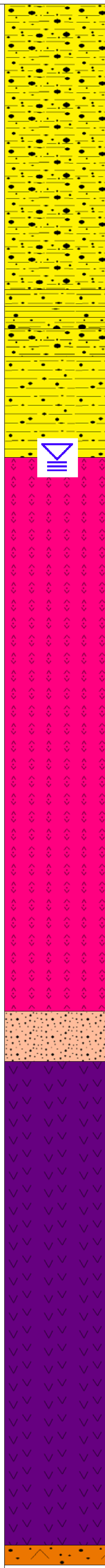
Summary Lithologic Log for NC-EWDP-24PB

Depth (1in:100ft)	Lithology	Description



Depth scale: 0, 100, 200, 300, 400, 500, 600, 700, 800, 900, 1000, 1100, 1200, 1300, 1400

(0 to 255 feet [ft]) WELL-GRADED SAND WITH SILT AND GRAVEL (SW-SM):
Unit consists of a thick sequence of well-graded sand with silt and gravel (SW-SM). The sequence contains occasional thin layers of well-graded gravel (GW). The gravel layers are predominantly less than 5 ft thick but are as thick as 7.5 ft at 87.5, 137.5, and 207.5 ft. The first appearance in the borehole of basalt gravel clasts occurs at 17.5 ft. From 70 to 100 ft, basalt clasts constitute from 20 to 50% of the gravel composition. The basalt is black (N 2.5) and vesicular. Below 100 ft gravel clast lithology is dominated by ash-flow tuff. Sediment color ranges from light reddish brown (5YR 6/3) to dark yellowish brown (10YR 4/2) from 0 to 170 ft. From 170 to 255 ft the color is predominantly brown (7.5YR 5/3). Gravel content decreases with depth: from 0 to 220 ft, gravel content ranges from 16 to 79%; from 220 to 255 ft gravel content ranges from 6 to 41%. Fines are nonplastic from 0 to 220 ft and display low plasticity from 220 to 255 ft. Gravels are predominantly volcanic in origin but rounded sandstone gravel clasts are present from 232.5 to 250 ft and constitute 1 to 5% of the gravel clasts. Overall, gravel shape is subangular from 0 to 172.5 ft and subrounded from 172.5 to 255 ft. Sediments are noncemented. Sediments react strongly to 10% hydrochloric acid (HCl) from 0 to 45 ft, show no reaction from 45 to 167.5 ft, and display a weak reaction from 167.5 to 255 ft. Samples that were not impacted by drilling water were dry, however, moisture was noted at 185 ft that was believed to be natural.

(255 to 270 ft) SILTY SAND WITH GRAVEL (SM):
Interval is a thin, homogeneous sequence of silty sand with gravel (SM). Sediment color is brown (7.5YR 5/3). Plasticity of fines ranges from low to high. Gravels are volcanic in origin and predominantly subangular. Sediments are noncemented. Sediment reaction to 10% HCl ranges from weak to strong. All samples were dry.

(270 to 290 ft) CLAYEY SAND WITH GRAVEL (SC) AND WELL-GRADED SAND WITH CLAY AND GRAVEL (SW-SC):
This thin unit consists of clayey sand with gravel (SC) from 270 to 280 ft and well-graded sand with clay and gravel (SW-SC) from 280 to 290 ft. Gravels increase with depth from 12% at the top of the sequence to 33% at the base. Sediment color is brown (7.5YR 5/3). Fines in the interval display high plasticity. Gravels are volcanic in origin and subangular. The sediments are noncemented and display strong reaction to 10% HCl. All samples were moist.

(290 to 315 ft) WELL-GRADED SAND WITH SILT AND GRAVEL (SW-SM):
Unit is a thin, homogeneous sequence of well-graded sand with silt and gravel (SW-SM). Sediment color is brown (7.5YR 5/3). Plasticity of the fines in the sequence is low, except at the base from 310 to 315 ft where the sediment is nonplastic. Gravels are volcanic in origin and range in shape from subrounded to subangular. Sediments are noncemented. Sediment reaction to 10% HCl is strong from 290 to 297.5 ft and weak from 297.5 to 315 ft. Most of the samples were moist.

(315 to 405 ft) SILTY SAND WITH GRAVEL (SM) AND CLAYEY SAND WITH GRAVEL (SC):
Predominantly a thick sequence of silty sand with gravel (SM) with 3 minor layers of clayey sand with gravel (SC). The layers of clayey sand with gravel are thin (less than 5 ft thick) and occur at 317.5, 332.5, and 377.5 ft. One layer of well-graded sand with silt and gravel (SW-SM) occurs from 357.5 to 360 ft and contains the highest percentage of gravel (33%) in the interval. An ashy matrix is present below 350 ft. Sediment color is brown (7.5YR 5/3) with the exception of the basal 7.5 ft from 397.5 to 405 ft where the color is dark brown (10YR 3/3). Plasticity of fines is high in the top of the sequence from 315 to 335 ft, and low to moderate from 335 to 405 ft. Gravels are volcanic in origin and consist of only a few lithic types below 350 ft. The gravels are subangular in shape. The sediment is noncemented and displays a strong reaction to 10% HCl. The samples were moist from 315 to 325 ft and dry from 325 to 405 ft.

(405 to 900 ft) ASH-FLOW TUFF (BULLFROG TUFF [Tcb]):
Tuff is predominantly moderate red (5YR 4/6) with color variations occurring in the upper and lower section of the unit. From 405 to 465 ft the tuff is pale red (5YR 6/2) and below 770 ft the color ranges from dark reddish brown (5YR 3/3) to moderate red (5YR 5/6) to yellowish red (5YR 5/8). The tuff is devitrified and variably welded. It is nonwelded from 405 to 460 ft, moderately welded from 460 to 700 ft and from 830 to 850 ft, densely welded from 700 to 830 ft, and weakly welded from 850 to 900 ft. Tuff matrix is open/porous from 405 to 460 ft, and dense/nonporous from 460 to 900 ft. Tuff contains pumice clasts as follows: 1% pale red (10YR 6/2) pumice clasts up to 5 millimeters (mm) in diameter from 405 to 640 ft; 3% light greenish grey (10BG 8/1) pumice clasts up to 1 mm in diameter from 640 to 655 ft; 3 to 15% very pale orange (10YR 8/2) pumice clasts up to 15 mm in diameter from 655 to 795 ft; and 3 to 10% reddish yellow (7.5YR 7/6) pumice clasts up to 10 mm in diameter from 795 to 900 ft. Lithic clasts observed in tuff are: 1 to 4% grayish brown (5YR 3/2) lithic clasts up to 10 mm in diameter from 405 to 565 ft; 1% white (N 9) to medium dark gray (N 4) lithic clasts up to 2 mm in diameter from 565 to 605 ft; 1% variably colored lithic clasts ranging from grayish brown (5YR 3/2) to moderate reddish brown (10R 4/6) to medium light gray (N 6) to medium dark gray (N 4) to reddish brown (2.5YR 4/4) and up to 3 mm in diameter from 605 to 660 ft; 1% medium dark gray (N 4) lithic clasts up to 2 mm in diameter from 660 to 710 ft; and 1 to 3% yellowish red (5YR 4/6) lithic clasts up to 3 mm in diameter from 710 to 900 ft. Tuff also contains: 1 to 5% colorless feldspars up to 4 mm in length; 2 to 5% very light gray (N 8) quartz phenocrysts up to 4 mm in diameter; 1 to 3% greenish black (5GY 2/1) and black (N 2.5) biotite up to 3 mm in length and rare hornblende. Tuff does not react to 10% HCl except where calcite fracture-fill is present. All samples were wet. The lower contact with the underlying sedimentary rock is sharp.

(900 to 945 ft) SANDSTONE (PRE-BULLFROG SEDIMENTARY ROCKS):
Dark brown (7.5YR 3/2) conglomeratic sandstone from 900 to 915 ft grading into very pale brown (10YR 7/3) fine volcaniclastic sandstone from 915 to 945 ft. Conglomeratic section contains rounded volcanic pebbles, and siltstone and sandstone clasts. The sandstone is argillic (or zeolitic) with poorly developed rounding of grains and contains very soft volcaniclastic clasts and hard siltstone clasts. Rock displays no reaction to 10% HCl. All samples were wet.

(945 to 1,377 ft) ASH-FLOW TUFF (TRAM TUFF [Tct]):
Tuff is variable in color and ranges from reddish yellow (5YR 7/6) from 945 to 1,140 ft, pink (7.5YR 7/3) from 1,140 to 1,160 ft, pale brown (10R 6/3) from 1,160 to 1,285 ft, pale yellow (2.5Y 7/3) from 1,285 to 1,355, and pale yellow (5Y 7/3) from 1,355 to 1,377 ft. Tuff is devitrified, has an open/porous matrix and is nonwelded. From 945 to 1,005 ft the tuff is highly weathered and from 1,005 to 1,377 ft the tuff is unweathered. Tuff contains pumice clasts as follows: 15% moderate orange pink (5YR 8/4) pumice clasts up to 15 mm in diameter from 945 to 965 ft; 1 to 5% reddish yellow (7.5YR 7/6) pumice clasts from 1 to 5 mm in diameter from 965 to 1,130 ft; 4 to 15% very light gray (N 8) pumice clasts from 4 to 10 mm in diameter from 1,130 to 1,220 ft; 1 to 2% pumice clasts ranging in color from very light gray (N 8) to pale greenish yellow (10Y 8/1) to light red (10R 6/8) and up to 2 mm in diameter from 1,220 to 1,377 ft. Lithic clasts were observed as follows: 1 to 8% lithic clasts ranging in color from dark to medium gray (N 3 to N 5) to moderate brown (5YR 3/4 to 5YR 4/6) and up to 10 mm in diameter from 945 to 1,150 ft; 10 to 25% dark reddish grey (2.5YR 3/1) lithic clasts up to 5 mm in diameter from 1,150 to 1,260 ft; and 1 to 10 % variably colored lithic clasts up to 5 mm in diameter from 1,260 to 1,377 ft. Tuff also contains: 1 to 2% colorless feldspars up to 2 mm in length from 945 to 1,185 ft; sparse to no feldspars from 1,185 to 1,290 ft; 1 to 2% colorless feldspars up to 2 mm in length from 1,290 to 1,325 ft; no feldspars from 1,325 to 1,377 ft; 1 to 5% colorless to light gray (N 7) quartz phenocrysts up to 2 mm in diameter from 945 to 1,377 ft; and 1 to 2% greenish black (5GY 2/1) to dark grayish black (N 2.5) biotite up to 2 mm in length from 945 to 1,377 ft. One distinctive feature of this unit is the reddish color and softness of the rock locally, due to weathering and possible iron oxide alteration. Below 1,320 ft, argillization of pumice clasts appears to increase and yellowish green quartz becomes the predominant fracture-filling mineral. Another distinctive feature is the presence of red and black siltstone and sandstone fragments, up to 10 mm in diameter, which first appear at 1,005 ft and persist to the bottom of the unit. No reaction to 10% HCl was observed. The lower contact is sharp with the underlying sedimentary rocks. All samples were wet.

(1,377 to 1,395 ft [Total Depth]) VOLCANICLASTIC SEDIMENTARY ROCK (PRE-TRAM SEDIMENTARY ROCKS):
Interbedded calcareous volcaniclastic siltstone, claystone, and fine sandstone. Color ranges from red (10R 4/6) to pale olive yellow (5Y 6/3). Sequence is generally clayey and weathered, and probably consists of interlayered soft claystones, platy fissile olive yellow siltstones and reddish fine sandstones. The sequence is calcareous and samples react strongly to 10% HCl. All samples were wet.