---- Time gap, Medford Dike crosscuts all dikes below, except possible rare Mesozoic dikes ----



Dolerite and basalt dikes (d), porphyritic dolerite and basalt dikes (dp) – numerous ages from Neoproterozoic to possibly Mesozoic, offset by faults and crosscut each other, youngest set is relatively large dikes that are E-W trending. Crosscut by the Medford Dike.



Gabbro dikes – altered, crosscuts some dolerite dikes, west side of Middle Hill and northern Pine Hill. Not related to Medford Dike. Neoproterozoic to Paleozoic (?).



Highly altered dolerite and basalt dikes – chloritic with epidote and porphyroblasts of amphibole and chlorite. Often have diffuse contacts. Possibly several ages, Neoproterozoic to Paleozoic. In Nanepashemet Fm. may have fed basalt flows in hydrothermal environments.

Dike ages (Ma)*: d 226 \pm 3 (40 Ar/ 39 Ar whole rock) d 290 <u>+</u> 15, (K/Ar whole rock) d 353 \pm 4, (40 Ar/ 39 Ar whole rock) gb 402.5 \pm 3 (40 Ar/ 39 Ar whole rock) d 573 <u>+</u> 4 (⁴⁰Ar/³⁹Ar whole rock)

*K/Ar and Ar/Ar ages not accurate due to later thermal events

---- Large time gap in major map units. Dikes above are Neoproterozoic to possibly Mesozoic ----



Cambridge Argillite - argillite south of Northern Border Fault

Boston Bay Group (~590-565 Ma)



Roxbury Conglomerate – conglomerate and sandstone north of Northern Border Fault



Felsic dikes with medium to coarse embayed quartz and feldspar xenocrysts – intrudes Zwp on Whip Hill, Zsg at MWRA facility, and Zbrc near Black Rock. Xenocrysts from coarse granite, has fluorite crystals. Neoproterozoic.



Gray porphyritic andesite to dacite dikes – east side of Spot Pond, probably offshoot of Zst. Xenoliths and xenocrysts including embayed quartz. Hornblende phenocrysts. Neoproterozoic.



Stoneham Granodiorite – granodiorite to tonalite, high mafic content, porphyritic at contacts.



Zdg

Wanapanaquin Porphyry – granodiorite porphyry. Branch of Stoneham Granodiorite. Neoproterozoic.



Lawrence Woods Granophyre – porphyritic granophyre with needlelike hornblende.



related to Zrhp. Age (Ma): 596.02 + 0.32 (U-Pb CA-TIMS) Rams Head Porphyry – tonalite porphyry with minor quartz and alkali feldspar, intrudes Spot Pond

Unnamed gabbro-diorite porphyry - intrudes Zvwq, may be

Age (Ma) - 2 zircon populations : inherited 598.13 <u>+</u> 0.27 (U-Pb **CA-TIMS)**; **596.77** <u>+</u> **0.25** (**U-Pb CA-TIMS**) - at Wrights Pond; **596.50 + 0.53 (U-Pb CA-TIMS)** - at Pine Hill.

Age (Ma): 595.14 + 0.17 (U-Pb CA-TIMS)



Granodiorite. Age (Ma): 596.24 + 0.16 (U-Pb CA-TIMS)

---- Stoneham Granodiorite intrudes Zlvf, Zlbf and Zlvx at Straw Point on Spot Pond and in Melrose, Stoneham and Wakefield -------- Lawrence Woods Granophyre intrudes base of Zlvc at Pine Hill and Boojum Rock, and Zlvx and Zlvv at Wrights Pond ----

Lynn Volcanic Complex (Neoproterozoic).

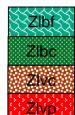
596-594 Ma

Lynn Volcanic Complex (597-594 Ma)

Subvolcanic rocks

Volcanic Complex

related to Lynn



Wakefield Formation – interlayered volcanic

facies (bimodal):

(Zlbf) - basaltic flows and associated breccia and tuff

(Zlbc) – basaltic volcaniclastic units, polymictic breccia and conglomerate

(Zlvc) – felsic volcaniclastic units, polymictic breccia and conglomerate

(Zlvp) – rhyolite porphyry, fissure intrusion



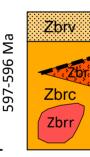
(Zlvv) – felsic vitric tuff (Zlvx) – felsic crystal tuff (Zlvl) - felsic lithic tuff (Zlvf) - rhyolitic flows

Ages (Ma): 594.70 ± 0.32 (U-Pb CA-TIMS) Zlvf at Middle Res.; 595.27 + 0.34 (U-Pb CA-TIMS) Zlvf at Spot Pd.; **595.82** <u>+</u> **0.23 (U-Pb CA-TIMS)** Zlvf at Wamoset Hill

---- Zlvc rests unconformably on Boojum Rock Tuff and Zsg ----

---- Unconformity, start of abundant embayed quartz and coarse feldspar xenocrysts in Lynn and felsic dikes ---

Boojum Rock Tuff – dacitic tuff facies with rare quartz (xenocrysts derived from broken quartzite in Westboro Fm.)



Zbrv - vitric tuff

(----) fiammé zone, top of Zbrl, Melrose to Pinnacle Rocks, dips steeply east Zbrl - lithic crystal tuff facies

Age (Ma): 596.35 + 0.21 (U-Pb CA-TIMS), high in Zbrc east of Boojum Rock

Zbrc – dominant crystal tuff facies, coarsens to east in Malden and Melrose

Zbrr – red crystal tuff in Malden and Melrose

---- Zbrc rests unconformably on Zsg north of Boojum Rock and Zvwq at Pine Banks Park ----

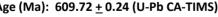
Dedham Complex (Neoproterozoic).



Spot Pond Granodiorite – coarse granodiorite to granite with abundant Zvwq xenoliths Ages (Ma): 609.46 + 0.18 (U-Pb CA-TIMS) - Red Cross Path; 609.11 + 0.22 (U-Pb CA-TIMS) South of Spot Pond; 609.08 + 0.24 (U-Pb CA-TIMS) - Doleful Pond



Winchester Granite - equigranular medium granite with relatively high mafic content. Plagioclase subordinate or equal to alkali feldspar.





Dark red to tan porphyritic rhyolite dikes west of Spot Pond – in Zsg, Zwg and Znpm, several Neoproterozoic ages possible. At Wenepoykin Hill red dikes crosscut Zsg and are crosscut by Zrhp.

Quartz Diorite Xenoliths in Zwg -

medium-grained quartz diorite



Age (Ma): 609.72 + 0.24 (U-Pb CA-TIMS)



xenoliths (uncertain source and age). **Zfi** – felsite xenoliths in Zsg , unknown source and age.

Alkali granite - alkali granite zones/xenoliths in the Dedham Complex (in both Zsg and Zwg). Uncertain origin and age.

conglomerate and sandstone and dark argillite with Westboro Fm. clasts.

---- Units below intruded by Zsg and Zwg ----

Nanepashemet Formation – mostly hydrothermally altered (baked) basalt and basaltic tuff with basaltic breccias and conglomerates. Basal red

---- Angular Unconformity overlain by basal breccia/conglomerate of the Nanepashemet Formation along Molly's Spring Rd.) ----

----- period of low-grade regional metamorphism -----



Zvwq

Znpm

Westboro Formation in Whip Hill area - non-metamorphosed laminated mudstone, fine sandstone, and mass flow units with quartz sandstone olistoliths. Not regionally metamorphosed. Isolated in a separate fault block. Intruded by ap and fq dikes. Neoproterozoic. Max. Age: < 910 Ma (LA-ICPMS, 210 detrital zircon grains, quartz sandstone olistolith)

Westboro Formation in Virginia Wood and west of Spot Pond – metamorphosed at a low grade and sheared, quartzite and argillite with calcium/magnesium silicate intervals. Max. Age: < 912 ± 0.6 Ma (U-Pb CA-TIMS youngest detrital zircon)

Westboro Fm.

Dedham Complex

(609-610 Ma)

< 912 Ma