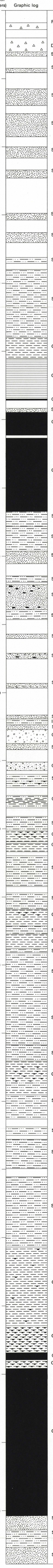
GEOTECHNICAL TESTS

Depth (meters) | Graphic log | Lithologic description | Joints | Discontinuities: Bedding break separations (mm) min. avg. max. | Point load $I_s(50)$ (MPa) 0.1 0.2 0.3 | Approximate unconfined compressive strength $I_s(50)\times24$ (MPa) 2 4 6 | Pocket penetrometer (MPa) 0.1 0.2 0.3 0.4 | Moisture content dry weight (percent) 10 20 30 | Depth (meters)



Peat, volcanic ash, and diamicton; basal organics at approximately 1.05 m; ash layers from 1.05 to 1.2 m; diamicton, glacial till, from 1.2 to 1.4 m

Diamicton, light-olive-gray (5*Y* 5/2), very fine pebbly glacial till; firm

Sandstone, moderate-yellowish-brown (10*YR* 5/2), medium-grained, soft, oxidized

Sandstone, dark-yellowish-brown (10*YR* 4/2) to moderate-brown (5*YR* 4/4), medium- to coarse-grained, poorly sorted; base firm and oxidized, upper interval soft

Sandstone, moderate-brown (4*YR* 4/4) to medium-light-gray (*N*6), very fine to medium-grained, poorly sorted; hardness variable with interbedded soft and firm zones; oxidized

Sandstone, olive-brown (5*Y* 5/3) to medium-light-gray (*N*6), fine-grained; scattered limonitic specs; hardness variable with interbedded very soft and firm zones

Sandstone, olive-brown (5*Y* 5/3), massive; top and bottom 0.1 m are medium- to coarse-grained; central interval fine- to medium-grained; coarser grained beds soft, finer grained beds firm

Sandstone, grayish-olive-green (5*Y* 3/2) to moderate-olive-brown (5*Y* 4/4), massive, medium-grained grading to fine-grained, well sorted; high quartz content; firm

Sandstone, dark-yellowish-brown (10*YR* 3/2), massive, medium-grained, moderately well sorted; subrounded primarily quartz grains; very soft to soft

Sandstone, dark-yellowish-brown (10*YR* 4/2), fine- to medium-grained; primarily subrounded quartz grains; finer grained beds soft to firm, coarser grained beds very soft

Siltstone, medium-gray (*N*5), massive, sandy, micaceous, firm

Siltstone, medium-dark-gray (*N*4) to medium-gray (*N*5), very finely to finely laminated, clayey with occasional coal stringers; firm; carbonate "blebs" scattered throughout the lower two-thirds of the unit; grades into unit below

Claystone, olive-gray (5*Y* 4/1), massive; few scattered coal inclusions; very firm; grades into unit below

Carbonaceous shale, brownish-gray (5*YR* 4/1), finely laminated; fissile; thin claystone interbeds

Coal, black (*N*1)

Sandstone, grayish-black (*N*2), fine-grained with clay and silt; soft

Coal, black (*N*1) to brownish-black (5*YR* 2/1); core highly fractured and broken into subangular pieces; hard; moderate-yellowish-brown (10*YR* 5/4) tuff (?) parting from 30.95 to 31.02 m

Coal, black (*N*1) to brownish-black (5*YR* 2/1) to grayish-black (*N*2); core highly fractured and broken to 35.2 m obscuring bedding, finely laminated from 35.3 to 36.8 m; hard; 0.1-m no recovery zones from 35.2 to 35.3 m and 36.6 to 37.7 m

Siltstone, dusky-yellowish-brown (10*YR* 2/2) to medium-gray (*N*5), finely laminated; clayey and carbonaceous with decreasing carbonaceous content downwards; firm

Siltstone, medium-gray (*N*5); thick interbeds of fine-grained sand and clayey siltstone; firm; gradational contact with unit below

Sandstone, olive-gray (5*Y* 4/1) to medium-gray (*N*5), fine- to medium-grained with carbonaceous laminae; firm; 0.6-cm diameter quartz pebble at 40.2 m

Siltstone, olive-gray (5*Y* 4/1); 0.1-m fine-grained sandstone at top; hard

Sandstone, medium-dark-gray (*N*4) to medium-gray (*N*5), massive, very fine grained, silty; includes interbeds of coaly fragments from 42.3 to 42.9 m and 43.7 to 44.1 m; very firm; gradational contact with unit below

Siltstone, medium-dark-gray (*N*4), very finely laminated, clayey; very firm

Sandstone, medium-light-gray, (*N*6), fine-grained; soft; irregular lump of bedded siltstone surrounded by sandstone

Sandstone, medium-dark-gray (*N*6), massive; fine-grained with coal fragments scattered throughout; soft

Siltstone, medium-dark-gray (*N*4), very finely laminated; very fine grained sandstone interbeds; small pebbles at base; hard

Sandstone, medium-gray (*N*5), massive, medium-grained, well sorted; soft
Interbedded siltstone, pebbly gravel, clayey siltstone, and medium-grained sandstone
Sandstone, medium-light-gray (*N*6), massive, fine- to medium-grained

Conglomerate, medium-dark-gray (*N*4) to medium-gray (*N*5), sandy, very fine grained; subangular to subrounded grains and pebbles; moderately firm

Sandstone, medium-dark-gray (*N*4), medium-grained with small pebbles; soft

Conglomerate and coarse-grained sandstone, medium-dark-gray (*N*4); soft

Siltstone, medium-dark-gray (*N*4), finely laminated; grades into carbonaceous siltstone; 0.1-m coal lens from 56.9 to 57.0 m

Claystone, medium-gray (*N*5), finely laminated; very firm; silty with coal fragments and carbonate "blebs" scattered throughout; grades into clayey siltstone at base

Siltstone, medium-light-gray (*N*6), massive; firm; carbonate "blebs" throughout; gradational contact with unit below

Claystone, medium-gray (*N*5) to medium-dark-gray (*N*4), finely laminated at base, coaly; very firm; grades into carbonaceous claystone at base
Claystone, olive-black (5*Y* 2/1), massive, silty; very hard; basal 0.15-m siltstone, brownish-black (5*YR* 2/1), sandy with carbonaceous stringers; very hard

Siltstone, medium-dark-gray (*N*4) to medium-gray (*N*5), massive, sandy, grading into a clayey siltstone by 63.3 m; hard; carbonate "blebs" scattered throughout sandy interval, carbonaceous stringers in clayey interval

Siltstone, medium gray (*N*5) to medium-light gray (*N*6), massive, grading into clayey siltstone; very firm; laminae of coal fragments at 65.6 m; gradational contact with unit below

Claystone, medium-gray (N5) to brownish-gray (5*YR* 4/1), massive, carbonaceous with laminae of coal fragments; very firm; gradational contact with unit below

Siltstone, medium-gray (*N*5), massive, cabonaceous; very firm; gradational contact with unit below

Claystone, medium-light-gray (*N*6), massive, silty; very firm; gradational contact with unit below

Siltstone, medium-gray (*N*5), massive, clayey; very firm

Siltstone, medium-gray (*N*5) to medium-dark-gray (*N*4), finely laminated, sandy, very fine grained; includes interbeds of clayey siltstone and coal lenses; firm

Siltstone, medium-dark-gray (*N*4), finely laminated; firm to very firm; carbonate "blebs" scattered throughout; slickensides at 75.9 m; gradational contact with unit below

Siltstone, medium-dark-gray (*N*4), massive; clayey; very firm; carbonate "blebs" scattered throughout

Claystone, medium-dark-gray (*N*4) to brownish-black (5*YR* 4/1), very finely laminated, carbonaceous; hard; slickensides from 77.5 to 77.7 m; clayey siltstone from 79.0 to 79.3 m, medium-gray (*N*5); very hard

Siltstone, brownish-gray (5*YR* 4/1) to medium-gray (*N*5), finely laminated, clayey, micaceous; very firm; includes regular to wavy bedding and frequent minor faulting; grades to a very fine grained sandy siltstone by 80.4 m with numerous interbeds of claystone, siltstone, and very fine grained sandstone; some carbonate "blebs" scattered throughout

Siltstone, brownish-gray (5*YR* 4/1) to medium-gray (*N*5), finely laminated; very firm; flow structures in the bedding

Siltstone, medium-gray (*N*5) to brownish-gray (5*YR* 4/1), finely laminated; interbedded claystone and coaly horizons; micaceous; firm; fossil leaf impression at 85.2 m

Siltstone, brownish-gray (5*YR* 4/1) to olive-gray (5*Y* 4/1), very finely laminated, clayey, carbonaceous laminae; very firm; numerous zones of carbonate "blebs" scattered throughout; possible slickensides at 87.8 m; minor fault planes from 89.5 to 89.7 m; gradational contact with unit below

Claystone, dark-brownish-gray (5*YR* 3/1) to medium-dark-gray (*N*4), very finely laminated, carbonaceous to very slightly silty; very hard; rhythmic banding of lighter and darker silty claystone and claystone from 93.9 to 96.3 m; slickensides at 93.8 m; gradational contact with unit below

Claystone, brownish-black (5*YR* 2/1) to brownish-gray (5*YR* 4/1), very finely laminated, carbonaceous with many thin coal lenses; increasingly carbonaceous downwards; very firm

Coal, black (*N*1) to dusky-yellowish-brown (10*YR* 2/2), very finely laminated; very firm; probably lignite

Claystone, brownish-black (5*YR* 2/1) to dusky-yellowish-brown (10*YR* 2/2), very finely laminated, carbonaceous; includes many thin interbeds of coal; firm; coal from 99.45 to 99.55 m

Coal, brownish-black (5*YR* 2/1) to black (*N*1), massive to very finely laminated; carbonaceous shale from 109.1 to 109.3 m; 0.05-m tuff (?) lens at 109.5 m; hard; high-angle fractures throughout upper two-thirds of coal interval; no recovery zone from 110.6 to 110.7 m

Sandstone, medium-gray (*N*5) to medium-light-gray (*N*6), massive, fine- to medium-grained; primarily subangular quartz and black aphanitic grains; coal lenses in upper half; hard in coal zone, soft to very soft below

Siltstone, medium-gray (*N*5) to medium-light-gray (*N*6), massive, clayey; firm; includes occasional coal laminae at various angles to the horizontal; carbonate-cemented siltstone from 112.55 to 112.85 m, intermediate-brownish-gray (5*YR* 5/1); very hard

Sandstone, medium-gray (*N*5), finely laminated, very fine to fine- to medium-grained, slightly silty; micaceous; soft and friable

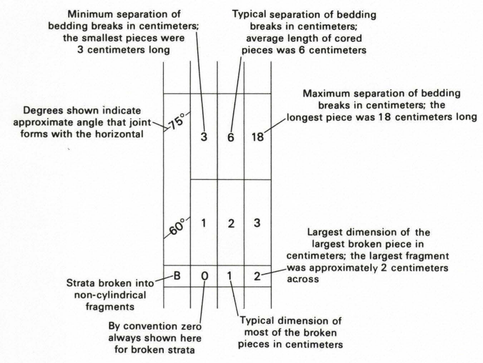
EXPLANATION

Lithologic Symbols

- DIAMICTON
- CONGLOMERATE
- SANDSTONE
- SILTSTONE—Blocks denote carbonaceous zones
- CLAYSTONE—Blocks denote carbonaceous zones
- CARBONACEOUS SHALE
- COAL
- NO RECOVERY

Geotechnical Tests

Notation of the discontinuities column (Modified after Rankilor, 1974)



Point load calculated in megapascals using: $I_s(50)$=point-load test value corrected to a reference diameter (Broch and Franklin, 1972). X, diametral test; ▲, axial test. See table 1 for numerical values

Approximate unconfined compressive strength calculated in megapascals using: $I_s(50)\times24$=approximate unconfined uniaxial strength (Broch and Franklin, 1972). ×, diametral test; ▲, axial test. See table 1 for numerical values

Pocket penetrometer: ●< symbol denotes material with a strength less than that which can be tested by the pocket penetrometer; >● symbol denotes material with a strength greater than that which can be tested by the pocket penetrometer

Moisture content — See table 2 for numerical values

GENERALIZED GEOTECHNICAL LOG FOR DRILL HOLE CE-82-1