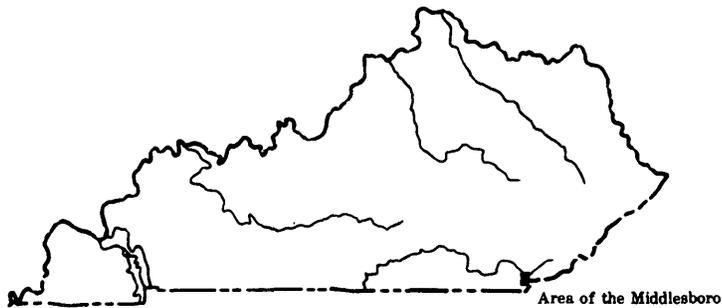


DEPARTMENT OF THE INTERIOR  
UNITED STATES GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH  
THE COMMONWEALTH OF KENTUCKY  
UNIVERSITY OF KENTUCKY  
KENTUCKY GEOLOGICAL SURVEY  
DONALD C. HANEY, DIRECTOR AND  
STATE GEOLOGIST

GEOLOGIC  
 QUADRANGLE MAPS  
 OF THE  
 UNITED STATES  
  
 GEOLOGY  
 OF THE  
 MIDDLESBORO NORTH QUADRANGLE  
 KENTUCKY  
 By  
 Charles L. Rice and Russell G. Ping



INDEX MAP OF KENTUCKY

Area of the Middlesboro  
North quadrangle

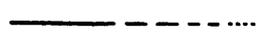
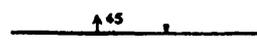
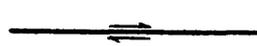
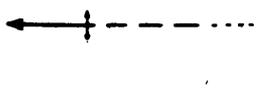
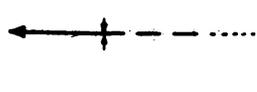
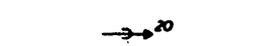
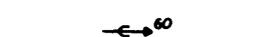
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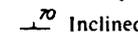
## GEOLOGIC MAP SYMBOLS

### COMMONLY USED ON MAPS OF THE UNITED STATES GEOLOGICAL SURVEY

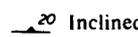
(Special symbols are shown in explanation)

-  Contact – Dashed where approximately located; short dashed where inferred; dotted where concealed
-  Contact – Showing dip; well exposed at triangle
-  Fault – Dashed where approximately located; short dashed where inferred; dotted where concealed
-  Fault, showing dip – Ball and bar on downthrown side
-  Normal fault – Hachured on downthrown side
-  Fault – Showing relative horizontal movement
-  Thrust fault – Sawteeth on upper plate
-  Anticline – Showing direction of plunge; dashed where approximately located; dotted where concealed
-  Asymmetric anticline – Short arrow indicates steeper limb
-  Overturned anticline – Showing direction of dip of limbs
-  Syncline – Showing direction of plunge; dashed where approximately located; dotted where concealed
-  Asymmetric syncline – Short arrow indicates steeper limb
-  Overturned syncline – Showing direction of dip of limbs
-  Monocline – Showing direction of plunge of axis
-  Minor anticline – Showing plunge of axis
-  Minor syncline – Showing plunge of axis

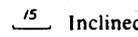
Strike and dip of beds – Ball indicates top of beds known from sedimentary structures

-  70° Inclined
-  Horizontal
-  Vertical
-  40° Overturned

Strike and dip of foliation

-  20° Inclined
-  Vertical
-  Horizontal

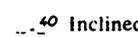
Strike and dip of cleavage

-  15° Inclined
-  Vertical
-  Horizontal

Bearing and plunge of lineation

-  15° Inclined
-  Vertical
-  Horizontal

Strike and dip of joints

-  40° Inclined
-  Vertical
-  Horizontal

Note: planar symbols (strike and dip of beds, foliation or schistosity, and cleavage) may be combined with linear symbols to record data observed at same locality by superimposed symbols at point of observation. Coexisting planar symbols are shown intersecting at point of observation.

Shafts

-  Vertical
-  Inclined

Adit, tunnel, or slope

-  Accessible
-  Inaccessible

x Prospect

Quarry

-  Active
-  Abandoned

Gravel pit

-  Active
-  Abandoned

Oil well

-  Drilling
-  Shut-in
-  Dry hole abandoned
-  Gas
-  Show of gas
-  Oil
-  Show of oil