Kent - 1      New Castle - 3      Sussex - 5

Quadrangle: Enter the name of the 7.5-minute topographic quadrangle map on which the outcrop/exposure can be located. A list of quadrangles and codes are presented in Figure 4.

(CODE) Enter the 3-letter code for the appropriate quadrangle (Figure 4).

Latitude: Enter the best available value for the latitude of the site in degrees, minutes, and seconds. Use leading zeros if needed. Please refer to the technique described below for determining latitude.

Longitude: Enter the best available value for the longitude of the site in degrees, minutes, and seconds. Use leading zeros if needed. Use the technique described below for determining longitude.

It is suggested that the following technique be utilized to determine latitude and longitude:

- (1) Locate the outcrop/exposure on the DGS outcrop map (scale 1:24,000). Any available information should be used, with reference to map features, to locate the outcrop as accurately as possible. If the available information is inadequate, judgment should be used to spot the outcrop.
- (2) The coordinates of the outcrop/exposure can be scaled to a second of lat/long even though the point may not represent the accurate location of the outcrop/exposure on the ground.

Altitude: Enter the elevation of the original land surface at the outcrop/exposure in feet above or below mean sea level. Precision can be extended to two decimal places. Elevations below mean sea level should be preceded by a minus (-) sign. If the site is offshore, enter the elevation of the measuring point with respect to mean sea level (-). When

using topographic maps for determining elevations, use the new (1992, 1993) 7.5-minute maps.

Altitude Method: Circle the appropriate code for the method used to determine elevation. The codes and their meanings are:

A - Altimeter  
L - Level

M - Map  
R - Relative

Altimeter (A) - elevation was determined through the use of an altimeter.

Level (L) - elevation was determined through the use of a level or other precision survey instrument or method.

Map (M) - elevation was determined through interpolation of a topographic map. In most instances, elevations determined from a map are accurate to  $\pm$  one-half the contour interval.

Relative (R) - elevation was determined through the use of a level or other precision survey instrument or method and tied into an arbitrarily selected benchmark or datum.

Delaware Modified Grid: Enter the 8-digit Delaware Modified Grid number obtained from maps showing the modified grid numbers. The Modified Grid is the 8-digit number of the grid location of the outcrop/exposure site. The Modified Grid is defined by road boundaries within the State as depicted on the maps published by the Department of Transportation. The grids are based on a modification of the State Plane Coordinate Grid System. Most numbers on a map will appear to be 6-digit numbers such as 130-208. In reality the number is 8 digits. The first four describe the east-west grid and the second four the north-south grid. The number which would be entered in the above example would be 13002080. The fourth and eighth zeros in the example would have to be added to the Modified Grid number entered on the schedule.

Local Id: Enter any local identification number into the space provided.

### Owner Identification

Owner Name:           First Name:           Enter the first name of the owner.  
Middle Initial:       Enter the middle initial of the owner.  
Last Name:            Enter the last name of the owner.

For ownership by a company, municipality, government agency, or other organization, enter the name in the spaces for the last name. Use meaningful abbreviations to keep the name within 15 characters. If the site is used, leased, or occupied by someone other than the owner, enter the appropriate data in the location section of the Outcrop Schedule. If the owner cannot be determined, write Unknown in the spaces for the last name.

Owner Address:       Enter the owner's full mailing address, including city, state, and zip code.     NOTE: ZIP CODE MUST BE ENTERED.

Telephone number: Enter telephone number (if known).

### Location Sketch Map or Location Description

Enter an appropriate hand-drawn sketch map or a portion of a photo-reduced topographic map showing the location of the outcrop/exposure. Include roads and road numbers and other important landmarks and indicate north and scale, if to scale. Place to the right of the map a written description of the location including distance from the nearest intersection.

### Outcrop Description

The outcrop description sheet (Figure 2) is located on the back of the outcrop schedule. Transfer the DGSID identification from the front of the schedule to the designated box in the upper right corner.

### Description, Comments, Sketch of Outcrop

The blank space to the right of the page is provided for writing a description of the outcrop/exposure. If the outcrop/exposure is described in general terms, a sketch of the exposure is placed in this area. If this is done, include appropriate scales for the outcrop/exposure in the sketch. Comments or interpretations on

the outcrop/exposure (if any) are placed at the bottom of the page separate from the description.

If a detailed description or measured section is taken, the written description is keyed to the symbol description column with the appropriate symbols and intervals.

#### Symbol Description

Place lithologic symbols for the lithologies from measured or composite measured sections within the symbol description column. The symbols follow any accepted symbolic scheme such as that of Swanson (1981). The written descriptions to the right should correspond with the symbolic descriptions given. Place the depth below land surface to the left of the symbol description column. The depth scale is chosen at an interval that conveys the most information possible. Note whether the interval increments are in English or metric units and the units used (feet, inches, meters, centimeters, etc.).

#### Notation of samples or photographs taken.

Note any samples taken from the site with an arrow pointing to the interval sampled in the symbol description column and the sample number (40,000 series) to the left of the arrow. If the site description is given only by a sketch, the arrow should point on the sketch to the site sampled. Note photographs and slides in a like manner.

NO sample is to be entered into the outcrop sample number book and a sample number designated without having designated an outcrop number first.

#### Units Exposed.

Write stratigraphic units recognized at a locality and the depth intervals they encompass at the bottom of the description page. Do not write them in the description section above.

#### Piedmont Outcrops.

A modified outcrop description sheet has been produced for outcrops/exposures of Piedmont rocks (Figure 5). Information is given as in the outcrop/exposure description sheets. In addition, abbreviations for metamorphic rock lithologies and textures (Figure 6) are placed at the bottom of the page. Circle those lithologies and textures that are present.

<div style="border: 1px solid black; padding: 2px; margin-bottom: 10px;"> <p>SAMPLES, PHOTOS</p> </div> <div style="border: 1px solid black; padding: 2px;"> <p>NOTED BY #</p> </div>	<p style="text-align: right;">DGS ID <span style="border: 1px solid black; display: inline-block; width: 100px; height: 15px; vertical-align: middle;"></span></p> <p style="text-align: center;">DESCRIPTION, COMMENTS, SKETCH OF OUTCROP</p>
<hr style="border: 0.5px solid black;"/> <p>UNITS EXPOSED _____</p>	
<p>PS PL AM PG SP DB MG FG MF RR HM QN GB DM CS GR GA BG GC FE BE MA MI MY SN SZ FL CFLO B H</p>	

Figure 5. Modified outcrop description sheet for Piedmont rocks.

PS	-	PSAMMITIC GNEISS
PL	-	PELITIC GNEISS
AM	-	AMPHIBOLITE
C	-	COARSE GRAINED
F	-	FINE GRAINED
L	-	LINEATED
O	-	FOLIATED
PG	-	PEGMATITE
SP	-	SERPENTINITE
DB	-	DIABASE
MG	-	MAFIC GNEISS
FG	-	FELSIC GNEISS
MF	-	MAFIC AND FELSIC GENISS INTERLAYERED (BANDED GNEISS OF WARD)
RR	-	GARNET-BEARING ORTHOPYROXENE GNEISS
HM	-	HORNBLLENDE METAGABBRO
QN	-	PYROXENE-BEARING GRANITIC ROCK
GB	-	GABBRO
DM	-	DOLOMITIC MARBLE (COCKEYSVILLE)
CS	-	CALC SCHIST (COCKEYSVILLE)
GR	-	GRANITIC ROCKS (GRANITES, GRANODIORITES, QUARTZ DIORITES)
B	-	CONTAINING BIOTITE
H	-	CONTAINING HORNBLLENDE
GA	-	GRANITIC/AMPHIBOLITE INTERLAYERED ROCKS
BG	-	BIOTITE-PLAGIOCLASE-QUARTZ GENISS
GC	-	GRADITIONAL CONTACT (MILL CREEK ROCKS)
FE	-	FEATHER TEXTURE
BE	-	BRIGHT EYE TEXTURE
MA	-	MASSIVE TEXTURE
MI	-	MIGMATITIC TEXTURE
MY	-	MYLONITIC TEXTURE
FL	-	FLOAT
SN	-	SILLIMANITE NODULES
SZ	-	OBVIOUS SHEAR ZONE

Figure 6. Abbreviations for lithologies and textures of the Piedmont rocks of Delaware.

#### References Cited

- American Geological Institute, 1987, Glossary of geology, Bates, R. L. and Jackson, J. A., eds., Alexandria, Virginia: American Geological Institute, 788 p.
- Swanson, R. G., 1981, Sample examination manual: American Association of Petroleum Geologists Methods in Exploration Series, 35 p. plus appendices.
- Talley, J. H., and Windish, D. C., 1984, Instructions for preparation of Delaware Geological Survey data base schedules: Delaware Geological Survey Special Publication No. 11, 119 p.

