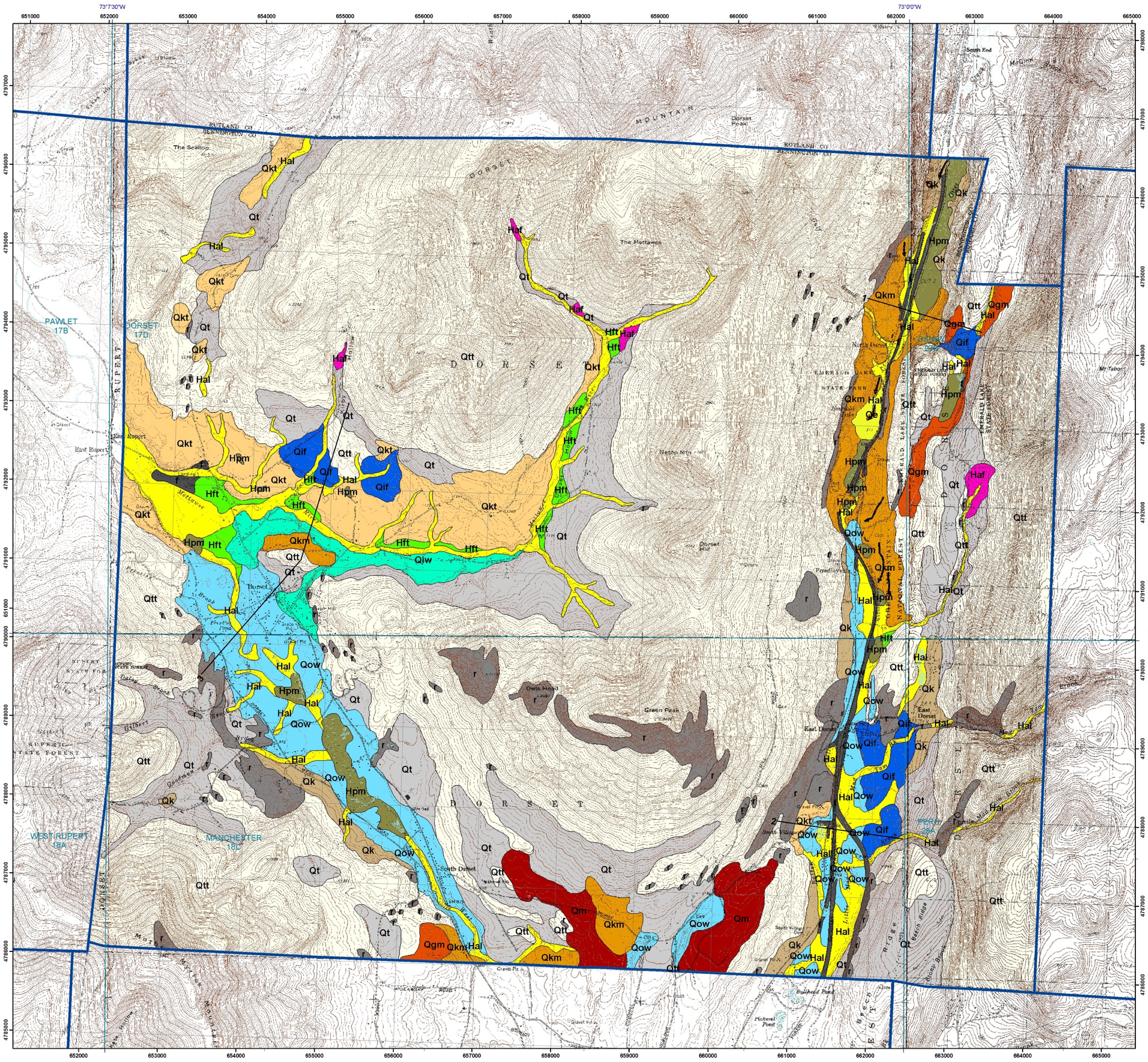
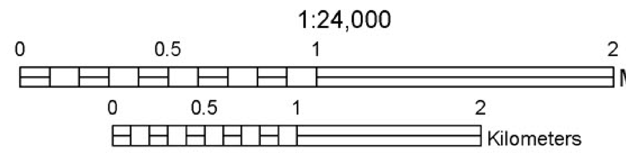


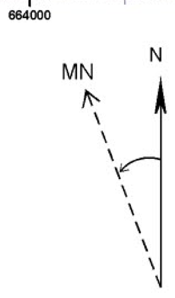
Base map from U.S. Geological Survey.
Quadrangle names printed in blue.
Coordinate System: Vermont State Plane, meters, NAD 83.
Geographic coordinates shown at topo corners are in NAD 83.
Grid overlay on map is Universal Transverse Mercator,
Zone 18N, NAD 27.

Digitization and Cartography by Marjorie Gale
Date: February 2009

1:24,000



Contour Interval 20 Feet



Magnetic declination
15.5 degrees west, 1968

SURFICIAL GEOLOGIC MAP OF THE TOWN OF DORSET, VERMONT

by
David De Simone
2009

Research supported by the Vermont Geological Survey, Dept. of Environmental Conservation, VT ANR.
This geologic map was funded in part by the USGS National Cooperative Mapping Program.
The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S. Government.
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Legend

DESCRIPTION OF MAP UNITS

RECENT

f — Fill; variable materials used as artificial fill along rail beds, road beds, embankments and low lying areas.

Hpm — Peat & Muck; organic sediment, mostly silt and clay in wetlands and swamps; low lying lands prone to flooding.

Hal — Alluvium; stream flood plains; fine sand, silt and gravel of river channel, bar, and bank areas; river bottom lands; variable permeability but usually intermediate to low; often wet sites and prone to flooding; can be good aquifer if sufficiently thick.

Haf — Alluvial Fan; tributary stream deposits; gravel, silt and sand, often poorly sorted; gently to moderately sloping lands located at the base of steep slopes and at stream junctions; variable permeability but usually intermediate to low; fair aquifer if sufficiently thick and permeable.

Hft — Fluvial Terrace; old flood plains; fine sand, silt, and gravel generally less than 5 meters thick; flat to gently sloping lands; variable permeability, usually intermediate; old stream terrace deposits above the flood plain; soils are often deep, well drained loams suitable for agriculture; water table may be sufficiently deep to allow for conventional septic systems; percolation rates may be locally variable and wet areas are not uncommon; banks above streams may be prone to failure; fair aquifer. Some terraces may be latest Pleistocene and related to lowering of glacial lake levels.

PLEISTOCENE

Qif — Inwash Fan; see Qiw description.

Qiw — Inwash; stratified fluvial sand, sand and gravel, or gravel deposited where uplands transition to lowlands and associated with other ice contact sediment or accumulated against an ice margin and having one ice contact side, typically the distal side; well drained and, if thick, a good aquifer.

Qow — Outwash; glacial melt water deposits of well sorted gravel and sand typically greater than 5 meters thick; gently sloping to flat lands which may be pitted due to melted ice blocks; intermediate to high permeability; high gravel-sand resource potential.

Qe — Esker; subglacial/englacial melt water stream deposits of moderately well sorted gravel and sand with boulders; prominent elongated and curving narrow ridges with steep sides and heights reaching 60+ feet; intermediate to high permeability; high gravel-sand resource potential; steep slopes may pose a slope stability problem.

Qk — Kame, undifferentiated hummocky terrain; glacial deposits from streams, slumps and deposition by ice; stratified and unstratified sand, gravel and boulders with variable silt; rolling, hilly lands to individual hills; intermediate to high permeability; high gravel-sand resource potential; fair to good aquifer limited by variable thickness and aerial extent.

Qkt — Kame terrace, sand with gravel; ice contact melt water and sediment flow deposits of stratified and unstratified gravel, sand, boulders and some silt; nearly flat lands; intermediate to high permeability; high gravel-sand resource potential; slopes at edges of these areas may pose a stability problem; variable sediment thickness typically exceeds 10 meters; percolation rates are generally satisfactory for conventional septic systems; aquifer recharge areas may be prone to contamination from infiltration.

Qkm — Kame Moraine, sand and gravel; ice contact melt water and sediment flow deposits of stratified and unstratified gravel and sand with silt and boulders; rolling, hilly ridged land with local flat areas; intermediate to high permeability; high gravel-sand resource potential; local steep slopes may pose a stability problem.

Qgm — Ground Moraine, hummocky till with sand and gravel; ice contact sediment flow, melt water and ice deposited sediments of variable texture ranging from stratified and well sorted gravel and sand to unstratified and poorly sorted silt, sand, gravel and boulders; thickness is variable and rock outcrops may portrude; low to high permeability; limited local slope stability problems; gently rolling hills and elongate smooth hills are possible.

Qm — Moraine, ridged till; ice contact ice deposited, sediment flow, and melt water materials of unstratified and stratified silt, sand, gravel and boulders; broad ridges and swales with rolling low hills; variable permeability; local slopes may pose a stability problem.

Qt — Till, thick or blanket; ice derived deposits of hardpan, silt, boulders, gravel and sand which are unsorted and unstratified and deposited beneath the glacier; may contain deformed stratified units that may be re-deposited diamictons from subaqueous or subglacial flows; thickness greater than 3 meters but rock outcrops may be common; surface boulders or erratics are common; smoothed and streamlined hills in the valley and gently undulating slopes on the lower mountain flanks to nearly flat plains dotted with erratics; low permeability; unstable slopes in excavations; may be prone to slope failures along stream banks.

Qtt — Till, thin or veneer; ice derived deposits of hardpan, silt, boulders, gravel and sand which are unsorted and unstratified and deposited beneath the glacier; thickness less than 3 meters with rock outcrops common; surface boulders or erratics are common; moderate to steep mountain slopes and summit areas; low permeability where thicker than 3'; moderately permeable where thin, weathered soils are less than 3' thick.

PALEOZOIC AND PRECAMBRIAN

r — Rock Outcrop; includes areas of predominantly outcrop with patches of till; outcrop areas serve to recharge bedrock units with groundwater; poor sites for septic systems; rock types are mainly marble, quartzite, schist and phyllite.

VT Town Boundaries

USGS 24K Quadrangle Boundaries

Line of Cross-Section

Introduction

The Town of Dorset encompasses portions of the West Rupert, Manchester, Peru, Dorset and Danby 1:24000 topographic quadrangles.

Two major valleys separate three upland regions. Both major valleys are underlain predominantly by Cambro-Ordovician carbonate rocks, chiefly marble and dolomitic marble. There are some quartzite interbeds in the carbonate valley rocks.

The southwest corner of the Town rises moderately up the flanks of Mother Myrick Mountain whose 3,361 ft summit is just south of the Town boundary. Goodman, Gilbert and Daley Brooks drain the mountain flank and cut through Taconic Highland lithologies composed of schist, phyllite and carbonates above approximately 2,400 ft elevation. Below this elevation, the mountain flank is underlain by Cambro-Ordovician carbonate lithologies with a Taconian thrust fault separating the distinct lithologies.

The eastern edge of the Town rises steeply up the flank of the Green Mountains toward the summit of Mount Tabor and Bromley Mountain, both beyond the Town boundary. Elevation exceeds 2,400 ft and the steep slopes are underlain predominantly by the Cambrian Cheshire quartzite.

A large central upland region of the Town separates the Dorset and East Dorset valleys. This upland region is underlain by Taconian lithologies composed of phyllite and schist above a major Taconian thrust fault. Kirby Hollow, Dorset Hollow and several unnamed tributaries form the head waters of the Mettawee River.

Surficial Geology

The map shows the observed and inferred contacts between sediment types based upon the field data sites and interpretation of maps, aerial photographs and soils maps. The interpretation of the deglacial history is based on mapping in Dorset and previous mapping in nearby quadrangles (De Simone, 2004, 2001, 2005).

The Green Mountain, Dorset Mountain and Taconic Mountain ridge lines and flanks are underlain by a thin veneer of till with frequent outcrops. The carbonate rocks on the Taconic and Dorset mountain flanks tend to outcrop in a series of cliffs separated by steps. The Green Mountain flanks are underlain chiefly by quartzite with less frequent outcrop and subtle ledges. Thick till occurs along the lower flanks of the mountains. The topography typically reveals the contact between thick and thin till as a small but distinctive break in slope. The thick till- thin till contact also generally coincides with the trace of the major Taconian thrust fault along the Taconic and Dorset mountain flanks.

Ice contact and glaciofluvial sediment predominate in the valleys. Two small areas of moraine and kame moraine at the southern margin of town represent still stands or minor surge margins of the Dorset and East Dorset valley glaciers. These sediments occur in the vicinity of Morse Hill Road. Ice contact stratified sands and gravels occur along the lower valley flanks in both the Dorset and East Dorset valleys. Mettawee Hollow contains a series of stepped kame terraces along the northern valley bottom that are composed of glaciofluvial sand with gravel. Thick ice marginal deposits occur just north of Dorset Village and at North Dorset. Both of these sites represent still stands of the respective retreating valley glaciers. The head of outwash at Dorset is beautifully kettled and links to a lateral margin kame terrace. The North Dorset ice margin is a site of excessively thick ice contact sedimentation with esker deposits and a notable former stagnation zone that heads at Emerald Lake, a large kettle depression with several other large kettles to the south of the lake. Much of the Dorset and East Dorset valley bottoms consist of outwash sands and gravels forming a prominent sandur or valley train of outwash. Mettawee Hollow contains a similar valley train of sands and gravels that descends along the southern margin of the hollow and merges with the Dorset valley outwash. This deposit represents inwash and the distal portion of this inwash was deposited against or beneath the Dorset valley glacier.

Deglacial History

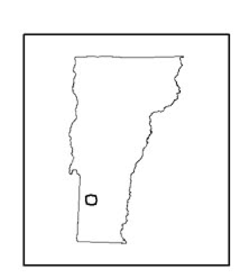
The moraine and kame moraine deposits in the Morse Hill Road area define the first ice marginal positions recognized. These were previously identified during mapping in Manchester and named the South Dorset Ice Margin. The exposed sediment south in Manchester of the Dorset glacier moraine consists of interbedded diamicton and stratified fluvial sediment. The deformation in the diamicton is consistent with sediment flow origins but also may be the result of a minor surge of the Dorset glacier during its retreat. A similar ridge was mapped as moraine and would have been deposited by the East Dorset glacier and is inferred to be contemporaneous. This latter ridge is not exposed. Melt water from these ice margins deposited outwash through Manchester Center south of the town.

The Dorset and East Dorset glaciers retreated to the Dorset and North Dorset ice positions, respectively. The extensive ice marginal deposits described above accumulated during this relatively long still stand. This is named the Dorset Ice Margin. Sedimentation associated with this still stand defined the present drainage divides in both the Dorset and East Dorset valleys. As the Dorset glacier maintained this ice position, retreat and down wasting of ice in Mettawee Hollow resulted in a series of stepped kame terraces. Each kame terrace likely records a local and small ice marginal lake in the upper Mettawee Hollow. These unnamed minor lakes apparently drained back under the Dorset ice rather than spilling over the divide between the valleys. The lakes were likely very short-lived and no surface fine grained lacustrine sediments were observed. Final retreat of the Mettawee Hollow ice allowed the inwash sandur to be deposited against the Dorset valley glacier. Mapping supports De Simone's (2004) conclusion that there was no Glacial Lake Batten in the Batten Kill valley extending south through Manchester toward Arlington. Rather, the sediments consist of typical outwash deposited in a subaerial environment.

Retreat of both the Dorset and East Dorset glaciers resulted in the establishment of ice marginal lakes in their respective valleys. Glacial Lake Emerald (De Simone 2005) was named because ponded waters in the Otter Creek drainage basin flowed across the spillway at the Emerald Lake divide. Retreat of the Dorset glacier allowed Mettawee basin waters to pond in front of the ice. This established a Glacial Lake Dorset with a spillway through the broad drainage divide to the Batten Kill basin. The previously deposited outwash was dissected and an inset outwash or valley train was deposited through Manchester. This can be seen as a lower outwash surface through Manchester Center to Manchester. The modern streams in the drainage divide are underfit. It is not believed that the use of this spillway was for a long time or that a large flow existed. Therefore, it is believed that a lower outlet for Lake Dorset and the establishment of a new glacial lake in the Mettawee basin occurred fairly quickly.

The Luzerne Readvance Question

Connally's (2002) depiction of the Luzerne readvance in eastern New York takes the limit of the readvance as far south as Mt. Equinox. There was evidence for a minor surge of ice associated with the South Dorset Ice Margin as discussed above and in De Simone (2004). However, the evidence is not of the type associated with a larger surge or ice readvance as envisioned by Connally. Indeed, the deformation in the moraine may be solely the result of sediment flow in a typical ice marginal setting. The occurrence of extensive deformed till in other places such as northern Vermont where the Bridport surge of the Hudson-Champlain Lobe occurred is taken as the necessary proof of a readvance. No such proof exists in the Vermont Valley precisely where Connally's depiction of the Luzerne readvance would place the readvance limit. Therefore, it is concluded here that the Luzerne readvance did not occur as most recently envisioned by Connally.



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