

Nye County Early Warning Drilling Program

Summary Lithologic Log

BOREHOLE ID: NC-EWDP-16P

Depth	LITHOLOGY	DESCRIPTION
0		(0-166 feet [ft]) SILTY, CLAYEY SAND WITH GRAVEL (SM/SC): The interval consists primarily of layers of silty, clayey sand with gravel (SM/SC) with a layer of sandy clay (CL) from 67.5 to 75 ft. Fines typically display no plasticity. Gravel clasts are volcanic in origin and subangular to angular from 0 to 5 ft, and rounded to subrounded from 5 to 166 ft. Sediment color is predominantly yellowish brown (10YR 5/4) to reddish brown (5YR 4/4), very dark gray (N3), dark gray (N4), and dark grayish brown (10YR 4/2). No cementation is observed. Sediments react strongly with 10 percent (%) hydrochloric acid (HCl). All samples are dry.
100		
200		(166 to 395 ft) ASH-FLOW TUFF (PRE-AMMONIA TANKS TUFF): The tuff is light brown (5YR 5/6) from 166 to 240 ft, dark yellowish orange (10YR 6/6) from 240 to 360 ft, and moderate orange pink (5YR 8/4) from 360 to 395 ft. The tuff is nonwelded, devitrified, and has an open/porous matrix. The unit is moderately weathered from 166 to 200 ft, slightly weathered from 200 to 240 ft, unweathered from 240 to 300 ft, and slightly weathered from 300 ft to 395 ft. The tuff contains 0 to 3% white (N9), orange pink (5YR 8/4), and pale orange (10YR 8/2) pumice clasts up to 20 millimeters (mm) in diameter with a pumice-rich (i.e., up to 50% pumice) zone from 360 to 370 ft and 1 to 5% reddish brown (10R 3/4) and dusky yellowish brown (10YR 2/2) lithic clasts up to 12 mm in diameter from 165 to 300 ft. The tuff is lithic-rich from 300 to 360 ft, with 5 to 20% variably colored clasts, mostly dusky yellowish brown (10YR 2/2), probably Paintbrush Tuff, up to 20 mm in diameter and up to 3% variably colored lithic clasts up to 10 mm in diameter from 360 to 395 ft. The tuff is phenocryst-poor with up to 1% colorless sanidine, including chatoyant sanidine, up to 3 mm long, up to 1% colorless quartz up to 3 mm in diameter. The interval from 200 to 300 ft contains 1% black and bronze biotite up to 3 mm long. A weak reaction to 10% HCl is observed in the first 5 feet of the unit. All samples are dry. The lower contact is gradational with the underlying ash-flow tuff.
300		
400		(395 to 720 ft) ASH-FLOW TUFF (RAINIER MESA TUFF): The tuff is light brownish gray (5YR 6/1) from 395 to 535 ft and medium light gray to very light gray (N6 to N8) below 535 ft. The tuff is nonwelded, devitrified, and has an open/porous matrix. The upper 5 ft from 395 to 400 ft is argillic and highly weathered; otherwise, the tuff is unweathered. The tuff contains up to 10% light brownish gray (5YR 6/1) to very pale orange (10YR 8/2) to medium light gray (N6) and very light gray (N8) angular and partially vitric pumice up to 12 mm in diameter, and 1 to 5% predominantly moderate brown (5YR 3/4) to grayish black (N2) lithic clasts up to 20 mm long. The unit is phenocryst-poor and has less than 2% feldspar, 1% quartz, and rare biotite. Samples show no reaction to 10% HCl. Moisture is noted from 405 to 410 and 480 to 495 ft. All samples are wet after 535 ft. The base of the unit is in sharp contact with the underlying ash-flow tuff.
500		
600		
700		
800		(720 to 876 ft) ASH-FLOW TUFF (RAINIER MESA TUFF): The tuff unit is composed of 3 subunits. Overall, the tuff is moderately weathered from 720 to 760 ft, highly weathered from 760 to 780 ft, moderately to slightly weathered from 780 to 795 ft, and fresh below 795 ft. The upper subunit from 720 to 762 ft is dark yellowish brown (10YR 2/2) to light brown (5YR 5/6) and nonwelded with an open/porous, altered matrix. Pumice clasts are replaced by cryptocrystalline silica. The upper subunit also contains 20% light brownish gray (5YR 6/1) pumice up to 20 mm in diameter, up to 5% variably colored lithic clasts up to 3 mm in diameter, 1% feldspar phenocrysts up to 2 mm long, 1% quartz phenocrysts up to 3 mm in diameter, and no mafic minerals. The middle subunit from 762 to 780 ft is pale reddish brown (10R 5/4) and consists of a clayey, matrix-supported, crystal ash tuff with no observed pumice or lithic clasts. It contains 15 to 20% feldspar phenocrysts up to 5 mm long and 15 to 20% quartz phenocrysts up to 2 mm in diameter. The matrix is intensely clay altered or argillized, and this subunit may represent a paleosol horizon. The lower subunit from 780 to 876 ft is a pale yellowish brown (10YR 6/2), homogeneous, nonwelded, devitrified, pumiceous tuff, with most of the pumice and lithic clasts completely to partially weathered out, imparting the tuff with a distinctive porous texture. This subunit also has an open, porous matrix. The lower section is phenocryst-poor, with no observed feldspar, 1% quartz phenocrysts, and rare mafics. Samples show no reaction to 10% HCl. The lower contact is sharp with the underlying ash-flow tuff.
900		
1000		(876 to 1,065 ft) ASH-FLOW TUFF (TIVA CANYON TUFF): The tuff color ranges from grayish brown (5YR 3/2) to moderate brown (5YR 3/4). Color changes correspond approximately with changes in the degree of welding and the presence or absence of vapor-phase alteration. The tuff unit has a dense/non-porous matrix and a generally fresh and unweathered appearance. The zones are as follows: 876 to 900 ft (UPPER LITHOPHYSAL ZONE): The zone is grayish brown (5YR 3/2), moderately welded, vapor-phase altered, and crystal-poor. The zone contains 1% predominantly sanidine feldspar phenocrysts, rare quartz phenocrysts, 1% bronze biotite, and rare very pale orange (10YR 8/2) pumice clasts up to 4 mm in diameter. Vapor-phase mineralization fills lithophysal cavities and coats grain surfaces. 900 to 1,000 ft (MIDDLE NONLITHOPHYSAL ZONE): The zone is moderate brown (5YR 3/4), densely welded, devitrified, and crystal-poor. The zone contains 1% feldspar phenocrysts, rare quartz phenocrysts, and trace mafic minerals; rare medium light gray (N6) lithic clasts that are less than 4 mm in diameter; and no observed pumice clasts. 1,000 to 1,020 ft (LOWER LITHOPHYSAL ZONE): The zone is moderate brown (5YR 3/4), densely welded, vapor-phase altered, and crystal-poor. The zone contains 1% feldspar phenocrysts, rare medium light gray (N6) pumice clasts up to 20 mm in diameter, no observed quartz phenocrysts or mafic minerals, and no observed lithic clasts. Vapor-phase alteration occurs as thick grain coatings. Lithophysae are poorly developed. 1,020 to 1,045 ft (BASAL VITROPHYRE): The zone is moderate brown (5YR 3/4), densely welded, and vitric with spherulitic texture below 1,026 ft. Phenocrysts are rare and pumice clasts are vitric. The contact between the overlying devitrified zone and this vitric zone is gradational with the matrix becoming more vitric with depth. This lower vitric zone is poorly developed. The dark translucent glass typical of vitrophyres is altered and appears to be incipiently devitrified. 1,045 to 1,065 ft (NONWELDED BASAL ZONE): The zone is moderate brown (5YR 3/4), nonwelded, devitrified, and crystal-poor, with rare feldspar phenocrysts, no observed quartz phenocrysts, and no mafic minerals. The lower interval in this zone is similar in texture and color to the nonwelded basal zone at 27P from 349 to 355 ft, but lacks the well-developed glass shards. The lower contact is sharp with the underlying ash-fall tuff.
1100		
1200		(1,065 to 1,080 ft) ASH-FALL TUFF (PRE-TIVA CANYON TUFF): The tuff is moderate yellowish brown (10YR 5/4), nonwelded, vitric, weathered, and has an open/porous matrix. The tuff contains up to 30% yellowish gray (5Y 7/2) to moderate orange pink (5YR 8/4) pumice clasts less than 3 mm in diameter, 1% dusky brown (5YR 2/2) angular lithic clasts 5 to 10 mm long, and 1% sanidine feldspar. Quartz phenocrysts and mafic minerals are not observed. The rock is in sharp contact with the underlying ash-flow tuff.
1300		
1400		(1,080 to 1,810 ft) ASH-FLOW TUFF (TOPOPAH SPRING TUFF): The tuff color is variable and related to changes in the degree of welding and presence or absence of vapor-phase alteration. The degree of welding and vapor-phase alteration defines each subzone. The unit is predominantly devitrified, with zones of intense vapor-phase alteration. The matrix is dense, and nonporous except in the nonwelded zones. The zones are as follows: 1,080 to 1,085 ft (UPPER NONWELDED ZONE): The zone is moderate yellowish brown (10YR 5/4), nonwelded, pumice-rich with 10% altered, white (N9) pumice clasts, and lithic-poor with 1% multi-colored lithic clasts. 1,085 to 1,115 ft (CAPROCK ZONE): The zone is composed of dark reddish brown (10R 3/4), densely welded, and devitrified glass and contains 30% white (N9) to moderate orange pink (10R 7/4) pumice clasts less than 3 mm long, 15 to 20% feldspar phenocrysts up to 2 mm long, 15 to 20% quartz phenocrysts, and sparse biotite. 1,115 to 1,175 ft (UPPER NONLITHOPHYSAL ZONE): The zone is pale brown (5YR 5/2) in the upper section and grades downward to light brown (5YR 5/6) below 1,150 ft. Welding increases with depth from weak to moderate at 1,150 ft to dense at 1,155 ft. The upper section from 1,115 to 1,150 ft is crystal- and pumice-poor; the lower section from 1,150 to 1,175 ft is crystal-rich with 5% feldspar phenocrysts up to 2 mm long and 2% quartz phenocrysts up to 2 mm in diameter. 1,175 to 1,330 ft (UPPER LITHOPHYSAL ZONE): The zone is light brown (5YR 5/6), moderate to densely welded, and devitrified. Lithics and pumice are absent, except in the lower part of the interval from 1,300 to 1,330 ft, which contains 1% moderate brown (5YR 3/4) lithic clasts up to 5 mm in diameter. The zone is crystal-poor, with less than 2% combined feldspar and quartz phenocrysts. The zone is intensely vapor-phase altered. Vapor-phase mineralization coats cavities, alters pumice clasts, and extends outward into the groundmass. Lithophysae are not observed in drill cuttings. 1,330 to 1,400 ft (MIDDLE NONLITHOPHYSAL ZONE): The zone is grayish orange pink (5YR 7/2), moderately to densely welded, and crystal-poor. There is little to no pumice present and vapor-phase alteration is absent to minor (i.e., less than 1%). 1,400 to 1,595 ft (LOWER LITHOPHYSAL ZONE): The zone is mottled moderate brown (5YR 4/4) and medium gray (N5), moderately to densely welded, and crystal-poor. The interval is intensely vapor-phase altered. The tuff contains rare altered pumice the same color as the matrix; rare medium gray (N5) angular lithic clasts up to 4 mm long, a few of which are glassy; 1% feldspar phenocrysts with sanidine predominating; and 1% quartz phenocrysts from 1,400 to 1,440

