

## MEMORANDUM

To: Ken Walker/LANTDIV

From: Doug Dronfield/CH2M HILL

Date: May 28, 1991

RE: Summary of RI data for Camp Allen Landfill Areas A & B

This memorandum is intended to summarize for the Navy the results of the volatile organic analyses (VOCs) from the sampling of groundwater during the Remedial Investigation at the Norfolk Naval Base, Camp Allen Landfill Areas A & B and our conversation of these results on May 21, 1991. While the interpretation of the geologic and hydrologic data has not been completed yet, we wanted to present these results to you as soon as possible.

#### Investigation Activities

As part of the Remedial Investigation being conducted at the Camp Allen Landfill, 25 monitoring wells were installed from depths of 25 to 60 feet deep; 14 at Area A and 11 at Area B. Groundwater samples were collected from all of these new monitoring wells and a selected number of existing monitoring wells during March and April 1991. The monitoring well locations that were sampled at Areas A and B are shown in Figures 1 and 2. Samples were analyzed at the CH2M HILL laboratory in Montgomery, Alabama for the list of parameters given in Table 1. A receptor survey of potential groundwater users in the area has not been tasked to CH2M HILL.

#### Chemical Analytical Results - Area A

The VOCs were the most significant compounds detected, in part because the distribution of contamination was not what was anticipated. The results of the VOC analyses are given in Table 2. The table also includes the Safe Drinking Water Act Maximum Contaminant Levels (MCLs) as a comparison to the data. The table indicates some shallow groundwater contamination at GW1 and MW11A and much higher concentrations (maximum concentrations 6000 times drinking water standards) within the landfill at location B20W. High concentrations have also been detected in previous investigations at B20W. Water level data for the shallow aquifer suggest that contamination in the shallow aquifer migrating from B20W would discharge into the drainageway west of B20W. However, no groundwater contamination was detected at downgradient locations MW9A and MWS.

Samples from two of the five monitoring wells installed into the Arktown aquifer (depth of wells - 60 ft) had detectable concentrations of VOCs (maximum concentrations of 40 times the drinking water standard). These two wells were MW1B and MW9B (Table 2). This suggests

that contaminants have migrated through the 20-foot thick confining layer that separates the surficial aquifer from the Yorktown aquifer. However, the extent of the confining unit beneath the landfill is not currently known as no deep wells were drilled through the landfill. It appears from the water levels within the Yorktown that the direction of groundwater flow in the vicinity of Area A is toward the west. It is not currently known whether any contamination has migrated beneath the drainageway off of the base within the Yorktown aquifer.

#### Chemical Analytical Results - Area B

The VOCs were the most significant contaminants detected at the Area B landfill. Table 3 presents the VOC chemical analytical results. These results indicate that the shallow aquifer groundwater had detectable concentrations at a number of locations; MW1, MW2A, MW3A, GW4, GW5, and MW11. The most notable of these findings are the concentrations detected at MW1 in the elementary school parking lot well, and the line of contamination migrating from the GW4 area (GW4, MW3A, and MW11). The shallow aquifer groundwater is believed to be flowing from Area B to the southeast in the vicinity of GW4. This would suggest that the highest concentrations of some compounds like vinyl chloride (concentration of 1500 times the drinking water standard) and 1,2-dichloroethene are at the furthest downgradient well (MW11). If this is true, the extent of the plume may be well beyond MW11.

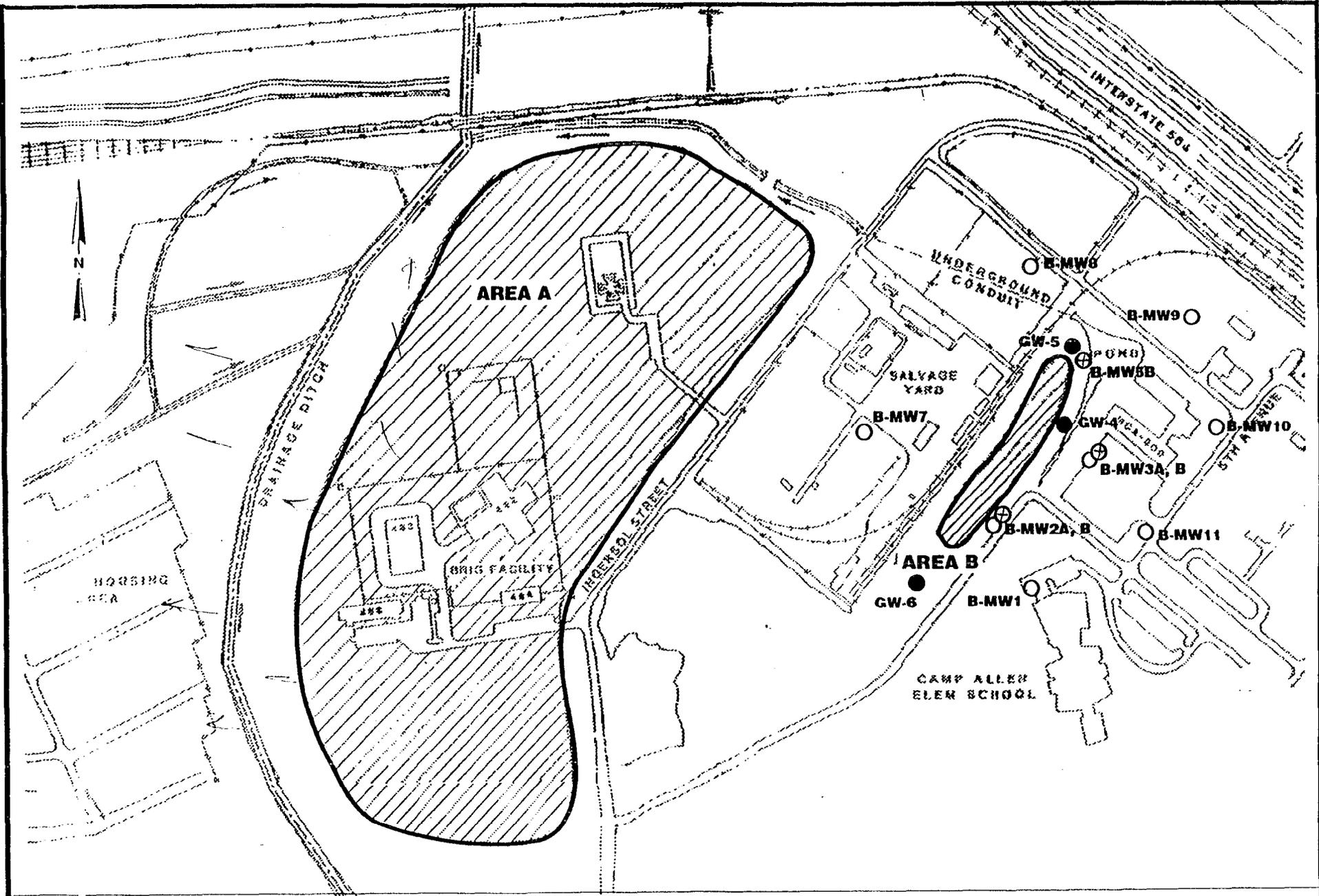
VOCs were detected in only one of the three Yorktown aquifer wells, MW3B but, at a maximum concentration of 10 times the drinking water standard. At this location, the confining unit is very thin or nonexistent.

#### Summary

These results indicate that CH2M HILL can not complete the RI/FS with the data that have currently been collected because of the high concentrations that have been detected at the furthest downgradient wells in Areas A and B. At both Areas A and B the extent of contamination has not been delineated and therefore a proper risk assessment and remedial alternatives evaluation can not be performed.

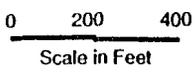
Our recommendation is for CH2M HILL to meet with the Navy, present the results in greater detail than our May 21 phone conversation and this memo have done and then determine what the proper course of investigation activities will be. This should include some of the investigation options that we discussed on May 21, 1991.

We would suggest that the Navy proceed rapidly with completing the investigation and promptly notify the appropriate agencies and residents as the potential for offsite migration of contaminants and, therefore, exposure to these contaminants is much higher than originally anticipated.



**Legend**

-  Approximate Landfill Area
-  **New** Monitoring Well
-  Existing Monitoring Well



**Figure 2**  
**GROUNDWATER MONITORING WELL LOCATIONS**   
 Camp Allen Landfill Area B  
 Norfolk Naval Base, Norfolk Virginia



NBN - 000 85 - 03, 04 - 05/28/11

Table 1  
 TARGET COMPOUND LIST AND TARGET ANALYTE LIST

TARGET COMPOUNDS	TARGET ANALYTES
<u>Volatile Organic Compounds (34)</u>	<u>Metals (24)</u>
Acetone	Aluminum
Benzene	Antimony
Bromodichloromethane	Arsenic
Bromoform	Barium
Bromomethane	Beryllium
Carbon disulfide	Cadmium
Carbon tetrachloride	Calcium
Chlorobenzene	Chromium
Chloroethane	Cobalt
Chloroform	Copper
Chloromethane	Iron
Dibromochloromethane	Lead
1,1-Dichloroethane	Magnesium
1,2-Dichloroethane	Manganese
1,1-Dichloroethene	Mercury
trans-1,2-Dichloroethene	Nickel
1,2-Dichloropropane	Potassium
cis-1,3-Dichloropropene	Selenium
trans-1,3-Dichloropropene	Silver
Ethylbenzene	Sodium
2-Hexanone	Thallium
Methyl ethyl ketone (2-Butanone)	Tin
4-Methyl-2-pentanone (MIBK)	Vanadium
Methylene chloride	Zinc
Styrene	
1,1,2,2-Tetrachloroethane	
Tetrachloroethene	
1,1,1-Trichloroethane	
1,1,2-Trichloroethane	
Trichloroethene	
Toluene	
Vinyl acetate	
Vinyl chloride	
Xylene (total)	
<u>Acid Extractable Organic Compounds (14)</u>	
Benzoic Acid	
4-Chloro-3 methyl phenol	
2-Chlorophenol	
2,4-Dichlorophenol	
2,4-Dimethylphenol	
2-Methyl-4,6-dinitrophenol	
2,4-Dinitrophenol	
2-Methyl phenol	
4-Methyl phenol	
2-Nitrophenol	
4-Nitrophenol	
Pentachlorophenol	
Phenol	
2,4,5-Trichlorophenol	

TABLE 2  
**Area A**  
**VOLATILE ORGANICS ANALYSIS DATA SHEET**  
 (results in ppb)

Groundwater Samples

COMPOUND	MCL	A-GW1	A-MW1B	A-B20W	A-MW9B	A-MW9B Dup	A-MW11A
Vinyl Chloride	2	11	82	12000	52	74	17
1,2-Dichloroethene (total)	70*	9	320	9500	160	210	40
1,2-Dichloroethane	5		29	200			
2-Butanone	—			10000			
Trichloroethene	5		100		13	17	24
Benzene	5			430			
4-Methyl-2-Pentanone	—			25000			
Tetrachloroethene	5						8
Toluene	2000*			6200			
Xylenes	10,000*			650			

MCL - Maximum Contaminant Level (Safe Drinking Water Act)

\* Proposed MCL

TABLE 3  
Area B  
VOLATILE ORGANICS ANALYSIS DATA SHEET  
(results in ppb)

Groundwater Samples

COMPOUND	MCL	B- MW1	B- MW2A	B- MW3A	B- MW3A Dup	B- MW3B	B- GW4	B- GW5	B- MW5B	B- MW11
Vinyl Chloride	2			410	350					3000
Chloroethane	—							16		
1,1-Dichloroethene	7			170	180					
1,1-Dichloroethane	—			320	340			22		
1,2-Dichloroethene (total)	70*			1400	1400	7	110			3200
1,2-Dichloroethane	5	11		490	520	50				68
1,1,1-Trichloroethane	200			170	180			5		
Trichloroethene	5			1300	2100	10			7	86
Benzene	5			1100	1200	5				35
4-Methyl-2-Pentanone	—		10				2100			
Tetrachloroethene	5		8	45						
Chlorobenzene	100*	110								

MCL - Maximum Contaminant Level (Safe Drinking Water Act)

\* Proposed MCL