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RESPONSE TO COMMENTS
OHIO ENVIRONMENTAL PRTOECTION AGENCY, DIVISION OF EMERGENCY AND REMEDIAL RESPONSE
BACKGROUND MONITORING WELL SELECTION TECHNICAL MEMO
FORMER PLUM BROOK ORDNANCE WORKS, SANDUSKY, OHIO

(Technical Memorandum Dated October 19, 2004)

Reference: Comments received from Ron Nabors (dated November 24, 2004)

Conclusions: **Ohio EPA concurs with Shaw in their choice of a background bedrock monitoring well network. Shaw should review Comments 2 through 3 below to assist them in developing a statistical approach in support of the sitewide GWI at the NPBS.**

Response: Noted.

Comment 1: **For clarification, the purpose of the US Army Corps of Engineers (USACE) Nashville District and Shaw Environmental, Inc. (Shaw) October 19, 2004 technical memorandum is to evaluate and determine the most appropriate background bedrock monitoring well network in support of the sitewide ground water investigation (GWI) at the NASA Plum Brook Station (NPBS). The potential background bedrock wells at the NPBS are PB-BED-MW24, BG8-BEDGW-001, PB-BED-MW25, PB-BED-MW29, PB-BED-MW26, PB-BED-MW20, and PB-BED-MW28 and are located along the western, southwestern, and southern boundary of the entire NPBS. Monitoring well construction details are provided in Table 1 below. Provided below is a brief synopsis of the Shaw evaluation and corresponding Ohio EPA commentary. The evaluation of the wells focused mainly on yield, ground water flow direction, general ground water quality parameters, and the presence of constituents of concern (COCs) associated with the NPBS.**

a. PB-BED-MW24

i. Several nitroaromatics have been detected in the well.
ii. The well is actually downgradient of the West Area Red Water Pond Area of Concern (AOC).

Shaw concludes that this well is not upgradient of former NPBS activities and any analytical data collected from the well is inappropriate to develop a background database. Ohio EPA concurs with this conclusion.

b. BG8-BEDGW-001

i. Nitroaromatics have never been detected in the well.

ii. Several VOCs and SVOCs have been detected in the well where some have also been detected in corresponding QA/QC blanks. The remaining detections were all less than 1 ug/l.

Shaw recommends that this well be included the background bedrock monitoring well network and Ohio EPA concurs.

c. PB-BED-MW25

i. A single nitroaromatic, nitrobenzene, has been detected in the well at very low concentrations; all detected concentrations have been qualified as estimated (J). No other nitroaromatics have been detected in the well suggesting that the nitrobenzene is not site-related but originated from some other source.

ii. Several VOCs and SVOCs have been detected in the well where some have also been detected in corresponding QA/QC blanks. Remaining organic detections are believed to be related to naturally occurring petroleum and gas widely documented in the local shale and carbonate bedrock.

Even though a single nitroaromatic and several organic constituents have been detected in the well, it should not be eliminated for consideration as a background location. One objective of the sitewide GWI is to determine if the NPBS is contributing naturally or non-naturally occurring COCs to the bedrock saturated zone for the purpose of determining potential risk to human health and the environment onsite and downgradient of the facility. The location of the well serves to meet this objective. Also, due to the sheer size of the NPBS facility, it would be difficult to completely characterize upgradient conditions in the bedrock saturated zone and to identify all those potential source areas which could be affecting upgradient ground water quality. The installation of another bedrock well at another background location would delay efforts to generate a background database where similar detections of nitrobenzene and naturally occurring VOCs and SVOCs would probably be observed. Therefore, Ohio EPA concurs with Shaw that PB-BED-MW25 should be incorporated into the background network.

d. PB-BED-MW29

i. Nitroaromatics have never been detected in the well.

ii. Several VOCs and SVOCs have been detected in the well where some have also been detected in corresponding QA/QC

blanks. Remaining organic detections are believed to be related to naturally occurring petroleum and gas widely documented in the local shale and carbonate bedrock.

Ohio EPA concurs with Shaw that this well should be incorporated into the background network for the items noted in 1.c. above.

e. PB-BED-MW26

This well was never fully developed following installation due to very slow recharge. A single sample was collected from the well via bailer but exhibited very high turbidity which skewed analytical results when compared to the other background bedrock monitoring wells. During a meeting held at NPBS on September 11, 2002, NPBS, Shaw, and Ohio EPA agreed that this well would be excluded rom the background network.

f. PB-BED-MW20

i. Several nitroaromatics have been detected in the well.

ii. Several VOCs and SVOCs have been detected in the well where some have also been detected in corresponding QA/QC blanks. Several organic detections are believed to be related to naturally occurring petroleum and gas widely documented in the local shale and carbonate bedrock. The occurrence of natural gas (methane) is especially prevalent at this well as evidenced by bubbling water, accumulated gas escaping around the well cap, and explosive meter measurements reaching maximum limits within the well casing.

iii. Concentrations of dissolved iron and manganese have been observed to be orders of magnitude higher at this well when compared to the other background bedrock wells and are attributed in part to the occurrence of naturally occurring gas.

Ohio EPA concurs with Shaw that this well should not be incorporated into the background network.

g. PB-BED-MW28

i. Nitroaromatics have never been detected in the well.

ii. Several VOCs and SVOCs have been detected in the well where some have also been detected in corresponding QA/QC

blanks. Several organic detections are believed to be related to naturally occurring petroleum and gas widely documented in the local shale and carbonate bedrock.

Ohio EPA concurs with Shaw that this well should be incorporated into the background network. Even though several organics have been detected in the well, the well is located approximately 1200 upgradient of the NPBS property boundary and there is no indication of impacts from NPBS related activities.

Response 1: As listed, OEPA's brief synopsis of Shaw's Background Technical Memorandum is correct. Groundwater from the above identified monitoring wells were used to calculate background groundwater screening concentrations and is presented in the 2004 Groundwater Data Summary and Evaluation Report.

Comment 2: **As previously discussed with Ohio EPA during a September 11, 2002 meeting at NPBS, only those samples from the background bedrock monitoring well network collected using low-flow methodologies will be used in statistical evaluations. Based on this criteria, there are currently a total of 28 background sampling data points as enumerated below.**

- **BG8-BEDGW-001 (10 samples);**
- **PB-BED-MW25 (10 samples);**
- **PB-BED-MW28 (4 samples); and**
- **PB-BED-MW29 (4 samples).**

As indicated on Table 1 of the technical memorandum, it appears as only 9 low-flow samples have been collected from well BG8-BEDGW-001. Ohio EPA requests clarification on this issue.

Response 2: Upon review of Table 1 in the Technical Memorandum, groundwater quality parameters from well BG8-BEDGW-001 of the April 2002 groundwater sampling event were missing. A corrected Table (Table 4-4) has been provided in the 2004 Groundwater Data Summary and Evaluation Report listing 10 samples collected from the well by the low-flow sampling methodology.

Comment 3: **While not contained in the technical memorandum, Ohio EPA is of the understanding that background statistical approaches will follow those procedures/methodologies contained in Appendix O of the Draft First Annual Data Summary and Evaluation Report (August 29, 2002) and Appendix L of the 2002 Groundwater Data Summary and Evaluation Report**

(June 2003). Ohio EPA will anticipate a future submittal which contains background bedrock ground water concentrations, corresponding calculations with supporting documentation, and a more detailed approach as to how the evaluations will be used to characterize ground water quality upgradient and downgradient of the NPBS in support of the sitewide GWI.

Response 3: Agreed. Background statistical data, methodologies, and calculations were provided as part of the 2004 Groundwater Data Summary and Evaluation report and shipped to your office December 23, 2004.

Comment 4:

Table 1

Well	Ground Surface	Top of Casing	Well Depth (bls)	Screened Interval	Casing Diameter	Screen Material	Date Installed	Driller
PB-BED-MW24	644.20	645.98	41.00	25.5-40.5	2-inch	PVC	09/13/01	IT
BG8-BEDGW-001	673.70	676.56	20	4.75-19.75	2-inch	PVC	09/20/97	IT
PB-BED-MW25	681.99	684.59	38.00	27.5-37.5	2-inch	PVC	09/12/01	IT
PB-BED-MW29	NA	678.30	40	27.65-37.65	2-inch	PVC	08/09/03	Shaw
PB-BED-MW26	674.61	677.21	57.75	42.75-57.75	2-inch	PVC	09/10/01	IT
PB-BED-MW20	673.25	676.01	49.5	28.5-48.5*	4-inch	PVC	1994	Dames&Moore
PB-BED-MW28	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
All dimensions in feet above mean sea level unless otherwise noted.
bls -Below land surface.
PVC -Polyvinyl chloride.
IT -IT Corporation.
NA -Not Available.
* -Well is completed as an open borehole in the Ohio Shale.

Response 4: A complete table showing monitoring well construction details of the above noted wells plus all of the additional monitoring wells as part of PBOW investigations is provided as Table 4-2 in the Groundwater Data Summary and Evaluation Report.