PLATE I Roddy 1966

2 102 000 FEET

2 110 000 FEET

698 000 FEET

688 000 FEET

686 000 FEET

684 000 FEET

682 000 FEET

676 000 FEET

2 102 000 FEET

2 110 000 FEET

Flynn Creek

Geology mapped by D. J. Roddy, 1962, 1965
Base map by J. D. Alderman, 1963, 1964

1 MILE
5000 FEET

INDEX MAP OF TENNESSEE

EXPLANATION *

QUATERNARY

Recent

Qal | Qlo | Ql | Qs

Qal, Alluvium: Clay, silt, sand, boulders in unconsolidated stream deposits, includes largest terrace deposits of unconsolidated to semi-consolidated clay, silt, sand, and boulders along main stream valleys; includes some colluvium in stream beds in upper parts of smaller valleys.

Qlo, Landslide: Colluvium of mixed rock fragments and soil materials from lower parts of hill slopes and weathered materials from higher parts of hill slopes collected locally in landslides.

Ql, Landslide: Angular, weathered, sand to boulder-sized fragments weathered from a specific interval of a formation and mixed with an unconsolidated colluvial matrix; "subscripts," if present, denote stratigraphic units forming majority of landslide material.

Qs, Slump: Angular, weathered boulder-sized blocks from a specific interval of a formation; commonly associated with cave slumping along the larger streams; "subscripts," if present, denote stratigraphic unit forming slump.

MISSISSIPPIAN

CARBONIFEROUS

Lower Mississippian

Mfp

Fort Payne Formation

Chert and siliceous limestone: White to brown to dark gray, locally dark brown to red in deeply weathered zones, thin to thick-bedded with local non to irregular-bedded zones, fossiliferous with local crinoid stem coquinas, very resistant and acts as ridge former; locally contains siliceous limestone boistromns and a few biotherms; occurring locally at base of chert are a few feet of greenish-gray calcareous shales (may be equivalent to New Providence Shale) containing crinoidal shaly limestone and thin chert beds. Thickness 100 to 150 feet.

Mm

Maury Formation

Claystone and shaly claystone: Olive-gray to dark greenish-gray, non-bedded to blocky weathered claystone to shaly, poorly fissile claystone; abundant ball, plate, and disk irregular-shaped phosphate nodules. Only well exposed outcrops are indicated on map by location of symbol Mm. Thickness 0 to 3 feet.

Upper Devonian

Dcg | Dc | Dcd | bc

Chattanooga Shale

Dc, Shale and claystone: Grayish-black, calcareous, highly carbonaceous shale, unweathered massive, weathers fissile, local pyrite, marcasite and fine silt partings; lesser amounts of medium light gray silty, calcareous, carbonaceous claystone interbedded with black shale. Formation undivided on most of map because of poor exposures. Thickness averages 27 feet except within crater where maximum thickness is about 200 feet.

Dcg, Gassaway member, shale and claystone: Upper and lower parts are grayish-black to black, fissile, calcareous, highly carbonaceous shale, unweathered massive, weathers into blocky, fissile slabs in upper part; local pyrite marcasite and fine siltstone partings. Middle part medium light to medium gray, silty, calcareous, carbonaceous, claystone interbedded with black shale. Subscripts, if present, indicate upper, middle, and lower divisions of member. Thickness averages 77 feet except within crater where maximum thickness is about 27 feet.

Dcd, Dowelltown member, shale and claystone: Upper part is medium light-gray, silty, calcareous, carbonaceous claystone interbedded with black shale, thin bentonite bed in upper 2 feet. Lower part is grayish-black to black fissile, calcareous, highly carbonaceous shale, unweathered massive, weathers fissile, local pyrite, marcasite and fine silt partings. Based contact with Leipers Formation sharp with less than 0.02 foot basal calcareous, poorly carbonaceous siltstone. Subscripts, if present, indicate upper and lower divisions of member. Thickness averages 10 feet except within crater where maximum thickness is about 175 feet.

bc, Basal claystone: Brownish-black to medium to dark gray, calcareous to dolomite carbonaceous silty claystone, local calcite siliceous nodules. Thickness 0 to 3 feet. Present only within crater.

Middle (?) to Upper Devonian

Bedded Breccias

bd

Bedded Dolomite

Bedded dolomite: Yellowish-gray to yellowish-brown, slightly argillaceous, fine grained, locally cross-bedded, commonly laminated, locally very thin lenses of breccia near base, occurs as single massive dolomite bed up to feet in parts of crater and thinning out high on crater walls.

bdb | pbdb

Bedded Dolomitic Breccia

bdb, Bedded dolomitic breccia: Yellowish-gray to yellowish-brown, poorly sorted, coarsely bedded, angular to poorly rounded fragments predominately of upper Leipers dolomite in an argillaceous dolomitic matrix very similar to bd.

pbdb, Poorly bedded dolomitic breccia: Same as bdb except poorly bedded with very coarse and poorly sorted fragments. Only occurs locally.

blsb | pblsb

Bedded Limestone Breccia

blsb, Bedded limestone breccia: Medium light to medium dark gray, poorly sorted, coarsely bedded, angular to poorly rounded fragments predominately of limestone of lower Leipers, Catheys and Cannon strata in an argillaceous dolomitic limestone matrix. Only occurs locally.

pblsb, Poorly bedded limestone breccia: Same as blsb except poorly bedded with very coarse and poorly sorted fragments. Only occurs locally.

bb | pbb

Bedded Breccia

bb, Bedded breccia: Yellowish-gray to dark gray, poorly sorted, coarsely bedded, angular to poorly rounded fragments of Leipers, Catheys, and Cannon strata in an argillaceous dolomitic limestone to limy dolomite matrix. Only occurs locally.

pbb, Poorly bedded breccia: Same as bb except very poorly bedded with very coarse and poorly sorted fragments. Only occurs locally.

Middle (?) to Upper Devonian

Limits Restricted to Crater and Surrounding Fault Zones

Non-Bedded Breccias

Symbols used for non-bedded breccias occurring within crater and fault zones. Placement of symbols indicate location of well-exposed outcrops.

Breccia of chaotic, angular, very fine microbreccia to blocks 10 feet in length and consisting of variable amounts of Leipers, Catheys, Cannon and occasional Hermitage strata.

bb, Dolomitic breccia: Yellowish to dark gray, commonly non-bedded, unsorted, angular fragments and blocks in a yellowish-gray to yellowish-brown, argillaceous limy dolomitic matrix. Very irregular in thickness and lateral extent. When present the dolomitic breccia always underlies bedded breccias and overlies breccia, b, with irregular indefinite craters.

b, Breccia: Medium light to dark gray, unsorted, chaotic, angular, very fine microbreccia to blocks 10 feet in length and of mixed lithologies in a medium light to medium dark gray, locally argillaceous, dolomitic limestone matrix. Thickness unknown with basal contact not exposed except on crater walls. Probably forms bulk of breccia in the crater.

lsb, Limestone breccia: Same as breccia, b, except fragments and blocks are predominately limestone.

dob, Dolomite breccia: Same as breccia, b, except fragments and blocks are predominately dolomite.

Breccia of chaotic, angular, very fine microbreccia to blocks 10 feet in length and consisting of a local concentration of fragments from only one part of a formation.

Osb: Sequatchie Formation (?) breccia
Olupb: Upper Leiper Platystrophia ponderosa unit breccia
Olub: Upper Leipers unit breccia
Ollb: Lower Leipers unit breccia
Ocyub: Upper Catheys unit breccia
Ocymb: Middle Catheys unit breccia
Ocylb: Lower Catheys unit breccia
Ocb: Cannon Limestone breccia
Ohb: Hermitage Formation breccia
Ostb: Stones River Group breccia
Okb: Knox Group breccia

Megabreccia

Megabreccia concentration of several to many chaotic, angular, blocks generally larger than 10 feet in length and consisting of variable amounts of Leipers, Catheys, Cannons and occasional Hermitage strata.

mb, Megabreccia: Medium light to dark gray, chaotic, angular, concentration of blocks generally larger than 10 feet in length in a matrix of either ab, b, lsb, or dob.

lsmb, Limestone megabreccia: Same as megabreccia, mb, except blocks are predominately limestone.

domb, Dolomite megabreccia: Same as megabreccia, mb, except blocks are predominately dolomite.

Megabreccia element consisting of a single, angular block generally larger than 10 feet in length and derived from an unspecified part of one of the local formations.

lsmbe, Limestone megabreccia element: Single, angular limestone block generally larger than 10 feet in length in a matrix of either db, b, lsb, or dob. Block may be faulted, fractured and locally brecciated.

dombe, Dolomite megabreccia element: Same as lsmbe except block is dolomite.

Megabreccia element consisting of a single angular block generally larger than 10 feet in length and derived from a specific part of one of the local formations.

Olupmbe: Upper Leiper Platystrophis ponderosa unit megabreccia element
Olumbe: Upper Leiper unit megabreccia element
Olmbe: Lower Leipers unit megabreccia element
Ocyumbe: Upper Catheys unit megabreccia element
Ocymmbe: Middle Catheys unit megabreccia element
Ocmbe: Cannon Limestone megabreccia element
Ohmbe: Hermitage Formation megabreccia element
Osmbe: Stones River Group megabreccia element
Okmbe: Knox Group megabreccia element

DEVONIAN

DEVONIAN (?)

Ok ?

Sequatchie Formation (?)

Dolomite: Pale green to grayish-green, fine grained and laminated to medium grained and non-laminated, poorly silty, argillaceous, shaly to medium bedded, limy dolomite in some locations, non-fossiliferous. Exposed only as breccia in faulted southeast rim of crater. Thickness unknown.

Olup | Olu | Oll

Leipers Formation

Olup, Upper Leipers Platystrophia ponderosa unit, dolomite: grayish-orange to brownish-gray, fine to coarse grained, irregular argillaceous and silty zones, large siliceous brachiopod fragments, large Platystrophia ponderosa. Occurs in faulted southeast rim of crater.

Olu, Upper Leipers unit, argillaceous dolomite to dolomitic claystone: Medium gray to greenish-gray to grayish-orange, very fine to fine grained, silty, moderately to highly argillaceous, locally non to irregular to blockly bedded, locally thin to very thick bedded, locally thin, shaly dolomitic beds. Lower blocky to non-bedded part of this unit may be equivalent to the "Centerville Mudstone", CM? Thickness averages 35 feet.

Oll, Lower Leipers unit, limestone: Medium light to medium dark gray, increase of light brownish-gray to grayish-orange to olive-gray in upper half, fine to coarse grained, argillaceous and silty content increases towards top, local, calcareous shaly horizons, poorly phosphatic in lateral zones, moderately to highly fossiliferous, thin to thick-bedded, irregular to poorly bedded locally discontinuous lateral zones in upper one third, cross-bedded in some horizons, locally dolomitic in upper half. Thickness 70–80 feet.

Ocyu | Ocym | Ocyl

Catheys Formation

Ocyu, Upper Catheys unit, limestone: Medium light to medium gray, increase in light brownish-gray, grayish-orange, and olive-gray in upper half, cryptocrystalline to coarse grained, sparsely to highly fossiliferous, thin to thick bedded, increasing silt content and thin irregular argillaceous silty zones and partings in upper half. Base includes 3 foot argillaceous, silty, highly fossiliferous, persistent ledge forming bed with scattered siliceous nodules at top. Thickness averages 100 feet.

Ocym, Middle Catheys unit, limestone: Upper half is light to medium gray with slight increase in argillaceous and silt content over lower half. Lower half is medium light to dark gray, cryptocrystalline to medium grained, sparsely to highly fossiliferous, thin to thick bedded, thin calcareous shale in middle of unit, occasional scattered brown to gray, small siliceous nodules throughout unit. Base includes 3 foot argillaceous, silty, highly fossiliferous, persistent ledge forming bed with siliceous nodules at top. Thickness averages 70 feet.

Ocyl, Lower Catheys unit, limestone: Medium light to dark gray, cryptocrystalline to medium grained, fossiliferous, scattered elongate gray chert nodules, thin to thick bedded. Thickness averages 10 to 15 feet.

ORDOVICIAN

Middle Ordovician

Oc

Cannon Limestone

Limestone: Medium light to dark gray, cryptocrystalline to medium grained, sparsely to highly fossiliferous, thin to thick, uniformly bedded, thin wavy calcareous shale partings and scattered gray to black chert nodules in upper one third. Thickness averages about 90 feet but only upper one third exposed in normal, undisturbed bedding in western part of map. Lower 50 to 80 feet exposed in faulted southeast rim of crater.

Oh

Hermitage Formation

Limestone: Light brownish to medium gray, argillaceous to silty, fine to coarse grained, moderately to highly fossiliferous, thin to medium bedded, locally weathers to nodular irregular bedding, few poorly developed thin, calcareous shaly beds. Exposed only in faulted southeast rim of crater and as megabreccia blocks along rim in crater. Subsurface thickness about 75 feet.

Ost | Oct ? | Owc

Stones River Group

Sequence of faulted, folded, and brecciated limestones and dolomitic limestones exposed only in central part of crater. Probably only part of each formation present with only Wells Creek Dolomite, Owc, and part of Carters Limestone, Oct ?, mapped separately. Total subsurface thickness of Group about 820 feet.

Oct . Carters Limestone: Light to medium gray, very fine to coarse grained, thin to medium bedded, some beds dolomitic, local irregular chert nodules in upper part.

Ost: Lebanon Limestone, Ridley Limestone, Pierce Limestone, Murfreesboro Limestone — Light to medium gray, very fine to coarse grained, thin to thick bedded, some beds dolomitic, highly faulted and brecciated in central part of crater. Undivided on map.

Owc, Wells Creek Dolomite: Light greenish-gray, cryptocrystalline to very fine grained, partly laminated, medium bedded. Thickness 2 to 4 feet.

Lower Ordovician

Ok

Knox Group

Sequence of dolomite and lesser amounts of limestone with a subsurface thickness probably in excess of 2500 feet. Only the top of the Knox Group is exposed in the center of the crater as faulted, folded and brecciated dolomite: light olive-gray to medium dark gray, very fine to fine grained, thin to thick bedded, locally contains irregular siliceous nodules and rare shatter cones. Probably equivalent to the Masco Dolomite with less than 100 feet of top exposed in central part of crater.

Mascot Dolomite, Kingsport Formation, Longview Dolomite, Chepultepec Dolomite — Not exposed in map area

Copper Ridge Dolomite

Upper Cambrian

CAMBRIAN

Intra-formation contacts used as tracing unit for local structure

Contacts, normal

Solid line accurate to ± 1 foot elevation
Long dash accurate to ± 5 feet elevation
Short dash accurate to ± 20 feet elevation
Dotted where concealed

Contacts, specialized

Solid sawtooth indicates zone of narrow, jumbled, disorientated strata at breccia-folded rim rock contact.
Solid line sawtooth indicates sharp contact intermittent with jumbled zone contact.
Long dash sawtooth indicates approximate location of jumbled zone contact.
Short dash sawtooth indicates inferred location of jumbled zone contact.
Double sawtooth indicates width of extensive jumbled zone.

Faults

Dip and strike given if constant along fault
D, downthrown side; U upthrown side.
Long dash indicates approximate location;
short dash indicates inferred location;
dotted where concealed.
Queried where concealed and inferred.

Faults zones

Same meaning as given in Faults and Contacts, but lines now enclose Fault Zones.

Anticline

Syncline

Horizontal bed

Vertical Bed

Dip and strike

Vertical joint

* The term crater is used in this explanation to denote the closed topographic depression present in pre-Chattanooga fine but later filled by Chattanooga, Mowry and Fort Payne sediments.