

**Table. Listing of all radiometric ages from bedrock units in the Middlesex Fells Reservation - version February 17, 2024**

Sample Name	Unit Name	Map Symbol	Rock Type	Location	Method	Age (Ma)	Notes on related units	Reference
<b><i>Dikes</i></b>								
none	dolerite dike	d	dolerite	west side of Bear Hill along Rt. 93 in Stoneham	K-Ar whole rock	290 ± 15	cuts through Stoneham Granodiorite	Zartman (1970)
dike 40	dolerite dike	d	dolerite	west of Bellevue Pond in Medford	<sup>40</sup> Ar/ <sup>39</sup> Ar whole rock	226 ± 3	cuts through Lynn Volcanic Complex	Ross (2021)
dike 33	dolerite dike	d	dolerite	Pine Hill in Medford	<sup>40</sup> Ar/ <sup>39</sup> Ar whole rock	353 ± 4	cuts through Lynn Volcanic Complex	Ross (2001, 2021)
dike 37	dolerite dike	d	dolerite	Pine Hill in Medford	<sup>40</sup> Ar/ <sup>39</sup> Ar whole rock	573 ± 5	cuts through Lynn Volcanic Complex	Ross (2001, 2021)
dike G	gabbro dike	gb	gabbro	Middle Hill in Medford	<sup>40</sup> Ar/ <sup>39</sup> Ar whole rock	403 ± 3	cuts through Lynn Volcanic Complex	Ross (2001, 2021)
none	Medford Dike		gabbro	west side of Pine Hill in Medford	K-Ar biotite	190 ± 6	cuts through Spot Pond Granodiorite, Lynn Volcanic Complex and Lawrence Woods Granophyre	Ross (1981, 1990, 2001, 2021)
dike 22	Medford Dike	T <sub>RM</sub>	gabbro	west side of Pine Hill in Medford	<sup>40</sup> Ar/ <sup>39</sup> Ar biotite	304.4 ± 0.6	cuts through Lynn Volcanic Complex and Lawrence Woods Granophyre	Ross (2020, 2021)
11559	Medford Dike	T <sub>RM</sub>	gabbro	west side of Pine Hill in Medford	zircon CA-ID-TIMS U-Pb	238.07 ± 0.09 (6 zircons)	cuts through Lynn Volcanic Complex and Lawrence Woods Granophyre	NEW
<b><i>Volcanic units</i></b>								
RH1625	Straw Point Volcanic Complex	Zspr	banded rhyolite flow	northeast corner Middle Reservoir in Stoneham	LA-ICPMS U-Pb, 17 zircons	601.2 ± 5.6	overlies unconformity on Winchester Granite and Nanepashemet Formation	Hamilton (2017)
RH1625	Straw Point Volcanic Complex	Zspr	banded rhyolite flow	northeast corner Middle Reservoir in Stoneham	zircon CA-ID-TIMS U-Pb	594.70 ± 0.32 (5 zircons), same sample as above	overlies unconformity on Winchester Granite and Nanepashemet Formation	Francis MacDonald (pers. comm.)
10421	Straw Point Volcanic Complex	Zspr	banded rhyolite flow	northwest corner of Spot Pond in Stoneham	zircon CA-ID-TIMS U-Pb	595.27 ± 0.34 (4 zircons)	interlayered with basalt, intruded by Stoneham Granodiorite	NEW
F1512	Lynn Volcanic Complex	Zwh	banded rhyolite flow	Wamosett Hill in Stoneham	zircon CA-ID-TIMS U-Pb	595.82 ± 0.23 (5 zircons)	unconformably overlies Westboro Fm.	Francis MacDonald (pers. comm.)

RH1601	Boojum Rock Tuff Member of Lynn Volcanic Complex	Zbrc	dacitic crystal tuff	southeastern Fells near Hemlock Pool in Medford	LA-ICPMS U-Pb, 42 zircons	602.1 ± 3.9	unconformably overlain by younger units in the Lynn Volcanic Complex, unconformably overlies Spot Pond Granodiorite	Hamilton (2017)
725BN	Boojum Rock Tuff Member of Lynn Volcanic Complex	Zbrc	dacitic crystal tuff	southeastern Fells near Pinnacle Rock in Medford	zircon CA-ID-TIMS U-Pb	596.35 ± 0.21 (6 zircons)	unconformably overlain by younger units in the Lynn Volcanic Complex, unconformably overlies Spot Pond Granodiorite	NEW

***Plutonic units***

10958	Stoneham Granodiorite	Zst	tonalite to granodiorite	along Pond Street near Rt. 93 in Stoneham	zircon CA-ID-TIMS U-Pb	595.14 ± 0.17 (6 zircons)	intrudes Straw Point Volcanic Complex, Nanepashemet Fm., and Westboro Fm., abundant basalt and quartzite xenoliths	NEW
MT95-1	subvolcanic phase of Lynn Volcanic Complex		granophyric porphyry	Castle Hill, Saugus	zircon CA-ID-TIMS U-Pb	595.8 ± 1.2 Ma	in the Middlesex Fells this is similar to the Lawrence Woods Granophyre but younger	Thompson et al., 2007
11555	unamed gabbro	Zdg	hornblende gabbro	between South Reservoir and South Border Road in Medford	zircon CA-ID-TIMS U-Pb	596.02 ± 0.32 (5 zircons)	intrudes Westboro Fm. on its north side and cut by major E-W fault on its south side	NEW
10969	Rams Head Porphyry	Zrhp	tonalite porphyry	between South Reservoir and South Border Road in Medford	zircon CA-ID-TIMS U-Pb	596.24 ± 0.21 (6 zircons)	intrudes Spot Pond Granodiorite	NEW
10478	Lawrence Woods Granophyre	Zlwg	subvolcanic granophyric granite	north side of Elm St. south of Wrights Pond in Medford	zircon CA-ID-TIMS U-Pb	2 populations - older inherited: 3 zircons, 598.13 ± 0.27; younger: 3 zircons, 596.77 ± 0.54	intrudes Lynn Volcanic Complex in southern Fells	NEW
10516	Lawrence Woods Granophyre	Zlwg	subvolcanic granophyric granite	southeast corner of Pine Hill along Rt. 93 exit ramp in Medford	zircon CA-ID-TIMS U-Pb	596.50 ± 0.53 (3 zircons), 3 other zircons had much older cores	locally intrudes Lynn Volcanic Complex in southern Fells and is subvolcanic.	NEW
10409	Spot Pond Granodiorite	Zsg	coarse granite	near east end of Doleful Pond in Stoneham	zircon CA-ID-TIMS U-Pb (5 zircons)	609.08 ± 0.24 (5 zircons)	intruded by Stoneham Granodiorite, Dedham North Granodiorite of Smith and Hon (1984) and Smith (1985)	NEW

SP700	Spot Pond Granodiorite	Zsg	coarse granodiorite	near Red Cross Path/Mud Road intersection in Medford	LA-ICPMS U-Pb, 38 zircons	602.2 ± 4.4	contains large Westboro Fm. inclusions and rare felsic volcanic inclusions, part of Dedham Complex, Dedham North Granodiorite of Smith and Hon (1984) and Smith (1985)	Francis MacDonald (pers. comm.)
SP700	Spot Pond Granodiorite	Zsg	coarse granodiorite	near Red Cross Path/Mud Road intersection in Medford	zircon CA-ID-TIMS U-Pb	609.45 ± 0.25 (5 zircons), same sample as above	contains large Westboro Fm. inclusions and rare felsic volcanic inclusions, part of Dedham Complex, Dedham North Granodiorite of Smith and Hon (1984) and Smith (1985)	Francis MacDonald (pers. comm.)
11368	Spot Pond Granodiorite	Zsg	coarse granodiorite	between Spot Pond and Wrights Pond	zircon CA-ID-TIMS U-Pb	609.11 ± 0.22 (6 zircons)	contains large Westboro Fm. inclusions, part of Dedham Complex, intruded by Rams Head Porphyry and Lawrence Woods Granophyre, Dedham North Granodiorite of Smith and Hon (1984) and Smith (1985)	NEW
RH1627	Winchester Granite	Zwg	medium granite	east of Long Pond in Winchester	LA-ICPMS U-Pb, 40 zircons	605.7 ± 3.3	intrudes Nanepashemet and Westboro Formations	Hamilton (2017)
RH1627	Winchester Granite	Zwg	medium granite	east of Long Pond in Winchester	zircon CA-ID-TIMS U-Pb	609.72 ± 0.24 (4 zircons), same sample as above	intrudes Nanepashemet and Westboro Formations	Francis MacDonald (pers. comm.)

***Sedimentary and Metasedimentary units***

11355	Westboro Fm. on Whip Hill	Zwp	quartz sandstone olistolith	northern Whip Hill in Stoneham	LA-ICPMS U-Pb, 250 zircons	youngest zircon age: <910 Ma	sample from sandstone olistolith	NEW
MT96-3	Westboro Fm. Near Breakheart Reservation		quartzite	east of Middlesex Fells in Saugus	LA-ICPMS U-Pb, 102 zircons	youngest zircon age: 912 Ma	intruded by Dedham Complex	Thompson et al., 2012
F1510	Westboro Fm. in Virginia Wood	Zvwq	quartzite	east side of Pond Street north of Woodland Road intersection in Stoneham	LA-ICPMS U-Pb, 40 zircons, youngest zircon CA-ID-TIMS	youngest zircon age: 912 ± 0.6 Ma	intruded by Spot Pond Granodiorite further south	Francis MacDonald (pers. comm.)

**Notes: All new ages and ages reported from MacDonald are U-Pb zircon ages measured at the Isotope Geology Laboratory at Boise State University, Boise, Idaho with 95%**

**References:**

Hampton, R., 2017, The Middlesex Fells Volcanic Complex: A revised tectonic model based on geochronology, geochemistry, and field data: Undergraduate senior thesis, Harvard University, Cambridge, Massachusetts, 115 p.

- Ross, M.E., 1981, Mafic dikes of northeastern Massachusetts, *in* Boothroyd, J.C. and Hermes, O.D., eds., Geological field trips in Rhode Island and adjacent areas: 73rd Annual New England Intercollegiate Geologic Conference Guidebook: Kingston, University of Rhode Island, p. 285-302.
- Ross, M.E., 1990, Mafic dikes of the Avalon Boston terrane, Massachusetts, *in* Socci, A.D., Skehan, J.W., and Smith, G.W., eds., Geology of the composite Avalon terrane of southern New England: Boulder, Colorado, Geological Society of America Special Paper 245, p. 133-153.
- Ross, M.E., 2001, Igneous petrology of the Pine Hill area, Medford, Massachusetts, *in* West, D.P., Jr. and Bailey, R.H., eds., Guidebook for Geological Field trips in New England: 2001 Annual Meeting of the Geological Society of America, Boston, Massachusetts, p. M-1 to M-25
- Ross, M.E., 2020, The petrology and age of the Medford dolerite dike, Medford, Massachusetts: Dept. of Marine and Environmental Sciences, Northeastern University, Open File Report no. 3, 55 p. <https://doi:10.13140/RG.2.2.21253.99041>
- Ross, M.E., 2021, Mafic dikes of the Boston metropolitan area, Massachusetts: Northeastern University, Boston, Massachusetts, Open File Report no. 4, 94 p. <https://doi:10.13140/RG.2.2.29116.16000>
- Smith, C.J., 1985, Late Proterozoic Avalonian magmatism north of Boston, eastern Massachusetts: Unpub. Master of Science thesis, Boston College, Chestnut Hill, Massachusetts, 156 p.
- Smith, C.J. and Hon, R., 1984, Geology, petrology and origin of the Precambrian igneous rocks located in the area north of Boston, *in* L.S. Hanson, ed., Geology of the Coastal Lowlands, Boston, MA to Kennebunk, ME: Guidebook of 76th Annual Meeting of the New England Intercollegiate Geologic Conference, p. 292-309.
- Thompson, M.D., Grunow, A.M., and Ramezani, J., 2007, Late Neoproterozoic paleogeography of the southern New England Avalon zone: Insights from U-Pb geochronology and paleomagnetism: Geological Society of America Bulletin, v. 119, no. 5/6, p. 681-696. Doi: 10.11130/B26014.1
- Thompson, M.D., Barr, S.M., and Grunow, A.M., 2012, Avalonian perspectives on Neoproterozoic paleogeography: Evidence from Sm-Nd isotope geochemistry and detrital zircon geochronology in SE New England, USA: Geological Society of America Bulletin, v. 119, no. 5/6, p. 681-696. Doi: 10.11130/B26014.1
- Zartman, R.E., Hurley, P.M., Krueger, H.W. and Giletti, B.J., 1970, A Permian disturbance of K-Ar ages in New England: its occurrence and cause: Geological Society of America Bulletin, v. 81, p. 3359-3374.