



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NEW ENGLAND - REGION I
1 CONGRESS STREET, SUITE 1100 (HBT)
BOSTON, MASSACHUSETTS 02114-2023

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NCBC DAVISVILLE
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October 22, 2007

Curtis Frye
Dept of the Navy, BRAC PMO Northeast
Code 5090 BPMO NE/CF
4911 South Broad St
Philadelphia, PA 19112-1303

Re: Interim Groundwater Sampling Event 05-April 2007 Results Report for Site 03: Construction Equipment Department, at the former Davisville Naval Construction Battalion Center, North Kingstown, RI dated September 2007

Dear Mr. Frye:

Pursuant to § 7.6 of the Davisville Naval Construction Battalion Center Federal Facility Agreement dated March 23, 1992, as amended (FFA), the Environmental Protection Agency has reviewed the subject documents and comments are below.

GENERAL COMMENTS

Review of the data contained in this report continues to support previously expressed USEPA concerns regarding monitoring of ground water migrating from and across Site 03. These concerns relate to 1), the Navy interpreted direction of ground water flow; 2), the inadequacy of the in-place ground water monitoring well network; and 3), the uncertainty as to the representation of the ground water data obtained from the limited wells currently in-place.

Comment 1: It is clear from review of the ground water elevation data presented that contrary to the Navy statement that "Groundwater in both the deep overburden and bedrock aquifers is interpreted to generally flow to the east, towards Allen Harbor and Narragansett Bay," there is a major, if not the major, component of ground water flow from Site 03 to the southeast towards Site 16. This is clearly demonstrated on Figures 3A and 3B of the Interim Groundwater Sampling Event (IGWSE) Report 05 with flow lines shown on the attached Figures 1 and 2. While there is a component of ground water flow to the east, it is relatively minor compared to the flow to the southeast. As discussed further in the Specific Comments below, the predominant direction of contaminated ground water movement is to the southeast from the highest chlorinated volatile organic compound (CVOC) contaminated well MW03-08D/R.

Further, while the Navy Figure 3A for the deep overburden did not include the ground water elevation from MW Z4-02, the ground water elevation for that deep overburden well measured during the same synoptic ground water elevation measurement round clearly shows that the deep ground water flow direction follows an inflection in the ground water flow patterns. This axis of ground water flow is oriented into the Site 16 area. Therefore, CVOC released at the former Nike PR-58 site, the western boundary of Site 03, or the northwest corner of Site 03 (possibly the vicinity of EA-104 just west of the Site 03 boundary) is likely to migrate to the location of Site 16 following the ground water flow lines from those locations. The ground water flow path from these locations extends over a wide segment of the southeast boundary of Site 03 as shown on the attached Figure 1.

Comment 2: Much has been made by the Navy during previous technical discussions of ground water quality in the southeast portion of Site 03 (especially related to Site 16). The Navy has stated that since no significant CVOC has been detected at EA-110D/R and EA-111D/R that no contamination is migrating in the southeast direction toward Site 16. However, the lack of elevated CVOC detections in the limited number of monitoring wells down gradient to the southeast, specifically EA-110D/R and EA-111D/R does not provide sufficient documentation that contaminant migration to the southeast does not exist. Comment on the robustness of water quality analyses from these wells is provided in the third comment below. However, as the USEPA has noted in previous comments, there is an extreme scarcity of ground water monitoring points in the southeast direction from the western boundary of Site 03.

The preponderance of Site 03 monitoring points is distributed to the east and northeast of the former Nike PR-58 site and the western boundary of Site 03. Only four of the twelve deep overburden wells may be considered in the southeast direction (MW03-10D, possibly MW02-11D, EA-110D/R, and EA-111D/R). The two furthest down gradient monitoring wells EA-110D/R and EA-111D/R are situated approximately 900 feet apart. Ground water flowing from the northwest corner of Site 03 flows directly between these two wells. Further, the ground water flow paths from MW03-08D/R, the Site 03 well with the highest CVOC contamination, is to the southwest of EA-111D/R (and MW03-10D) indicating that contamination leaves the down gradient boundary of Site 03 across an interval longer than 900 feet. During the pore water sampling effort conducted during the same time frame as the sampling for IGWSE Report 05, piezometer PGU-Z3-11, which is located west of EA-111D/R by approximately 600 feet had CVOC detected in excess of 50 micrograms per liter ($\mu\text{g/L}$).

The location of PGU-Z3-11 is down gradient from the location of the former Nike PR-58 site release area as well as MW03-08D/R. While this well is a shallow piezometer with a short 2.5 foot well screen set from 14 to 16.5 feet below the ground surface, review of the log for this piezometer did not indicate refusal at the bottom of the borehole depth of 18 feet. Blow counts were no higher than 5 blows per six inches. The photo ionization detector (PID) reading was still increasing from 0.5 parts per million just below the water table to 10.7 parts per million (ppm) at 15 to 17 feet below the ground surface. Therefore, CVOC contaminated ground water is present in the direction southwest of EA-111D/R at least

in the shallow overburden and likely deeper in the overburden. However, there are no monitoring wells in that area. Overall, there are only two monitoring points (EA-110D/R and EA-111D/R) that monitor ground water exiting the Site 03 area along the southeast boundary of over a quarter mile.

It should also be noted that monitoring well MW03-10D and EA-111D/R do not fully evaluate the weathered rock interval. MW03-10D is screened approximately 3 feet above the inferred competent rock with no monitoring of the weathered rock zone and no bedrock well having been installed at this location. Also, two up gradient wells, MW03-08D/R and MW03-13D/R, while having bedrock well components, have intervals of approximately 7 feet above the bedrock well component for the bottom elevation of the deep overburden well, leaving the weathered bedrock zone unmonitored. A similar situation exists at monitoring well EA-111D/R where there is a 5 foot gap between the overburden well and the top of the competent bedrock. Thus, the existing monitoring wells do not adequately characterize CVOC migration across Site 03.

Comment 3: The fact that only low levels of CVOC have been detected at EA-110D/R and EA-111D/R is not sufficient to interpret that CVOC from the former Nike PR-58 site or Site 03 is not migrating to the southeast toward Site 16. In addition to the significant lateral gap between those two wells (and no monitoring well to the southwest of EA-111D/R) the reliability of the data obtained from EA-110D/R and EA-111D/R is questionable. Inspection of the sampling logs for these wells indicates that their integrity has likely been compromised with influx of ground water from other than the screened interval.

Ground water at Site 03 overall has a pH less than 6.5. The average dissolved oxygen (DO) for deep overburden and bedrock wells is generally around 0.50 milligram per liter (mg/L). As such, a pH value above 7.0 and a DO value above 1.0 mg/L is reason to suspect well integrity. The table below shows the pH and DO values recorded after purging over the five sampling events.

Well	Event 1		Event 2		Event 3		Event 4		Event 5	
	pH	DO	pH	DO	pH	DO	pH	DO	PH	DO
EA-110D	6.9	0.68	7.0	1.78	6.8	2.59	7.4	0.40	7.0	0.29
EA-110R	8.7	0.99	8.9	9.75	8.5	1.30	8.6	0.18	9.0	0.22
EA-111D	6.2	0.57	6.1	24.53	6.4	5.55	6.2	0.49	6.3	1.11
EA-111R	6.4	0.27	11.9	2.09	7.9	3.77	5.9	0.76	6.8	2.35

The pH is in standard units and DO is in milligrams per liter.

In addition, the values were generally higher at the beginning of purging. For IGWSE 05, for instance, EA-110D had a starting pH of 9.29 and EA-111R had a starting pH of 9.13. The dissolved oxygen for all four wells was very high to start, ranging from 7.64 to 11.68 mg/L. While a higher dissolved oxygen level might be expected in a stagnant well at the beginning of purging, this is unusual for the middle interval of a deep overburden or bedrock well.

These elevated values are signs that the groundwater sample is compromised. The elevated pH points to a breach in the well seal resulting in leaching of bentonite or cement into the screened or hole interval. The elevated DO suggests more oxygenated shallow ground water entering the screened interval, which if less contaminated would result in diluting the sample to be collected from depth. In addition to these two water quality parameters, the sample log notes that groundwater from EA-110D was continuously “cloudy.” Groundwater from EA-111R was described as continuously “tan” after an initial “cloudy, brown.” Nearly all other wells in the Site 03 area describe the water as “clear.”

MW16-55D/R/R2

While not part of the Site 03 monitoring program it should be noted that the nearby down gradient monitoring well MW16-55D/R/R2 also appears to be compromised. The log for well development recorded elevated pH values of 8.11, 12.52, and 11.48 for those well, respectively. Dissolved oxygen levels were very low at 0.03, 0.11, and -0.04 mg/L, respectively. The sampling log recorded elevated pH values of 8.08, 11.12 and elevated DO levels of 1.12 and 3.30 mg/L for MW16-55D and R, respectively. No data was available for MW16-55R2. As a result, in addition to being off the axis of ground water flow from Site 03, the quality of data from this location is also suspect.

Specific Comments

Comment 1: *Page 1-3, Section 1.3, 2nd Paragraph:* The statements in this paragraph are incorrect and misleading. Specifically, the Navy judges the CVOC source to be on the former Nike PR-58 site. While a source does exist at that location, it is clearly not the only source at Site 03 or just off of the Site 03 boundaries. In particular, it is not clear that a source does not exist at the northwest corner of Site 03 or just across the boundary at the location of EA-104D/R. Also, the statement that studies on the Nike PR-58 site shows “the main plume moving east toward the adjacent Navy property (designated as Parcel 7). A branch of the plume has been determined to extend to the north, beyond the Navy property line, towards private residences identified as having private wells” is not correct. The Navy has only to look at its own ground water contours for the Site 03 deep overburden and bedrock ground water to see that the primary direction of ground water flow is to the southeast from the former Nike PR-58 site and the western and northwestern areas of Site 03. The Navy Figures 3A and 3B with ground water flow paths superimposed are attached as Figures 1 and 2 of this technical document review.

Comment 2: *Page 1-4, 1st Paragraph:* While data is provided regarding polychlorinated biphenyl’s (PCB) and total petroleum hydrocarbons (TPH), no data is provided on residual chlorinated volatile organic compounds. The cleanup limit for TPH is relatively high at 300 ppm. Were soils tested for CVOC? If so, similar data should be provided.

Comment 3: *Page 1-5, Section 1.5, 2nd Paragraph:* The monitoring wells installed and monitored as part of this IGWSP do not effectively assess the contribution of CVOC from the former Nike PR-58 site to the

Site 03 area. As shown on Figures 1 and 2 attached, groundwater flow from the former Nike PR-58 site source area and the western boundary of Site 03 migrates in a southeastern direction. Monitoring well distribution at Site 03 is weighted to the north and northeast in the Site 03 area.

Comment 4: *Page 1-6, Section 1.5, 3rd Paragraph, Last Sentence:* The selected wells do not “continue to document the character and extent of the plume beneath the Navy property.” There is a large area of the southern half of Site 03, where the bulk of the ground water flow is occurring that is only marginally monitored (Figures 1 and 2). This constitutes a data gap in Site 03 monitoring. The exiting ground water monitoring well network is biased toward the northern half of the Site 03 area and is inadequate to assess the character and extent of the CVOC plume migrating beneath the southern half of Site 03.

Comment 5: *Page 2-1, Section 2.1, Last Sentence:* The statement “Groundwater in both the deep overburden and bedrock aquifers is interpreted to generally flow to the east, towards Allen Harbor and Narragansett Bay” is not supported. Inspection of Figures 3A and 3B of this IGWSE report clearly show the primary direction of groundwater flow to the southeast as shown on the attached Figures 1 and 2.

Comment 6: *Page 2-3, Section 2.4, First Paragraph, First Sentence:* While the duplicate sample analyses suggest that the data quality may be sufficient in regard to field collection and laboratory analytical procedures it is not clear that the data is uniformly of sufficient quality for all wells. In particular, monitoring wells EA-110D/R and EA-111D/R appear to be of substandard integrity as noted in General Comment 3, above. Both of these wells have exhibited elevated pH and/or dissolved oxygen levels during this sampling event and/or past sampling events. These elevated values in contrast with general pH and DO levels for ambient groundwater for Site 03 strongly suggest that the wells are not effectively sealed such that groundwater from intervals outside of the screened zone have entered the well.

Comment 7: *Table 4:* What is the explanation for the elevated pH (7.02) in monitoring well EA-110D and (9.02) in EA-110R and the elevated dissolved oxygen levels (1.11 mg/L) in EA-111D and (2.35 mg/L) in EA-111R?

Comment 8: *Figure 3A:* This figure clearly shows that the predominant direction of groundwater flow from the western boundary of Site 03 and the former Nike PR-58 Site source area is to the southeast. This is in conflict with the Navy statements in the text of the IGWSE Report 5 that flow is generally to the east. The Navy description of groundwater flow directions should be amended to reflect the data presented on this figure. Further, this data supports the USEPA interpretation that the direction of groundwater flow from Site 03 and the former Nike PR-58 site is channeled into the Site 16 area, as shown on the attached Figure 1, which includes the groundwater elevation for monitoring well MW Z4-02 that was taken during this synoptic groundwater elevation measurement event. Figure 1 also shows the approximate location for PGU-Z3-11S which had a detection of over 50 µg/L of CVOC during the pore water sampling event conducted at this time. Therefore, in addition to the in-place wells being inadequate in number and yielding data that may not be representative of groundwater at those locations,

CVOC contamination from the former Nike PR-58 site appears to be migrating to the southwest of monitoring well EA-111D/R.

Comment 9: Figure 3B: The groundwater flow direction in the bedrock is clearly to the southeast as shown by the data presented on this figure. This is in conflict with the Navy statements in the text of this report that flow is generally to the east toward Allen Harbor and Narragansett Bay. The data presented shows that the predominant direction of groundwater flow in the bedrock is to the southeast as shown on Figure 2. The text of the Navy report should be amended to reflect the data that shows the predominant direction of groundwater flow is to the southeast toward Site 16. Additionally, this figure should be amended to remove the dashed groundwater contours to the southwest. There is no data, i.e. bedrock wells, to support the sweeping turn to the south of the dashed contours to the southwest of EA-111R.

Comment 10: Figures 3&4. These figures seem to be about 300 feet off. MW 03-8 and Z3-01 clusters are very close to if not adjacent to the Navy/Army Nike FUDS property line.

Comment 11: Tables 2A and 2B - The notes at the bottom of these tables should include a definition of "NI".

Comment 12: Table 6 - The notes at the bottom of these tables should include a definition of "NR".

Comment 13: Appendix A: What is the explanation for the elevated pH and/or dissolved oxygen concentrations as well as descriptions of "cloudy" or "tan" water shown for monitoring wells EA-110D/R and EA-111D/R? The elevated values suggest that these wells are compromised by poor seals and influx of groundwater other than from the screened interval.

If you have any questions with regard to this letter, please contact me at (617) 918-1384.

Sincerely,



Christine A.P. Williams, RPM
Federal Facilities Superfund Section

cc:

Brian Balukonix, RIDEM
Johnathan Reiner, ToNK
Steven King, RIEDC
Bill Brandon, EPA (via e-mail only)
Steve DiMattei, EPA (via e-mail only)
Kathleen Campbell, CDW (via e-mail only)
Conrad Leszkiewicz, CDW (via e-mail only)
Lee Ann Sinagoga, Tetra Tech NUS, Inc (via e-mail only)

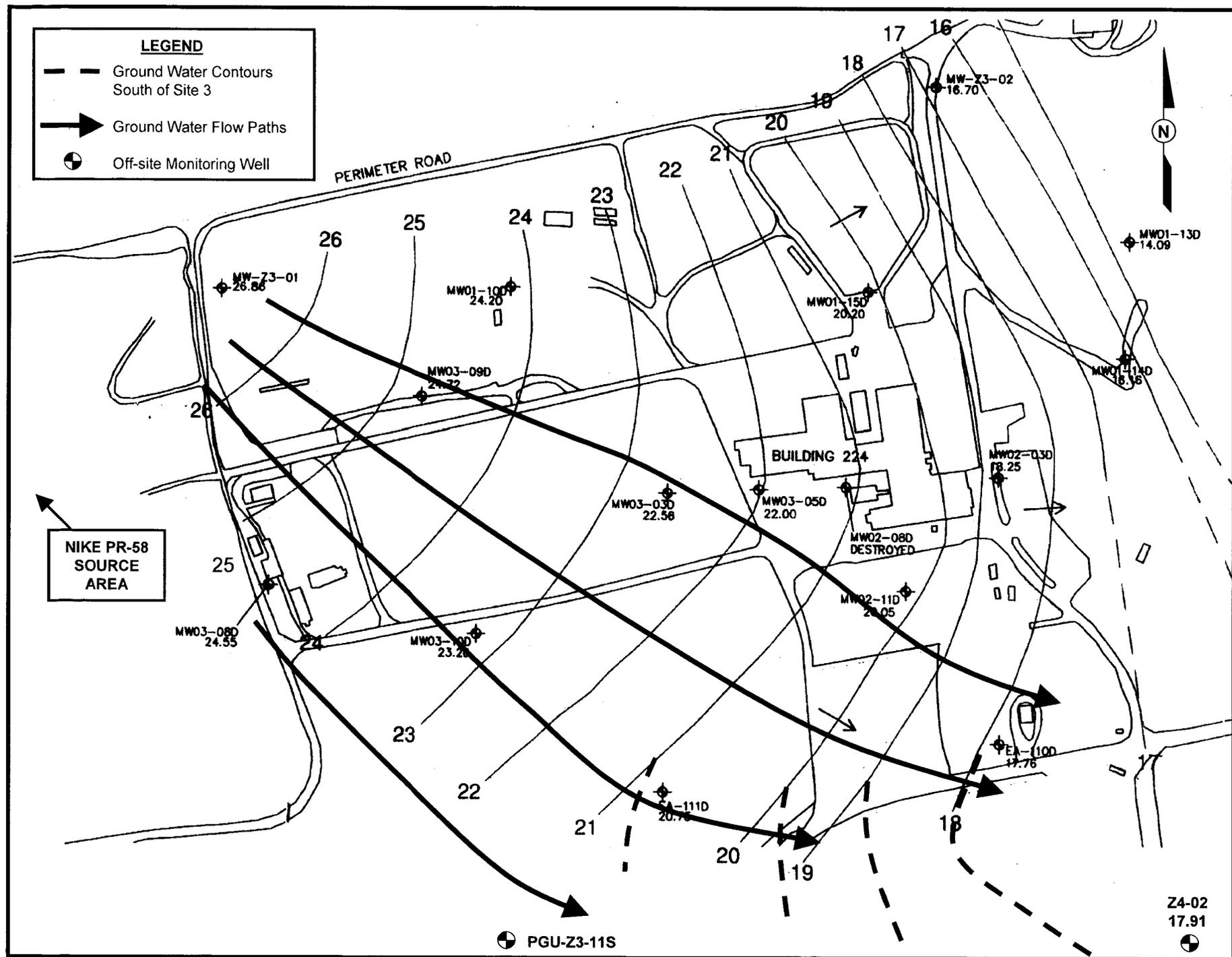


Figure 1. Deep overburden ground water flow direction.

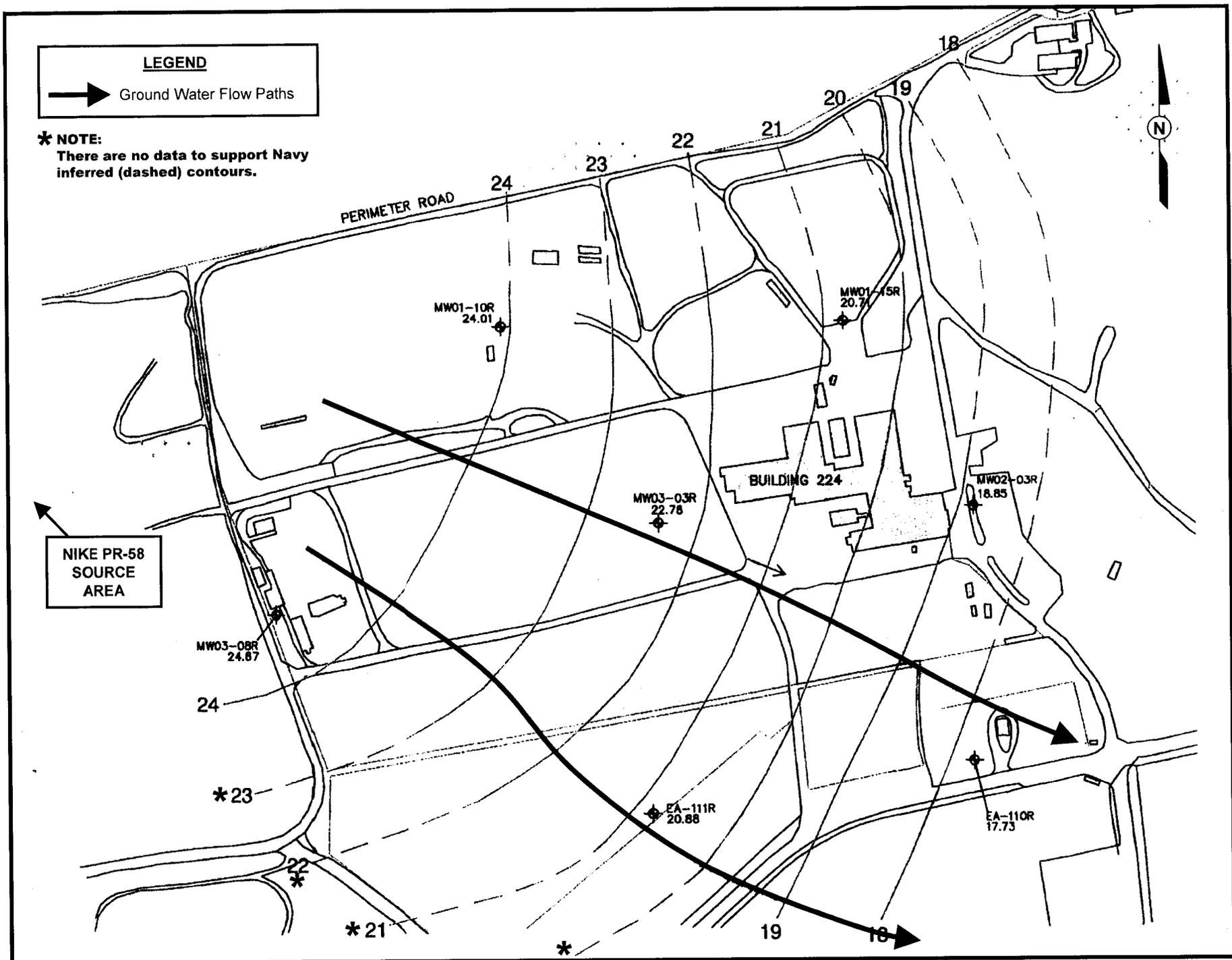


Figure 2. Bedrock ground water flow direction.