

*Preliminary*

BEDROCK GEOLOGIC MAP OF THE STAFFORD SPRINGS QUADRANGLE, TOLLAND COUNTY, CONNECTICUT, BY M.H. PEASE, JR., 1975

Description of Map Units

Bronson Hill  
Anticlinorium  
Sequence

Stratified rocks at staurolite grade of metamorphism exposed west of Bonemill Brook fault. -- This is the standard New Hampshire sequence (Billings, 1956) that has been traced southward across Massachusetts to Connecticut. In the Stafford Springs quadrangle most of the sequence is exposed in a narrow north-northeast trending syncline squeezed between two bodies of Glastonbury Gneiss. The eastern body of Glastonbury Gneiss intertongues southward with the Monson Gneiss, the lowest member of the stratified sequence. The lower part of the Monson Gneiss is also exposed east of the Glastonbury along the west side of the Bonemill Brook fault.

U. S. Geological Survey  
OPEN FILE REPORT 75-633  
This report is preliminary and has not been edited or reviewed for conformity with Geological Survey standards or nomenclature.

D1 Littleton Formation.-- Gray-weathering garnet-staurolite-muscovite schist exposed in the trough of the Bolton syncline (Eaton and Rosenfeld, 1960). Conspicuous interlamination of pelite and very fine psammite common. Relic graded bedding present but obscure. Small-scale isoclinal folds observed mostly near major fold axis. Thickness increases from about 200 m at north border to as much as 500 m on the south. Formation well exposed in

southeast slopes of ridges north of West Stafford and north of Aborn Brook.

**Dls** Sandy member, Littleton Formation.-- Similar to D1, except for predomination of fine-grained psammitic beds over pelitic beds in this section at top of formation; mapped only between West Stafford and fault trending east from the south end of Chestnut Hill. Maximum thickness about 50 m.

**Sc** Clough Quartzite.-- Mostly fine-grained well bedded, evenly bedded 1-15 mm thick muscovite-garnet quartzite and muscovite-quartz schist exposed in two narrow bands, flanking the Littleton. Evenly distributed small magnetite grains characteristic of some beds particularly near base of formation; locally hematite replaces magnetite. Garnet sparse to absent in presence of magnetite. Maximum thickness less than 75 m. Exposure on west limb apparently pinches out just north of the fault at Chestnut Hill. Formation almost entirely exposed in quarry on north slope of hill south of West Stafford.

**Op** Partridge Formation.-- Interlayered gray sulfide-graphite bearing granular schist and thinly layered fine grained dark-gray sulfide-bearing quartz feldspar gneiss. Characteristically weathers rusty, moderate reddish

brown. Mapped as continuous band on west flank of Bolton syncline; occurs on east flank, only in southwest part of quadrangle and in faulted un-named syncline to east. Best exposures are in this un-named syncline and on southeastern slopes of Chestnut Hill. Maximum thickness about 200 m. Large xenolith or roof pendant of Partridge-like schist and gneiss, Op?, in the western exposure of Glastonbury Gneiss on steep slope south of Springfield Road. Lens about 600 m long and about 75 m maximum thickness.

**Qc Ammonoosuc Formation.**-- Light-to-medium-gray felsic meta-volcanic and metavolcaniclastic rock. - Chiefly layered (1 cm to 1 m) fine-grained granular felsic gneiss exposed on both flanks of the Bolton Syncline. In southern exposures, west of the un-named syncline in Partridge Formation and in vicinity of Sugar Hill the felsic Ammonoosuc is foliated and faintly compositionally banded, but layering is conspicuously absent; possibly represents a hypabyssal feeder to volcanoclastic Ammonoosuc. Maximum thickness of layered rock about 300 m; stratigraphic thickness vicinity Sugar Hill uncertain. Good exposures in Chestnut Hill where felsic gneiss is interlayered with minor thin beds of amphibolite; the fine-grained massive gneiss is best exposed in outcrops just east of Sugar Hill Road.

Oaa      Ammonoosuc Formation. - Mafic metavolcanic and - volcani-  
clastic rock - Layered (1 mm to 5 cm) dark-green amphibolite  
locally mapped at or near the base of the formation. Con-  
tains minor interlayers of light-gray felsic gneiss. The  
northernmost exposures, at Crow Hill on the eastern flank  
of the Bolton syncline is about 300 m thick, the thickest  
section of amphibolite in the formation; it is well ex-  
posed on the steep eastern slope of the hill. A narrow,  
perhaps discontinuous band, mostly less than 50 m thick,  
marks the contact with the Monson Gneiss just west of  
Brooks Brook and Tolland Turnpike; cut off by fault at  
its southern end. The small exposure near Clough Brook  
at the western border of the quadrangle is at the same  
stratigraphic horizon - apparently offset by two faults.  
The amphibolite exposed within the Glastonbury Gneiss at  
the south end of Neff Hill (Oaa?) may represent the same  
stratigraphic unit preserved as a xenolith, the more fel-  
sic Ammonoosuc and Monson rocks having been absorbed by  
the intrusive magma. Amphibolite interlayered with minor  
felsic gneiss is well exposed in a gravel pit and along  
the highway just west of the quadrangle at Crystal Lake.  
In southeast corner of Ellington quadrangle medium-grained  
non-layered amphibolite gneiss is present at stratigraphic  
or structural position of the massive felsic gneiss  
vicinity of Sugar Hill. The two rock types intertongue

but their contact also is folded. This massive amphibolite is possibly a metagabbro intrusion contemporaneous with false Ammonoosuc intrusion.

On Monson Gneiss.-- Light-to medium-gray fine- to medium-grained granitic gneiss. The principal mafic mineral is biotite, with minor hornblende; it occurs in thin laminae which gives the rock a persistent compositional banding. Layering not conspicuous but commonly a few centimeters to several meters thick. Amphibolite occurs in layers and lenses up to 15 m thick; amounts to less than 5 percent of formation. Lithologic distinctions between Monson and Glastonbury Gneiss become obscure near the contact, and Monson outcrops south of the Glastonbury commonly contain concordant intrusions as much as a meter thick of Glastonbury. Band exposed between Bonemill Brook fault and east edge of Glastonbury Gneiss is about 80 m thick; at least twice as thick south of Glastonbury Gneiss, but exact thickness uncertain because of possible repetition by folding and faulting. Fresh exposures in back of shopping center 600 m south-southeast of Orcutt's; numerous exposures in headwaters of Bonemill Brook; most extensive southern exposures are in bedrock-controlled ridges on either side of Charter Road.

**Qm** Amphibolite unit less than 20 m thick exposed east of Tolland Turnpike and south of Charter Brook.

**Merrimack  
Synclinorium  
Sequence**

Stratified rocks at sillimanite-orthoclase grade of metamorphism exposed east of Bonemill Brook fault. These rocks are assigned to the upper part of the Brimfield Group (Seper, Pesse, and Seiders 1975) and include the Mt. Pisgah and Hamilton Reservoir Formations.

**Dp** Mt. Pisgah Formation.-- Light- to medium-gray weathering medium- to coarse-grained garnet-sillimanite-potassium feldspar gneiss and schist. Rock is conspicuously layered on a scale of 1 to 10 cm. Relict graded bedding characteristic; obscured by coarse recrystallization and felsic injection gneiss and locally by cataclastic textures. Garnets, as much as 4 cm. in diameter, are common in brown biotite-fibrolite-rich schist layers. Occurs in the trough of a highly sheared and attenuated northerly trending isoclinal syncline, (Mount Pisgah syncline) the axial trace of which is in part obliterated by the trace of the Furnace Brook fault just east of Stafford Springs. On order of 300 m thick but highly uncertain because of extensive faulting and small-scale folding. Well exposed section in steep drainage on hill 650 west side of the

head of Glenville Pond; also in ravine below dam at Stafford.

Dpp Porphyroblastic unit in the Mt. Pisgah.-- Narrow wedge of layered brown-weathering biotite schist crowded with conspicuous houndstooth orthoclase crystals 1-5 cm long and aligned subparallel to foliation and bedding. Maximum width about 160 m; thins to pinch out southward about 2500 m. Occurs on the east side of the Furnace Brook fault at its southern end. Best exposed in large outcrop on Highway 32 at bend on west side of bridge over Willimantic River. Note plug of foliated gabbro in this outcrop. Even distribution of large orthoclase porphyroblasts in schist suggests Mt. Pisgah nearly reached melting point at convergence of Bonnell Brook and Hollow Brook faults on the Furnace Brook fault; proximity to syntectonic foliated gabbro,  $D_{31}$ , may also be a factor.

Sdhus Hamilton Reservoir Formation, Upper Schist Member.-- More than 75 percent of these strata are an alternation of rusty weathering dark- to light-gray felsic gneiss and brownish pelitic schist on scale of 1 cm to 3 m. The gneiss layers are more resistant and generally thicker than the schist layers. The more common dark- to medium-gray gneiss is very fine to medium grained, composed

almost entirely of quartz and feldspar with wispy biotite; flinty with conchoidal fracture where very fine grained. Garnet, graphite, and sulfide are sparse but ubiquitous. The light-gray gneiss is coarse grained and consists of eugen and interlocking grains of feldspar and quartz in a finer grained biotite-quartz-feldspar brownish mesostasis. Medium to coarse garnets generally amount to less than 1 percent. Cordierite is sparsely present in some layers. Laminae rich in fibrolite and biotite, with or without sulfide and graphite commonly are interwoven between grains along lines of foliation. The pelitic schist occurs mostly in layers less than 1 cm thick; it is rich in brown biotite and sillimanite with lesser amounts of quartz and feldspar. Graphite and sulfide are most common in these layers; and the red and orange-brown staining of most outcrops is largely derived from these layers.

Variation in the ratio of biotite and sillimanite to the felsic minerals distinguishes schist from gneiss; there is every gradation from gneiss to schist. An heterogeneous assortment of other rock types scattered throughout includes: metavolcanic and metavolcaniclastic brown-weathering thinly layered fine-grained quartz-feldspar-biotite schist and gneiss, dark-brown massive orthopyroxene-bearing gneiss, and dark-gray hornblende-bearing gneiss. Calc-silicate bearing lenses and layers

also present. Rarely layers locally contain more than 50 percent garnet. Gneissoid pegmatite is abundant, mostly too small to map; grossly parallel to foliation but in detail crosscut strata in all directions.

Upper Schist Member underlies about one-third of the quadrangle and is more than 3000 m thick. Western boundary the Bonemill Brook fault; eastern boundary defined along most of its trace by a nearly concordant intrusive - Hedgehog Hill foliated quartz diorite (dfqdh). Member overturned on west limb of Mt. Pisgah syncline. Upper part of member crops out extensively on either side of Willimantic River gorge from near junction Highway 32 and Alek Schofields road to Stafford Springs, 400 m-long highway exposure at hill 665 east side of Willimantic River ~~island~~ shows heterogeneity and structural chaos in these strata. Lower part of formation well exposed in gorge of Roaring Brook from intersection of Loiseau and Kucko roads almost to bridge at Highway 32.

**Mapped rock units within Upper Schist Member:**

SDhusr Rusty weathering schist.-- sulfide-graphite bearing biotite-sillimanite pelitic schist and fine-grained sandy schist. Occurs at top of member on east limb of Mt. Pisgah syncline; maximum thickness about 100 m. Similar schist exposed locally at contact with Mt. Pisgah on over-

turned western limb but not mapped. Good accessible, outcrop in front yard of house, west of Highway 19 about 300 m north of Highway 190 intersection.

SDhusv<sub>3</sub> Upper metavolcanic and metavolcaniclastic unit.-- Medium-gray weathering thickly layered to massive medium - to fine-grained feldspar-quartz-black biotite gneiss with sparse patchy hornblende. Massive to weakly layered metavolcanic gneiss well exposed on ridge east of Dennis Pond; also in small outcrops between Highway 19 and Baker Brook about 2000 m north of Highway 190 intersection, includes thin rusty sillimanite schist lenses. Unit thickens northward to as much as 400 m and becomes more strongly layered. Exposure of typical layered gneiss in yard northwest side Patten Road, Stafford. No evidence for presence of this unit on overturned limb. Stratigraphic pinch out seems unlikely; suggests fault at contact of SDhus with Mt. Pisgah Formation on west limb, but no substantiating evidence.

SDhusv<sub>3a</sub> Amphibolite lens less than 20 m thick in above metavolcanic unit; mapped for about 200 m along prominent ridge east of Warren Pond.

SDhusa<sub>2</sub> Massive amphibolite exposed in large outcrop east side Highway 32 at hill 665. Three lenses about 10 m in

maximum thickness representing two or perhaps one stratigraphic units repeated by faulting.

SDhusa<sub>1</sub> Lens of massive amphibolite less than 10 m thick exposed east side of Alek Schofields road about 800 m northeast and about 300 m stratigraphically below SDhusa<sub>2</sub>.

SDhusb Brecciated gneiss unit.-- Massive foliated grey-weathering gneiss containing distinctly more-mafic elongate brown hornblende gneiss fragments. Exposed as a narrow ridge at the crest of Rockwell Hill; maximum thickness about 40 m.

SDhusg Grey-weathering gneiss unit.-- does not crop out but extends into the extreme northeast corner of quadrangle from the Wales quadrangle.

SDhusv<sub>2</sub> Middle metavolcanic and metavolcaniclastic unit.-- Medium-grey, brownish grey-weathering, compositionally homogeneous orthopyroxene-hornblende-biotite-labradorite gneiss. Weakly thickly layered to massive with a knobby weathered surface. Unit extends from vicinity of Village Hill Road north for about 2800 m where it reaches a maximum thickness of about 150 m and is cut off by a fault; apparently offset northeast to extreme edge of quadrangle; fresh exposures were observed at dam site in adjacent Westford quadrangle. Well exposed east side Rockwell Hill

where it crosses head of Boundary Brook and State Highway 190; at southern end best exposed on either side of prominent fault valley between two low hills about 1300 m north of Kucke Road.

**SDhusv<sub>1</sub>** Lower metavolcaniclastic unit.-- thinly layered gray - to brown-weathering granular biotite schist with conspicuous diopside. Thin resistant unit with a maximum thickness of 30 m; appears to be a lens approximately 2000 m long. Small low exposures along a low south-trending ridge just west of the Nipmuck State Forest Boundary west of Fenton Road.

**SDhusv** Sulfidic schist unit.-- Rusty weathering sulfidic graphitic fine-grained granular biotite-garnet-sillimanite schist. Very poorly exposed; lies directly beneath the lower volcaniclastic unit forming a topographic trough less than 80 m wide. Contact between the two units exposed in low outcrop on east side of ridge 500 m due south of Highway 190. Not observed north of 190; has been traced south about 3000 m to a northeast-trending fault. Southernmost exposure is in steep east-flowing stream valley about due east of Spak Road.

Hamilton Reservoir Formation.-- Upper Gneiss Member:  
Member exposed in 6 km-long northeast-trending belt in southeast corner of quadrangle. Consists chiefly of the granular gneiss unit, SDhugg, within which lenticular rock units SDhugs, SDhuga, SDhugc<sub>1,2,3</sub> are mapped. Member is at least 4500 m thick in adjacent Westford quadrangle (Peper, Pease, and Seiders 1975). Top of member cut out by nearly concordant Hedgehog Hill foliated quartz diorite except at extreme eastern border of quadrangle where Upper Schist Member is exposed beneath the intrusive; contact between members not exposed. Base of member cut out by Pinney Pond and Rock Meadow faults.

Mapped rock units within Upper Gneiss Member:

SDhugg Granular gneiss unit.-- Chiefly light - to medium-gray medium-grained felsic gneiss interlayered with lesser amounts of darker gray thinly layered fine-grained gneiss and granular schist, characteristically containing brown biotite and light-brown pyroxene. Also includes thin lenses of amphibolite, calc-silicate bearing gneiss and rusty weathering garnet-bearing gneiss and garnet-sillimanite schists. Minimum thickness about 1000 m.

**SDhugs** Sulfidic schist unit.-- Lenticular sulfidic graphitic sillimanitic schist and subordinate garnet gneiss. No outcrop in quadrangle; extrapolated from west border of Westford quadrangle.

**SDhugs** Amphibolitic gneiss unit.-- Strongly color banded dark- and medium-gray gneiss and schist. Quartz-plagioclase rich layers interleaved with subordinate black hornblende-black biotite-rich layers; contains minor amphibolite lenses. Good exposure along Ruby road near intersection with Hancock road. Unit not mapped in Westford quadrangle.

**SDhugc<sub>1,2,3</sub>** Calc-silicate bearing units.-- Three mapped units contain conspicuous lenses of calc-silicate bearing fine-grained granular gneiss exposed in lower part of member near east boundary of quadrangle. Mapped units commonly form low ridges extending for as much as 100 m along strike; mostly less than 5 m thick, exaggerated on maps. Calc-silicate lenses distinguished by greenish-gray color and presence of diopside and epidote; range from a few centimeters to several meters thick. Good exposures in Frink Brook. Units pinch out southwestward; are mapped northeastward into Westford quadrangle where they are thicker and better exposed.

SDbms

Hamilton Reservoir Formation, Middle Schist Member.--

Medium-gray, rusty grayish-orange weathering, medium-grained pelitic biotite schist rich in sillimanite and garnet, poor in potassium feldspar. Sillimanite strongly lined in the plane of foliation and also occurs in composite fan shapes as much as 2 cm long; lavender garnet, 1 mm to 1 cm in diameter, breaks down readily on weathering to form rusty clots and to rust-stain outcrop surfaces. Sulfida is ubiquitous but sparse; graphite is rare. Internal folding of the schist commonly is so intense that foliation is almost completely obliterated normal to the lineation. Resistant lenses, as much as 10 cm thick, of thinly layered, fine - to very fine grained, greenish-gray to pinkish-gray (calc-silicate and biotite-rich respectively) granular schists are a conspicuous component of this member; these commonly are not internally folded with the schist. Foliated pegmatites as much as 2 m thick are common; these contain abundant potassium feldspar, and bluish cordierite weathering to pinnite is common.

Member best exposed on Whifford Hill in southeast corner of quadrangle; fresh outcrops on Ruby Road at the southwest end of Whifford Hill exposure. Member is about 1100 m thick in this quadrangle; it is 2500 m at its thickest, in the Wales quadrangle to the northeast

(Peper, Pease, and Seiders 1975).

Mapped rock unit within Middle Schist Member:

SDhmsb

Felsic biotite gneiss unit.-- Medium-gray, grayish-brown weathering, medium-layered fine- to medium-grained quartz-plagioclase-biotite granular gneiss with clinopyroxene and calc-silicate minerals locally common. About 30 m thick and poorly exposed in this quadrangle; forms stratigraphic marker near middle of Middle Schist Member in Westford quadrangle where it is more than three times as thick at its maximum.

Hamilton Reservoir Formation, Lower Gneiss Member.-- Rests with apparent conformity beneath Middle Schist Member in southeast corner of quadrangle. Member about 800 ft in maximum thickness here, consists chiefly of the granular gneiss unit, SDhlgg, the lower part of which intertongues northeastward with the Lower Schist Member. The member is about 2000 feet thick in the Westford quadrangle where the granular gneiss unit forms the base of the member and is overlain by a heterogeneous assortment of lenticular gneisses of varied mineralogy and texture that grade into each other by vertical interlayering and complex lateral intertonguing.

Mapped rock units within Lower Gneiss Member

- SDh1g Granular gneiss unit.-- Weakly to strongly layered mostly medium-grained light-gray felsic gneiss inter-layered with thin-layered bands of fine-grained brown-weathering biotite schist and gneiss commonly containing hornblende and pale-brown amphibole and diopside. Rusty weathering layers of gneiss (containing conspicuous garnet) and schist (containing sillimanite, garnet, and sulfide) are increasingly common in the upper part; unit appears to grade upward into the highly pelitic Middle Schist Member. Gradational relationship most apparent in series of outcrops on southeast slope of Whifford Hill; unit also crops out extensively in the vicinity of Common road.
- SDh1g Sulfidic schist unit.-- Thin lens of rusty weathering schist, characteristic of the schist members, poorly exposed within the Lower Gneiss Member at the western border of the Westford quadrangle. Does not outcrop in Stafford Springs quadrangle.
- SDh1g Amphibolite gneiss unit.-- Conspicuous lens of thinly layered, evenly layered black hornblende schist and gneiss about 50 m thick forms prominent low ridge along south side Pilchers Road and pinches out about 600 m north. Massive dark-brownish-gray gneiss 1 m thick rests on the

Layered gneiss in outcrop on south side of Highway 44 at intersection with Ruby Road. Unit extends in complex fault blocks for about 100 m into South Coventry quadrangle but cannot be traced further.

**SDh1g1** Layered gneiss unit.-- Thinly layered strongly banded gray-weathering fine-grained biotite gneiss containing black pods of amphibolite 1-3 cm long. Best exposed in west-facing outcrop just north of Pilchers Road about 160 m east of quadrangle boundary. May represent same approximate stratigraphic unit as amphibolite gneiss unit (SDh1g2) but cannot be demonstrated. Mapped unit pinches out 800 m northeast in Westford quadrangle.

**SDh1s** Hamilton Reservoir Formation, Lower Schist Member.-- Rusty, reddish- and orange-gray weathering, plagioclase-quartz-garnet-biotite-sillimanite gneiss and schist. Rock is more feldspathic and gneissic than is the Middle Schist Member. Intertongues with Lower Gneiss Member in extreme southeast corner of quadrangle; sparsely exposed.

**Intrusive  
Rocks**

Intrusive rocks in quadrangle range from diabasic basalt dikes of Triassic and possibly Jurassic age to foliated granitic orthogneiss and foliated pegmatite of Middle Devonian age. Several of the metavolcanic units may include co-magmatic meta-intrusive rock that is pre-Devonian in age.

**Trd**

Diabase dikes.-- Dark-gray, fine-grained, massive basalt with diabasic texture. Composed of labradorite, augite, orthopyroxene, and magnetite. Two dikes mapped in southeast corner of quadrangle - one southeast of Parker Mountain; the other southeast of Pilchner Road. Thickness 5 m to 20 m. Closely spaced joints (5 cm to 30 cm) oriented normal and parallel to dike walls commonly give outcrops a blocky fracture pattern highly susceptible to erosion particularly by glacial ice, so this resistant rock type commonly is poorly exposed in natural outcrop. Dikes observed in outcrop at 4 other localities and noted on map; diabase float scattered through quadrangle suggests presence of many more unexposed dikes.

**Dfgh**

Hedgehog Hill foliated quartz diorite.-- Medium-to dark-gray brown weathered foliated medium-to coarse-grained biotite gneiss. Thick-layered to non-layered except near borders where locally strongly parted along compositional planes. Composition homogeneous in most outcrops, but

varies along strike between exposures from medium-gray felsic grains with as much as 40 percent quartz and less than 10 percent biotite to dark-gray gneiss with almost no quartz and greater than 40 percent mafic minerals, mostly biotite but including hornblende and orthopyroxene. Unit emplaced near base of Upper Schist Member, Hamilton Reservoir Formation at eastern boundary of quadrangle; it separates Upper Schist from Upper Gneiss Member for most of its extent southwestward to southern border. Thickness ranges from 50 to 100 m. Well exposed on Jimmy Ledges eastern border, along Highway I-86 at Roaring Brook crossing, and in large road cut on Highway 44 just south of I-86. In the Highway 44 road cut, the foliated quartz diorite is strongly layered and granulated at western border and contact with country rock is unclear. Possibly protoclastic on border of intrusion, but equally possibly a cataclastic texture due to faulting along the intrusive boundary.

Dfgg

Foliated granitic gneiss.-- Several orthogneiss bodies within the Hamilton Reservoir Formation similar in composition and texture to the Hedgehog Hill orthogneiss. Largest one exposed in north-northeast trending fault sliver extending south from sharp bend in Willimantic River; areal distribution delineated largely on basis

of float; best exposures on south slope Willimantic River valley. Sugary texture light-gray foliated weakly compositionally banded non-layered quartz-feldspar-biotite gneiss with garnet. Similar rock crops out with abundant float in much smaller fault sliver on north side of valley. Lens just south of intersection Village Hill Road with Alek Schofields road intertongues with and contains numerous inclusions of schistose country rock; this lens weakly layered and compositionally banded. Lenticular body exposed on Spak Road is brown-weathering foliated thickly layered biotite gneiss with no garnet. East of this is gray-to-brown-weathering non-layered foliated biotite gneiss exposed in several fault slivers on hill 871 and north to Loiseau Road. Lens exposed just south of ~~Frank~~ Brook resembles the Hedgehog Hill quartz diorite to which it is adjacent on the east. Small lenses, too small to map, of light-gray to medium-gray felsic biotite gneiss with and without garnet are intruded subparallel to foliation in many outcrops throughout Hamilton Reservoir Formation.

Dfmg

Mafic gneiss.-- Four small bodies of foliated mafic orthogneiss all appearing to be syntectonic intrusives similar in origin to the foliated quartz diorite. One is exposed in roadcut on Highway 32 on the north side of

the bridge crossing the Willimantic River, forming a dark-gray half cylinder about 10 m in diameter with vertical walls. Foliation in the enclosing Mount Pisgah Formation, also near vertical, is warped around the intrusive. Rock is massive to weakly foliated near the border; Principal mineral constituents: plagioclase,  $A_n 70$ , brown biotite and green hornblende with minor epidote and trace of apatite and quartz. Exposure at north end of ridge east side of Glenville Pond also is intruded parallel to near vertical foliation in the Mt. Pisgah Formation. The "Z" shaped configuration of the intrusive conforms to left-lateral drag of the foliation between faults in this area. Medium-gray rock, more strongly foliated and compositionally banded than the first body; principal mineral constituents are plagioclase,  $A_n 70$ , brown biotite, pale brown amphibole, olive brown hornblende and trace quartz. An irregular shaped mafic gneiss within the Glastonbury Gneiss less than 5 m in maximum dimension and conforming generally to the trend of foliation is exposed in a flat bull-dozed area north end of dam crossing Patten Brook, about 800 m due east of quadrangle border. Fine grained dark greenish gray groundmass with more than 50 percent subhedral to augen shaped medium gray plagioclase phenocrysts showing a preferred orientation parallel to the regional

foliation. Bright green hornblende is the dominant mineral in the groundmass also observed were sphene, apatite and a trace of quartz; the plagioclase is greater than  $A_{70}$ . The most extensive occurrence of mafic ortho-gneiss occurs on the south side Tetraault Road 450 m northeast of Springfield Road. Also in the Glastonbury Gneiss this rock very similar to that exposed further south of the dam on Patten Brook. Mapped chiefly on the basis of float; it appears to occur in 3 fanning dikes each less than 100 m long and less than 10 m wide.

Dfpg Foliated porphyritic gneiss.-- Strongly foliated light-gray, grayish-orange-weathering, quartz monzonite porphyry. Phenocrysts 1-5 cm long of potassium feldspar compose 1-30 percent; groundmass is quartz, potassium-feldspar, plagioclase, olive to brown biotite and muscovite. Exposed in north-northwest trending band about 2.4 km long along ridge west side Alden Brook. Best exposed in back of sanitary land-fill area north of Hillside Cemetery. Outcrop on highway northeast of Stafford exhibits a cataclastic texture; highly fractured phenocrysts with rounded corners and mortar-textured groundmass. This texture found locally throughout unit. May be equivalent to Coys Hill Granite of Emerson, 1917.

Dfp Foliated pegmatite.-- Light gray foliated medium-to fine-

grained pegmatite bodies mostly emplaced parallel to regional lineation in the plane of foliation. Composed of potassium feldspar (50 percent), oligoclase (25 percent) and quartz with accessory biotite, muscovite, garnet, sillimanite, and sulfides. Range from stringers less than 1 cm wide to bodies as much as 3 m by 100 m. Widely distributed throughout Hamilton Reservoir Formation. Only one shown on map is in southeast corner of quadrangle and this greatly exaggerated.

Dg

Glastonbury Gneiss.-- Medium - to coarse-grained, medium- to light-gray foliated orthogneiss that underlies much of the northwestern third of quadrangle. Compositionally homogeneous rock of tondhjemitic composition; chiefly quartz, plagioclase, and biotite (olive to brown pleochroism) with only minor potassium feldspar. Epidote is common accessory; garnet and muscovite present in trace amounts. Fish-scale-like patches of biotite with epidote about 1 cm in diameter characteristically lie in the plane of metamorphic foliation aligned parallel to regional lineation; apparently formed by intersection of igneous and metamorphic foliation planes. Gneiss commonly contains mafic screens and inclusions also parallel to lineation. Fresh rock well exposed in excavated areas adjacent to small airstrip 1.5 km east-southeast of West Stafford; good exposure also in small quarry south of

Cooper Lane Road 2.2 km southeast of West Stafford.

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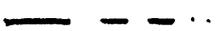
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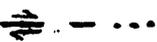
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## SYMBOLS

 Contact - dashed where approximately located;  
dotted where concealed

 Fault - dashed where approximately located; dotted  
where concealed. Letters indicate dip-slip  
relative movement; arrows indicate strike-  
slip relative movement

 Syncline

 Overturned syncline

### Strike and dip of foliation in layered metamorphic rocks

 inclined

 vertical

 crenulate

 reliability uncertain

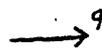
 parallel to relict bedding

 bedding apparently overturned; for vertical strata  
position of tick indicates apparent top direction.

 tops determined from observed sedimentary structures

 warped bedding and foliation

Bearing and plunge of lineation - May be used alone or in combination with strike and dip symbols

 mineral, or strike axis, or intersection of plane

 rodding

Strike and dip of intrusive orthogneiss

 inclined

 vertical

 reliability uncertain

Strike and dip of joints

 inclined

 vertical

Strike and dip of axial plane of minor isoclinal folds

 inclined showing bearing and plunge of axis

 inclined - axis horizontal

 vertical

Bearing and plunge of minor folds

 anticline - horizontal axis

 anticline - plunging axis

 syncline - plunging axis

 asymmetric fold showing map sense of asymmetry

Strike and dip of minor dike or fault observed in outcrop

 inclined Triassic dike

 vertical fault

 shear zone

 quarry

 gravel pit

Connecticut (Stafford Springs)  
sheet 4