

David Garrett & Associates

Engineering and Geology



December 18, 2009

Ms. Jackie Drummond
NC Division of Waste Management
Solid Waste Section
Mail Service Center 1646
Raleigh, NC 27699-1646

RE: Discussion of Ground Water Assessment
Cobalt and Other Inorganic Constituents
C&D Landfill, Inc. (Pitt County, NC)
Solid Waste Permit #74-07

Dear Ms. Drummond:

On behalf of C&D Landfill, Inc., I am pleased to present the following discussion of historic cobalt detection in background sampling at the landfill. This letter was prepared pursuant to our meeting of December 14, 2009 and subsequent telephone conversations. The facility is undergoing Assessment Monitoring in accordance with our Work Plan dated June 22, 2009. We anticipate petitioning the SWS for consideration of a future Alternate Source Demonstration relative to certain constituents. Cobalt is an inorganic compound that has been detected in the ground water at the facility and may be naturally occurring or, at least, is believed to be a regional background constituent. Please refer to the facility map following this text.

Early in the monitoring program (i.e., the first sampling event) turbidity was recognized as an issue. Filtered samples acquired during the first sampling event showed no detection of certain metals, including cobalt, whereas the unfiltered samples did show detections (discussed below). A copy of the third water quality sampling report, dated January 9, 2003, is attached for your consideration (**Attachment 1**). This information is offered in lieu of acquiring new filtered samples, which you requested during our meeting, whereas I believe the facility has already made a demonstration that cobalt is a background constituent, tied to turbidity.

Cobalt was detected in the pre-operational baseline sampling event at MW-2s, conducted 5/16/01, and has been detected twice in the upstream background surface water sample on 5/8/08 and 5/18/09 – all unfiltered samples. Phase 1 of the landfill became operational 6/1/01, beginning in the northeast corner of the footprint (Phase 1A), and developed in four sub-phases that progressed to the south then west, near the locations of MW-3s and MW-3d. The wells were installed at different times, as indicated on the following table (**Attachment 2**).

5105 Harbour Towne Drive • Raleigh • North Carolina • 27604

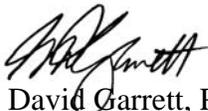
919-418-4375 (Mobile) • 919-231-1818 (Office/fax) • E-mail: david@davidgarrettpe.com

A trend in cobalt during this time – as well as the other metals – has been more prevalent detections since mid-2007 at most wells, including the facility background wells MW-1s and MW-1d. This trend is seen in the surface water data, whereas cobalt was only detected in the surface water since mid-2007. Periodic detection of cobalt at well MW-2s, one of the oldest wells on site with continual semi-annual monitoring, is believed to reflect a pattern of ground water fluctuation in response to regional drought conditions (**Attachment 3**).

Finally, cobalt has been identified in the regional background, per the North Carolina Geological Survey's "Chemical Atlas", which is based on the NURE data (**Attachment 4**). More specific data for Pitt County may be available, which will be researched prior to issuing a final report of an upcoming Alternate Source Demonstration. At the present time, we cannot conclude that the landfill activities are responsible for the cobalt detections, nor detection of other constituents. This discussion was considered useful to put the effects of turbidity and recent drought conditions into perspective with the regional background conditions.

I propose to continue the assessment in accordance with semi-annual monitoring schedule, which is due for sampling prior to the end of this calendar year. We intend to use the services of Environment-1, who performs the routine sampling at the facility, with Appendix II sampling performed at the same wells as in the August 2009 special sampling. We will not install any more new wells, unless the data so warrant. I will review the data for the next sampling event with you when it becomes available, then we can discuss the next course of action. Please contact me if you have any questions or concerns.

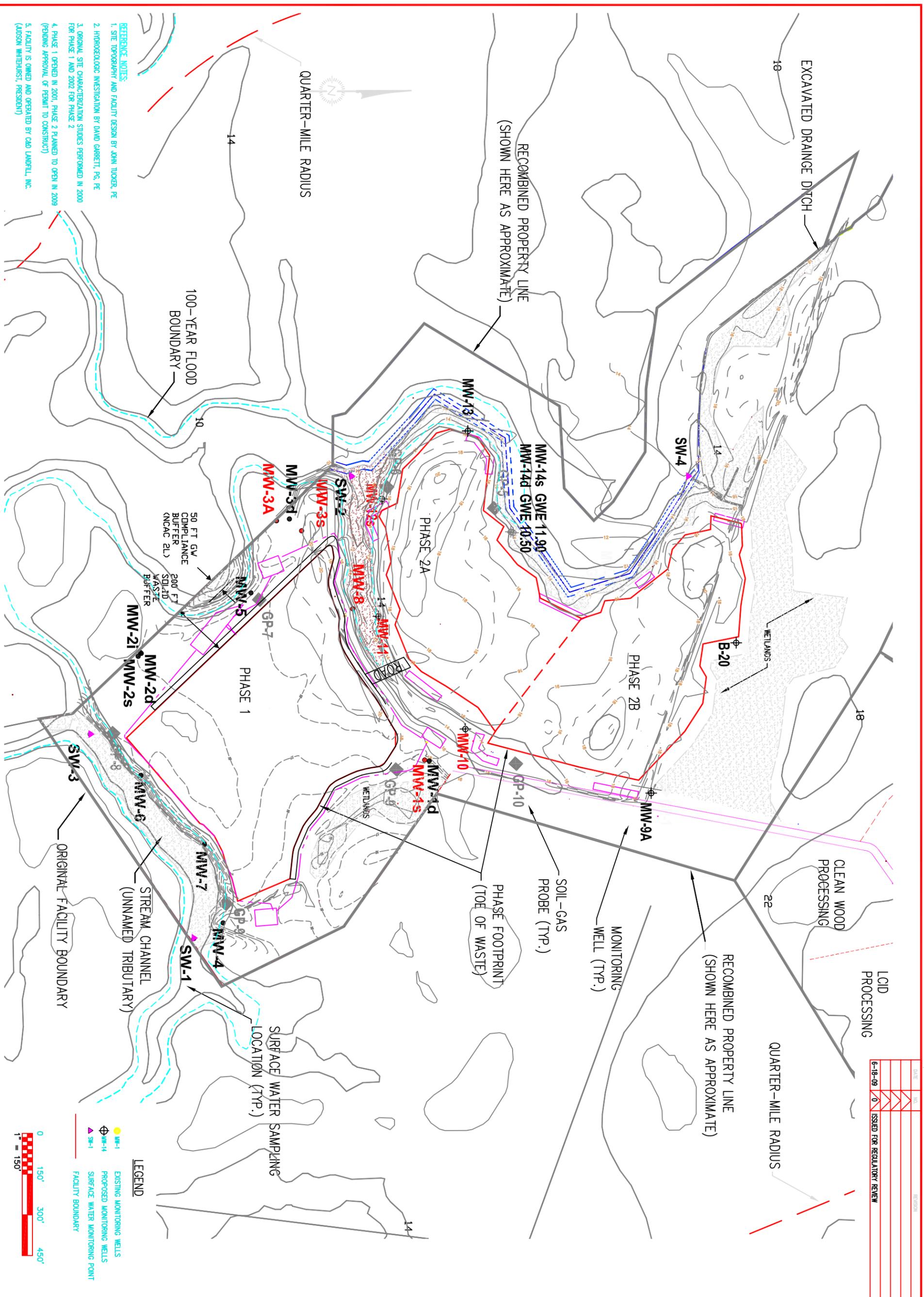
Cordially yours,



G. David Garrett, PG, PE

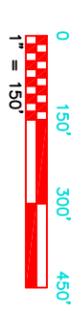
cc: Judson Whitehurst, Wayne Bell – C&D Landfill, Inc.
Elizabeth Werner, Donna Wilson – NC DENR-DWM, SWS
Brian Boutin, PG

DATE	BY	REVISION
6-18-09	0	ISSUED FOR REGULATORY REVIEW



REFERENCE NOTES:
 1. SITE TOPOGRAPHY AND FACILITY DESIGN BY JOHN TUCKER, PE
 2. HYDROGEOLOGIC INVESTIGATION BY DAVID GARRETT, PG, PE
 3. ORIGINAL SITE CHARACTERIZATION STUDIES PERFORMED IN 2000 FOR PHASE 1 AND 2002 FOR PHASE 2
 4. PHASE 1 OPENED IN 2001, PHASE 2 PLANNED TO OPEN IN 2009 (PENDING APPROVAL OF PERMIT TO CONSTRUCT)
 5. FACILITY IS OWNED AND OPERATED BY C&D LANDFILL, INC. (AUSON WHITEHURST, PRESIDENT)

LEGEND
 ● MW-1 EXISTING MONITORING WELLS
 ⊕ MW-14 PROPOSED MONITORING WELLS
 ▲ SW-1 SURFACE WATER MONITORING POINT
 --- FACILITY BOUNDARY



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PROJECT TITLE:
**C&D LANDFILL, INC.
 ASSESSMENT MONITORING
 PITT COUNTY, NC
 PERMIT #74-07**

DRAWING TITLE:
**GROUND WATER
 MONITORING LOCATIONS
 (PHASES 1 AND 2)**

DATE	BY	REVISION
6/18/09	0	ISSUED FOR REGULATORY REVIEW
DATE	BY	REVISION
6/26/09	0	6/26/09
SCALE	DATE	
AS SHOWN	JUNE 2009	
PROJECT TITLE		
C&D LANDFILL ASSESSMENT		
SHEET NO.		
5		AP3



David Garrett, P.G., P.E.

Engineering and Geology

January 9, 2003

Mr. Larry Rose
NC Division of Waste Management
Solid Waste Section
Mail Service Center 1646
Raleigh, NC 27699-1646

**RE: Water Quality Monitoring Report
C&D Landfill, Inc. (Pitt County, NC)**

Dear Mr. Rose:

On behalf of C&D Landfill, Inc., I am pleased to present this report of the third semi-annual water quality monitoring event. Stream and well samples were acquired on November 27, 2002 by Environment-1, Inc. This sampling represents the background sampling event for four new wells, MW-5, MW-8, MW-9d and MW-9s. The new wells were added prior to operation of Phase 1B, in accordance with the approved Water Quality Monitoring Plan (WQMP). Based on the WQMP, the deeper wells shall be sampled heretofore on a bi-annual basis, while the shallower wells shall be sampled on a semi-annual basis.

There are now four sampling events in the data set for wells MW-1s, 2s, 4, 6, and 7. The data are presented on Tables 1 and 2. A discussion of the trends observed thus far is presented below. Water levels were slightly lower during this sampling event, relative to data collected in 2001 and earlier in 2002 (see Table 1). The water levels varied from a few inches to about one and a half feet lower than the highest observed levels recorded in November 2001.

Specific conductivity shows a seasonal trend at MW-2s (see Table 2), with values ranging from 360 to 600 : Mho/cm – the higher values have been observed in the autumn sampling events, but this is not consistent with the water level fluctuation at MW-1. Conductivity at the other wells typically varies from 190 to 320 : Mho/cm, although some values in the 400+ range have been observed in the sampling data for new wells.

The indicator parameter pH shows a slight variation at all wells with no discernable seasonal effects. Values typically vary between 5.4 to 6.1 after the initial sampling event, but pH values for several initial sampling events (when the wells were new) varied in the range of 7 to 8. These trends could be relict of the well construction – new concrete and/or Portland cement grout could have affected these values temporarily. It is also possible that the new sand packs, although comprised of washed quartz sand, could have affected the indicator parameters or introduced constituents which have now disappeared.

The historical data set shows an initial detection of several inorganic parameters, typically observed in just the initial sampling event or in the first two sampling events, but the trend has been steadily decreasing. No inorganic (or organic) constituents were detected during this sampling event.

Chromium	MW-1d, 1s, 2d, 2s, 4 7	First three events only (not observed this event)
Lead	MW-2s, 4	First two events only
Cobalt	MW-2s	First two events only
Vanadium	MW-1d, 2s	First two events only
Zinc	MW-1d, 2s	First two events only

Please note that chromium and lead were observed above the 2L standard at MW-2s (see Table 2), but these are clearly background values because no waste had been placed in proximity to this well prior to either sampling event. Also, the fact that both chromium and lead were detected in both up-gradient background wells (MW-1d and MW-1s) supports the conclusion that these constituents are within the background geochemistry.

At present, the data do not indicate any impact on ground water due to activities associated with the landfill. These trends will be watched and future amendments to the water quality monitoring plan will be made as appropriate. For future sampling events, the indicator parameter turbidity will be tested. Any changes to the overall WQMP will be submitted to the Solid Waste Section for approval.

Please contact me at your earliest convenience with questions or comments.

Sincerely,

G. David Garrett, P.G., P.E.



cc: Mr. Judson Whitehurst – C&D Landfill, Inc.
Mr. John A.K. Tucker, P.E.

**Table 1
Monitoring Well Water Level Data**

Monitoring Location	TOC Elevation	Ground Elevation	Depth of Well (bgs)	Screened Interval (bgs)	Water Level¹	Water Level²
MW-1d (B-1) ^{3,4}	21.14	17.40	50	40 - 50	NA	NA
MW-1s ³	20.91	17.59	13	3 - 13	7.85	8.56
					13.06	12.35
MW-2d (B-2d) ⁴	21.80	17.97	49	39 - 49	NA	NA
MW-2s	21.44	18.45	13	3 - 13	10.53	11.49
					10.91	9.95
MW-3d (B-3) ⁵	22.83	19.37	50	40 - 50	NA	NA
					22.83	
MW-4	18.42	14.83	13	3 - 13	6.62	6.76
					11.80	11.66
MW-5	17.90	14.80	18	3 - 18	NA	6.98
						10.92
MW-6	20.03	16.87	13	3 - 13	9.73	10.30
					10.30	9.73
MW-7	19.40	16.03	13	3 - 13	8.51	9.07
					10.89	10.33
MW-8	21.21	18.30	18	3 - 18	NA	10.18
						11.03
MW-9d ⁴	22.88	19.88	38	33 - 38	NA	12.67
						10.21
MW-9s	22.95	19.91	18	3 - 18	NA	12.11
						10.84

- Notes: 1. Last Semi-Annual Event, depth / **elevation**, reference top of casing (TOC), recorded on 05/02/02
2. This Semi-Annual Event, depth / **elevation**, reference top of casing (TOC), recorded on 11/27/02
3. Up-gradient Background Well for each respective aquifer
4. Sample Bi-annually, all others sample semi-annually except as noted
5. Only sample MW-3d for assessment monitoring, if needed
6. Elevations were surveyed July 2001 and November 2002 by Burgess Land Surveying, Greenville, NC

Table 2
Detected Inorganic Constituents

All values are given in mg/l

No Appendix I organic constituents were detected.

Bold data represent duplicates or resampling events, if required.

Italics represents values that exceed North Carolina 2L Ground Water Standards

Constituent	NC 2L Standard	Sampling Date	MW-1d BG	MW-1s BG	MW-2d	MW-2s	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9d	MW-9s	SW-1 BG	SW-2	SW-3
Antimony		05/16/01 11/12/01 05/02/02 11/27/02														
Arsenic	0.05	05/16/01 11/12/01 05/02/02 11/27/02														
Barium	2.0	05/16/01 11/12/01 05/02/02 11/27/02														
Barium (Dissolved) Not Tested Not Tested		05/16/01 11/12/01 05/02/02 11/27/02														
Beryllium		05/16/01 11/12/01 05/02/02 11/27/02														
Beryllium (Dissolved) Not Tested Not Tested		05/16/01 11/12/01 05/02/02 11/27/02														

Constituent	NC 2L Standard	Sampling Date	MW-1d BG	MW-1s BG	MW-2d	MW-2s	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9d	MW-9s	SW-1 BG	SW-2	SW-3
Cadmium	0.005	05/16/01 11/12/01 05/02/02 11/27/02														
Cobalt		05/16/01 11/12/01 05/02/02 11/27/02				0.019 0.016										
Cobalt (Dissolved) Not Tested Not Tested		05/16/01 11/12/01 05/02/02 11/27/02														
Copper	1.0	05/16/01 11/12/01 05/02/02 11/27/02														
Copper (Dissolved) Not Tested Not Tested		05/16/01 11/12/01 05/02/02 11/27/02														
Chromium (total)	0.05	05/16/01 11/12/01 05/02/02 11/27/02	0.083	0.015	0.029	0.085 0.069	0.029 0.042 0.013			0.015						
Lead	0.015	05/16/01 11/12/01 05/02/02 11/27/02				0.029 0.027	0.011 0.013									

Constituent	NC 2L Standard	Sampling Date	MW-1d BG	MW-1s BG	MW-2d	MW-2s	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9d	MW-9s	SW-1 BG	SW-2	SW-3
Nickel	0.1	05/16/01 11/12/01 05/02/02 11/27/02														
Nickel (Dissolved) Not Tested Not Tested		05/16/01 11/12/01 05/02/02 11/27/02														
Selenium	0.05	05/16/01 11/12/01 05/02/02 11/27/02														
Silver	0.018	05/16/01 11/12/01 05/02/02 11/27/02														
Thallium		05/16/01 11/12/01 05/02/02 11/27/02														
Vanadium		05/16/01 11/12/01 05/02/02 11/27/02	0.048			0.124 0.098										
Zinc	2.1	05/16/01 11/12/01 05/02/02 11/27/02	0.053			0.099 0.057										

Constituent	NC 2L Standard	Sampling Date	MW-1d BG	MW-1s BG	MW-2d	MW-2s	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9d	MW-9s	SW-1 BG	SW-2	SW-3
pH		05/16/01 11/12/01 05/02/02 11/27/02	8.4	6.1 6.1 5.6 5.6	7.4	5.6 5.5 5.6 5.8	5.9 5.8 5.2 5.8		5.5 5.7 5.5 5.8	5.4 5.9 5.4 6.1				6.1 NA 5.7 5.3	5.6 5.8 5.8 5.8	6.4
Specific Conductance, : mho/cm		05/16/01 11/12/01 05/02/02 11/27/02	400	430 510 360 607	470	420 320 210 300	250 110 250 220		320 320 190 285	280 360 260 310				430 NA 110 209	420 160 110 254	191
Static Water Level, feet (toc)		05/16/01 11/12/01 05/02/02 11/27/02	10.02	8.91 10.08 7.85 8.56	12.69	10.90 11.74 10.53 11.49	6.94 7.47 6.62 6.76		9.84 10.46 9.73 10.30	8.66 9.32 8.51 9.07						

Notes: The wells denoted "d" monitor the deeper regional aquifer (Yorktown Formation); wells denoted "s" and all others monitor the uppermost aquifer
Sampling of wells MW-5, MW-8, MW-9s, and MW-9d, and surface water location SW-3 represents background samples for these wells

Turbidity, NTU		05/16/01														
Not Tested		11/12/01														
Not Tested		05/02/02														
Not Tested		11/27/02														

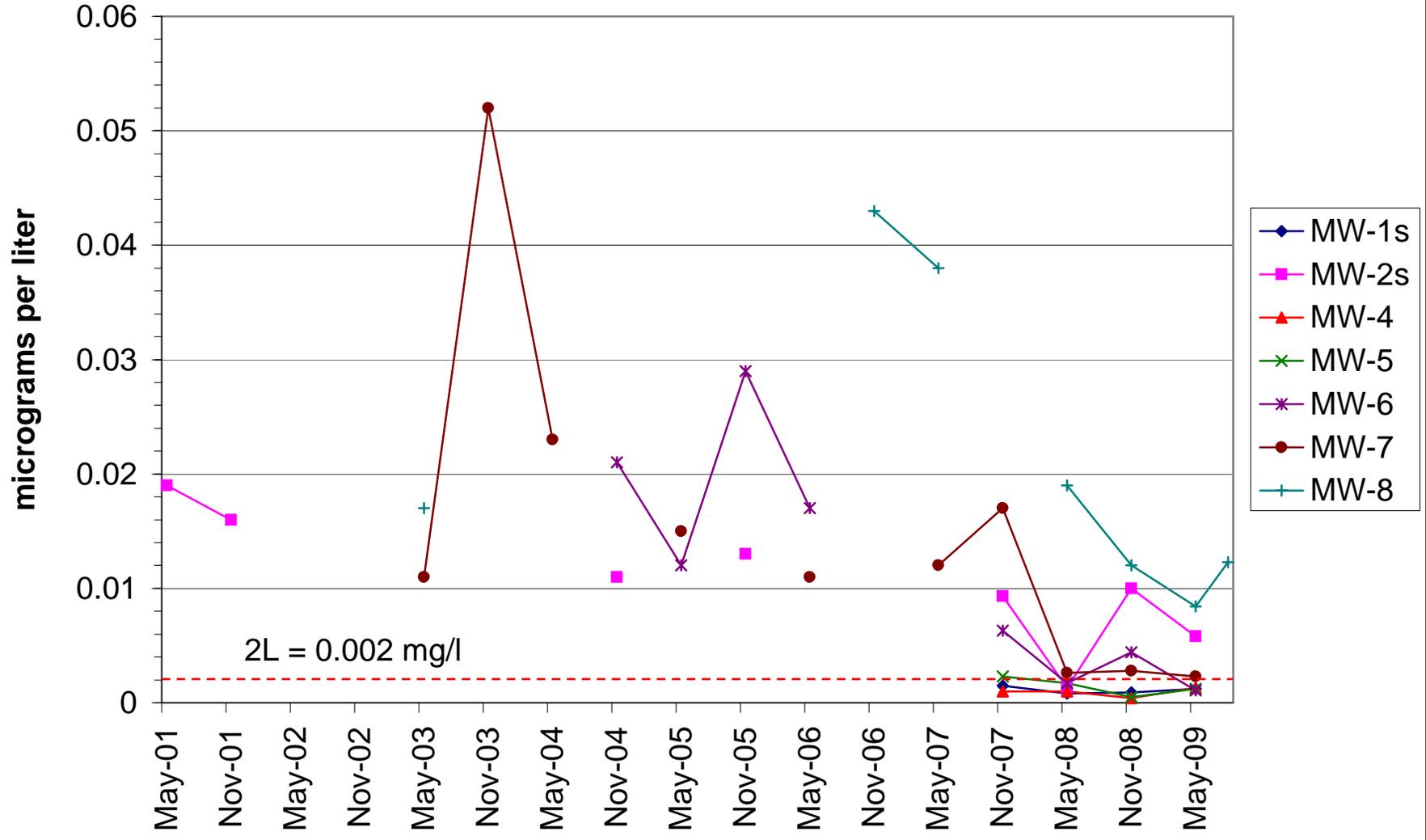


TABLE 2
Detected Constituents and Field Measured Parameters
C&D Landfill, Inc., Permit #74-07
Pitt County, NC

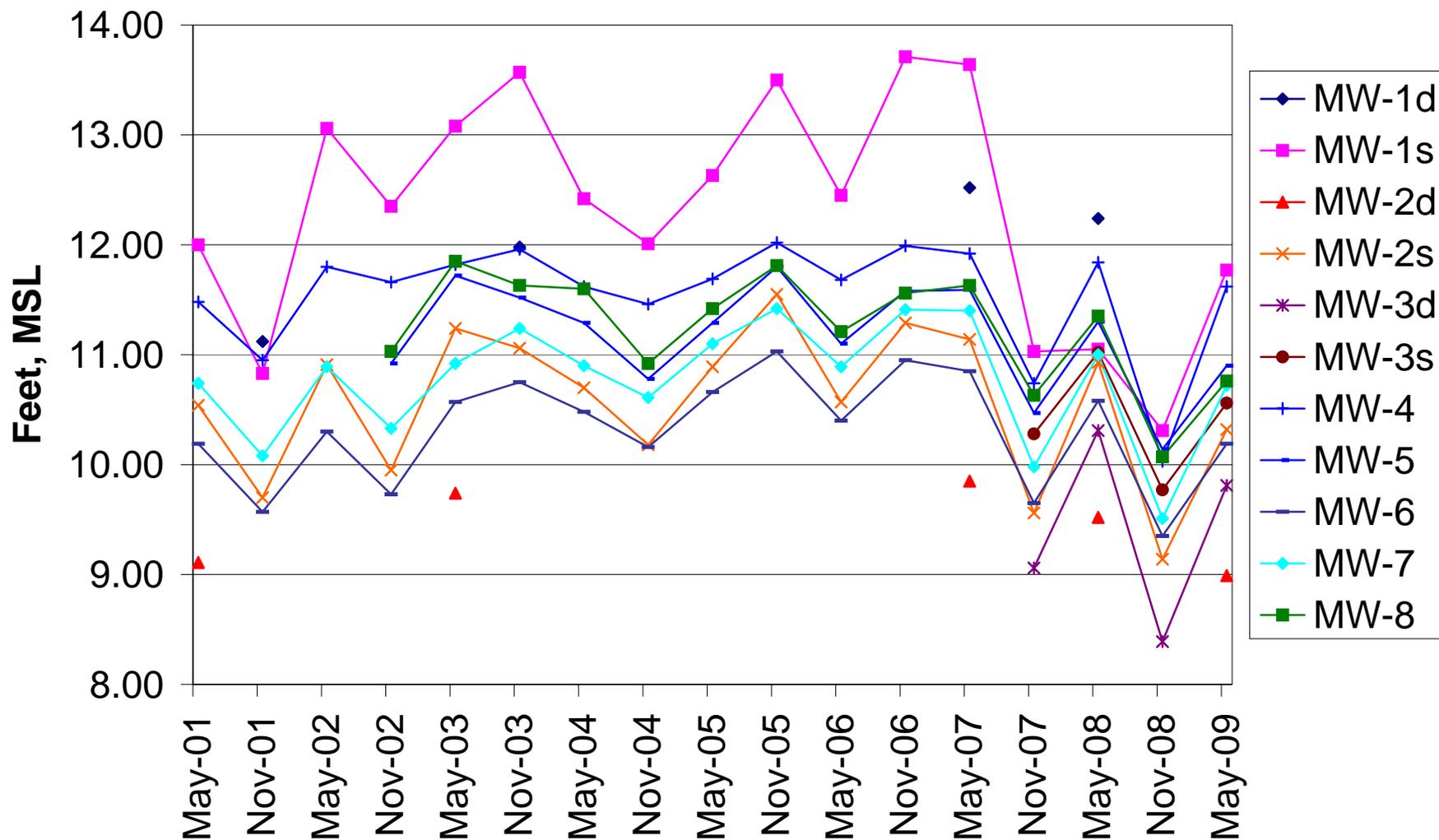
Note: All results in mg/L unless otherwise noted

Constituent	SWSL	SWS Groundwater Protection Standard	NC 2L Standard	Sampling Date	MW-1d October 2000 BG	MW-1s May 2001 BG	MW-2d May 2000	MW-2s October 2000	MW-3s August 2007	MW-3d October 2000	MW-3A August 2009	MW-4 May 2001	MW-5 November 2002	MW-6 May 2001	MW-7 May 2001	MW-8 November 2002	SW-1 BG	SW-2	SW-3			
Cobalt	0.01	0.002	NE	5/16/2001				0.019														
				11/12/2001				0.016														
				5/2/2002																		
				11/27/2002																		
				5/14/2003														0.011	0.017			
				11/13/2003														0.052				
				5/20/2004														0.023				
				11/5/2004							0.011							0.021				
				5/31/2005														0.012	0.015			
				11/4/2005							0.013							0.029				
				5/30/2006														0.017	0.011			
				11/2/2006																0.043		
				5/16/2007														0.012	0.038			
				11/16/2007					0.0015		0.0093	0.0094			0.001	0.0023	0.0063	0.017			0.0008	0.0007
				5/8/2008				0.0001	0.0008	0.0001	0.0013	0.0001	0.013		0.001	0.0017	0.0017	0.0026	0.019	0.0012	0.0008	0.001
				11/7/2008					0.0009		0.01	0.017	0.0001		0.0004	0.0005	0.0044	0.0028	0.012		0.0019	0.0051
5/18/2009					0.0012	0.0004	0.0058	0.0126	0.0001		0.0013	0.0012	0.0011	0.0023	0.0084	0.001	0.0004	0.0013				
8/11/2009								0.0106		0.019					0.0123	Not Sampled	Not Sampled	Not Sampled				
Cobalt (Dissolved)				5/16/2001																		
Not Tested				11/12/2001																		
Not Tested				5/2/2002																		
Not Tested				11/27/2002																		

Cobalt concentrations

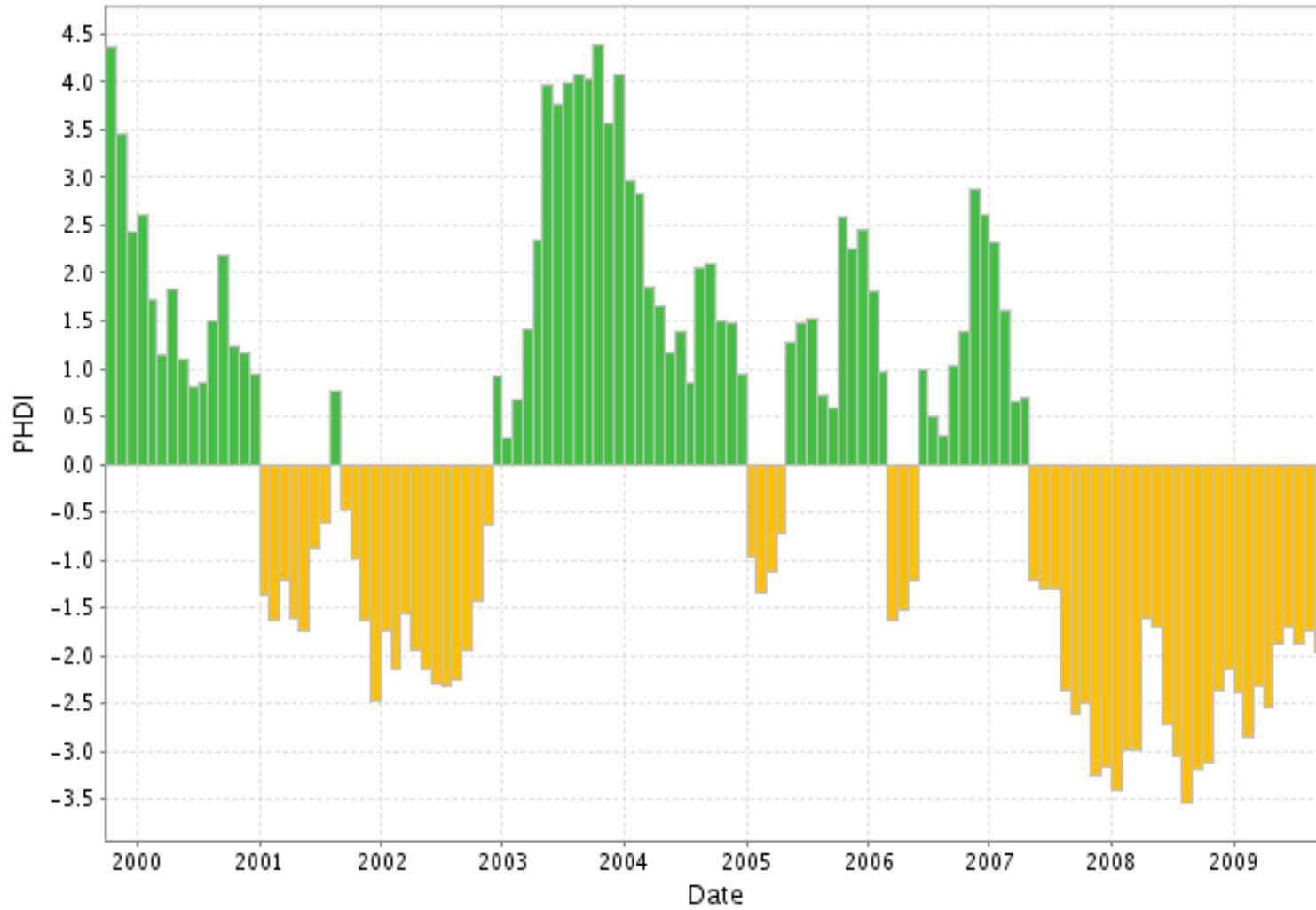


Ground Water Elevations



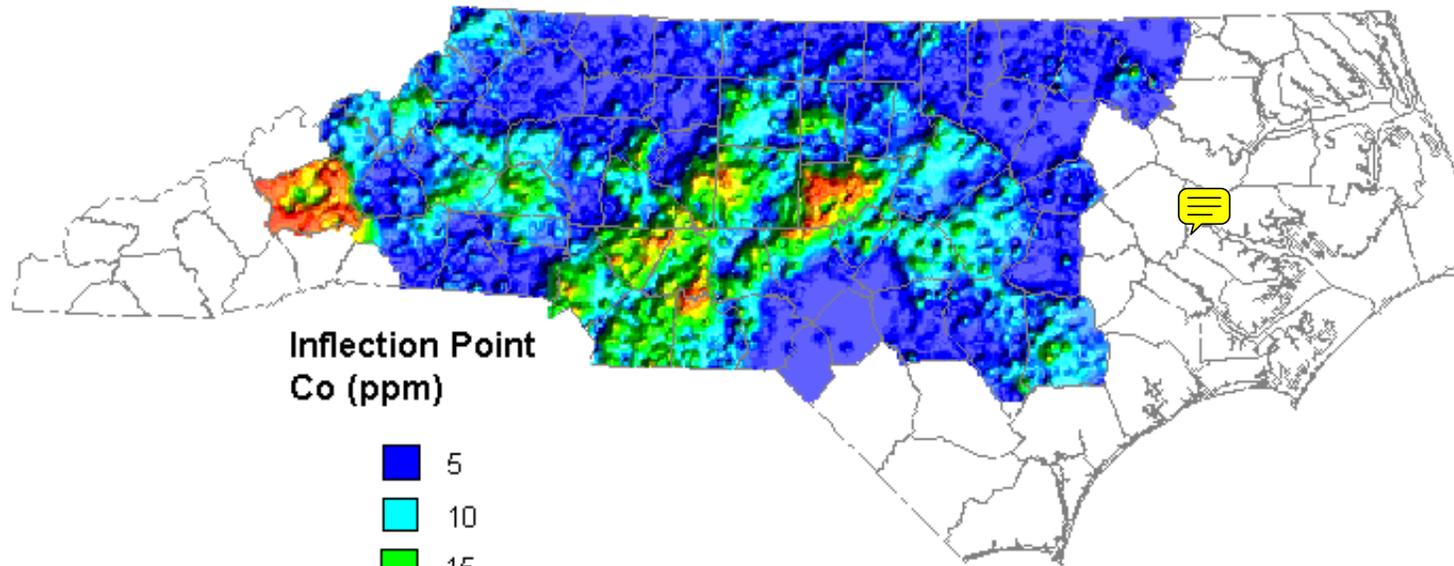


NC Central Coastal Plain - PHDI 199910 - 200910

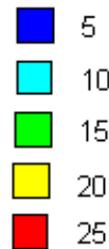




Cobalt in Stream Sediment



**Inflection Point
Co (ppm)**



Grid Cell Interpolated Thematic
Grid Cell = 1.5 miles

