GFP

REPORT OF FINDINGS:

BUFFALO COLOR AREA “D” EVALUATION OF BUFFALO RIVER EMBANKMENT WASTEFILL

Buffalo, New York NYSDEC Site No. 9-15-012

PREPARED FOR:

AlliedSignal

Morristown, New Jersey

PREPARED BY:

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PARSONS

NOVEMBER 1998

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November 13, 1998

Mr. Gerald Pietraszek
New York State Department of Environmental Conservation
270 Michigan Avenue
Buffalo, New York 14203

RE: Buffalo Color Area "D"
Buffalo River Embankment Wastefill Evaluation

Dear Mr. Pietraszak:

The attached report provides the results of AlliedSignal's recent evaluation of the approximately 4,000 cubic yards of wastefill outside the slurry wall between stations 19+00 and 24+00 at Buffalo Color Area "D". AlliedSignal, Inc. has conducted characterization activities on this material including sampling, chemical analysis, and a natural recovery assessment.

As discussed in the attached report, AlliedSignal, Inc. proposes to leave the currently installed sand/shot rock/geotextile/riprap capping system (cap) in place as a permanent remedy for the wastefill material adjacent to the Buffalo River for the following reasons:

- The cap separates waste material from the sediment/surface water interface zone. Also, it limits vertical or horizontal migration of the wastefill material.
- Natural sedimentation is expected to occur over a period of time because the site is in a well-documented depositional area. This will create a new benthic invertebrate zone, which will be separated from the wastefill material by the cap.
- Results of porewater sampling confirm that the impact of organic compounds and metals from the wastefill on the benthic community will be minimal. With the exception of total metals in unfiltered porewater samples, very few constituents were detected above background levels, and in excess of USEPA's Threshold Values (TVs) or NYSDEC's Criteria. In total, six organic compounds, two pesticides, and three metals (dissolved) were detected in excess of USEPA's TVs and background concentrations; and five organic compounds and four metals (dissolved) were detected in excess of NYSDEC's Criteria and background concentrations. Per USEPA guidance (USEPA, 1996), dissolved metals more closely approximate the bioavailable fraction of metals in the water column. Benthic organisms are more susceptible to contact with chemical constituents dissolved in the porewater than to the chemical constituents bound to the wastefill.
- The porewater samples collected during the investigation were obtained from the wastefill and represent a worst-case scenario. The concentrations of both metals and organic compounds will decrease with distance from the wastefill, due to the effects of mechanical dispersion,

dilution, and biodegradation. Thus, concentrations in the future benthic zone are expected to be lower than those in the porewater associated with the wastefill.

- Installation of the slurry wall and groundwater recovery system have altered the groundwater/surface water interactions adjacent to the river, greatly reducing the potential for migration of dissolved constituents of concern from the porewater in the wastefill to the water/sediment interface.
- Based on chemical indicators of natural biodegradation, it appears that the organic compounds in the wastefill are currently undergoing biological degradation. It is expected that the organic compound concentrations will decrease over time due to the ongoing natural biodegradation processes.
- During the remedial action, NYSDEC required "grossly contaminated" wastefill along the shoreline to be excavated, spread on the landfill, dried, and compacted. Wastefill which was not considered grossly contaminated was left in-place. In order to obtain consensus of what fill was considered grossly contaminated, visual observation and qualitative toluene extraction field tests were used to determine gross contamination. Random confirmatory sampling indicated that wastefill that was mutually considered to be grossly contaminated generally contained between one and two percent total organic compounds. The total organic concentrations in all wastefill samples collected during the recent investigation were at least one order of magnitude less than one percent, indicating that the wastefill would not be considered grossly contaminated by the screening methods used previously.

As a result, AlliedSignal, Inc. proposes to undertake no further remedial activities for the section of shoreline between stations 19+00 and 24+00. If you have any questions concerning this report, or need additional information, feel free to call me at (315) 633-7074.

Very truly yours,

PARSONS ENGINEERING SCIENCE, INC.

Peter M. Petrone

Peter M. Petrone, P.E.
Project Manager

cc: M. Raybuck, File
D. Paley, AlliedSignal
E. Walerko, AlliedSignal

Report of Findings:

Evaluation of Buffalo River Embankment Wastefill

Prepared For:

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November 1998

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EXECUTIVE SUMMARY

SCOPE OF WORK

An investigation was conducted at the Buffalo Color Area "D" to evaluate ecological impacts of approximately 4,000 cubic yards (CY) of wastefill material outside the slurry wall, under a sand/shot rock/geotextile/riprap capping system (cap) between stations 19+00 and 24+00, and to recommend actions (if necessary) to prevent or minimize potential impacts of the wastefill on ecological receptors. Seven borings were installed to characterize the wastefill material and associated porewater. Temporary two-inch diameter piezometers were installed in six of the seven borings to facilitate collection of the porewater samples. Wastefill and porewater samples were analyzed for a complete range of organic compounds and inorganic chemicals, including parameters to evaluate the potential for natural biodegradation of the organic compounds.

ANALYTICAL RESULTS

Analytical results from wastefill samples were compared to United States Environmental Protection Agency's (USEPA) Ecotox Threshold Values (TVs), and New York State Department of Environmental Conservation's (NYSDEC) Sediment Criteria. Analytical results from porewater samples were compared to USEPA's Ecotox TVs and NYSDEC's Class C Surface Water Standards.

In general, the concentrations of most detected organic compounds in the wastefill samples did not exceed either NYSDEC's or USEPA's sediment criteria.

Several metals exceeded NYSDEC's Sediment Criteria in most of the wastefill samples. Sample WF-05S was less impacted than others, with only two metals, chromium and lead, slightly exceeding NYSDEC's criteria. The highest concentration of manganese (3,500 ug/kg) was found in one of the background samples, BG-01S. Several metals also exceeded USEPA's criteria in all samples, with fewer exceedances in WF-05S.

Results of the porewater sampling indicated that leaching of both organic compounds and inorganic chemicals from the wastefill to water was minimal. It appeared that the natural total organic carbon (TOC) content (2.3 percent) in the river sediment was a possible factor in reducing the release of organics into the water column. Also, the porewater results suggest that inorganic chemicals (metals) have limited mobility between the wastefill and water phases.

NATURAL RECOVERY ASSESSMENT

The ongoing natural recovery process, in conjunction with the physical barriers currently in-place, is considered to be a viable means of wastefill/sediment remediation at the Buffalo Color Site (Site) because the appropriate physical and chemical conditions are present, as indicated by the following:

- The constituents of concern are presently separated from the benthic habitat by the existing sand/shot rock/geotextile/ riprap cap.
- Sedimentation processes are expected to produce a new benthic zone over the existing cap.
- Natural biodegradation processes are likely to reduce organic compound concentrations.
- Chemical/hydrogeologic factors are greatly reducing the potential for leaching to the benthic habitat.

Each of these points is supported by data derived from the current or prior studies, including chemical analysis of the wastefill and associated porewater, site-specific hydrogeologic and hydrodynamic factors, natural attenuation parameters measured in porewater samples, and design and construction drawings showing the cap configuration.

CONCLUSIONS

AlliedSignal proposes to leave the currently installed cap in place as a permanent remedy for the wastefill material adjacent to the Buffalo River for the following reasons:

physically, not hydraulically w/ transmiss[illegible]

- The cap separates waste material from the sediment/surface water interface zone. Also, it limits vertical or horizontal migration of the wastefill material.
- Natural sedimentation is expected to occur over a period of time, because the Site is in a well-documented depositional area. This will create a new benthic invertebrate zone, which will be separated from the wastefill material by the cap. OK
- Results of porewater sampling confirm that the impact of organic compounds and metals from the wastefill ~~on the benthic community will~~ be minimal. With the exception of total metals in unfiltered porewater samples, very few constituents were detected above background levels, and in excess of USEPA's Threshold Values (TVs), or NYSDEC's Criteria. In total, six organic compounds, two pesticides, and three metals (dissolved) were detected in excess of USEPA's TVs and background concentrations; and five organic compounds and four metals (dissolved) were detected in excess of NYSDEC's Criteria and background concentrations. Per USEPA guidance (USEPA, 1996), dissolved metals more closely approximate the bioavailable fraction of metals in the water column. Benthic organisms are more susceptible to contact with chemical constituents dissolved in the porewater than to the chemical constituents bound to the wastefill.

  based on site studies?

  Benthic organism live on & eat seds.
- The porewater samples collected during the investigation were obtained from the wastefill and represent a worst case scenario. The concentrations of both metals and organic compounds will decrease with distance from the wastefill, due to the effects of mechanical dispersion, dilution, and biodegradation. Thus, concentrations in the future benthic zone are expected to be lower than those in the porewater associated with the wastefill. True

irrelevant

- ✓ Installation of the slurry wall and groundwater recovery system have altered the groundwater/surface water interactions adjacent to the river, greatly reducing the potential for migration of dissolved constituents of concern from the porewater in the wastefill to the water/sediment interface.

This only deals w/ site contained waste not that outside the slurry wall.

- Based on geochemical indicators of natural biodegradation, it appears that the organic compounds in the wastefill are currently undergoing biological degradation. It is expected that the organic compound concentrations will decrease over time due to the ongoing natural biodegradation processes.
- During the remedial action, NYSDEC required "grossly contaminated" wastefill along the shoreline to be excavated, spread on the landfill, dried, and compacted. Wastefill which was not considered grossly contaminated was left in-place. In order to obtain consensus of what fill was considered grossly contaminated, visual observation and qualitative toluene extraction field tests were used to determine gross contamination. Random confirmatory sampling indicated that wastefill that was mutually considered to be grossly contaminated generally contained between one and two percent total organic compounds. The total organic concentrations in all wastefill samples collected during the recent investigation were at least one order of magnitude less than one percent, indicating that the wastefill would not be considered grossly contaminated by the screening methods used previously.

As a result, no further remedial activities are planned for the section of shoreline between Stations 19+00 and 24+00.

SECTION 1

SECTION 1

INTRODUCTION

1.1 PROJECT OBJECTIVES

- Evaluate ecological impacts of approximately 4,000 CY of wastefill material outside the slurry wall limits, between stations 19+00 and 24+00.
- Recommend actions (if necessary) to prevent or minimize potential impacts of the wastefill on ecological receptors.

1.2 SITE HISTORY AND BACKGROUND

During the course of the remedial construction of the Buffalo Color Area "D" Site, a significant quantity of wastefill was observed along the western shoreline, between stations 19+00 and 24+00. This area coincided with the shoreline that had previously failed and slumped into the Buffalo River. The approved remediation for the western shoreline involved clearing of surface debris and trees, relocating wastefill from the riverbank by dredging, grading the remaining materials, and constructing a slurry cutoff wall with shoreline protection. The wastefill was removed until either clean material was found, or to within practical construction limits, to prevent impact to the structural or functional aspects of the slurry cutoff wall. While dredging along the shore between stations 19+00 and 24+00, it was determined that an estimated 4,000 CY of wastefill containing organic compounds and other chemicals were too close to the slurry cutoff wall to be excavated without affecting the stability of the wall. As a result, this wastefill remains between the river and the slurry cutoff wall.

In October and November of 1997, stabilization measures were implemented in the area of concern between stations 19+00 and 24+00, under NYSDEC oversight, concurrent with the slurry cutoff wall construction. These measures were considered necessary for continuing construction of the slurry cutoff wall, without comprising its structural integrity. The riverbank dredging had created some areas with unstable slopes in excess of 3 feet horizontal to 1 foot vertical (3H:1V). To advance construction of remaining portions of the slurry cutoff wall, the excavated areas with slopes in excess of 3H:1V were filled/covered with a sandy material to achieve the desired slope of 3H:1V. The entire embankment, including sand fill material, was then covered with shot rock, geotextile, and riprap armoring for erosion protection, in accordance with the approved design. As a result, the wastefill outside the slurry wall is covered by the cap. As-built cross sections of sand, shot rock, geotextile placement and riprap armoring of the river bank between stations 19+00 and 24+00 are provided in Section 4.

1.3 REPORT ORGANIZATION

The report is organized into the following sections:

- Section 1 - Introduction: lists project objectives, and provides site history and background.
- Section 2 - Scope of Work: describes the techniques used on the field investigation.
- Section 3 - Results: describes wastefill and porewater analytical results.
- Section 4 - Natural Recovery Evaluation: presents rationale for natural recovery of the waterfill area.
- Section 5 - Conclusions and Recommendations.

In addition, the five appendices contain files, analytical data, and backup documentation.

SECTION 2

SECTION 2

SCOPE OF WORK

2.1 INTRODUCTION

This section describes the tasks that were conducted during the Buffalo River Embankment Wastefill Investigation at the Buffalo Color "Area D" Site. Tasks were conducted in accordance with the NYSDEC-approved Work Plan, dated July 27, 1998.

2.2 FIELD INVESTIGATION

The scope of work included borings and subsurface wastefill sampling, temporary piezometer installations, porewater sampling, laboratory analysis, data validation, and air monitoring.

2.2.1 Borings/Analysis

Seven borings were drilled between August 3, 1998 and August 6, 1998 to characterize the nature and chemical composition of the wastefill material and associated porewater. An eighth boring was attempted multiple times, but was not completed due to encountering refusal. This boring was deleted from the drilling program with the concurrence of Mr. Gerald Pietraszek of the NYSDEC. Boring locations are identified on Figures 2.1 and 2.2. Borings BG-01 and BG-02 were located upstream of the Site, and are intended to provide background sediment data (Figure 2.2). Boring logs are included in Appendix A.

The six borings were completed by Maxim Technologies, Inc. (Maxim) under the supervision of a Parsons Engineering Science, Inc. (Parsons ES) field geologist, while the seventh boring (BG-02, a background sediment location) was completed by a Parsons ES technician utilizing a hand auger. Maxim used a truck-mounted CME-55 drill rig to complete boring and temporary piezometer installations. Drilling, sampling, waste handling, and decontamination procedures as specified in the Work Plan were followed. Split-spoon samples were collected continuously at two-foot intervals in each boring, screened for total volatile organic compounds (VOCs) with a photoionization detector (PID), visually inspected, and geologically logged.

One sample from each of the seven borings was submitted for laboratory analyses. Each of the seven samples was analyzed for VOCs, semivolatile organic compounds (SVOCs), pesticides/PCBs, TAL metals, percent solids, and pH. Four samples (BG-01S, BG-02S, WF-03S, and WF-06S) were analyzed for total organic carbon (TOC), and five samples (WF-02S, through WF-06S) were analyzed for acid volatile sulfides/simultaneously extracted metals (AVS/SEM). A chemical analysis summary table showing analyses performed and methods used for each sample is provided as Table 2.1.

Five soil samples were collected for geotechnical analysis (WF-02, WF-03, WF-04, WF-05, and WF-06). All five soil samples were analyzed for grain size by sieve and hydrometer methods. Grain size sample WF-02 was from 6 to 16 feet, WF-03 was from 6 to 14 feet, WF-04 was from 2 to 14 feet, WF-05 was from 4 to 11 feet, and WF-06 was from 3.5 to 8 feet. All geotechnical analyses were performed following approved ASTM methods, and the results are presented in Appendix B.

2.2.2 Temporary Piezometer Installation/Development

Six 2-inch diameter temporary piezometers (WF-02 through WF-06 and BG-01) were installed between August 3 and August 6, 1998 to characterize porewater quality. Piezometers WF-02 through WF-06 were installed on the western boundary of the Site, adjacent to the shoreline (station numbers: 20+00, 21+00, 21+75, 22+50, and 23+50). Piezometer BG-01 was installed approximately 3000 feet upstream, adjacent to the shoreline near the South Park Avenue lift bridge (see Figure 2.2).

The piezometer borings were drilled to depths ranging from 6 feet (BG-01) to 18.5 feet (WF-03). Ten feet of 0.010-inch slotted, schedule 40 PVC well screen was installed in four of the six borings. These screens were placed at depths corresponding to visibly stained soils and/or wastefill zones. A 3.5-foot well screen was installed in BG-01, and a 5-foot well screen was installed in WF-02. The shorter well screens were installed where shallower depths were drilled, and/or where thinner zones of visibly stained soils or wastefill were observed. Sand packs were placed around each well screen to at least one foot above the top of each screen. Bentonite pellets were backfilled from the top of the sand pack to the ground surface, and hydrated with potable water. Piezometer diagrams are presented in Appendix A.

Piezometers (WF-02, WF-03, WF-04, WF-05, WF-06, and BG-01) were developed between August 7 and August 11, 1998, using dedicated tubing connected to a low-flow peristaltic pump and a Geotech™ flow-through cell. Wells were developed until pH, temperature, specific conductivity, dissolved oxygen, and redox potential stabilized. A summary of field observations and measurements is presented in Appendix C.

2.2.3 Porewater Level Measurements

Measurements of groundwater levels were taken August 8, 1998 from the Site piezometers using an electronic water-level indicator. The depth to water was measured from the top of each PVC piezometer casing.

2.2.4 Porewater Sampling/Analysis

Sampling was conducted to characterize porewater quality in the wastefill material. The six piezometers were sampled on August 7, 1998 through August 10, 1998. Each piezometer was sampled using dedicated tubing connected to a low-flow peristaltic pump. Each well was purged of a minimum of three well volumes, and allowed to recover before sampling. Porewater sampling and sample handling procedures described in the Work Plan were followed.

All porewater samples were analyzed for VOCs, SVOCs, pesticides/PCBs, and TAL metals (unfiltered/total metals and filtered/dissolved metals). Also, groundwater samples collected from WF-02, WF-03, WF-04, and BG-01 were analyzed for methane, sulfate and nitrate. A summary showing analyses performed and methods used for each sample is provided in Table 2.1.

2.2.5 Laboratory Analysis and Data Validation

Laboratory analysis and reporting for most of the parameters were conducted under NYSDEC's Analytical Services Protocol (ASP). A NYSDEC ASP Level B reporting package was generated by the laboratory for use in data validation. The laboratory that conducted the analyses is certified under the New York State Department of Health's (NYSDOH) Environmental Laboratory Approval Program (ELAP).

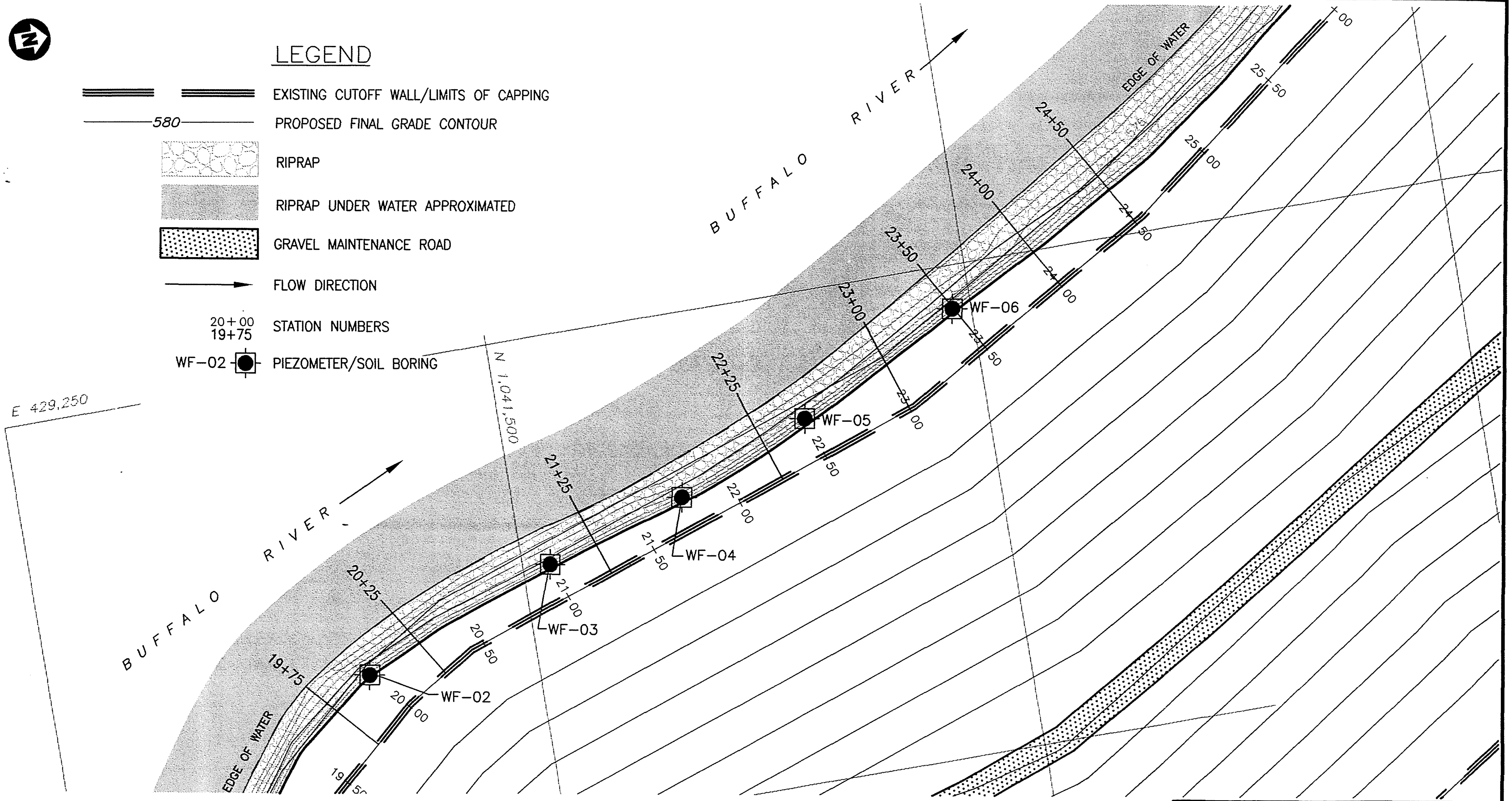
Data validation was performed on the wastefill, porewater, and background sample analytical results. Full validation (USEPA Level IV) was performed on ten percent of the collected samples and the remaining samples were validated at USEPA Level III. Level III validation includes the review of holding times, quality control (QC) blanks, surrogate recoveries, matrix spike/matrix spike duplicate (MS/MSD) precision and accuracy, internal standard responses, calibration responses, field duplicate precision, and all other instrument performance QC checks. Level IV validation includes the Level III review, plus confirming the calculations of detected results from the raw data, verifying presence or absence of compounds or analytes from a sample, and calculating lab and sample QC results with instrument raw data. The data validation report is presented in Appendix D.

2.2.6 Site Survey

After the sampling activities were completed, a New York State-licensed land surveyor (Douglas C. Myers, Professional Land Surveyor, P.C.) surveyed the six onsite piezometers. Vertical control to the nearest 0.1 foot was established for the ground surface at each boring and to the nearest 0.01 foot for the top of each piezometer casing. Elevations were determined relative to the existing Site datum. Horizontal control for piezometers was determined by ties (location and distance), relative to one another and the specified datum.

2.2.7 Air Monitoring

Air monitoring was conducted during all Site activities, including soil borings and temporary piezometer installations, and porewater sampling, as specified in the Work Plan. Any photoionization detector (PID) readings above background were recorded in the field log book. In addition to health and safety monitoring, soil samples were screened with the PID for the presence of VOCs. Soil sample screening results are included in the boring and piezometer logs in Appendix A.



DATE: 10/2/98 (JHG)
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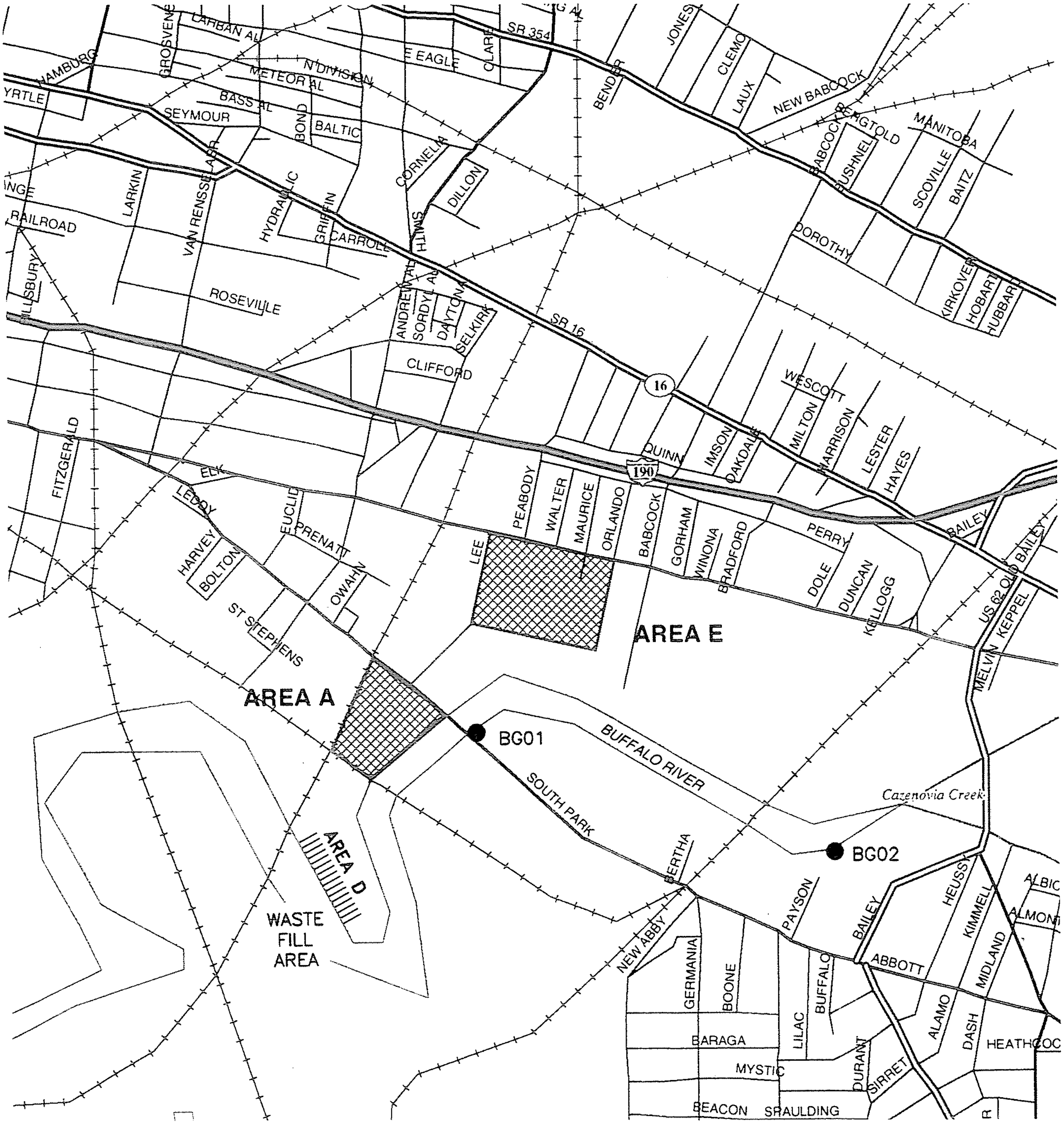
XREF'S: NONE

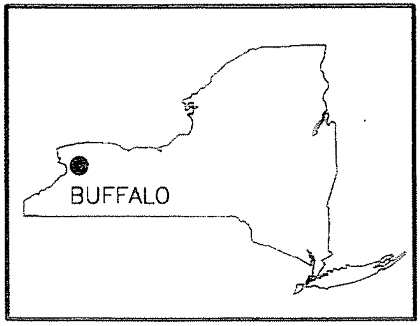
FIGURE 2.1

BUFFALO COLOR "AREA D"– ALLIEDSIGNAL
BUFFALO, NEW YORK

PIEZOMETER/SOIL BORING
LOCATION PLAN

PARSONS ENGINEERING SCIENCE, INC.
DESIGN * RESEARCH * PLANNING
290 ELWOOD DAVIS ROAD * SUITE 312 * LIVERPOOL, N.Y. 13088 * 315/451-9560
OFFICES IN PRINCIPAL CITIES





QUADRANGLE LOCATION
NEW YORK

LATITUDE: N42° 51' 54"
LONGITUDE: W78° 50' 35"

Scale 1:15,625 (at center)

1000 Feet

500 Meters

FIGURE 2.2

BUFFALO COLOR CORPORTATION
100 LEE STREET
BUFFALO, NEW YORK

LOCATION OF OFF SITE BACKGROUND SAMPLES

PARSONS ENGINEERING SCIENCE, INC.
DESIGN * RESEARCH * PLANNING
290 ELWOOD DAVIS ROAD * SUITE 312 * LIVERPOOL, N.Y. 13088 * 315/451-9560
OFFICES IN PRINCIPAL CITIES

TABLE 2.1

AlliedSignal
Buffalo Color Area "D"
Wastefill Area
Buffalo, New York
Chemical Analysis Summary

Chemical Analyses for Water Samples													
Sample Id	Station No.	Date Sampled	Matrix	ASP 95-1 VOCs	ASP 95-2 SVOCs	ASP 95-3 PEST/PCBs	CLP-M Metals	Filtered Metals	Methane	Nitrate Nitrogen	Nitrite Nitrogen	Nitrate-nitrite Nitrogen	Sulfate
BG-01W	South Park Bridge	08/07/98	Water	X	X	X	X	X	X	X	X	X	X
WF-02W	20+00	08/07/98	Water	X	X	X	X	X	X	X	X	X	X
WF-03W*	21+00	08/10/98	Water	X	X	X	X	X	X	X	X	X	X
WF-04W	21+75	08/07/98	Water	X	X	X	X	X	X	X	X	X	X
WF-05W	22+50	08/10/98	Water	X	X	X	X	X					
WF-06W	23+50	08/10/98	Water	X	X	X	X	X					
Trip Blank		08/07/98	Water	X	X				X				
Trip Blank		08/10/98	Water	X	X				X				

Field Parameters for Water Samples									
Sample Id	Station No.	Date Sampled	Matrix	Redox Potential	Dissolved Oxygen	pH	Temp	Conductivity	Ferrous Iron
BG-01W	South Park Bridge	08/07/98	Water	X	X	X	X	X	X
WF-02W	20+00	08/07/98	Water	X	X	X	X	X	X
WF-03W	21+00	08/10/98	Water	X	X	X	X	X	X
WF-04W	21+75	08/07/98	Water	X	X	X	X	X	X
WF-05W	22+50	08/10/98	Water	X	X	X	X	X	X
WF-06W	23+50	08/10/98	Water	X	X	X	X	X	X

Chemical Analyses for Soil Samples													
Sample Id		Depth	Date Sampled	Matrix	ASP 95-1 VOCs	ASP 95-2 SVOCs	ASP 95-3 PEST/PCBs	CLP-M Metals	pH	Total Solids	TOC	AVS/SEM Metals	Grain Size
BG-01S	South Park Bridge	(0-1')	08/06/98	Soil	X	X	X	X	X	X	X		
BG-02S	Upstream (Tops)	(0-1')	08/06/98	Soil	X	X	X	X	X	X	X		
WF-02S	20+00	(6-16')	08/03/98	Soil		X	X	X	X	X		X	X$^{(1)}$
WF-02S	20+00	(12-14')	08/03/98	Soil	X					X			
WF-03S*	21+00	(6-14')	08/04/98	Soil		X	X	X	X	X	X	X	X$^{(1)}$
WF-03S	21+00	(10-12')	08/04/98	Soil	X					X			
WF-04S	21+75	(2-14')	08/05/98	Soil		X	X	X	X	X		X	X$^{(1)}$
WF-04S	21+75	(8-10')	08/05/98	Soil	X					X			
WF-05S	22+50	(4-11')	08/05/98	Soil		X	X	X	X	X		X	X$^{(1)}$
WF-05S	22+50	(6-8')	08/05/98	Soil	X					X			
WF-06S	23+50	(2-4')	08/05/98	Soil	X					X			
WF-06S	23+50	(3.5-8')	08/05/98	Soil		X	X	X	X	X	X	X	X$^{(1)}$

Note:
* MS/MSD sets on this sample location for VOCs, SVOCs, and Pest/PCBs
(1) Soil was a composite sample.

SECTION 3

SECTION 3

RESULTS

3.1 INTRODUCTION

Both wastefill and porewater concentrations were evaluated and compared to appropriate guidelines, criteria, or benchmarks to determine potential impacts to benthic invertebrates.

Analytical results from wastefill samples were compared to USEPA's Ecotox Threshold Values (USEPA TVs) (Table 3.1, USEPA, 1996), and NYSDEC's Sediment Criteria (Table 3.2). Analytical results from porewater samples were compared to USEPA's TVs (Table 3.3), and NYSDEC's Class C Surface Water Standards (Table 3.4). Where appropriate, results were also compared to the upstream background sample locations, BG-01 and BG-02.

Although both wastefill and porewater were evaluated, the porewater results should be given greater consideration for the following reasons:

- Currently, benthic organisms do not inhabit the wastefill material, and will not inhabit this material in the future. The construction of the cap has temporarily removed the benthic habitat zone, which typically includes only the top several inches of sediment. When a new benthic zone is established on top of the cap, it will be separated from the wastefill by the cap (see Section 4.2 for details).
- Contact with porewater has greater potential impacts on benthic organisms than contact with the sediment because porewater is what they ingest and absorb. Certain sediment quality criteria, especially those for non-polar organic compounds, are tied to water quality standards, guidance values, and criteria. In the case of metals, the dissolved fraction seems to account for most of the toxicity to organisms (NYSDEC, 1993). Thus, the primary concern for the Buffalo Color Site is the potential for porewater in the wastefill material to migrate through the existing cap to the future benthic zone.

The specific NYSDEC sediment criteria selected for comparison to wastefill concentrations included the benthic aquatic acute criteria for organic compounds, and the severe effects levels for metals. These criteria were considered appropriate as a screening tool to determine whether concentrations in wastefill might potentially impact ecological receptors. As mentioned above, benthic organisms will not inhabit the wastefill, and the primary concern is the potential for porewater from the wastefill to migrate to the future benthic zone.

The Class C Surface Water Standards for aquatic chronic effects were selected for porewater because porewater has a greater potential impact on benthic organisms, as described above. These chronic effects values are more conservative than the aquatic acute effects criteria, as they represent longer-term potential effects.

The USEPA's TVs for both water and sediment were intended by USEPA to be primarily used for screening purposes to determine whether further site investigation is warranted. They are presented here to provide an additional set of guidelines for comparison to detected concentrations. There are several USEPA TVs that have been developed for which there are no corresponding NYSDEC Criteria. For those chemicals which have both USEPA TVs and NYSDEC Criteria, the USEPA TVs provide an independent comparison to NYSDEC Criteria and Guidelines. The USEPA TVs are not regulatory criteria.

Results of background sampling indicated elevated levels of many of the constituents found in the wastefill material. These are discussed below, as appropriate, in conjunction with the NYSDEC Criteria and USEPA TVs.

3.2 WASTEFILL RESULTS

In general, the concentrations of most detected organic compounds did not exceed either NYSDEC or USEPA sediment criteria. A background TOC content of 2.3 percent (obtained by averaging the TOC analytical results from the two background sediment samples) was used to calculate the NYSDEC and USEPA criteria for organic compounds, based on partitioning theory.

organics
acute criteria

metals
severe levels

None of the detected VOCs exceeded NYSDEC's sediment criteria. Benzene and xylenes exceeded USEPA's TVs in WF-02S and WF-05S by less than one order of magnitude.

Of the SVOCs, only 1,2-dichlorobenzene in WF-04S and WF-06S exceeded the NYSDEC Criteria. 1,2,- and 1,4-dichlorobenzene exceeded USEPA's TVs in WF-04S, and only 1,2-dichlorobenzene exceeded USEPA's TVs in WF-06S. Several PAHs exceeded USEPA's TVs in multiple samples. Only napthalene exceeded USEPA's TV in WF-05S.

Of the pesticides detected, endosulfan I and endosulfan II, slightly exceeded the NYSDEC criteria in WF-05S, and only endosulfan II slightly exceeded the criteria in WF-03S and WF-06S. A total of four pesticides exceeded USEPA's TVs in samples WF-02S (endrin and methoxychlor, WF-03S (dieldrin, endosulfan II), WF-04S (endrin), and WF-06S (dieldrin, endosulfan II, and methoxychlor).

Eleven metals exceeded the NYSDEC sediment criteria in most of the wastefill samples, as shown on Table 3.2. Sample WF-05S was less impacted than others, with only chromium and lead slightly exceeding the NYSDEC criteria. The highest concentration of manganese (3,500 ug/kg) was found in one of the background samples, BG-01S. Also, several metals exceeded the USEPA's TVs in all samples, with fewer exceedances in WF-05S.

3.3 POREWATER RESULTS

The relatively low concentration of chemicals in the porewater samples indicate that release of organic compounds and inorganic chemicals from the wastefill to water is minimal. It appears that the natural TOC content (2.3 percent) in the river sediment is a possible factor in reducing mobility of organics into the water column. Also, the results suggest that metals have limited mobility between the wastefill and water phases.

The USEPA Office of Water Policy states "....... concentrations of dissolved metal rather than total metal, should be used to set and measure compliance with water quality standards, because dissolved metal concentrations more closely approximate the bioavailable fraction of metal in the water columns" (USEPA 1996).

Therefore, the analytical results from the filtered metals samples were compared to the NYSDEC's Class C Water Quality Standards and the USEPA's TVs.

The only VOC detected above NYSDEC's Criteria was chlorobenzene. This compound was detected in all six water samples, including the background sample, BG-01W (Table 3.4). Benzene was detected slightly above USEPA's TVs in WF-02W and WF-03W, and chlorobenzene was detected above USEPA TVs in WF-05W and WF-06W (Table 3.3).

A total of five SVOCs, including two PAHs (fluorene and naphthalene), as shown on Table 3.4, were detected above NYSDEC's Criteria. Fluorene and 1,2-dichlorobenzene concentrations exceeded USEPA's TVs in WF-04W, and naphthalene was above the USEPA TVs in WF-02W and WF-03W.

Pesticides did not exceed NYSDEC's Criteria in any samples. Only endosulfan II and dieldrin were detected above USEPA's criteria in WF-02W and WF-03W, respectively.

Only four dissolved metals were detected above NYSDEC's Criteria in any of the samples. Only iron was detected above the NYSDEC's Criteria in more than one sample. Iron was also detected above the criteria in the background sample, BG-01W, and at higher concentrations than in WF-02W and WF-06W. Zinc was detected above the NYSDEC's criteria in a single sample, WF-04W. A similar pattern was observed relative to USEPA's TVs. Barium exceeded USEPA's criteria in all samples, but the highest concentration was in the background sample, BG-01W.

Generally, total metals concentrations were higher than dissolved metals concentrations, as shown on Tables 3.3 and 3.4. As discussed previously, dissolved metals, rather than total metals, are more appropriate for determining potential impacts to ecological receptors, such as benthic macroinvertebrates.

TABLE 3.1
ALLIEDSIGNAL
BUFFALO COLOR AREA "D"
WASTE FILL AREA
WASTEFILL SAMPLE RESULTS COMPARED TO USEPA ECOTOX THRESHOLD VALUES

AlliedSignal Buffalo Color Area D Validated Sediment Data Detected Compound Summary			SAMPLE ID:	BG-01S	BG-02S	WF-02S	WF-02S	WF-03S	WF-03S
			DEPTH:	(0-1')	(0-1')	(12-14')	(6-16')	(10-12')	(6-14')
			LAB ID:	J3372/J3373	J3370/J3371	J3126	J3127/J3131	J3128	J3129/J3132
			SOURCE:	OB&G	OB&G	OB&G	OB&G	OB&G	OB&G
			SDG:	8690/8737	8690/8737	8690/8737	8690/8737	8690/8737	8690/8737
			MATRIX:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Ecotox	SAMPLED:	8/6/98	8/6/98	8/3/98	8/3/98	8/4/98	8/4/98
		Threshold	VALIDATED:	9/4/98	9/4/98	9/4/98	9/4/98	9/4/98	9/4/98
CAS NO.	COMPOUND	Value	UNITS:			DRC			
	VOLATILES								
67-64-1	Acetone	NS	ug/Kg	12 J	10 J	43	NA	24	NA
71-43-2	Benzene	131 SQB	ug/Kg	ND	ND	110 170	NA	61	NA
78-93-3	2-Butanone	NS	ug/Kg	42 J	4 J	7 J 79	NA	24	NA
108-90-7	Chlorobenzene	1886 SQB	ug/Kg	2 J	ND	21 70	NA	220	NA
67-66-3	Chloroform	NS	ug/Kg	ND	ND	ND	NA	ND	NA
100-41-4	Ethylbenzene	8280 SQB	ug/Kg	ND	ND	7J 14 J	NA	2 J	NA
127-18-4	Tetrachloroethene	1219 SQB	ug/Kg	ND	ND	ND	NA	ND	NA
108-88-3	Toluene	1541 SQB	ug/Kg	2 J	ND	7 J 62	NA	6 J	NA
1330-20-7	Xylene (total)	58 SQB	ug/Kg	ND	ND	26 150	NA	5 J	NA
	SEMIVOLATILES								
85-68-7	Butyl benzyl phthalate	25.3 SQB	ug/Kg	R	ND	NA	ND	NA	ND
86-74-8	Carbazole	NS	ug/Kg	130 J	ND	NA	660 J	NA	2500 J
106-47-8	4-Chloroaniline	NS	ug/Kg	ND	ND	NA	990 J	NA	7700 J
117-84-0	Di-n-octyl phthalate	NS	ug/Kg	R	ND	NA	ND	NA	R
106-46-7	*1,4-Dichlorobenzene*	805 SQB	ug/Kg	72 J	ND	NA	ND	NA	ND
95-50-1	1,2-Dichlorobenzene	782 SQB	ug/Kg	ND	ND	NA	ND	NA	2600 J
91-94-1	3,3'-Dichlorobenzidine	NS	ug/Kg	R	ND	NA	ND	NA	ND
51-28-5	2,4-Dinitrophenol	NS	ug/Kg	ND	190 J	NA	ND	NA	ND
606-20-2	2,6-Dinitrotoluene	NS	ug/Kg	ND	ND	NA	ND	NA	3000 J
121-14-2	2,4-Dinitrotoluene	NS	ug/Kg	ND	ND	NA	2400 J	NA	11000 J
118-74-1	Hexachlorobenzene	NS	ug/Kg	ND	ND	NA	ND	NA	3500 J
91-57-6	2-Methylnaphthalene	NS	ug/Kg	ND	ND	NA	1400 J	NA	2300 J
106-44-5	4-Methylphenol	NS	ug/Kg	ND	88 J	NA	ND	NA	ND
86-30-6	N-Nitrosodiphenylamine	NS	ug/Kg	ND	ND	NA	3900 J	NA	11000 J
88-74-4	2-Nitroaniline	NS	ug/Kg	ND	ND	NA	3600 J	NA	ND
99-09-2	3-Nitroaniline	NS	ug/Kg	ND	ND	NA	2000 J	NA	ND
98-95-3	Nitrobenzene	NS	ug/Kg	ND	ND	NA	1200 J	NA	5400 J
87-86-5	Pentachlorophenol	NS	ug/Kg	ND	270 J	NA	ND	NA	ND
120-82-1	1,2,4-Trichlorobenzene	NS	ug/Kg	ND	ND	NA	ND	NA	8000 J
117-81-7	bis(2-Ethylhexyl)phthalate	NS	ug/Kg	270 J	410 J	NA	950 J	NA	2500 J
	PAHs								
83-32-9	Acenaphthene	1426 SQC(FW)	ug/Kg	210 J	ND	NA	640 J	NA	1300 J
120-12-7	Anthracene	NS	ug/Kg	190 J	84 J	NA	1800 J	NA	3400 J
56-55-3	Benzo[a]anthracene	NS	ug/Kg	730 J	340 J	NA	4400 3300 J	NA	6800 J
50-32-8	Benzo[a]pyrene	989 ERL	ug/Kg	1000 J	390 J	NA	3100 J	NA	9100 J
205-99-2	Benzo[b]fluoranthene	NS	ug/Kg	1300 J	600 J	NA	6900 4000 J	NA	9600 J
191-24-2	Benzo[g,h,i]perylene	NS	ug/Kg	1400 J	250 J	NA	1900 J	NA	2900 J
207-08-9	Benzo[k]fluoranthene	NS	ug/Kg	520 J	180 J	NA	1700 J	NA	3600 J
218-01-9	Chrysene	NS	ug/Kg	990 J	510 J	NA	9700 3700 J	NA	7600 J
53-70-3	*Dibenz[a,h]anthracene*	NS	ug/Kg	270 J	ND	NA	ND	NA	R
132-64-9	Dibenzofuran	4600 SQB	ug/Kg	150 J	ND	NA	980 J	NA	2300 J
206-44-0	Fluoranthene	6670 SQC(FW)	ug/Kg	880 J	650	NA	8500 5500	NA	9900 J
86-73-7	Fluorene	1242 SQB	ug/Kg	160 J	60 J	NA	1100 J	NA	2800 J
193-39-5	Indeno[1,2,3-cd]pyrene	NS	ug/Kg	880 J	240 J	NA	1700 J	NA	2700 J
91-20-3	Naphthalene	1104 SQB	ug/Kg	160 J	ND	NA	5900 7200	NA	44000
85-01-8	Phenanthrene	1955 SQC(FW)	ug/Kg	790 J	470 J	NA	7400 5500	NA	12000
129-00-0	Pyrene	1518 ERL	ug/Kg	1900 J	1100 J	NA	7300 6700	NA	17000
	Total PAHs			11530	4874	NA	48820	NA	135000

TABLE 3.1
ALLIEDSIGNAL
BUFFALO COLOR AREA "D"
WASTE FILL AREA
WASTEFILL SAMPLE RESULTS COMPARED TO USEPA ECOTOX THRESHOLD VALUES

AlliedSignal			SAMPLE ID:	BG-01S	BG-02S	WF-02S	WF-02S	WF-03S	WF-03S
Buffalo Color Area D			DEPTH:	(0-1')	(0-1')	(12-14')	(6-16')	(10-12')	(6-14')
Validated Sediment Data			LAB ID:	J3372/J3373	J3370/J3371	J3126	J3127/J3131	J3128	J3129/J3132
Detected Compound Summary			SOURCE:	OB&G	OB&G	OB&G	OB&G	OB&G	OB&G
			SDG:	8690/8737	8690/8737	8690/8737	8690/8737	8690/8737	8690/8737
			MATRIX:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Ecotox	SAMPLED:	8/6/98	8/6/98	8/3/98	8/3/98	8/4/98	8/4/98
		Threshold	VALIDATED:	9/4/98	9/4/98	9/4/98	9/4/98	9/4/98	9/4/98
CAS NO.	COMPOUND	Value	UNITS:						
	PESTICIDES								
309-00-2	Aldrin	NS	ug/Kg	ND	ND	NA	ND	NA	ND
72-54-8	4,4'-DDD	NS	ug/Kg	11 JN	ND	NA	ND	NA	500 J
72-55-9	4,4'-DDE	NS	ug/Kg	6.5 J	4.5 JN	NA	ND	NA	ND
50-29-3	4,4'-DDT	1.6	ug/Kg	ND	ND	NA	ND	NA	1300
60-57-1	Dieldrin	119.6 SQC(FW)	ug/Kg	ND	0.83 JN	NA	ND	NA	380 JN
959-98-8	Endosulfan I	6.67 SQB	ug/Kg	ND	ND	NA	ND	NA	ND
33213-65-	Endosulfan II	32.2 SQB	ug/Kg	ND	ND	NA	12 JN	NA	34 JN
1031-07-8	Endosulfan sulfate	NS	ug/Kg	2.6 JN	ND	NA	ND	NA	170 JN
72-20-8	Endrin	46 SQC(FW)	ug/Kg	12 J	ND	NA	14JP 58 JN	NA	750 J
53494-70-	Endrin ketone	NS	ug/Kg	12 J	ND	NA	21 JN	NA	ND
76-44-8	Heptachlor	NS	ug/Kg	ND	ND	NA	19 J	NA	4.9 JN
1024-57-3	Heptachlor epoxide	NS	ug/Kg	3.9 JN	3.3 JN	NA	ND	NA	130 J
72-43-5	Methoxychlor	43.7 SQC	ug/Kg	ND	ND	NA	28JP 59 JN	NA	100 JN
319-95-7	beta-BHC	NS	ug/Kg	ND	ND	NA	26 JN	NA	ND
319-86-8	delta-BHC	NS	ug/Kg	ND	ND	NA	ND	NA	ND
	METALS								
7429-90-5	Aluminum	NS	mg/Kg	6850	7500	NA	5900	NA	4030
7440-36-0	Antimony	NS	mg/Kg	ND	0.98 J	NA	25.4 J	NA	311 J
7440-38-2	Arsenic	8.2 ERL	mg/Kg	6.3	9	NA	38.7	NA	32.5
7440-39-3	Barium	NS	mg/Kg	71	73	NA	118	NA	192
7440-41-7	Beryllium	NS	mg/Kg	0.74 J	0.47 J	NA	0.82 J	NA	0.37 J
7440-43-9	Cadmium	1.2 ERL	mg/Kg	0.47 J	0.49 J	NA	2 J	NA	9.5 J
7440-70-2	Calcium	NS	mg/Kg	56200	16500	NA	25900	NA	33700
7440-47-3	Chromium	81 ERL	mg/Kg	96.7	15.6	NA	419	NA	9190
7440-48-4	Cobalt	NS	mg/Kg	5.5 J	9.5 J	NA	10.3 J	NA	8.8 J
7440-50-8	Copper	34 ERL	mg/Kg	34.2	46.6	NA	132	NA	738
7439-89-6	Iron	NS	mg/Kg	28300	24000	NA	55700	NA	66300
7439-92-1	Lead	34 ERL	mg/Kg	62.6	71.2	NA	5080	NA	914
7439-95-4	Magnesium	NS	mg/Kg	9400	6100	NA	7020	NA	9280
7439-96-5	Manganese	NS	mg/Kg	3500 J	390 J	NA	557	NA	581
7439-97-6	Mercury	0.15 ERL	mg/Kg	0.08 J	0.12 J	NA	161	NA	18.4
7440-02-0	Nickel	21 ERL	mg/Kg	17.4 J	25.1 J	NA	36.6 J	NA	65.7 J
7440-09-7	Potassium	NS	mg/Kg	321 J	460 J	NA	428 J	NA	283 J
7782-49-2	Selenium	NS	mg/Kg	2.4	ND	NA	2.2	NA	2.1
7440-22-4	Silver	NS	mg/Kg	ND	ND	NA	ND	NA	ND
7440-23-5	Sodium	NS	mg/Kg	224 J	139 J	NA	398 J	NA	318 J
7440-62-2	Vanadium	NS	mg/Kg	47.3 J	13 J	NA	18.2 J	NA	19.9 J
7440-66-6	Zinc	150 ERL	mg/Kg	139	176	NA	429	NA	2000 J
	OTHER								
7440-44-0	Total Organic Carbon	NS	mg/Kg	18600	29300	NA	NA	NA	87800
SOLIDS	% Total Solids	NS	%	75.4	65.5	73.6	74.7	58.3	80.3
PH	pH	NS	STD u	NA	NA	NA	7.6 J	NA	7.7 J

TABLE 3.1
ALLIEDSIGNAL
BUFFALO COLOR AREA "D"
WASTE FILL AREA
WASTEFILL SAMPLE RESULTS COMPARED TO USEPA ECOTOX THRESHOLD VALUES

AlliedSignal Buffalo Color Area D Validated Sediment Data Detected Compound Summary			SAMPLE ID:	WF-04S	WF-04S	WF-05S	WF-05S	WF-06S	WF-06S
			DEPTH:	(2-14')	(8-10')	(4-11')	(6-8')	(2-4')	(3.5-8')
			LAB ID:	J3365/J3374	J3364	J3367/J3375	J3366	J3368	J3369/J3376
			SOURCE:	OB&G	OB&G	OB&G	OB&G	OB&G	OB&G
			SDG:	8690/8737	8690/8737	8690/8737	8690/8737	8690/8737	8690/8737
			MATRIX:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Ecotox	SAMPLED:	8/5/98	8/5/98	8/5/98	8/5/98	8/5/98	8/5/98
		Threshold	VALIDATED:	9/4/98	9/4/98	9/4/98	9/4/98	9/4/98	9/4/98
CAS NO.	COMPOUND	Value	UNITS:						
	VOLATILES								
67-64-1	Acetone	NS	ug/Kg	NA	20	NA	110 210 J	34	NA
71-43-2	Benzene	131 SQB	ug/Kg	NA	24 35	NA	230 400	76	NA
78-93-3	2-Butanone	NS	ug/Kg	NA	6 J	NA	20 75 J	7 J	NA
108-90-7	Chlorobenzene	1886 SQB	ug/Kg	NA	88 280	NA	10J 30 J	150	NA
67-66-3	Chloroform	NS	ug/Kg	NA	ND	NA	ND	1 J	NA
100-41-4	Ethylbenzene	8280 SQB	ug/Kg	NA	ND	NA	47 180	3 J	NA
127-18-4	Tetrachloroethene	1219 SQB	ug/Kg	NA	ND	NA	2J 9 J	ND	NA
108-88-3	Toluene	1541 SQB	ug/Kg	NA	ND	NA	44 ND	12 J	NA
1330-20-7	Xylene (total)	58 SQB	ug/Kg	NA	ND	NA	160	8 J	NA
	SEMIVOLATILES								
85-68-7	Butyl benzyl phthalate	25.3 SQB	ug/Kg	ND	NA	ND	NA	NA	ND
86-74-8	Carbazole	NS	ug/Kg	1700 J	NA	ND	NA	NA	1600 J
106-47-8	4-Chloroaniline	NS	ug/Kg	3900 J	NA	ND	NA	NA	ND
117-84-0	Di-n-octyl phthalate	NS	ug/Kg	ND	NA	ND	NA	NA	ND
106-46-7	1,4-Dichlorobenzene	805 SQB	ug/Kg	3700 J	NA	ND	NA	NA	ND
95-50-1	1,2-Dichlorobenzene	782 SQB	ug/Kg	13000 17000	NA	ND	NA	NA	3200 J
91-94-1	3,3'-Dichlorobenzidine	NS	ug/Kg	ND	NA	ND	NA	NA	ND
51-28-5	2,4-Dinitrophenol	NS	ug/Kg	ND	NA	ND	NA	NA	ND
606-20-2	2,6-Dinitrotoluene	NS	ug/Kg	12000 13000 J	NA	1000J 4300 J	NA	NA	4100 J
121-14-2	2,4-Dinitrotoluene	NS	ug/Kg	27000 24000	NA	5200 18000	NA	NA	12000
118-74-1	Hexachlorobenzene	NS	ug/Kg	15000 24000	NA	ND	NA	NA	ND
91-57-6	2-Methylnaphthalene	NS	ug/Kg	ND	NA	ND	NA	NA	3000 J
106-44-5	4-Methylphenol	NS	ug/Kg	ND	NA	ND	NA	NA	ND
86-30-6	N-Nitrosodiphenylamine	NS	ug/Kg	12000 10000 J	NA	570J ND	NA	NA	2100 J
88-74-4	2-Nitroaniline	NS	ug/Kg	ND	NA	ND	NA	NA	ND
99-09-2	3-Nitroaniline	NS	ug/Kg	3700J 2700 J	NA	ND	NA	NA	ND
98-95-3	Nitrobenzene	NS	ug/Kg	13000 26000	NA	ND	NA	NA	ND
87-86-5	Pentachlorophenol	NS	ug/Kg	ND	NA	ND	NA	NA	ND
120-82-1	1,2,4-Trichlorobenzene	NS	ug/Kg	1400J 2200 J	NA	ND	NA	NA	1900 J
117-81-7	bis(2-Ethylhexyl)phthalate	NS	ug/Kg	2400 J	NA	100J ND	NA	NA	1800 J
	PAHs								
83-32-9	Acenaphthene	1426 SQC(FW)	ug/Kg	1400J ND	NA	ND	NA	NA	1400 J
120-12-7	Anthracene	NS	ug/Kg	3200 J	NA	ND	NA	NA	5700 J
56-55-3	Benzo[a]anthracene	NS	ug/Kg	18000 10000 J	NA	940J ND	NA	NA	10000 J
50-32-8	Benzo[a]pyrene	989 ERL	ug/Kg	14000 8400 J	NA	ND	NA	NA	15000 J
205-99-2	Benzo[b]fluoranthene	NS	ug/Kg	32000 12000 J	NA	1100J ND	NA	NA	9400 J
191-24-2	Benzo[g,h,i]perylene	NS	ug/Kg	4700 J	NA	ND	NA	NA	2600 J
207-08-9	Benzo[k]fluoranthene	NS	ug/Kg	5100 J	NA	ND	NA	NA	4000 J
218-01-9	Chrysene	NS	ug/Kg	18000 11000 J	NA	670J ND	NA	NA	7900 J
53-70-3	Dibenz[a,h]anthracene	NS	ug/Kg	ND	NA	ND	NA	NA	ND
132-64-9	Dibenzofuran	4600 SQB	ug/Kg	1700J ND	NA	ND	NA	NA	1900 J
206-44-0	Fluoranthene	6670 SQC(FW)	ug/Kg	25000 13000 J	NA	1000J ND	NA	NA	13000
86-73-7	Fluorene	1242 SQB	ug/Kg	25000 11000 J	NA	ND	NA	NA	2400 J
193-39-5	Indeno[1,2,3-cd]pyrene	NS	ug/Kg	4400 J	NA	ND	NA	NA	2500 J
91-20-3	Naphthalene	1104 SQB	ug/Kg	11000 13000 J	NA	9100 9300 J	NA	NA	150000
85-01-8	Phenanthrene	1955 SQC(FW)	ug/Kg	14000 11000 J	NA	1200J ND	NA	NA	17000
129-00-0	Pyrene	1518 ERL	ug/Kg	26000 19000 J	NA	1100J ND	NA	NA	18000
	Total PAHs			125800	NA	9300	NA	NA	260800

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TABLE 3.1
ALLIEDSIGNAL
BUFFALO COLOR AREA "D"
WASTE FILL AREA
WASTEFILL SAMPLE RESULTS COMPARED TO USEPA ECOTOX THRESHOLD VALUES

AlliedSignal Buffalo Color Area D Validated Sediment Data Detected Compound Summary			SAMPLE ID:	WF-04S	WF-04S	WF-05S	WF-05S	WF-06S	WF-06S
			DEPTH:	(2-14')	(8-10')	(4-11')	(6-8')	(2-4')	(3.5-8')
			LAB ID:	J3365/J3374	J3364	J3367/J3375	J3366	J3368	J3369/J3376
			SOURCE:	OB&G	OB&G	OB&G	OB&G	OB&G	OB&G
			SDG:	8690/8737	8690/8737	8690/8737	8690/8737	8690/8737	8690/8737
			MATRIX:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Ecotox	SAMPLED:	8/5/98	8/5/98	8/5/98	8/5/98	8/5/98	8/5/98
		Threshold	VALIDATED:	9/4/98	9/4/98	9/4/98	9/4/98	9/4/98	9/4/98
CAS NO.	COMPOUND	Value	UNITS:						
	PESTICIDES								
309-00-2	Aldrin	NS	ug/Kg	ND	NA	ND	NA	NA	11 JN
72-54-8	4.4'-DDD	NS	ug/Kg	ND	NA	25 JN	NA	NA	360 JN
72-55-9	4.4'-DDE	NS	ug/Kg	980 J	NA	ND	NA	NA	ND
50-29-3	4.4'-DDT	1.6	ug/Kg	ND	NA	150 J	NA	NA	ND
60-57-1	Dieldrin	119.6 SQC(FW)	ug/Kg	ND	NA	ND	NA	NA	140 JN
959-98-8	Endosulfan I	6.67 SQB	ug/Kg	ND	NA	40 J	NA	NA	ND
33213-65-	Endosulfan II	32.2 SQB	ug/Kg	ND	NA	23 JN	NA	NA	72 J
1031-07-8	Endosulfan sulfate	NS	ug/Kg	4000 JN	NA	29 JN	NA	NA	ND
72-20-8	Endrin	46 SQC(FW)	ug/Kg	6900 J	NA	44 JN	NA	NA	ND
53494-70-	Endrin ketone	NS	ug/Kg	ND	NA	ND	NA	NA	ND
76-44-8	Heptachlor	NS	ug/Kg	ND	NA	ND	NA	NA	ND
1024-57-3	Heptachlor epoxide	NS	ug/Kg	510 J	NA	27 27 JN	NA	NA	88 J
72-43-5	Methoxychlor	43.7 SQC	ug/Kg	ND	NA	ND	NA	NA	520 J
319-95-7	beta-BHC	NS	ug/Kg	ND	NA	ND	NA	NA	ND
319-86-8	delta-BHC	NS	ug/Kg	ND	NA	200 P	NA	NA	ND
	METALS								
7429-90-5	Aluminum	NS	mg/Kg	3910	NA	6120	NA	NA	16000
7440-36-0	Antimony	NS	mg/Kg	1700 J	NA	6 J	NA	NA	55.5 J
7440-38-2	Arsenic	8.2 ERL	mg/Kg	65.1	NA	9.8	NA	NA	148
7440-39-3	Barium	NS	mg/Kg	226	NA	67.7	NA	NA	756
7440-41-7	Beryllium	NS	mg/Kg	0.44 J	NA	0.36 J	NA	NA	0.77 J
7440-43-9	Cadmium	1.2 ERL	mg/Kg	68.3 J	NA	0.63 J	NA	NA	36.9 J
7440-70-2	Calcium	NS	mg/Kg	24200	NA	4150	NA	NA	31500
7440-47-3	Chromium	81 ERL	mg/Kg	12600	NA	194	NA	NA	586
7440-48-4	Cobalt	NS	mg/Kg	15.9	NA	7.8 J	NA	NA	9.4 J
7440-50-8	Copper	34 ERL	mg/Kg	1330	NA	96.3	NA	NA	926
7439-89-6	Iron	NS	mg/Kg	150000	NA	22700	NA	NA	64800
7439-92-1	Lead	34 ERL	mg/Kg	2830	NA	180	NA	NA	4340
7439-95-4	Magnesium	NS	mg/Kg	4540	NA	2980	NA	NA	6010
7439-96-5	Manganese	NS	mg/Kg	1220	NA	218 J	NA	NA	860 J
7439-97-6	Mercury	0.15 ERL	mg/Kg	44.1	NA	1 J	NA	NA	14.4
7440-02-0	Nickel	21 ERL	mg/Kg	149 J	NA	30.9 J	NA	NA	85.4 J
7440-09-7	Potassium	NS	mg/Kg	415 J	NA	442 J	NA	NA	9940
7782-49-2	Selenium	NS	mg/Kg	7.1	NA	1.3	NA	NA	2.4
7440-22-4	Silver	NS	mg/Kg	ND	NA	ND	NA	NA	0.42 J
7440-23-5	Sodium	NS	mg/Kg	464 J	NA	140 J	NA	NA	2440
7440-62-2	Vanadium	NS	mg/Kg	34.3 J	NA	14.7 J	NA	NA	34.9 J
7440-66-6	Zinc	150 ERL	mg/Kg	23000	NA	243	NA	NA	14500
	OTHER								
7440-44-0	Total Organic Carbon	NS	mg/Kg	NA	NA	NA	NA	NA	153000
SOLIDS	% Total Solids	NS	%	66.3	64.7	82.8	82.8	80.5	80.9
PH	pH	NS	STD u	7.1 J	NA	7.6 J	NA	NA	7.5 J

See BCC file for other DEC analytical values for the remaining locations.

Benzene

NYS WQC 210 ug/l

Kow 2.0 = .30103

$$SC_{oc} = WQC \times Kow$$

$$SC_{oc} = 210_{ug/\cancel{l}} \times .30103_{\cancel{l}/\cancel{kg}} \times \frac{1\ \cancel{kg}}{1000\ g\ OC}$$

$$\underset{\text{Benzene}}{SC_{oc}} = .0632163\ ug/g\ OC$$

$$SC = SC_{oc} \times f_{oc} \qquad w/\ f_{oc} = 2.3\% = 23\ g/kg$$

$$= .0632_{ug/g} \times 23_{g/kg}$$

$$= 1.45\ ug/kg$$

DEC
Data

TABLE 3.2
ALLIEDSIGNAL
BUFFALO COLOR AREA "D"
WASTE FILL AREA
WASTEFILL SAMPLE RESULTS COMPARED TO NYSDEC SEDIMENT CRITERIA

AlliedSignal			SAMPLE ID:	BG-01S	BG-02S	WF-02S	WF-02S	WF-03S	WF-03S
Buffalo Color Area D			DEPTH:	(0-1')	(0-1')	(12-14')	(6-16')	(10-12')	(6-14')
Validated Sediment Data			LAB ID:	J3372/J3373	J3370/J3371	J3126	J3127/J3131	J3128	J3129/J3132
Detected Compound Summary			SOURCE:	OB&G	OB&G	OB&G	OB&G	OB&G	OB&G
			SDG:	8690/8737	8690/8737	8690/8737	8690/8737	8690/8737	8690/8737
			MATRIX:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		NYSDEC	SAMPLED:	8/6/98	8/6/98	8/3/98	8/3/98	8/4/98	8/4/98
		Sediment	VALIDATED:	9/4/98	9/4/98	9/4/98	9/4/98	9/4/98	9/4/98
CAS NO.	COMPOUND	Criteria	UNITS:						
	VOLATILES								
67-64-1	Acetone	NS	ug/Kg	12 J	10 J	43	NA	24	NA
71-43-2	Benzene	813.1	ug/Kg	ND	ND	170	NA	61	NA
78-93-3	2-Butanone	NS	ug/Kg	42 J	4 J	79	NA	24	NA
108-90-7	Chlorobenzene	NS	ug/Kg	2 J	ND	70	NA	220	NA
67-66-3	Chloroform	NS	ug/Kg	ND	ND	ND	NA	ND	NA
100-41-4	Ethylbenzene	NS	ug/Kg	ND	ND	14 J	NA	2 J	NA
127-18-4	Tetrachloroethene	NS	ug/Kg	ND	ND	ND	NA	ND	NA
108-88-3	Toluene	NS	ug/Kg	2 J	ND	62	NA	6 J	NA
1330-20-7	Xylene (total)	NS	ug/Kg	ND	ND	150	NA	5 J	NA
	SEMIVOLATILES								
85-68-7	Butyl benzyl phthalate	NS	ug/Kg	R	ND	NA	ND	NA	ND
86-74-8	Carbazole	NS	ug/Kg	130 J	ND	NA	660 J	NA	2500 J
106-47-8	4-Chloroaniline	NS	ug/Kg	ND	ND	NA	990 J	NA	7700 J
117-84-0	Di-n-octyl phthalate	NS	ug/Kg	R	ND	NA	ND	NA	R
106-46-7	1,4-Dichlorobenzene	2820	ug/Kg	72 J	ND	NA	ND	NA	ND
95-50-1	1,2-Dichlorobenzene	2820	ug/Kg	ND	ND	NA	ND	NA	2600 J
91-94-1	3,3'-Dichlorobenzidine	NS	ug/Kg	R	ND	NA	ND	NA	ND
51-28-5	2,4-Dinitrophenol	NS	ug/Kg	ND	190 J	NA	ND	NA	ND
606-20-2	2,6-Dinitrotoluene	NS	ug/Kg	ND	ND	NA	ND	NA	3000 J
121-14-2	2,4-Dinitrotoluene	NS	ug/Kg	ND	ND	NA	2400 J	NA	11000 J
118-74-1	Hexachlorobenzene	213403.5	ug/Kg	ND	ND	NA	ND	NA	3500 J
91-57-6	2-Methylnaphthalene	NS	ug/Kg	ND	ND	NA	1400 J	NA	2300 J
106-44-5	4-Methylphenol	NS	ug/Kg	ND	88 J	NA	ND	NA	ND
86-30-6	N-Nitrosodiphenylamine	NS	ug/Kg	ND	ND	NA	3900 J	NA	11000 J
88-74-4	2-Nitroaniline	NS	ug/Kg	ND	ND	NA	3600 J	NA	ND
99-09-2	3-Nitroaniline	NS	ug/Kg	ND	ND	NA	2000 J	NA	ND
98-95-3	Nitrobenzene	NS	ug/Kg	ND	ND	NA	1200 J	NA	5400 J
87-86-5	Pentachlorophenol	2350 –	ug/Kg	ND	270 J	NA	ND	NA	ND
120-82-1	1,2,4-Trichlorobenzene	NS	ug/Kg	ND	ND	NA	ND	NA	8000 J
117-81-7	bis(2-Ethylhexyl)phthalate	NS	ug/Kg	270 J	410 J	NA	950 J	NA	2500 J
	PAHs								
83-32-9	Acenaphthene	NS	ug/Kg	210 J	ND	NA	640 J	NA	1300 J
120-12-7	Anthracene	NS	ug/Kg	190 J	84 J	NA	1800 J	NA	3400 J
56-55-3	Benzo[a]anthracene	NS	ug/Kg	730 J	340 J	NA	3300 J	NA	6800 J
50-32-8	Benzo[a]pyrene	NS	ug/Kg	1000 J	390 J	NA	3100 J	NA	9100 J
205-99-2	Benzo[b]fluoranthene	NS	ug/Kg	1300 J	600 J	NA	4000 J	NA	9600 J
191-24-2	Benzo[g,h,i]perylene	NS	ug/Kg	1400 J	250 J	NA	1900 J	NA	2900 J
207-08-9	Benzo[k]fluoranthene	NS	ug/Kg	520 J	180 J	NA	1700 J	NA	3600 J
218-01-9	Chrysene	NS	ug/Kg	990 J	510 J	NA	3700 J	NA	7600 J
53-70-3	Dibenz[a,h]anthracene	NS	ug/Kg	270 J	ND	NA	ND	NA	R
132-64-9	Dibenzofuran	NS	ug/Kg	150 J	ND	NA	980 J	NA	2300 J
206-44-0	Fluoranthene	NS	ug/Kg	880 J	650	NA	5500	NA	9900 J
86-73-7	Fluorene	NS	ug/Kg	160 J	60 J	NA	1100 J	NA	2800 J
193-39-5	Indeno[1,2,3-cd]pyrene	NS	ug/Kg	880 J	240 J	NA	1700 J	NA	2700 J
91-20-3	Naphthalene	NS	ug/Kg	160 J	ND	NA	7200	NA	44000
85-01-8	Phenanthrene	NS	ug/Kg	790 J	470 J	NA	5500	NA	12000
129-00-0	Pyrene	NS	ug/Kg	1900 J	1100 J	NA	6700	NA	17000
	Total PAHs			11530	4874	NA	48820	NA	135000

Hexachlorobutadiene ○

Hexachlorocyclohexanes ○

Parathion + methyl
Parathion ○

Isodecyldiphenyl phosphate ○

TABLE 3.2
ALLIEDSIGNAL
BUFFALO COLOR AREA "D"
WASTE FILL AREA
WASTEFILL SAMPLE RESULTS COMPARED TO NYSDEC SEDIMENT CRITERIA

AlliedSignal Buffalo Color Area D Validated Sediment Data Detected Compound Summary			SAMPLE ID:	BG-01S	BG-02S	WF-02S	WF-02S	WF-03S	WF-03S
			DEPTH:	(0-1')	(0-1')	(12-14')	(6-16')	(10-12')	(6-14')
			LAB ID:	J3372/J3373	J3370/J3371	J3126	J3127/J3131	J3128	J3129/J3132
			SOURCE:	OB&G	OB&G	OB&G	OB&G	OB&G	OB&G
			SDG:	8690/8737	8690/8737	8690/8737	8690/8737	8690/8737	8690/8737
			MATRIX:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			SAMPLED:	8/6/98	8/6/98	8/3/98	8/3/98	8/4/98	8/4/98
			VALIDATED:	9/4/98	9/4/98	9/4/98	9/4/98	9/4/98	9/4/98
CAS NO.	COMPOUND	NYSDEC Sediment Criteria	UNITS:						
	PESTICIDES								
309-00-2	*Aldrin*	NS	ug/Kg	ND	ND	NA	ND	NA	ND
72-54-8	4,4'-DDD	25850	ug/Kg	11 JN	ND	NA	ND	NA	500 J
72-55-9	4,4'-DDE	25850	ug/Kg	6.5 J	4.5 JN	NA	ND	NA	ND
50-29-3	4,4'-DDT	25850	ug/Kg	ND	ND	NA	ND	NA	1300
60-57-1	Dieldrin	NS	ug/Kg	ND	0.83 JN	NA	ND	NA	380 JN
959-98-8	*Endosulfan I*	18.33	ug/Kg	ND	ND	NA	ND	NA	ND
33213-65-	Endosulfan II	18.33	ug/Kg	ND	ND	NA	12 JN	NA	34 JN
1031-07-8	Endosulfan sulfate	NS	ug/Kg	2.6 JN	ND	NA	ND	NA	170 JN
72-20-8	Endrin	NS	ug/Kg	12 J	ND	NA	58 JN	NA	750 J
53494-70-	Endrin ketone	NS	ug/Kg	12 J	ND	NA	21 JN	NA	ND
76-44-8	Heptachlor	307.85	ug/Kg	ND	ND	NA	19 J	NA	4.9 JN
1024-57-3	Heptachlor epoxide	307.85	ug/Kg	3.9 JN	3.3 JN	NA	ND	NA	130 J
72-43-5	Methoxychlor	NS	ug/Kg	ND	ND	NA	59 JN	NA	100 JN
319-95-7	beta-BHC	NS	ug/Kg	ND	ND	NA	26 JN	NA	ND
319-86-8	delta-BHC	NS	ug/Kg	ND	ND	NA	ND	NA	ND
	METALS								
7429-90-5	Aluminum	NS	mg/Kg	6850	7500	NA	5900	NA	4030
7440-36-0	Antimony	25	mg/Kg	ND	0.98 J	NA	26.4 J	NA	31.1 J
7440-38-2	Arsenic	33	mg/Kg	6.3	9	NA 51.2	38.7	NA	32.5
7440-39-3	Barium	NS	mg/Kg	71	73	NA	118	NA	192
7440-41-7	Beryllium	NS	mg/Kg	0.74 J	0.47 J	NA	0.82 J	NA	0.37 J
7440-43-9	Cadmium	9	mg/Kg	0.47 J	0.49 J	NA	37.7 2 J	NA	9.5 J
7440-70-2	*Calcium*	NS	mg/Kg	56200	16500	NA	25900	NA	33700
7440-47-3	Chromium	110	mg/Kg	96.7	15.6	NA 1290	419	NA	9190
7440-48-4	Cobalt	NS	mg/Kg	5.5 J	9.5 J	NA	10.3 J	NA	8.8 J
7440-50-8	Copper	110	mg/Kg	34.2	46.6	NA 319	132	NA	738
7439-89-6	Iron	40000	mg/Kg	28300	24000	NA 52000	55700	NA	66300
7439-92-1	Lead	110	mg/Kg	62.6	71.2	NA 2020	5080	NA	914
7439-95-4	Magnesium	NS	mg/Kg	9400	6100	NA	7020	NA	9280
7439-96-5	Manganese	1100	mg/Kg	3500 J	390 J	NA	635 557	NA	581
7439-97-6	Mercury	1.3	mg/Kg	0.08 J	0.12 J	NA 5.6	161	NA	18.4
7440-02-0	Nickel	50	mg/Kg	17.4 J	25.1 J	NA	50 36.6 J	NA	65.7 J
7440-09-7	Potassium	NS	mg/Kg	321 J	460 J	NA	428 J	NA	283 J
7782-49-2	Selenium	NS	mg/Kg	2.4	ND	NA	2.2	NA	2.1
7440-22-4	Silver	2.2	mg/Kg	ND	ND	NA	.43 ND	NA	ND
7440-23-5	Sodium	NS	mg/Kg	224 J	139 J	NA	398 J	NA	318 J
7440-62-2	Vanadium	NS	mg/Kg	47.3 J	13 J	NA	18.2 J	NA	19.9 J
7440-66-6	Zinc	270	mg/Kg	139	176	NA 781	429	NA	2000 J
	OTHER								
7440-44-0	Total Organic Carbon	NS	mg/Kg	18600	29300	NA	NA	NA	87800
SOLIDS	% Total Solids	NS	%	75.4	65.5	73.6	74.7	58.3	80.3
PH	pH	NS	STD u	NA	NA	NA	7.6 J	NA	7.7 J

TABLE 3.2
ALLIEDSIGNAL
BUFFALO COLOR AREA "D"
WASTE FILL AREA
WASTEFILL SAMPLE RESULTS COMPARED TO NYSDEC SEDIMENT CRITERIA

AlliedSignal Buffalo Color Area D Validated Sediment Data Detected Compound Summary			SAMPLE ID:	WF-04S	WF-04S	WF-05S	WF-05S	WF-06S	WF-06S
			DEPTH:	(2-14')	(8-10')	(4-11')	(6-8')	(2-4')	(3.5-8')
			LAB ID:	J3365/J3374	J3364	J3367/J3375	J3366	J3368	J3369/J3376
			SOURCE:	OB&G	OB&G	OB&G	OB&G	OB&G	OB&G
			SDG:	8690/8737	8690/8737	8690/8737	8690/8737	8690/8737	8690/8737
			MATRIX:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		NYSDEC Sediment Criteria	SAMPLED:	8/5/98	8/5/98	8/5/98	8/5/98	8/5/98	8/5/98
			VALIDATED:	9/4/98	9/4/98	9/4/98	9/4/98	9/4/98	9/4/98
CAS NO.	COMPOUND		UNITS:						
	VOLATILES								
67-64-1	Acetone	NS	ug/Kg	NA	20	NA	210 J	34	NA
71-43-2	Benzene	813.1	ug/Kg	NA	35	NA	400	76	NA
78-93-3	2-Butanone	NS	ug/Kg	NA	6 J	NA	75 J	7 J	NA
108-90-7	Chlorobenzene	NS	ug/Kg	NA	280	NA	30 J	150	NA
67-66-3	Chloroform	NS	ug/Kg	NA	ND	NA	ND	1 J	NA
100-41-4	Ethylbenzene	NS	ug/Kg	NA	ND	NA	180	3 J	NA
127-18-4	Tetrachloroethene	NS	ug/Kg	NA	ND	NA	9 J	ND	NA
108-88-3	Toluene	NS	ug/Kg	NA	ND	NA	ND	12 J	NA
1330-20-7	Xylene (total)	NS	ug/Kg	NA	ND	NA	160	8 J	NA
	SEMIVOLATILES								
85-68-7	Butyl benzyl phthalate	NS	ug/Kg	ND	NA	ND	NA	NA	ND
86-74-8	Carbazole	NS	ug/Kg	1700 J	NA	ND	NA	NA	1600 J
106-47-8	4-Chloroaniline	NS	ug/Kg	3900 J	NA	ND	NA	NA	ND
117-84-0	Di-n-octyl phthalate	NS	ug/Kg	ND	NA	ND	NA	NA	ND
106-46-7	1,4-Dichlorobenzene	2820	ug/Kg	3700 J	NA	ND	NA	NA	ND
95-50-1	1,2-Dichlorobenzene	2820	ug/Kg	17000	NA	ND	NA	NA	3200 J
91-94-1	3,3'-Dichlorobenzidine	NS	ug/Kg	ND	NA	ND	NA	NA	ND
51-28-5	2,4-Dinitrophenol	NS	ug/Kg	ND	NA	ND	NA	NA	ND
606-20-2	2,6-Dinitrotoluene	NS	ug/Kg	13000 J	NA	4300 J	NA	NA	4100 J
121-14-2	2,4-Dinitrotoluene	NS	ug/Kg	24000	NA	18000	NA	NA	12000
118-74-1	Hexachlorobenzene	213403.5	ug/Kg	24000	NA	ND	NA	NA	ND
91-57-6	2-Methylnaphthalene	NS	ug/Kg	ND	NA	ND	NA	NA	3000 J
106-44-5	4-Methylphenol	NS	ug/Kg	ND	NA	ND	NA	NA	ND
86-30-6	N-Nitrosodiphenylamine	NS	ug/Kg	10000 J	NA	ND	NA	NA	2100 J
88-74-4	2-Nitroaniline	NS	ug/Kg	ND	NA	ND	NA	NA	ND
99-09-2	3-Nitroaniline	NS	ug/Kg	2700 J	NA	ND	NA	NA	ND
98-95-3	Nitrobenzene	NS	ug/Kg	26000	NA	ND	NA	NA	ND
87-86-5	Pentachlorophenol	2350	ug/Kg	ND	NA	ND	NA	NA	ND
120-82-1	1,2,4-Trichlorobenzene	NS	ug/Kg	2200 J	NA	ND	NA	NA	1900 J
117-81-7	bis(2-Ethylhexyl)phthalate	NS	ug/Kg	2400 J	NA	ND	NA	NA	1800 J
	PAHs								
83-32-9	Acenaphthene	NS	ug/Kg	ND	NA	ND	NA	NA	1400 J
120-12-7	Anthracene	NS	ug/Kg	3200 J	NA	ND	NA	NA	5700 J
56-55-3	Benzo[a]anthracene	NS	ug/Kg	10000 J	NA	ND	NA	NA	10000 J
50-32-8	Benzo[a]pyrene	NS	ug/Kg	8400 J	NA	ND	NA	NA	15000 J
205-99-2	Benzo[b]fluoranthene	NS	ug/Kg	12000 J	NA	ND	NA	NA	9400 J
191-24-2	Benzo[g,h,i]perylene	NS	ug/Kg	4700 J	NA	ND	NA	NA	2600 J
207-08-9	Benzo[k]fluoranthene	NS	ug/Kg	5100 J	NA	ND	NA	NA	4000 J
218-01-9	Chrysene	NS	ug/Kg	11000 J	NA	ND	NA	NA	7900 J
53-70-3	Dibenz[a,h]anthracene	NS	ug/Kg	ND	NA	ND	NA	NA	ND
132-64-9	Dibenzofuran	NS	ug/Kg	ND	NA	ND	NA	NA	1900 J
206-44-0	Fluoranthene	NS	ug/Kg	13000 J	NA	ND	NA	NA	13000
86-73-7	Fluorene	NS	ug/Kg	11000 J	NA	ND	NA	NA	2400 J
193-39-5	Indeno[1,2,3-cd]pyrene	NS	ug/Kg	4400 J	NA	ND	NA	NA	2500 J
91-20-3	Naphthalene	NS	ug/Kg	13000 J	NA	9300 J	NA	NA	150000
85-01-8	Phenanthrene	NS	ug/Kg	11000 J	NA	ND	NA	NA	17000
129-00-0	Pyrene	NS	ug/Kg	19000 J	NA	ND	NA	NA	18000
	Total PAHs			125800	NA	9300	NA	NA	260800

TABLE 3.2
ALLIEDSIGNAL
BUFFALO COLOR AREA "D"
WASTE FILL AREA
WASTEFILL SAMPLE RESULTS COMPARED TO NYSDEC SEDIMENT CRITERIA

AlliedSignal Buffalo Color Area D Validated Sediment Data Detected Compound Summary			SAMPLE ID:	WF-04S	WF-04S	WF-05S	WF-05S	WF-06S	WF-06S
			DEPTH:	(2-14')	(8-10')	(4-11')	(6-8')	(2-4')	(3.5-8')
			LAB ID:	J3365/J3374	J3364	J3367/J3375	J3366	J3368	J3369/J3376
			SOURCE:	OB&G	OB&G	OB&G	OB&G	OB&G	OB&G
			SDG:	8690/8737	8690/8737	8690/8737	8690/8737	8690/8737	8690/8737
			MATRIX:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		NYSDEC	SAMPLED:	8/5/98	8/5/98	8/5/98	8/5/98	8/5/98	8/5/98
		Sediment	VALIDATED:	9/4/98	9/4/98	9/4/98	9/4/98	9/4/98	9/4/98
CAS NO.	COMPOUND	Criteria	UNITS:						
	PESTICIDES								
309-00-2	Aldrin	NS	ug/Kg	ND	NA	ND	NA	NA	11 JN
72-54-8	4,4'-DDD	25850	ug/Kg	ND	NA	25 JN	NA	NA	360 JN
72-55-9	4,4'-DDE	25850	ug/Kg	980 J	NA	ND	NA	NA	ND
50-29-3	4,4'-DDT	25850	ug/Kg	ND	NA	150 J	NA	NA	ND
60-57-1	Dieldrin	NS	ug/Kg	ND	NA	ND	NA	NA	140 JN
959-98-8	Endosulfan I	18.33	ug/Kg	ND	NA	40 J	NA	NA	ND
33213-65-	Endosulfan II	18.33	ug/Kg	ND	NA	23 JN	NA	NA	72 J
1031-07-8	Endosulfan sulfate	NS	ug/Kg	4000 JN	NA	29 JN	NA	NA	ND
72-20-8	Endrin	NS	ug/Kg	6900 J	NA	44 JN	NA	NA	ND
53494-70-	Endrin ketone	NS	ug/Kg	ND	NA	ND	NA	NA	ND
76-44-8	Heptachlor	307.85	ug/Kg	ND	NA	ND	NA	NA	ND
1024-57-3	Heptachlor epoxide	307.85	ug/Kg	510 J	NA	27 JN	NA	NA	88 J
72-43-5	Methoxychlor	NS	ug/Kg	ND	NA	ND	NA	NA	520 J
319-95-7	beta-BHC	NS	ug/Kg	ND	NA	ND	NA	NA	ND
319-86-8	delta-BHC	NS	ug/Kg	ND	NA	200 P	NA	NA	ND
	METALS								
7429-90-5	Aluminum	NS	mg/Kg	3910	NA	6120	NA	NA	16000
7440-36-0	Antimony	25	mg/Kg	1700 J	1020 NA	11.2 6 J	NA	NA	55.5 J
7440-38-2	Arsenic	33	mg/Kg	65.1	57 NA	11.5 9.8	NA	NA	148
7440-39-3	Barium	NS	mg/Kg	226	NA	67.7	NA	NA	756
7440-41-7	Beryllium	NS	mg/Kg	0.44 J	NA	0.36 J	NA	NA	0.77 J
7440-43-9	Cadmium	9	mg/Kg	68.3 J	141 NA	20.1 0.63 J	NA	NA	36.9 J
7440-70-2	Calcium	NS	mg/Kg	24200	NA	4150	NA	NA	31500
7440-47-3	Chromium	110	mg/Kg	12600	11500 NA	224 194	NA	NA	586
7440-48-4	Cobalt	NS	mg/Kg	15.9	NA	7.8 J	NA	NA	9.4 J
7440-50-8	Copper	110	mg/Kg	1330	8470 NA	123 96.3	NA	NA	926
7439-89-6	Iron	40000	mg/Kg	150000	162000 NA	31400 22700	NA	NA	64800
7439-92-1	Lead	110	mg/Kg	2830	NA	239 180	NA	NA	4340
7439-95-4	Magnesium	NS	mg/Kg	4540	NA	2980	NA	NA	6010
7439-96-5	Manganese	1100	mg/Kg	1220	2460 NA	322 218 J	NA	NA	860 J
7439-97-6	Mercury	1.3	mg/Kg	44.1	46 NA	1.1 1 J	NA	NA	14.4
7440-02-0	Nickel	50	mg/Kg	149 J	178 NA	42.4 30.9 J	NA	NA	65.4 J
7440-09-7	Potassium	NS	mg/Kg	415 J	NA	442 J	NA	NA	9940
7782-49-2	Selenium	NS	mg/Kg	7.1	NA	1.3	NA	NA	2.4
7440-22-4	Silver	2.2	mg/Kg	ND	.49 NA	.41 ND	NA	NA	0.42 J
7440-23-5	Sodium	NS	mg/Kg	464 J	NA	140 J	NA	NA	2440
7440-62-2	Vanadium	NS	mg/Kg	34.3 J	NA	14.7 J	NA	NA	34.9 J
7440-66-6	Zinc	270	mg/Kg	23000	13300 NA	363 243	NA	NA	14500
	OTHER								
7440-44-0	Total Organic Carbon	NS	mg/Kg	NA	NA	NA	NA	NA	153000
SOLIDS	% Total Solids	NS	%	66.3	64.7	82.8	82.8	80.5	80.9
PH	pH	NS	STD u	7.1 J	NA	7.6 J	NA	NA	7.5 J

TABLE 3.3
ALLIEDSIGNAL
BUFFALO COLOR AREA "D"
WASTEFILL AREA
POREWATER SAMPLE RESULTS COMPATED TO USEPA ECOTOX THRESHOLD VALUES

CAS NO.	COMPOUND	USEPA Ecotox Threshold Value		BG-01W	WF-02W	WF-03W	WF-04W	WF-05W	WF-06W
	Allied Signal, Inc.		SAMPLE ID:	BG-01W	WF-02W	WF-03W	WF-04W	WF-05W	WF-06W
	Buffalo Color Area D Site		LAB ID:	J3617/J3623/J3628	J3616/J3622/J3627	J3771/J3773/J3778	J3818/J3624/J3629	J3774/J3779	J3775/J3780
	Validated Water Samples		SOURCE:	OB&G	OB&G	OB&G	OB&G	OB&G	OB&G
	Detected Compound Summary		SDG:	8757/8780	8757/8780	8757/8780	8757/8780	8757/8780	8757/8780
			MATRIX:	Water	Water	Water	Water	Water	Water
			SAMPLED:	8/7/98	8/7/98	8/10/98	8/7/98	8/10/98	8/10/98
			VALIDATED:	9/4/98	9/4/98	9/4/98	9/4/98	9/4/98	9/4/98
			UNITS:						
	VOLATILES								
67-64-1	Acetone	NS	ug/L	10	5 J	3 J	3 J	ND	4 J
71-43-2	Benzene	46	ug/L	12	49	68	12	11	14
78-93-3	2-Butanone	NS	ug/L	5 J	2 J	ND	ND	ND	ND
108-90-7	Chlorobenzene	130	ug/L	57	22	130	67	220	1000
108-88-3	Toluene	130	ug/L	ND	5 J	ND	ND	ND	ND
1330-20-7	Xylene (total)	1.8 -m	ug/L	ND	9 J	ND	ND	11	ND
	SEMIVOLATILES								
86-74-8	Carbazole	NS	ug/L	1 J	5 J	2 J	ND	ND	ND
106-47-8	4-Chloroaniline	NS	ug/L	ND	72	110	33	22	9 J
91-58-7	2-Chloronaphthalene	NS	ug/L	ND	ND	ND	ND	2 J	ND
541-73-1	1,3-Dichlorobenzene	71 #	ug/L	2 J	ND	3 J	ND	ND	ND
106-46-7	1,4-Dichlorobenzene	15 #	ug/L	13	ND	3 J	9 J	ND	8 J
95-50-1	1,2-Dichlorobenzene	14 #	ug/L	ND	ND	10 J	35	ND	5 J
121-14-2	2,4-Dinitrotoluene	NS	ug/L	ND	ND	ND	2 J	ND	ND
91-57-6	2-Methylnaphthalene	NS	ug/L	8 J	4 J	ND	ND	ND	ND
86-30-6	N-Nitrosodiphenylamine	NS	ug/L	6 J	76	37	12	ND	ND
99-09-2	3-Nitroaniline	NS	ug/L	ND	ND	ND	2 J	ND	ND
120-82-1	1,2,4-Trichlorobenzene	110 #	ug/L	ND	ND	1 J	ND	ND	ND
117-81-7	bis(2-Ethylhexyl)phthalate	32	ug/L	ND	11	2 J	4 J	ND	ND
	PAHs								
83-32-9	Acenaphthene	23 S	ug/L	2 J	3 J	1 J	ND	ND	ND
218-01-9	Chrysene	NS	ug/L	ND	ND	2 J	ND	ND	ND
132-64-9	Dibenzofuran	20	ug/L	ND	2 J	1 J	ND	ND	ND
206-44-0	Fluoranthene	8.1 S	ug/L	ND	1 J	2 J	ND	ND	ND
86-73-7	Fluorene	3.9 #	ug/L	ND	3 J	2 J	7 J	ND	ND
91-20-3	Naphthalene	24	ug/L	2 J	44	190	10	3 J	3 J
85-01-8	Phenanthrene	6.3 S	ug/L	3 J	3 J	2 J	ND	ND	ND
129-00-0	Pyrene	NS	ug/L	ND	ND	2 J	ND	ND	ND
	Total PAHs			7	56	202	17	3	3
	PHENOLS								
95-57-8	2-Chlorophenol	NS	ug/L	2 J	ND	ND	ND	ND	6 J
105-67-9	2,4-Dimethylphenol	NS	ug/L	6 J	15	ND	ND	4 J	2 J
95-48-7	2-Methylphenol	NS	ug/L	11	ND	ND	ND	ND	ND
106-44-5	4-Methylphenol	NS	ug/L	3 J	ND	1 J	1 J	2 J	2 J
108-95-2	Phenol	NS	ug/L	3 J	4 J	2 J	4 J	ND	2 J
	PESTICIDES								
309-00-2	Aldrin	NS	ug/L	0.00068 JN	0.054 J	0.012 JN	0.026 J	ND	0.025 J
72-54-8	4,4'-DDD	NS	ug/L	ND	ND	0.026 JN	ND	ND	ND
50-29-3	4,4'-DDT	0.013 +	ug/L	ND	ND	0.0094 JN	0.093 J	0.0085 J	0.0015 JN
60-57-1	Dieldrin	0 062 S	ug/L	ND	ND	0.074 JN	0.039 JN	ND	ND
959-98-8	Endosulfan I	0.051 #	ug/L	ND	0.019 J	ND	ND	ND	ND
33213-65-	Endosulfan II	0.051 #	ug/L	0.0045 JN	ND	ND	ND	0.0025 JN	0.0035 J
1031-07-8	Endosulfan sulfate	NS	ug/L	0.0042 JN	0.038 J	ND	0.04 JN	ND	ND
72-20-8	Endrin	0.061 S	ug/L	0.018 JN	ND	ND	ND	ND	0.018 JN
7421-36-3	Endrin aldehyde	NS	ug/L	0.03 J	ND	ND	ND	ND	ND
53494-70-	Endrin ketone	NS	ug/L	ND	0.029 JN	0.021 JN	0.1 J	ND	ND
1024-57-3	Heptachlor epoxide	NS	ug/L	0.069	ND	0.94	0.029 J	0.002 JN	ND
319-84-6	alpha-BHC	NS	ug/L	ND	0.017 J	0.0037 JN	ND	ND	ND
5103-71-9	alpha-Chlordane	NS	ug/L	ND	ND	ND	0.018 JN	ND	ND
319-86-8	delta-BHC	NS	ug/L	ND	ND	ND	ND	0.014 J	0.0023 JN
58-89-9	gamma-BHC (Lindane)	NS	ug/L	ND	ND	ND	ND	ND	0.0021 JN
5103-74-2	gamma-Chlordane	NS	ug/L	ND	ND	ND	ND	0 0024 JN	ND

Would be helpful
for A/S to add page
to explain footnotes, etc.
ie: #, ERL
SQB

TABLE 3.3
ALLIEDSIGNAL
BUFFALO COLOR AREA "D"
WASTEFILL AREA
POREWATER SAMPLE RESULTS COMPATED TO USEPA ECOTOX THRESHOLD VALUES

Allied Signal, Inc.			SAMPLE ID:	BG-01W	WF-02W	WF-03W	WF-04W	WF-05W	WF-06W
Buffalo Color Area D Site			LAB ID:	J3617/J3623/J3628	J3616/J3622/J3627	J3771/J3773/J3778	J3618/J3624/J3629	J3774/J3779	J3775/J3780
Validated Water Samples			SOURCE:	OB&G	OB&G	OB&G	OB&G	OB&G	OB&G
Detected Compound Summary			SDG:	8757/8780	8757/8780	8757/8780	8757/8780	8757/8780	8757/8780
		USEPA Ecotox Threshold Value	MATRIX:	Water	Water	Water	Water	Water	Water
			SAMPLED:	8/7/98	8/7/98	8/10/98	8/7/98	8/10/98	8/10/98
			VALIDATED:	9/4/98	9/4/98	9/4/98	9/4/98	9/4/98	9/4/98
CAS NO.	COMPOUND		UNITS:						
	TOTAL METALS								
7429-90-5	Aluminum	NS	ug/L	6750	145 J	1210	770	458	362
7440-36-0	Antimony	NS	ug/L	4.4 J	32.7 J	101	22 J	90.8	4.6 J
7440-38-2	Arsenic	190	ug/L	39.6	16.5	37.7	4.5 J	54.5	5.7 J
7440-39-3	Barium	3.9	ug/L	400	71.6 J	159 J	68.4 J	166 J	71.7 J
7440-41-7	Beryllium	5.1	ug/L	0.54 J	1.4 J	0.33 J	0.21 J	ND	0.13 J
7440-43-9	Cadmium	3.1 (H)	ug/L	1 J	1.6 J	12.3	3 J	ND	ND
7440-70-2	Calcium	NS	ug/L	238000	155000	486000	438000	333000	200000
7440-47-3	Chromium	554 (H)	ug/L	54.8	36.2	18400	375	23.3	9.8 J
7440-48-4	Cobalt	3	ug/L	7.8 J	ND	3.2 J	ND	ND	ND
7440-50-8	*Copper*	37 (H)	ug/L	54.5	21.9 J	1330	109	7.2 J	12.5 J
7439-89-6	Iron	1000	ug/L	25100	2950	61600	28600	1550	1400
7439-92-1	Lead	15 (H)	ug/L	119	88.2	1060	183	4.5	2.1 J
7439-95-4	Magnesium	NS	ug/L	43000	19500	53400	80500	66700	23200
7439-96-5	Manganese	80	ug/L	1710	271	1880	1920	514	467
7439-97-6	Mercury	1.3	ug/L	0.55 J	16 J	5.6 J	1.5 J	ND	ND
7440-02-0	Nickel	508	ug/L	22.3 J	9.5 J	46.4	43.2	1.6 J	2.3 J
7440-09-7	*Potassium*	NS	ug/L	17300	17400	31700	17600	42800	24800
7782-49-2	Selenium	5	ug/L	4.9 J	ND	ND	ND	ND	6.5
7440-23-5	Sodium	NS	ug/L	63100	114000	132000	127000	97300	319000
7440-62-2	Vanadium	19	ug/L	23.4 J	2.3 J	13.5 J	3.8 J	2.1 J	11.6 J
7440-66-6	Zinc	338 (H)	ug/L	177	127	2570	2910	30.8	37.5
	FILTERED METALS								
7429-90-5	Aluminum	NS	ug/L	43.3 J	30 J	17.7 J	36.8 J	ND	133 J
7440-36-0	Antimony	NS	ug/L	4 J	28.1 J	4.5 J	4.1 J	4.2 J	4.5 J
7440-38-2	Arsenic	190	ug/L	30.3	16.1	ND	ND	ND	4.6 J
7440-39-3	Barium	3.9	ug/L	390	75.7 J	8.6 J	38.1 J	143 J	65.5 J
7440-41-7	Beryllium	5.1	ug/L	ND	ND	0.15 J	0.14 J	ND	0.14 J
7440-43-9	Cadmium	3.1 (H)	ug/L	ND	ND	1.1 J	1.1 J	ND	ND
7440-70-2	Calcium	NS	ug/L	232000	168000	486000	469000	315000	194000
7440-47-3	Chromium	554 (H)	ug/L	8.3 J	8.3 J	16.6	13.6	9.8 J	9.9 J
7440-48-4	Cobalt	3	ug/L	6.4 J	ND	ND	3.9 J	ND	ND
7440-50-8	Copper	37 (H)	ug/L	3.4 J	3.8 J	ND	4.7 J	1.3 J	6 J
7439-89-6	Iron	1000	ug/L	7580	2250	20900	21800	239	830
7439-92-1	Lead	15 (H)	ug/L	ND	6.7	ND	2.1 J	ND	ND
7439-95-4	Magnesium	NS	ug/L	39500	22700	54500	86700	63100	21700
7439-96-5	Manganese	NS	ug/L	1250	292	1650	1940	447	442
7439-97-6	Mercury	1.3	ug/L	ND	0.85 J	ND	ND	ND	ND
7440-02-0	Nickel	508 (H)	ug/L	6.1 J	7.5 J	ND	34.9 J	ND	2 J
7440-09-7	Potassium	NS	ug/L	17000	20700	34500	18300	44300	27900
7782-49-2	Selenium	5	ug/L	ND	ND	ND	ND	ND	5.2
7440-23-5	*Sodium*	NS	ug/L	66700	135000	137000	135000	91300	348000
7440-62-2	Vanadium	19	ug/L	2.6 J	1.1 J	ND	1.9 J	ND	12.3 J
7440-66-6	Zinc	338 (H)	ug/L	8.8 J	26	6.3 J	2600	2.5 J	20
	OTHER								
	Methane	NS	mg/L	3	2	0.4	0.2	NA	NA
	Nitrate-nitrogen	NS	mg/L	0.66	0.08	ND	0.16	NA	NA
	Nitrite nitrogen	NS	mg/L	0.12	ND	ND	ND	NA	NA
	Nitrite-nitrate nitrogen	NS	mg/L	0.78	0.08	ND	0.16	NA	NA
	Sulfate-B	NS	mg/L	33	280	1000	930	NA	NA

TABLE 3.4
ALLIEDSIGNAL
BUFFALO COLOR AREA "D"
WASTEFILL AREA
POREWATER SAMPLE RESULTS COMPARED TO NYSDEC CLASS C SURFACE WATER STANDARDS

Allied Signal, Inc.			SAMPLE ID:	BG-01W	WF-02W	WF-03W	WF-04W	WF-05W	WF-06W
Buffalo Color Area D Site			LAB ID:	J3817/J3823/J362	J3816/J3822/J362	J3771/J3773/J377	J3818/J3824/J362	J3774/J3779	J3775/J3780
Validated Water Samples			SOURCE:	OB&G	OB&G	OB&G	OB&G	OB&G	OB&G
Detected Compound Summary			SDG:	8757/8780	8757/8780	8757/8780	8757/8780	8757/8780	8757/8780
		NYSDEC	MATRIX:	Water	Water	Water	Water	Water	Water
		Class C A(C)	SAMPLED:	8/7/98	8/7/98	8/10/98	8/7/98	8/10/98	8/10/98
		Surface Water	VALIDATED:	9/4/98	9/4/98	9/4/98	9/4/98	9/4/98	9/4/98
CAS NO.	COMPOUND	Standards/Guidelines	UNITS:						
	VOLATILES								
67-64-1	Acetone	NS	ug/L	10	5 J	3 J	3 J	ND	4 J
71-43-2	Benzene	210	ug/L	12	49	68	12	11	14
78-93-3	2-Butanone	NS	ug/L	5 J	2 J	ND	ND	ND	ND
108-90-7	Chlorobenzene	5	ug/L	57	22	130	67	220	1000
108-88-3	Toluene	100 (G)	ug/L	ND	5 J	ND	ND	ND	ND
1330-20-7	Xylene (total)	65	ug/L	ND	9 J	ND	ND	11	ND
	SEMIVOLATILES								
117-81-7	bis(2-Ethylhexyl)phthalate	0.6	ug/L	ND	11	2 J	4 J	ND	ND
86-74-8	Carbazole	NS	ug/L	1 J	5 J	2 J	ND	ND	ND
106-47-8	4-Chloroaniline	NS	ug/L	ND	72	110	33	22	9 J
91-58-7	2-Chloronaphthalene	NS	ug/L	ND	ND	ND	ND	2 J	ND
541-73-1	1,3-Dichlorobenzene	5	ug/L	2 J	ND	3 J	ND	ND	ND
106-46-7	1,4-Dichlorobenzene	5	ug/L	13	ND	3 J	9 J	ND	8 J
95-50-1	1,2-Dichlorobenzene	5	ug/L	ND	ND	10 J	35	ND	5 J
121-14-2	2,4-Dinitrotoluene	NS	ug/L	ND	ND	ND	2 J	ND	ND
91-57-6	2-Methylnaphthalene	NS	ug/L	8 J	4 J	ND	ND	ND	ND
86-30-6	N-Nitrosodiphenylamine	NS	ug/L	6 J	76	37	12	ND	ND
99-09-2	3-Nitroaniline	NS	ug/L	ND	ND	ND	2 J	ND	ND
120-82-1	1,2,4-Trichlorobenzene	NS	ug/L	ND	ND	1 J	ND	ND	ND
	PAHs								
83-32-9	Acenaphthene	5.3	ug/L	2 J	3 J	1 J	ND	ND	ND
218-01-9	Chrysene	NS	ug/L	ND	ND	2 J	ND	ND	ND
132-64-9	Dibenzofuran	NS	ug/L	ND	2 J	1 J	ND	ND	ND
206-44-0	Fluoranthene	NS	ug/L	ND	1 J	2 J	ND	ND	ND
86-73-7	Fluorene	0.54	ug/L	ND	3 J	2 J	7 J	ND	ND
91-20-3	Naphthalene	13	ug/L	2 J	44	190	10	3 J	3 J
85-01-8	Phenanthrene	5	ug/L	3 J	3 J	2 J	ND	ND	ND
129-00-0	Pyrene	4.6	ug/L	ND	ND	2 J	ND	ND	ND
	Total PAHs			7	56	202	17	3	3
	PHENOLS								
95-57-8	*2-Chlorophenol*	NS	ug/L	2 J	ND	ND	ND	ND	6 J
105-67-9	2,4-Dimethylphenol	NS	ug/L	6 J	15	ND	ND	4 J	2 J
95-48-7	2-Methylphenol	NS	ug/L	11	ND	ND	ND	ND	ND
106-44-5	4-Methylphenol	NS	ug/L	3 J	ND	1 J	1 J	2 J	2 J
108-95-2	Phenol	NS	ug/L	3 J	4 J	2 J	4 J	ND	2 J
	PESTICIDES								
309-00-2	Aldrin	NS	ug/L	0.00068 JN	0.054 J	0.012 JN	0.026 J	ND	0.025 J
72-54-8	4,4'-DDD	NS	ug/L	ND	ND	0.026 JN	ND	ND	ND
50-29-3	4,4'-DDT	NS	ug/L	ND	ND	0.0094 JN	0.093 J	0.0085 J	0.0015 JN
60-57-1	*Dieldrin*	NS	ug/L	ND	ND	0.074 JN	0.039 JN	ND	ND
959-98-8	Endosulfan I	NS	ug/L	ND	0.019 J	ND	ND	ND	ND
33213-65-	Endosulfan II	NS	ug/L	0.0045 JN	ND	ND	ND	0.0025 JN	0.0035 J
1031-07-8	Endosulfan sulfate	NS	ug/L	0.0042 JN	0.038 J	ND	0.04 JN	ND	ND
72-20-8	Endrin	0.036	ug/L	0.018 JN	ND	ND	ND	ND	0.018 JN
7421-36-3	Endrin aldehyde	NS	ug/L	0.03 J	ND	ND	ND	ND	ND
53494-70-	Endrin ketone	NS	ug/L	ND	0.029 JN	0.021 JN	0.1 J	ND	ND
1024-57-3	Heptachlor epoxide	NS	ug/L	0.069	ND	0.94	0.029 J	0.002 JN	ND
319-84-6	alpha-BHC	NS	ug/L	ND	0.017 J	0.0037 JN	ND	ND	ND
5103-71-9	alpha-Chlordane	NS	ug/L	ND	ND	ND	0.018 JN	ND	ND
319-86-8	delta-BHC	NS	ug/L	ND	ND	ND	ND	0.014 J	0.0023 JN
58-89-9	gamma-BHC (Lindane)	NS	ug/L	ND	ND	ND	ND	ND	0.0021 JN
5103-74-2	gamma-Chlordane	NS	ug/L	ND	ND	ND	ND	0.0024 JN	ND

TABLE 3.4
ALLIEDSIGNAL
BUFFALO COLOR AREA "D"
WASTEFILL AREA
POREWATER SAMPLE RESULTS COMPARED TO NYSDEC CLASS C SURFACE WATER STANDARDS

Allied Signal, Inc. Buffalo Color Area D Site Validated Water Samples Detected Compound Summary			SAMPLE ID:	BG-01W	WF-02W	WF-03W	WF-04W	WF-05W	WF-06W
			LAB ID:	J3817/J3823/J382	J3818/J3822/J382	J3771/J3773/J377	J3818/J3824/J382	J3774/J3779	J3775/J3780
			SOURCE:	OB&G	OB&G	OB&G	OB&G	OB&G	OB&G
			SDG:	8757/8780	8757/8780	8757/8780	8757/8780	8757/8780	8757/8780
		NYSDEC	MATRIX:	Water	Water	Water	Water	Water	Water
		Class C A(C)	SAMPLED:	8/7/98	8/7/98	8/10/98	8/7/98	8/10/98	8/10/98
		Surface Water	VALIDATED:	9/4/98	9/4/98	9/4/98	9/4/98	9/4/98	9/4/98
CAS NO.	COMPOUND	Standards/Guidelines	UNITS:						
	TOTAL METALS								
7429-90-5	Aluminum	GLS	ug/L	6750	145 J	1210	770	458	362
7440-36-0	Antimony	NS	ug/L	4.4 J	32.7 J	101	22 J	90.8	4.6 J
7440-38-2	Arsenic	150	ug/L	39.6	16.5	37.7	4.5 J	54.5	5.7 J
7440-39-3	Barium	NS	ug/L	400	71.6 J	159 J	68.4 J	166 J	71.7 J
7440-41-7	Beryllium	1100	ug/L	0.54 J	1.4 J	0.33 J	0.21 J	ND	0.13 J
7440-43-9	Cadmium	10.6 (H)	ug/L	1 J	1.6 J	12.3	3 J	ND	ND
7440-70-2	Calcium	NS	ug/L	238000	155000	486000	438000	333000	200000
7440-47-3	Chromium	404 (H)	ug/L	54.8	36.2	18400	375	23.3	9.8 J
7440-48-4	Cobalt	5 GLS*	ug/L	7.8 J	ND	3.2 J	ND	ND	ND
7440-50-8	Copper	52.5	ug/L	54.5	21.9 J	1330	109	7.2 J	12.5 J
7439-89-6	Iron	300 GLS*	ug/L	25100	2950	61600	28600	1550	1400
7439-92-1	Lead	32.6	ug/L	119	88.2	1060	163	4.5	2.1 J
7439-95-4	Magnesium	NS	ug/L	43000	19500	53400	80500	66700	23200
7439-96-5	Manganese	NS	ug/L	1710	271	1880	1920	514	467
7439-97-6	Mercury	0.77	ug/L	0.55 J	16 J	5.6 J	1.5 J	ND	ND
7440-02-0	Nickel	299	ug/L	22.3 J	9.5 J	46.4	43.2	1.6 J	2.3 J
7440-09-7	Potassium	NS	ug/L	17300	17400	31700	17600	42800	24800
7782-49-2	Selenium	4.6	ug/L	4.9 J	ND	ND	ND	ND	6.5
7440-23-5	Sodium	NS	ug/L	63100	114000	132000	127000	97300	319000
7440-62-2	Vanadium	14 GLS*	ug/L	23.4 J	2.3 J	13.5 J	3.8 J	2.1 J	11.6 J
7440-66-6	Zinc	480	ug/L	177	127	2570	2910	30.8	37.5
	FILTERED METALS								
7429-90-5	Aluminum	GLS	ug/L	43.3 J	30 J	17.7 J	36.8 J	ND	133 J
7440-36-0	Antimony	NS	ug/L	4 J	28.1 J	4.5 J	4.1 J	4.2 J	4.5 J
7440-38-2	Arsenic	150	ug/L	30.3	16.1	ND	ND	ND	4.6 J
7440-39-3	Barium	NS	ug/L	390	75.7 J	6.6 J	38.1 J	143 J	65.5 J
7440-41-7	Beryllium	1100	ug/L	ND	ND	0.15 J	0.14 J	ND	0.14 J
7440-43-9	Cadmium	10.6 (H)	ug/L	ND	ND	1.1 J	1.1 J	ND	ND
7440-70-2	Calcium	NS	ug/L	232000	168000	486000	469000	315000	194000
7440-47-3	Chromium	404 (H)	ug/L	8.3 J	8.3 J	16.6	13.6	9.8 J	9.9 J
7440-48-4	Cobalt	5 GLS*	ug/L	6.4 J	ND	ND	3.9 J	ND	ND
7440-50-8	Copper	52.5	ug/L	3.4 J	3.8 J	ND	4.7 J	1.3 J	6 J
7439-89-6	Iron	300 GLS*	ug/L	7580	2250	20900	21800	239	830
7439-92-1	Lead	32.6	ug/L	ND	6.7	ND	2.1 J	ND	ND
7439-95-4	Magnesium	NS	ug/L	39500	22700	54500	86700	63100	21700
7439-96-5	Manganese	NS	ug/L	1250	292	1650	1940	447	442
7439-97-6	Mercury	0.77	ug/L	ND	0.85 J	ND	ND	ND	ND
7440-02-0	Nickel	299	ug/L	6.1 J	7.5 J	ND	34.9 J	ND	2 J
7440-09-7	Potassium	NS	ug/L	17000	20700	34500	18300	44300	27900
7782-49-2	Selenium	4.6	ug/L	ND	ND	ND	ND	ND	5.2
7440-23-5	Sodium	NS	ug/L	66700	135000	137000	135000	91300	348000
7440-62-2	Vanadium	14 GLS	ug/L	2.6 J	1.1 J	ND	1.9 J	ND	12.3 J
7440-66-6	Zinc	480	ug/L	8.8 J	26	6.3 J	2600	2.5 J	20
	OTHER								
	Methane	NS	mg/L	3	2	0.4	0.2	NA	NA
	Nitrate-nitrogen	NS	mg/L	0.66	0.08	ND	0.16	NA	NA
	Nitrite nitrogen	NS	mg/L	0.12	ND	ND	ND	NA	NA
	Nitrite-nitrate nitrogen	NS	mg/L	0.78	0.08	ND	0.16	NA	NA
	Sulfate-B	NS	mg/L	33	280	1000	930	NA	NA

TABLE 3.5

AlliedSignal
Buffalo Color Area D Site
Reference Documents and Additional Notes

Sources:

Table 3.1 - NYSDEC Technical Guidance for Screening Contaminated Sediments (11/93.)

Table 3.2 - SQC(FW) = USEPA Sediment Quality Criteria. Assumes 1 percent organic carbon (USEPA, 1993g). Values are lower limit of 95 percent confidence interval.
- SQB = Sediment quality benchmarks by equilibrium partitioning. Assumes 1 percent organic carbon. (USEPA, 1995b).
- ERL = Effects Range - Low (Long et al., 1995).

Table 3.3 - NYSDEC Ambient Water Quality Standards and Guidance Values(10/98), Class C Aquatic Chronic Standards for Fish Propagation (fresh waters)

Table 3.4 - Same as Table 3.2.

Notes:

ug/L = micrograms per liter. ppb
mg/Kg = micrograms per kilogram. ← wrong designation
mg/kg milligrams/kg, ppm
ug/kg micrograms/kg, ppb
NS = No Standard.
(H) = hardness dependent ambient water quality criterion (100 mg/L as $CaCO_3$ used.)
(G) = Guidance value.
m = refers to m-Xylene.
S = final chronic value derived for EPA Sediment Quality Criteria documents (EPA, 1993a,b,c,d,e).
+ = value with EPA support documents.
# = value calculated for this project.
GLS = NYSDEC Ambient Water Quality Standard subject to adjustment as part of the Great Lakes System.

Data Qualifiers:

U - Not detected at the detection limit indicated.
J - Estimated value.
N - Presumable evidence of detection at the concentration indicated.

733309.04000

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Date 1/21/99	# of pages ▶ 1
To GERRY PIETRASZEK	From PETE PETRONE
Co./Dept. NYSDEC	Co. PARSONS
Phone # 851-7220	Phone # 633-7074
Fax # 851-7226	Fax #

SECTION 4

NATURAL RECOVERY ASSESSMENT

4.1 INTRODUCTION

Natural recovery of sediments is often a viable method of remediation under the appropriate site conditions. In certain situations, it offers the advantage of the lowest exposure risks to human and ecosystem receptors (TRB, 1998). Natural recovery is most effective in environments where surface concentrations of contaminants are relatively low, where deposition rates are rapid, or where natural processes degrade or modify the contaminants. The combined result of these physical and chemical processes, under the right conditions, decreases the release of contaminants to the environment over time.

Natural recovery, in conjunction with the physical barriers currently in place, is considered to be a viable method of wastefill/sediment remediation at the Buffalo Color Site. This section discusses the advantages of natural recovery at the Site, particularly related to the following Site conditions:

- Separation of the constituents of concern in the wastefill from the benthic habitat at the surface of the cap;
- Sedimentation processes that are expected to produce a new benthic zone over the existing cap;
- Evidence of natural biodegradation; and
- Chemical/hydrogeologic factors that are greatly reducing the potential for leaching to the benthic habitat.

Each of these conditions is supported by data derived from the current or prior site studies, including chemical analysis of the wastefill and surrounding porewater, site-specific hydrogeologic and hydrodynamic factors, natural attenuation parameters measured in porewater samples, and design and construction drawings showing cap configuration.

4.2 EXISTING CONDITIONS

As shown in Figures 4.1, 4.2, and 4.3, the constituents of concern in the wastefill are effectively separated from benthic habitat by the multi-layer cap placed during the IRM. Because of the recent disturbances caused by riprap and topsoil construction along the shoreline, a benthic zone does not exist, currently. However, a new benthic community is expected to emerge as additional native sediment settles on top of the riprap.

Figure 4.1 is a plan view of the shoreline between stations 19+50 and 25+50, showing the locations of two cross-sections parallel to the shoreline. Figure 4.2 shows the wastefill remaining at a distance of approximately 30 feet from the slurry wall and the clean fill, geotextile, and riprap covering it. Figure 4.3 shows a cross section approximately 50 feet from the slurry wall. At this distance, all wastefill has been removed and natural material is covered by sand, woven geotextile, shot rock, and riprap. The cover materials placed during October and November 1997 form a barrier that limits contact between the future benthic zone and the constituents of concern.

This cap is similar to the approved Cherry Farm/River Road cap design, installed to provide slope stability and isolation of organic compounds and metals from the river environment. The Cherry Farm/River Road capping system consists of a geotextile barrier overlain by 21 inches of riprap. Figure 4.4 is a series of photos taken during installation of the woven geotextile material in the river and subsequent covering by riprap. As with the Cherry Farm/River Road cap, the geotextile provides a substantial physical barrier between the waste material and any future benthic habitats.

Recent construction activities have been completed, involving placement of several inches of substrate soil above a substantial portion of the riprap adjacent to the shoreline. These efforts have essentially facilitated and enhanced the development of a clean benthic habitat over some portions of the riprap (see Buffalo Color Design Report for details).

4.3 SEDIMENTATION RATES

Several recent sedimentation studies for the Buffalo River indicate that the river is aggrading. Using the HEC-6 Model (Meredith and Rumer, 1987, and Raggio et al., 1988) it was estimated that 68 percent of the time all incoming sediment is deposited in the river. Rates of scour calculations using increasing flow rates (from 500 to 20,000 cfs) indicate that significant scour in some areas of the Buffalo River begins at 6,000 cfs (the Buffalo River rate of flow is less than 6,000 cfs 99 percent of the time). However, these same test results indicate that deposition would continue in the area around Buffalo Color Area "D" even at flow rates of 20,000 cfs. It is not known if the Buffalo River has ever achieved a flow rate this high.

A report done for the USEPA ARCS/RAM project for the Buffalo River provides evidence of the depositional nature of the river. The report states that the river is known to function as a relatively efficient sediment trap, in which sediment that enters the system from upstream tributaries tends to remain in the river (Atkinson and others, 1994). An April 1995 USEPA ARCS report indicates that sediment resuspension only contributes a significant amount of contaminants to the water column during major high flow events. The resuspension that does occur comes almost entirely from the dredged channel of the river (USEPA, 1995). Thus, any resuspension during high flow events would not be expected to impact the nearshore area where the capping system is presently located.

Dredging records indicate certain areas of the Buffalo River need consistent maintenance through sediment removal, including one area around Buffalo Color Area "D". The greatest amount of dredging in the past, and presumably the highest siltation rates, have occurred in an area that includes Area "D". Although the total volume of materials dredged from the river has decreased over the past 40 years, the quantity is still substantial.

According to the USACE Buffalo District (personal communication, September 1998), the Buffalo River was dredged annually between the 1960s and late 1980s, at a rate of about 400,000 CY per year. From the late 1980s to the present, the river has continued to need dredging about every two to three years. The rate has decreased to an annualized average of about 90,000 CY per year. The reduction is attributed to the shutdown of Republic Steel, grainieries, sewage treatment plants, etc.

Bathymetric data were used with MSM Terrain Modeler software to calculate and present cross-sectional bathymetric areas. Bathymetric data collected immediately before and after dredging were analyzed, and used to project sedimentation rates for a one year interval. The area analyzed was downstream from Buffalo Color Area "D", including the next meander bend. The projected sedimentation rate is sufficient to indicate the deposition of a sand bar inside the meander bend.

A study of river bottom morphology using side scanning sonar (Singer et al., 1995) indicates that the subject area between stations 19+00 and 24+00 is in a state of constant deposition. This report concludes that new sediments will eventually cover the area.

4.4 NATURAL BIODEGRADATION

4.4.1 Introduction

It is well known that many organic compounds are readily biodegraded via naturally occurring processes. A literature review was conducted to evaluate the natural biodegradation potential for the organic compounds (VOCs, SVOCs, PAHs and phenols) detected in porewater samples in excess of NYSDEC's Class C Surface Water Standards/Guidelines, as presented in Table 4.1. In summary, all of the organic compounds detected in excess of the NYSDEC's criteria have been shown to be readily biodegraded aerobically under naturally occurring conditions, while six of the eight have been shown to be biodegradable under anaerobic conditions as well.

To assess whether natural biodegradation of Site compounds is occurring, the results for chemical indicators of biodegradation were evaluated in detail, as presented in Appendix E and summarized below.

4.4.2 Geochemical Indicators of Natural Biodegradation

Microorganisms obtain energy for cell production and maintenance by facilitating reduction-oxidation (redox) reactions involving the transfer of electrons from electron donors to available electron acceptors. By documenting depleted levels of electron acceptors such as dissolved oxygen (DO), nitrate, sulfate, and/or elevated levels of biological products such as methane and ferrous iron in an area where organic compounds are present, it can be inferred that biological activity is occurring. Geochemical data on electron acceptors and biological products collected from the porewater samples are shown in Table 4.2. Specific evidence that biodegradation of site organic compounds is occurring includes:

only an inference!

- Significant levels of ferrous iron were detected at the Site. Because reduction of ferric iron to ferrous iron cannot proceed without the presence of microbial action, the presence of ferrous iron is a strong indicator that biodegradation of site organic compounds is occurring via iron reduction.
- Methane was detected in all porewater samples where methane was analyzed for, indicating that biodegradation of site organic compounds is occurring via methanogenesis.
- The redox potential, expressed as pe, is sufficiently depressed to indicate that the full range of natural biodegradation processes is likely occurring.
- Generally, Site DO levels in porewater are less than one mg/L, indicating that any oxygen being transported into the wastefill area via groundwater flow or hydraulic communication with the river is being consumed. The consumption of oxygen is most likely due to biodegradation of site organic compounds.

DO generally is low in the Buffalo River.

- Generally, Site nitrate levels in porewater are less than one mg/L, indicating that any nitrate being transported into the wastefill area via groundwater flow or hydraulic communication with the river is being consumed. The consumption of nitrate, if occurring, is most likely due to biodegradation of site organic compounds.

are nitrate levels generally high in SW or river water.

For biodegradation to occur, an ongoing supply of electron acceptors (oxygen, nitrate, sulfate, etc.) is required. As discussed in Section 4.5, groundwater flow is likely occurring parallel to the river current, providing one potential ongoing source of electron acceptors. In addition, sulfate and ferric iron from the waste fill material may be providing additional electron acceptors. Finally, the electron acceptor for methanogenesis is carbon dioxide, which is also a by-product of biological activity, providing another potential source of electron acceptors.

4.4.3 Summary

In summary, it is expected that organic compound concentrations will decrease over time due to natural biodegradation processes. This conclusion is based on the demonstrated biodegradability of all of the organic compounds (VOCs, SVOCs, PAHs and phenols) detected in wastefill area porewater samples in excess of NYSDEC's Class C Surface Water Standards/Guidelines, and on site-specific geochemical indicators of natural biodegradation.

4.5 FATE AND TRANSPORT

Remedial construction activities, particularly the installation of the slurry wall and groundwater recovery system, have altered the groundwater/surface water interactions adjacent to the river. This has resulted in a greatly reduced potential for migration of dissolved constituents of concern from the porewater in the wastefill material to the water/sediment interface. The low permeability slurry wall, designed to contain groundwater within the Area "D" Site, inhibits the normal flux of groundwater from the Site to the river. In the absence of a slurry wall, upward gradients would be expected in the river near the shoreline due to upwelling of groundwater. However, following placement of the slurry wall, those upward gradients have been either eliminated, or greatly reduced, because there no longer is significant hydraulic communication between Site groundwater and the river. In the absence of upward gradients, groundwater movement, or transport of porewater within and adjacent to the wastefill material, will tend to be horizontal in the direction of the river current. Thus, the potential for upward movement of chemicals of concern from the wastefill to the sediment/water interface is either eliminated or significantly reduced around the entire peninsula.

ok

Moreover, startup and continued operation of the groundwater extraction system should produce inward gradients between the river and the Site, such that vertical fluxes, if present at all within the wastefill, would tend to be downwards.

insignificant

Furthermore, concentrations of chemicals within the porespace of the wastefill will be reduced through the processes of advective transport and mechanical dispersion. As discussed above, movement of porewater within the wastefill will tend to be more horizontal than vertical, in the direction of river flow, because of the reduced upward vertical gradients. Under these conditions, it is expected that water from the wastefill may not reach the sediment/water interface of the future benthic zone for some distance downstream. This allows reduction of chemical concentrations through dispersion as water moves along the flow path parallel to the slurry wall. The slurry wall extends an estimated 450 feet beyond the wastefill area.

Thus, the design and construction of the Area "D" groundwater extraction and containment system has the added benefit of reducing upward chemical fluxes from the wastefill, and increasing the potential for dispersion. These two factors provide supporting evidence that there will be no impact to ecological receptors from the wastefill, once a benthic habitat is reestablished.

Why?

If they can show how and where this exists (examples), we will believe it. However its bogus.

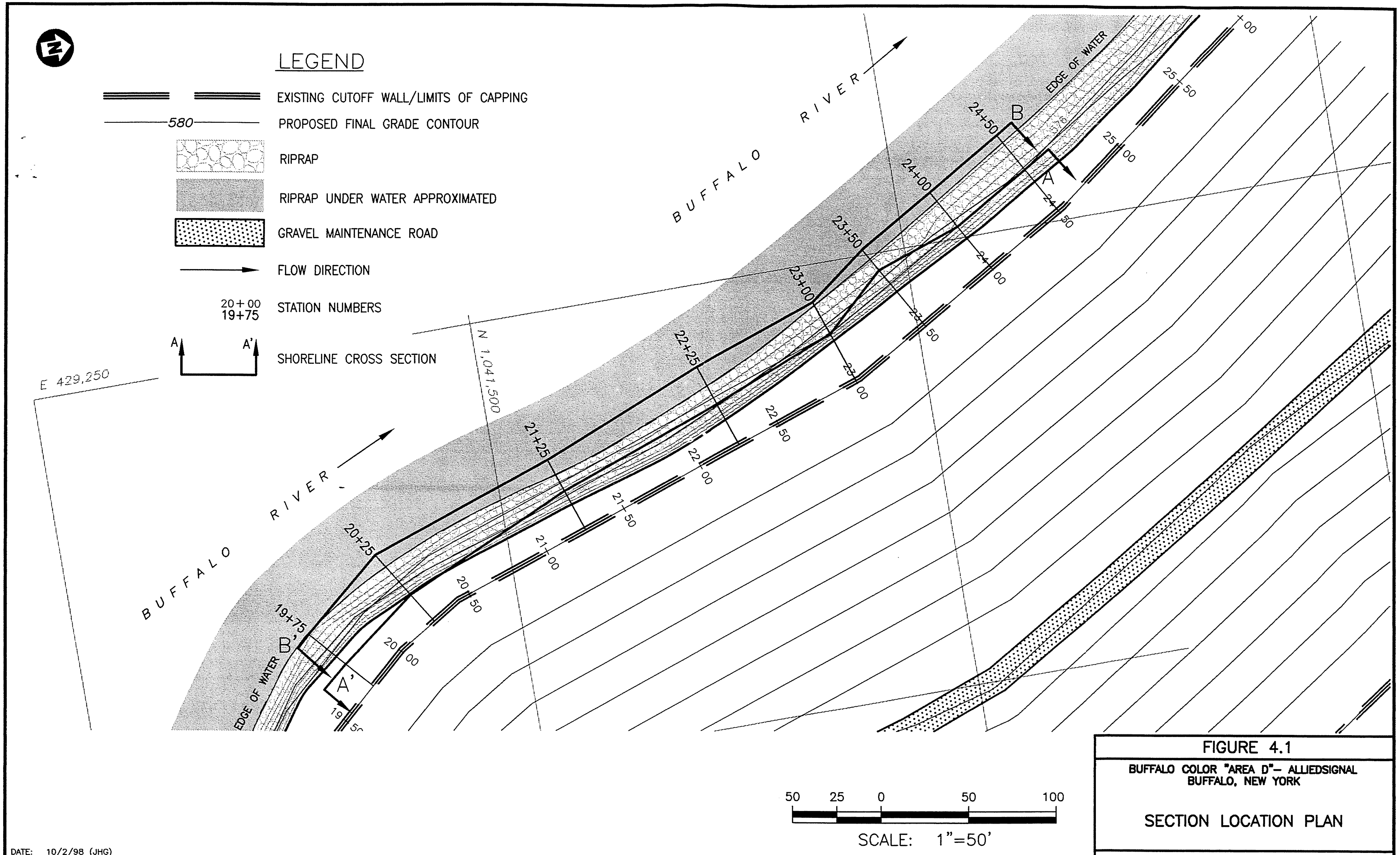

FIGURE 4.1

BUFFALO COLOR "AREA D"– ALLIEDSIGNAL
BUFFALO, NEW YORK

SECTION LOCATION PLAN

PARSONS ENGINEERING SCIENCE, INC.
DESIGN * RESEARCH * PLANNING
290 ELWOOD DAVIS ROAD * SUITE 312 * LIVERPOOL, N.Y. 13088 * 315/451-9560
OFFICES IN PRINCIPAL CITIES

DATE: 10/2/98 (JHG)
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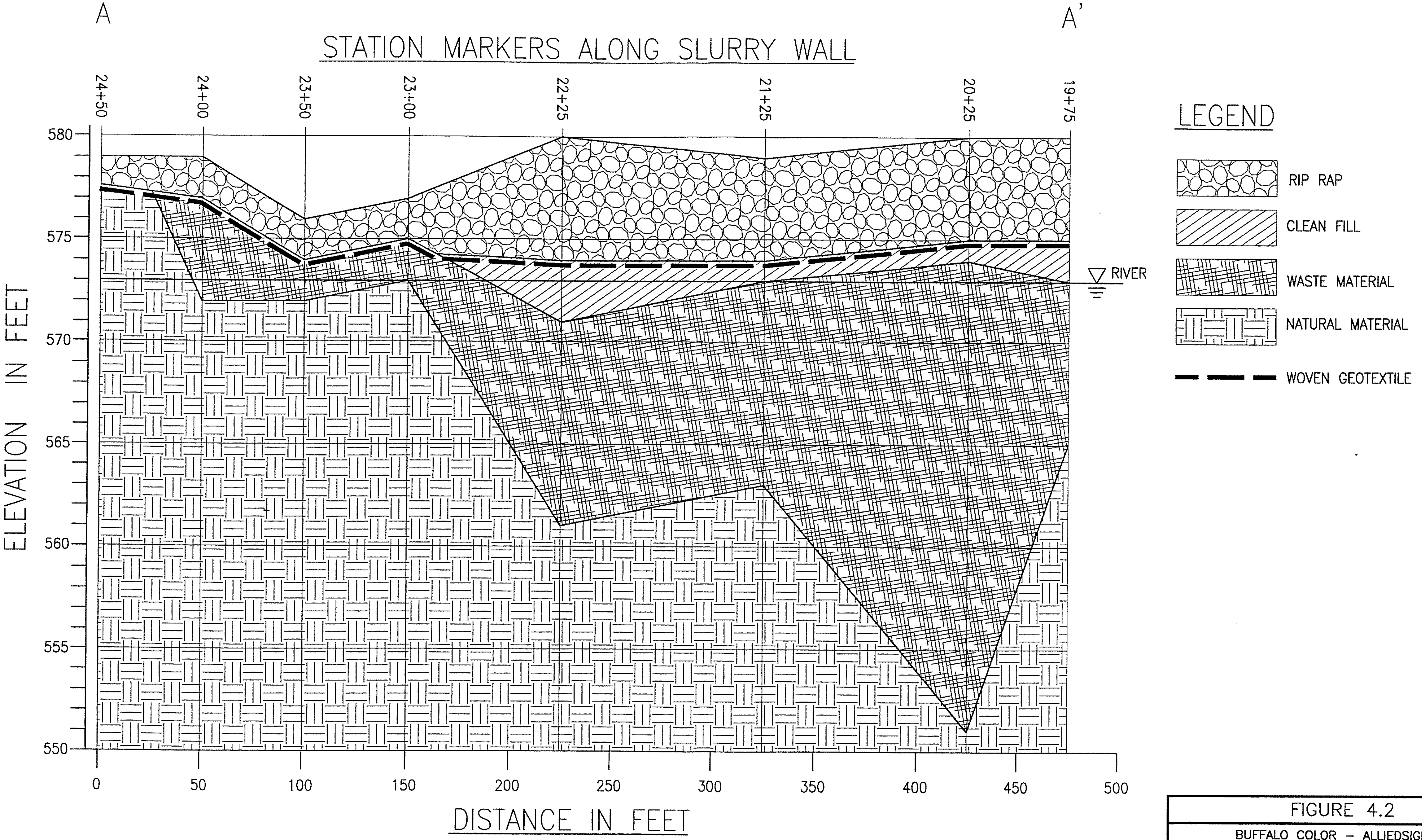
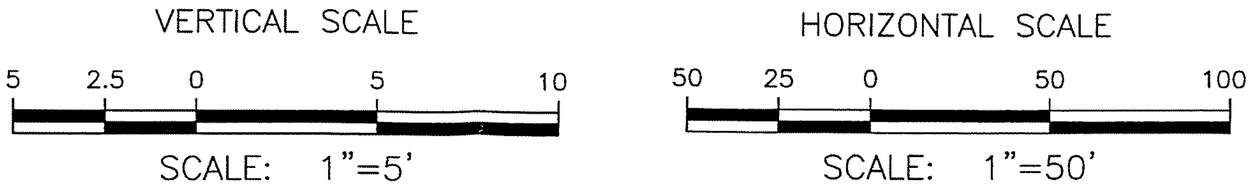
SCALE: PAPER SCALE, 1=50
XREF'S: NONE





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SCALE: PAPER SCALE, 1=50
XREF'S: NONE

FIGURE 4.2

BUFFALO COLOR – ALLIEDSIGNAL
BUFFALO, NEW YORK

PARTIAL SHORELINE
CROSS SECTION PROFILE
A – A'

PARSONS ENGINEERING SCIENCE, INC.
DESIGN * RESEARCH * PLANNING
290 ELWOOD DAVIS ROAD * SUITE 312 * LIVERPOOL, N.Y. 13088 * 315/451-9560
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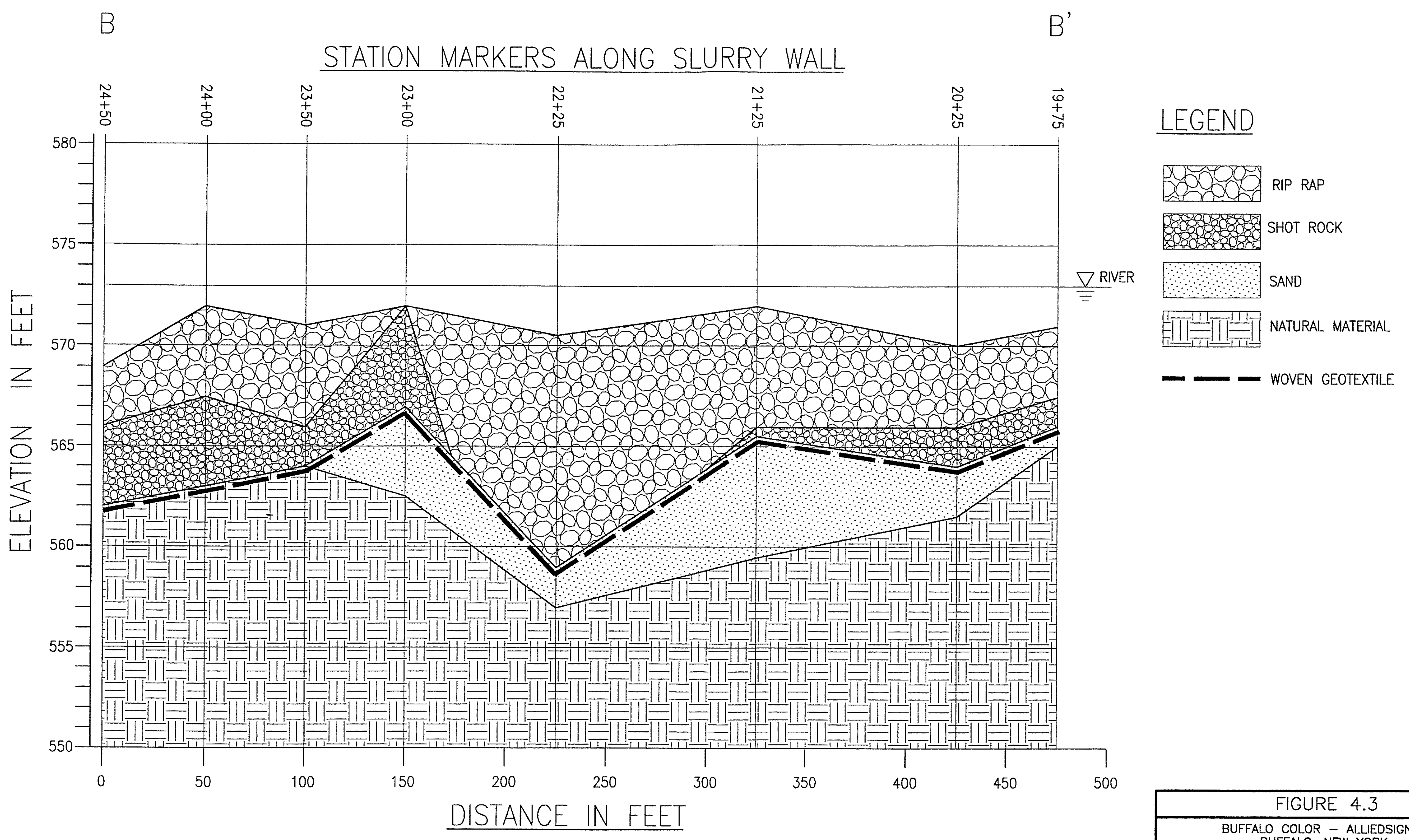

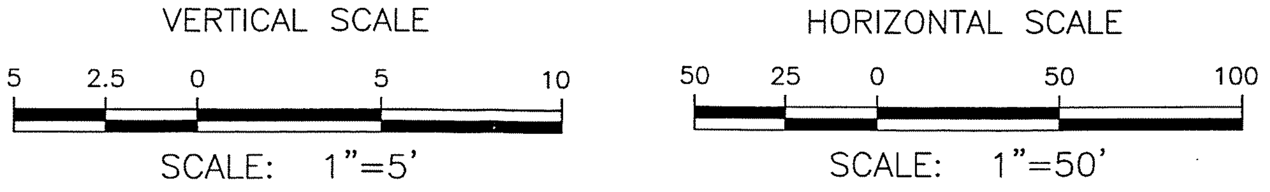

DATE: 10/07/98 (FCW)
FILE: P:\732980\CAD\PROFILE2.DWG
SCALE: PAPER SCALE, 1=50
XREF'S: NONE

FIGURE 4.3

BUFFALO COLOR – ALLIEDSIGNAL
BUFFALO, NEW YORK

PARTIAL SHORELINE
CROSS SECTION PROFILE
B– B'

PARSONS ENGINEERING SCIENCE, INC.
DESIGN • RESEARCH • PLANNING
290 ELWOOD DAVIS ROAD • SUITE 312 • LIVERPOOL, N.Y. 13088 • 315/451-9560
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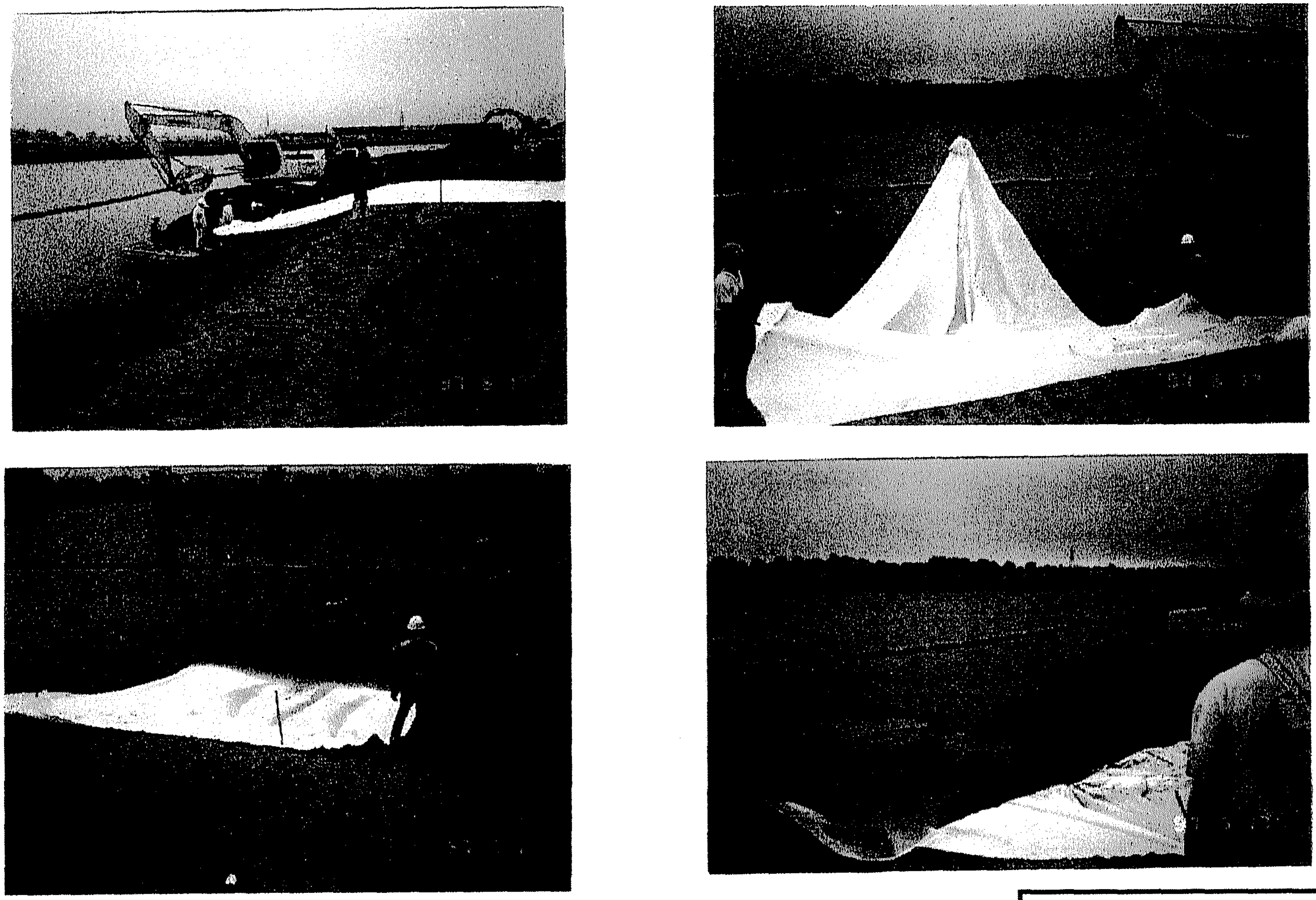

FIGURE 4.4

AlliedSignal BUFFALO COLOR AREA "D"
BUFFALO, NEW YORK

GEOTEXTILE INSTALLATION

PARSONS ENGINEERING SCIENCE, INC.

DESIGN * RESEARCH * PLANNING

100 LAWRENCE BELL DRIVE * SUITE 100 * WILLIAMSVILLE, NEW YORK 14221 * 716/633-7074
OFFICES IN PRINCIPAL CITIES

TABLE 4.1
BUFFALO COLOR AREA "D"
WASTE FILL AREA
NATURAL BIODEGRADATION POTENTIAL

Compound	NYSDEC Class C Surface Water Standard/Guideline (ug/L)	Maximum (ug/L)	Degrades Aerobically	Degrades Anaerobically	Comment
Benzene	10 H(FC)	68	Yes(1)	Yes(1)	Readily biodegraded aerobically and anaerobically, hundreds of case studies. (1)
Chlorobenzene	400 H(FC)	1000	Yes(1)	Unlikely(1)	Readily biodegradable aerobically via pathways similar to those of benzene(3)
bis(2-Ethylhexyl)phthalate	0.6 A(C)	11	Yes(1)	Unlikely(1)	Biodegradation occurs rapidly under aerobic conditions. Several studies show it does not readily biodegrade anaerobically(1).
1,4-Dichlorobenzene	5**	13	Yes(1)	Yes(4)	Has been shown to be readily biodegraded aerobically via pathways similar to those of benzene(3), and has also been shown to be degradable under anaerobic conditions via reductive dechlorination(4).
1,2-Dichlorobenzene	5**	35	Yes(1)	Yes(4)	Has been shown to be readily biodegraded aerobically via pathways similar to those of benzene(3), and has also been shown to be degradable under anaerobic conditions via reductive dechlorination(4).

TABLE 4.1 (CONTINUED)
BUFFALO COLOR AREA "D"
WASTE FILL AREA
NATURAL BIODEGRADATION POTENTIAL

Compound	NYSDEC Class C Surface Water Standard/Guideline (ug/L)	Maximum (ug/L)	Degrades Aerobically	Degrades Anaerobically	Comment
Fluorene	0.54 A(C)	7 J	Yes(2)	Yes(2)	Fluorene appears to be slowly biodegraded in anaerobic groundwaters based on the published data. (2)
Naphthalene	13 A(C)	190 D	Yes(2)	Likely(2)	Biodegradation occurs fairly rapidly under aerobic conditions and anaerobic degradation is also reported in literature. (2)
Phenol	1 E**	4 J	Yes(2)	Yes(2)	Phenol has been shown to be readily biodegraded aerobically, and it is generally accepted that it is also biodegraded under anaerobic conditions under multiple pathways. (2)

(1) Howard, Philip H., Handbook of Environmental Fate and Exposure Data for Organic Chemicals. Lewis Publishers, 1990.

(2) Aronson, Dallas and Howard, Philip H., Anaerobic Biodegradation of Organic Chemicals in Groundwater: A summary of Field and Laboratory Studies. Draft Final, August 13, 1997.

(3) Spain, J.C. , 1996, Future Vision: Compounds with Potential for Natural Attenuation, in Proceedings of the Symposium on Natural Attenuation of Chlorinated Organics in Ground Water: USEPA/540/R-96/509, Dallas, TX, September 11-13, 1996.

(4) Bosma, T.N., van der Muer, J.R., Reductive dechlorination of trichlorobenzene and dichlorobenzene isomers. FEMS Microbial Ecology. Vol 53, pp 223-229.

TABLE 4.2

ALLIED SIGNAL
BUFFALO COLOR AREA "D"
WASTE FILL AREA
NATURAL ATTENUATION PARAMETERS
BUFFALO, NEW YORK

Piezometer Location	Methane (mg/L)	Nitrate (mg/L)	Sulfate (mg/L)	pH	Temperature (°C)	Conductivity (µs/cm)	Dissolved Oxygen (mg/L)	Redox Potential (MV)	Fe^{+2} (1) (mg/L)	Comments
WF-02 (2) ✓	2.0	0.08	280	7.99	NM(3)	130	0.04	-167	0.80	Clear, odor
WF-03 ✓	0.4	ND(4)	1,000	7.11	15.5	632	0.03	-195	6.0	Low turbidity, no odor
WF-04 ✓	0.2	0.16	930	7.08	16.1	247	0.02	-94	6.0	Clear, odor
WF-05	NA(5)	NA	NA	7.53	16.9	505	1.60	-293	0.6	Low turbidity, no odor
WF-06	NA	NA	NA	7.41	15.1	475	0.38	-78	1.2	Clear, no odor
BG-01 ✓	3.0	0.66	33	7.72	22.5	123	2.62	-108	2.05	Low turbidity, no odor. Piezometer purged dry.

DO is low most time of yr. in B'flo R. (4-5 ppm)

8-10 ppm N. River normal

Notes:

(1) Fe^{+2} - Iron

(2) No temperature readings were collected at WF-02 due to temperature probe problems.

(3) NM - Not measured

(4) ND - Not Detected

(5) NA - Not Analyzed

(6) Redox can be converted to pe by: pe = (redox potential + 241)/59.16. (Probe-specific conversion)

SECTION 5

SECTION 5

CONLUSIONS AND RECOMMENDATIONS

AlliedSignal proposes to leave the currently installed cap in place as a permanent remedy for the following reasons:

- The cap separates waste material from the sediment/surface water interface zone. Also, it limits vertical or horizontal migration of the wastefill material.
- Natural sedimentation is expected to occur over a period of time, because the Site is in a well-documented depositional area. This will create a new benthic invertebrate zone, which will be separated from the wastefill material by the cap.
- Results of porewater sampling confirm that the impact of organic compounds and metals from the wastefill on the benthic community will be minimal. With the exception of total metals in unfiltered porewater samples, very few constituents were detected above background levels, and in excess of USEPA's Threshold Values (TVs) or NYSDEC's Criteria. In total, six organic compounds, two pesticides, and three metals (dissolved) were detected in excess of USEPA's TVs and background concentrations and five organic compounds and four metals (dissolved) were detected in excess of NYSDEC's Criteria and background concentrations. Per USEPA guidance (USEPA, 1996), dissolved metals more closely approximate the bioavailable fraction of metals in the water column. Benthic organisms are more susceptible to contact with chemical constituents dissolved in the porewater than to the chemical constituents bound to the wastefill. what do benthic organisms feed on? → Sec 6.
- The porewater samples collected during the investigation were obtained from the wastefill and represent a worst-case scenario. The concentrations of both metals and organic compounds will decrease with distance from the wastefill, due to the effects of mechanical dispersion, dilution, and biodegradation. Thus, concentrations in the future benthic zone are expected to be lower than those in the porewater associated with the wastefill.
- Installation of the slurry wall and groundwater recovery system have altered the groundwater/surface water interactions adjacent to the river, greatly reducing the potential for migration of dissolved constituents of concern from the porewater in the wastefill to the water/sediment interface.
- Based on geochemical indicators of natural biodegradation, it appears that the organic compounds in the wastefill are currently undergoing biological degradation. It is expected that the organic compound concentrations will decrease over time due to the ongoing natural biodegradation processes.

- During the remedial action, NYSDEC required "grossly contaminated" wastefill along the shoreline to be excavated, spread on the landfill, dried, and compacted. Wastefill which was not considered grossly contaminated was left in place. In order to obtain consensus of what fill was considered grossly contaminated, visual observation and qualitative toluene extraction field tests were used to determine gross contamination. Random confirmatory sampling indicated that wastefill that was mutually considered to be grossly contaminated generally contained between one and two percent total organic compounds. The total organic concentrations in all wastefill samples collected during the recent investigation were at least one order of magnitude less than 1 percent, indicating that the wastefill would not be considered grossly contaminated by the screening methods used previously.

where's this data?

SECTION 6

SECTION 6

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APPENDIX A

APPENDIX A

BORING LOGS

PARSONS ENGINEERING SCIENCE, INC.
DRILLING RECORD

BORING/ WELL NO. BG-01 **Sheet** 1 **of** 1

Contractor: Maxim, Inc.
Driller: R. Brown
Inspector: E. Ashton
Rig Type: CME-55

PROJECT NAME: Buffalo Color "Area D", Waste Fill Area
PROJECT NUMBER: 732121

Location Description: SEE SITE PLAN

Location Plan SEE SITE PLAN

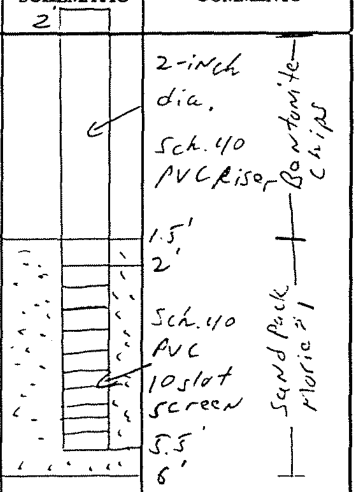
GROUNDWATER OBSERVATIONS

Water Level	2.25'		
Date	8/7/98		
Time	12:34 p.m.		
Meas. From	TOC		

Weather: Cloudy - 70'F
Date/Time Start: 8/6/98 - 1100
Date/Time Finish: 8/6/98 - 1110

Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL
+2					
+1					
0	BG-01	2/9	50	15	(0'-2') Dark Grey to Dark Brown, f-sand, f-gravel, tr. silt, wet.
	VOCS	8/3			
1					
2					(2'-6') No recovery, soil to loose for sampling spoon to maintain soil collected.
3					
4					
5					
6					
					Soil Boring Terminated at 6 feet bgs.
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					

SCHEMATIC **COMMENTS**



SAMPLING METHOD
SS = SPLIT SPOON
A = AUGER CUTTINGS
C = CORED

COMMENTS:
Collected soil samples from interval 0 to 1 feet bgs (grab sample) for VOC analysis and interval 0 to 1 feet (composite sample) for remaining.
remaining. See Table 2.1 for summary of analysis. Geotechnical sample also collected from 0 to 1 feet bgs for sieve analysis.

PARSONS ENGINEERING SCIENCE, INC.
DRILLING RECORD

Contractor:	Maxim, Inc.
Driller:	R. Brown
Inspector:	E. Ashton
Rig Type:	CME-55

PROJECT NAME: Buffalo Color "Area D", Waste Fill Area
PROJECT NUMBER: 732121

BORING/ WELL NO. WF-02
Sheet 1 of 1

Location Description:
SEE SITE PLAN

Location Plan
SEE SITE PLAN

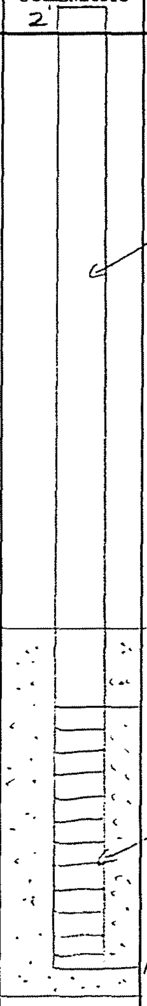
Weather: Sunny - 70'F
Date/Time Start: 8/3/98 - 1050
Date/Time Finish: 8/3/98 - 1346

GROUNDWATER OBSERVATIONS

Water Level	8.97'		
Date	8/6/98		
Time	2:00 p.m.		
Meas. From	TOC		

Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL
+2					
+1					
0		3/7	80	0	(0'-2') Brown, silt, f-sand, tr. f-gravel, dry.
		7/3			
1					
2		1/3	80	0	(2'-4') Brown, silt, clay, tr. f-sand & f-gravel, dry to moist.
		3/4			
3					
4		11/21	95	0	(4'-5.5') SAA
		24/12			
5					
					(5.5'-6') Black, silt, f-sand, wood, moist. (Black Waste Fill)
6		10/7	90	0	(6'-8') Black, f-m sand, tr. silt & f-gravel, wet. (Black Waste Fill)
		7/10			
7					
8		6/9	15	0	(8'-10') Black, f-sand, wood, brick, gravel, wet, sheen on water. (Black Waste Fill)
		6/11			
9					
10		6/12	25	0	(10'-12') SAA, except soil contains moth ball odor. (Black Waste Fill)
		18/14			
11					
12	WF-02	6/7	95	0	(12'-14') Black, f-sand, silt, tr. clay, brick, moth ball odor, wet. (Black Waste Fill)
	VOCS	6/7			
13					
14		2/1	75	0.7	(14'-15.5') Black, f-sand, silt, tr. brick, moth ball odor, wet. (Black Waste Fill)
		1/2			
15					
					(15.5'-16') Grey, f-sand, silt, moth ball odor, wet
16					
					Soil Boring Terminated at 16 feet bgs.
17					
18					

SCHEMATIC



COMMENTS

2-inch dia Sch. 40 PVC Riser

Bentonite chips

9'

10.5'

Sch. 40 PVC 10 slot screen

Sand Pack Morie #1

15.5'

16'

COMMENTS:
Collected soil samples from interval 12 to 14 feet bgs (grab sample) for VOC analysis and interval 6 to 16 feet (composite sample) for remaining.
remaining. See Table 2.1 for summary of analysis. Geotechnical sample also collected from 6 to 16 feet bgs for sieve analysis.

SAMPLING METHOD
SS = SPLIT SPOON
A = AUGER CUTTINGS
C = CORED

PARSONS ENGINEERING SCIENCE, INC.
DRILLING RECORD

BORING/ WELL NO. WF-03 Sheet 1 of 1

Contractor: Maxim, Inc.
Driller: R. Brown
Inspector: E. Ashton
Rig Type: CME-55

PROJECT NAME: Buffalo Color "Area D", Waste Fill Area
PROJECT NUMBER: 732121

Location Description: SEE SITE PLAN

Location Plan SEE SITE PLAN

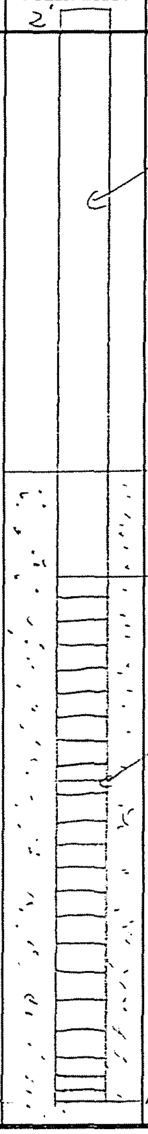
Weather: Cloudy - 65'F
Date/Time Start: 8/4/98 - 1103
Date/Time Finish: 8/4/98 - 1319

GROUNDWATER OBSERVATIONS

Water Level	9.38'		
Date	8/6/98		
Time	2:00 p.m.		
Meas. From	TOC		

Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL	COMMENTS
+2						
+1						2-inch
						dia.
0		4/10	50	3	(0'-2') Brown, silt, tr. f-sand, dry.	
		1/9				Sch. 40
1						
						Riser
2		5/5	45	3.1	(2'-4') SAA	Bentonite Chips
		5/8				
3						
4		3/6	95	5	(4'-5.8') SAA	
		10/15				
5						
					(5.8'-6') Black, silt, f-sand, brick, wood, moist. (Black Waste Fill)	
6		9/11	40	2	(6'-8') SAA, except soil contained small fragments of shells. (Black Waste Fill)	6'
		15/30				
7						
8		1/3	50	0	(8'-10') Black, silt, f-sand, roots, moth ball odor, wet. (Black Waste Fill)	8'
		4/7				
9						
10	WF-03	1/1	20	0	(10'-12') SAA, except soil contains sheen and green color on water. (Black Waste Fill)	
	VOCS	5/6				
11	MS&					Sch. 40
	MSD					PVC
12		3/4	20	0	(12'-14') SAA (Black Wast Fill)	10 slot
		4/5				screen
13						Sand Pack Morie #1
14					Note: Drilled to a depth of 18.5 feet in order to install 10 feet of well screen with hollow stem augers.	
15						
16						
17						
18					Soil Boring Terminated at 18.5 feet bgs.	18'
						18.5'

SCHEMATIC



COMMENTS:
Collected soil samples from interval 10 to 12 feet bgs (grab sample) for VOC analysis and interval 6 to 14 feet (composite sample) for remaining.
remaining. See Table 2.1 for summary of analysis. Geotechnical sample also collected from 6 to 14 feet bgs for sieve analysis.

SAMPLING METHOD
SS = SPLIT SPOON
A = AUGER CUTTINGS
C = CORED

PARSONS ENGINEERING SCIENCE, INC.
DRILLING RECORD

BORING/ WELL NO. WF-04
Sheet 1 **of** 1

Contractor: Maxim, Inc.
Driller: R. Brown
Inspector: E. Ashton
Rig Type: CME-55

PROJECT NAME: Buffalo Color "Area D", Waste Fill Area
PROJECT NUMBER: 732121

Location Description: SEE SITE PLAN

Location Plan SEE SITE PLAN

Weather: Cloudy - 65'F
Date/Time Start: 8/5/98 - 0723
Date/Time Finish: 8/5/98 - 0845

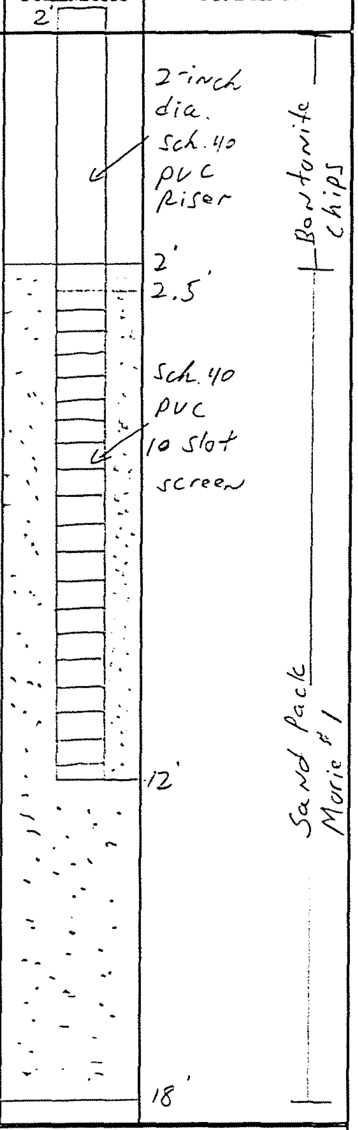
GROUNDWATER OBSERVATIONS

Water Level	8.06'		
Date	8/6/98		
Time	2:00 p.m.		
Meas. From	TOC		

Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL
+2					
+1					
0		4/5	100	13.5	(0'-1.8') Brown, silt, clay, tr. f-sand & f-gravel, dry to moist.
		12/12			
1					
					(1.8'-2') Black, silt, tr. clay & f-gravel, moth ball odor, moist. (Black Waste Fill)
2		8/8	70	5	(2'-4') SAA, except soils contained brick and roots. (Black Waste Fill)
		10/8			
3					
4		8/5	0	0	(4'-6') No Recovery
		3/3			
5					
6		7/5	10	0	(6'-8') Black, silt, f-gravel, tr. f-sand, roots, moth ball odor, wet. (Black Waste Fill)
		3/4			
7					
8	WF-04	1/1	50	3	(8'-10') SAA (Black Waste Fill)
	VOCS	2/2			
9					
10		1/1	25	0	(10'-12') SAA (Black Waste Fill)
		2/1			
11					
12		8/9	5	0.5	(12'-14') SAA (Black Waste Fill)
		6/6			
13					
14		5/7	5	0	(14'-16') Black, f-m sand, moderately sorted, wet. (Black Waste Fill)
		9/11			
15					
16		14/25	100	2	(16'-18') Grey, f-m sand, f-c gravel, moderately sorted, wet.
		30/37			
17					
18					Soil Boring Terminated at 18 feet bgs.

SCHEMATIC

COMMENTS



COMMENTS:
Collected soil samples from interval 8 to 10 feet bgs (grab sample) for VOC analysis and interval 2 to 14 feet (composite sample) for remaining.
remaining. See Table 2.1 for summary of analysis. Geotechnical sample also collected from 2 to 14 feet bgs for sieve analysis.

SAMPLING METHOD
SS = SPLIT SPOON
A = AUGER CUTTINGS
C = CORED

Contractor: Maxim, Inc.
Driller: R. Brown
Inspector: E. Ashton
Rig Type: CME-55

PARSONS ENGINEERING SCIENCE, INC.
DRILLING RECORD

PROJECT NAME: Buffalo Color "Area D", Waste Fill Area
PROJECT NUMBER: 732121

BORING/ WELL NO. WF-06
Sheet ___ **of** ___

Location Description:
SEE SITE PLAN

Location Plan
SEE SITE PLAN

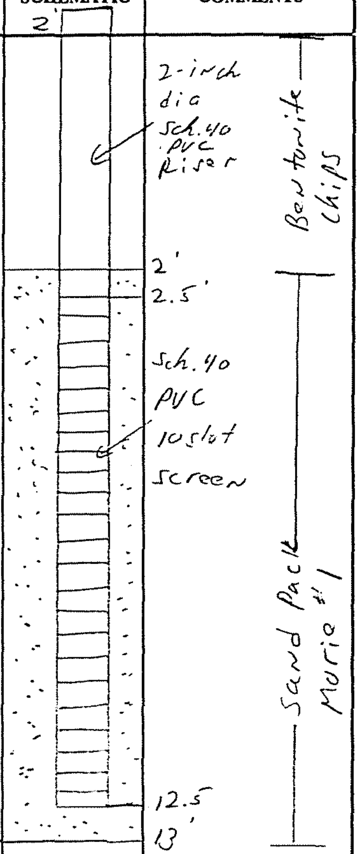
Weather: Cloudy - 65'F
Date/Time Start: 8/5/98 - 1326
Date/Time Finish: 8/5/98 - 1410

GROUNDWATER OBSERVATIONS

Water Level	9.03'		
Date	8/6/98		
Time	2:00 p.m.		
Meas. From	TOC		

Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL
+2					
+1					
0		7/20	95	7.7	(0'-2') Brown, f-sand, silt, tr. f-gravel. dry.
		20/12			
1					
2	WF-06	8/8	60	22	(2'-3.5') SAA
	VOCS	10/12			
3					
					(3.5'-4') Black, f-sand, silt, coal, ash, brick, moth ball odor, moist. (Black Waste Fill)
4		2/5	75	12.1	(4'-6') Black, f-sand, silt, tr. clay, wood, brick, coal, ash, moth ball odor, moist to wet.
		9/9			(Black Waste Fill)
5					(5'-6') Black, silt, clay,tr. f-sand & f-gravel, brick, moist. (Black Waste Fill)
6		10/8	100	1.2	(6'-7.5') SAA, except soil contained a higher percentage of clay. (Black Waste Fill)
		5/3			
7					
					(7.5'-8') Grey, silt, f-sand, tr. clay, moist.
8		1/1	100	12.7	(8'-10') SAA, except soil is wet.
		2/2			
9					
10		1/2	100	10	(10'-12') SAA
		7/8			
11					
12					Note: Drilled to a depth of 13 feet in order to install 10 feet of well screen
					with hollow stem augers.
13					
					Soil Boring Terminated at 13 feet bgs.
14					
15					
16					
17					
18					

SCHEMATIC | COMMENTS



SAMPLING METHOD
SS = SPLIT SPOON
A = AUGER CUTTINGS
C = CORED

COMMENTS:
Collected soil samples from interval 2 to 4 feet bgs (grab sample) for VOC analysis and interval 3.5 to 8 feet (composite sample) for remaining.
remaining. See Table 2.1 for summary of analysis. Geotechnical sample also collected from 3.5 to 8 feet bgs for sieve analysis.

Contractor: Maxim, Inc.
Driller: R. Brown
Inspector: E. Ashton
Rig Type: CME-55

PARSONS ENGINEERING SCIENCE, INC.

DRILLING RECORD

BORING/ WELL NO. WF-05 **Sheet** 1 **of** 1

Location Description: SEE SITE PLAN

PROJECT NAME: Buffalo Color "Area D", Waste Fill Area
PROJECT NUMBER: 732121

Weather: Cloudy - 65'F

Date/Time Start: 8/5/98 - 1040

Date/Time Finish: 8/5/98 - 1155

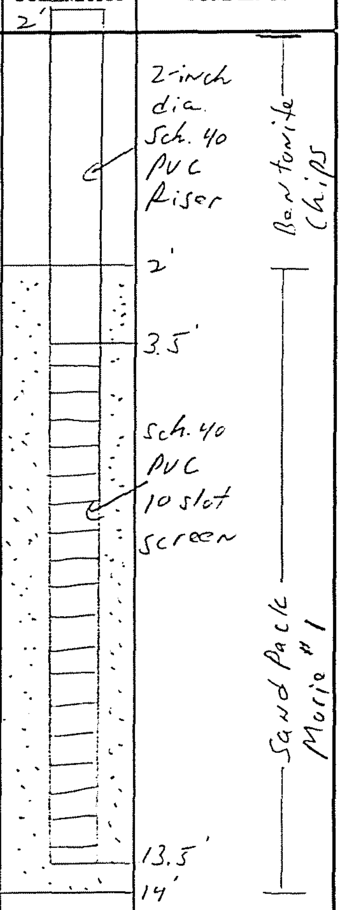
Location Plan
SEE SITE PLAN

GROUNDWATER OBSERVATIONS

Water Level	8.40'		
Date	8/6/98		
Time	2:00 p.m.		
Meas. From	TOC		

Sample Depth	Sample I.D.	SPT	% Rec.	PID (ppm)	FIELD IDENTIFICATION OF MATERIAL
+2					
+1					
0		4/3	90	0	(0'-2') Brown, silt, tr. clay & f-sand & f-gravel, moist.
		3/4			
1					
2		3/4	50	10	(2'-3.8') SAA, except soil contained higher percentage of clay content.
		9/6			
3					
					(3.8'-4') Brown to Black, silt, clay, tr. f-sand & f-gravel, brick, moist.
4		5/11	55	57	(4'-5') Brown, silt, clay, tr. f-sand, moist.
		10/10			
5					(5'-6') Black, silt, clay,tr. f-sand & f-gravel, brick, moist. (Black Waste Fill)
6	WF-05	9/11	100	136	(6'-8') Black to Grey, silt, tr. f-sand & clay, tr. brick, moth ball odor, moist. (Black Waste Fill)
	VOCS	18/8			
7					
8		2/3	100	10	(8'-10') Black to Grey, silt, f-sand, tr. clay, moth ball odor, moist. (Black Waste Fill)
		4/4			
9					
10		3/4	100	0	(10'-11') SAA (Black Waste Fill)
		4/3			
11					(11'-12') Grey, silt, clay, f-sand, moth ball odor, moist.
12					Note: Drilled to a depth of 14 feet in order to install 10 feet of well screen with hollow stem augers.
13					
14					
					Soil Boring Terminated at 14 feet bgs.
15					
16					
17					
18					

SCHEMATIC | COMMENTS



SAMPLING METHOD
SS = SPLIT SPOON
A = AUGER CUTTINGS
C = CORED

COMMENTS:
Collected soil samples from interval 6 to 8 feet bgs (grab sample) for VOC analysis and interval 4 to 11 feet (composite sample) for remaining. remaining. See Table 2.1 for summary of analysis. Geotechnical sample also collected from 4 to 11 feet bgs for sieve analysis.

APPENDIX B

APPENDIX B

GRAIN SIZE DATA

MAXIM
TECHNOLOGIES INC

September 28, 1998

Parsons Engineering Science, Inc.
100 -180 Lawrence Bell Drive
Williamsville, New York 14221

Phone: (716) 633-7074
Fax: (716) 633-7195

Attention: Mr. Mark Raybuck

Reference: Grain Size Test
Buffalo Color Site

Dear Mr. Raybuck:

Please find attached the Grain Size Distribution Test Data form the Buffalo Color Site. If you have any questions or if we can provide further assistance, please contact our office. We look forward to working with you on your next project.

Sincerely,
MAXIM TECHNOLOGIES OF NEW YORK, INC.

Jerry A. Jones
Drilling Services Manager

5167 South Park Ave. • P.O. Box 0913 • Hamburg, NY 14075 • (716) 649-8110 • Fax: (716) 649-8051

Austin Research Engineers • Chen-Northern • Empire Soils Investigations
Kansas City Testing • Southwestern Laboratories • Twin City Testing

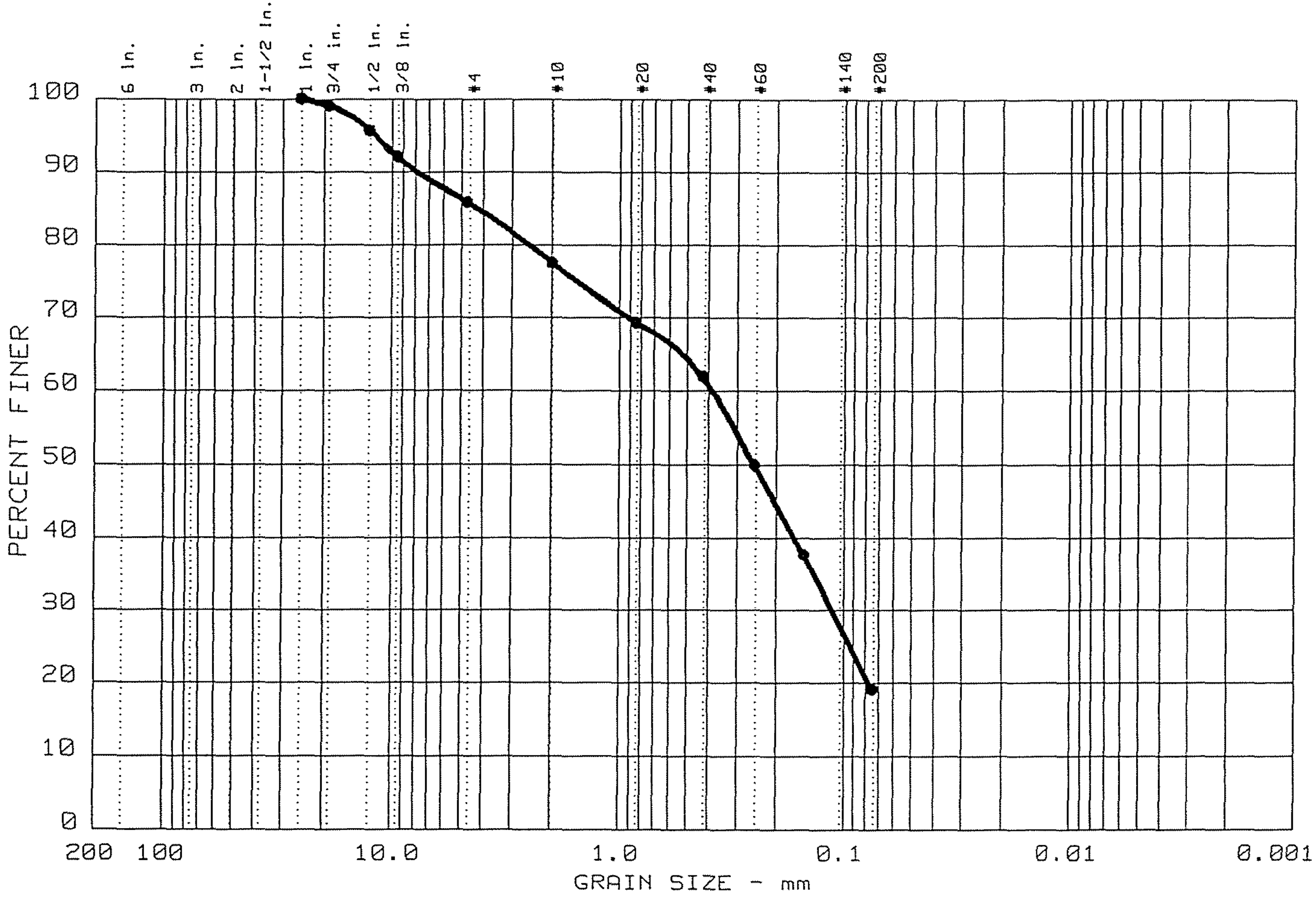
```
 =============================================================================
                         GRAIN SIZE DISTRIBUTION TEST DATA        Test No.: 3
 -----------------------------------------------------------------------------
ate: 9/28/98
Project No.:
Project: Buffalo Color Waste
 =============================================================================

------------------------------------------------------------------------------
                                     Sample Data
 -----------------------------------------------------------------------------
Location of Sample: WF025
Sample Description: Sand, little fines, gravel
 SCS Class: SM                          Liquid limit:
ASHTO Class: A-2-4(0.0)                 Plasticity index:
------------------------------------------------------------------------------
                                        Notes
 -----------------------------------------------------------------------------
Remarks:

 ig. No.: 268
------------------------------------------------------------------------------
                              Mechanical Analysis Data
 -----------------------------------------------------------------------------
 ieve             Size, mm   Percent finer
1      inches      25.40     100.0
.75    inches      19.05      99.1
 .5    inches      12.70      95.7
0.375  inches       9.53      92.0
# 4                 4.750     85.8
  10                2.000     77.5
# 20                0.850     69.3
# 40                0.425     61.9
  60                0.250     49.9
  100               0.150     37.7
# 200               0.075     19.1
------------------------------------------------------------------------------
                                Fractional Components
------------------------------------------------------------------------------
Gravel/Sand based on #4 sieve
 and/Fines based on #200 sieve
  + 3 in. =   0.0     % GRAVEL = 14.2    % SAND = 66.7
% FINES = 19.1

 85=    4.32  D60=    0.384  D50=    0.251
D30=    0.1108
```

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	3	0.0	14.2	66.7	19.1	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			4.32	0.384	0.251	0.111				

MATERIAL DESCRIPTION	USCS	AASHTO
● Sand, little fines, gravel	SM	A-2-4(0.0)

Project No.:
Project: Buffalo Color Waste
● Location: WF025

Date: 9/28/98

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
MAXIM TECHNOLOGIES

Figure No. 268

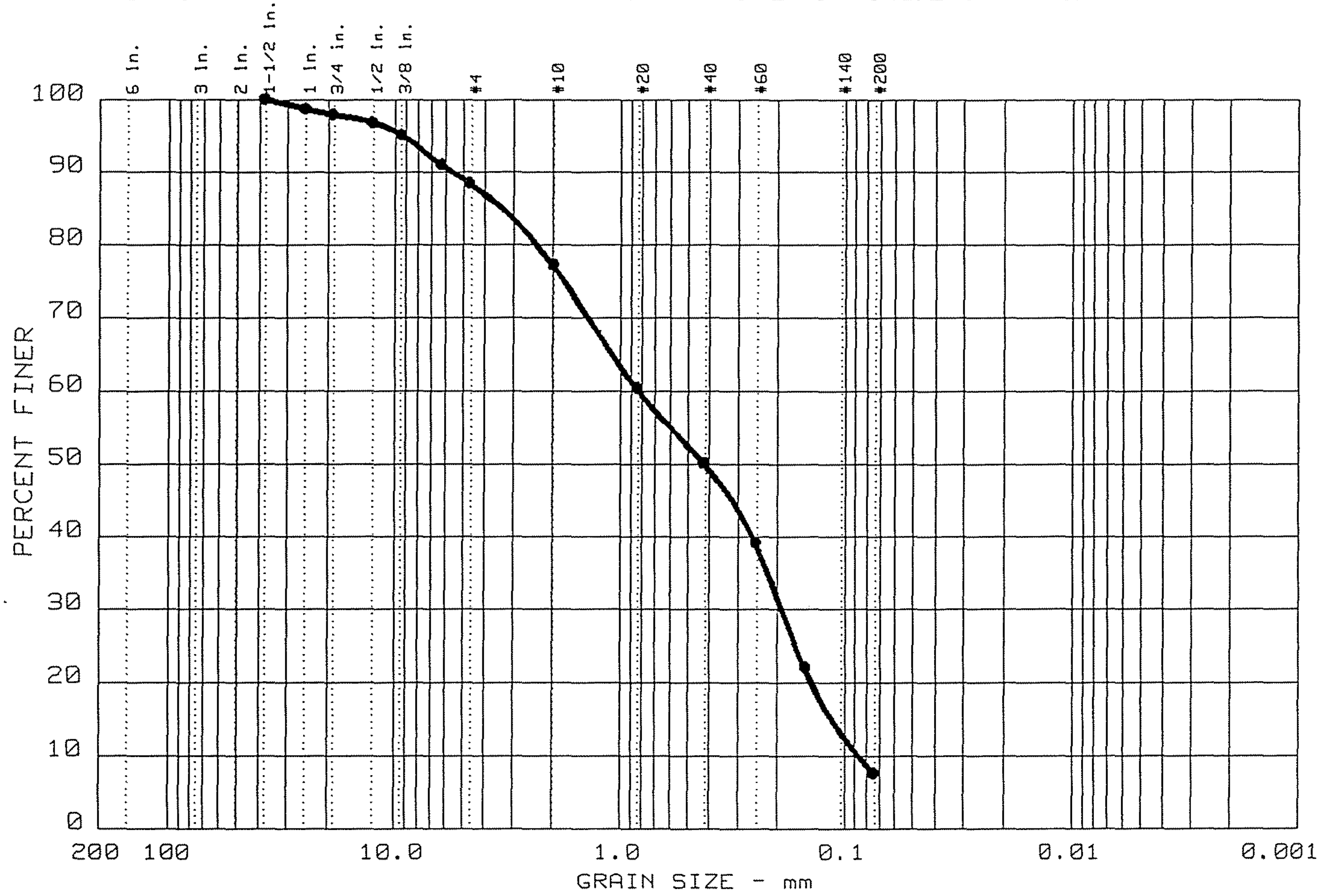
```
================================================================================
                    GRAIN SIZE DISTRIBUTION TEST DATA          Test No.: 3
 -------------------------------------------------------------------------------
Date: 9/28/98
Project No.:
Project: Buffalo Color
 ===============================================================================

--------------------------------------------------------------------------------
                                     Sample Data
 -------------------------------------------------------------------------------
Location of Sample: WF-035
Sample Description: Sand, little gravel, trace fines
 SCS Class: SP-SM                      Liquid limit:
AASHTO Class: A-1-b                    Plasticity index:
--------------------------------------------------------------------------------
                                        Notes
 -------------------------------------------------------------------------------
Remarks:

 ig. No.: 269
--------------------------------------------------------------------------------
                               Mechanical Analysis Data
 -------------------------------------------------------------------------------
Sieve          Size, mm   Percent finer
1.5   inches    38.10     100.0
      inches    25.40      98.7
 .75  inches    19.05      97.9
0.5   inches    12.70      96.8
0.375 inches     9.53      95.1
 .25  inches     6.35      91.0
# 4              4.750     88.4
# 10             2.000     77.2
  20             0.850     60.4
  40             0.425     50.2
# 60             0.250     39.2
  100            0.150     22.1
  200            0.075      7.7
--------------------------------------------------------------------------------
                                Fractional Components
 -------------------------------------------------------------------------------
Gravel/Sand based on #4 sieve
Sand/Fines based on #200 sieve
  + 3 in. =   0.0     % GRAVEL = 11.6    % SAND = 80.7
  FINES =  7.7

D85=   3.39  D60=   0.822  D50=   0.417
D30=   0.1897  D15=   0.11298  D10=  0.08570
Cc =   0.5105  Cu =   9.5940
```

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	3	0.0	11.6	80.7	7.7	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			3.39	0.822	0.417	0.190	0.113	0.0857	0.51	9.6

MATERIAL DESCRIPTION	USCS	AASHTO
● Sand, little gravel, trace fines	SP-SM	A-1-b

Project No.:
Project: Buffalo Color
● Location: WF-035

Date: 9/28/98

GRAIN SIZE DISTRIBUTION TEST REPORT
MAXIM TECHNOLOGIES

Remarks:

Figure No. 269

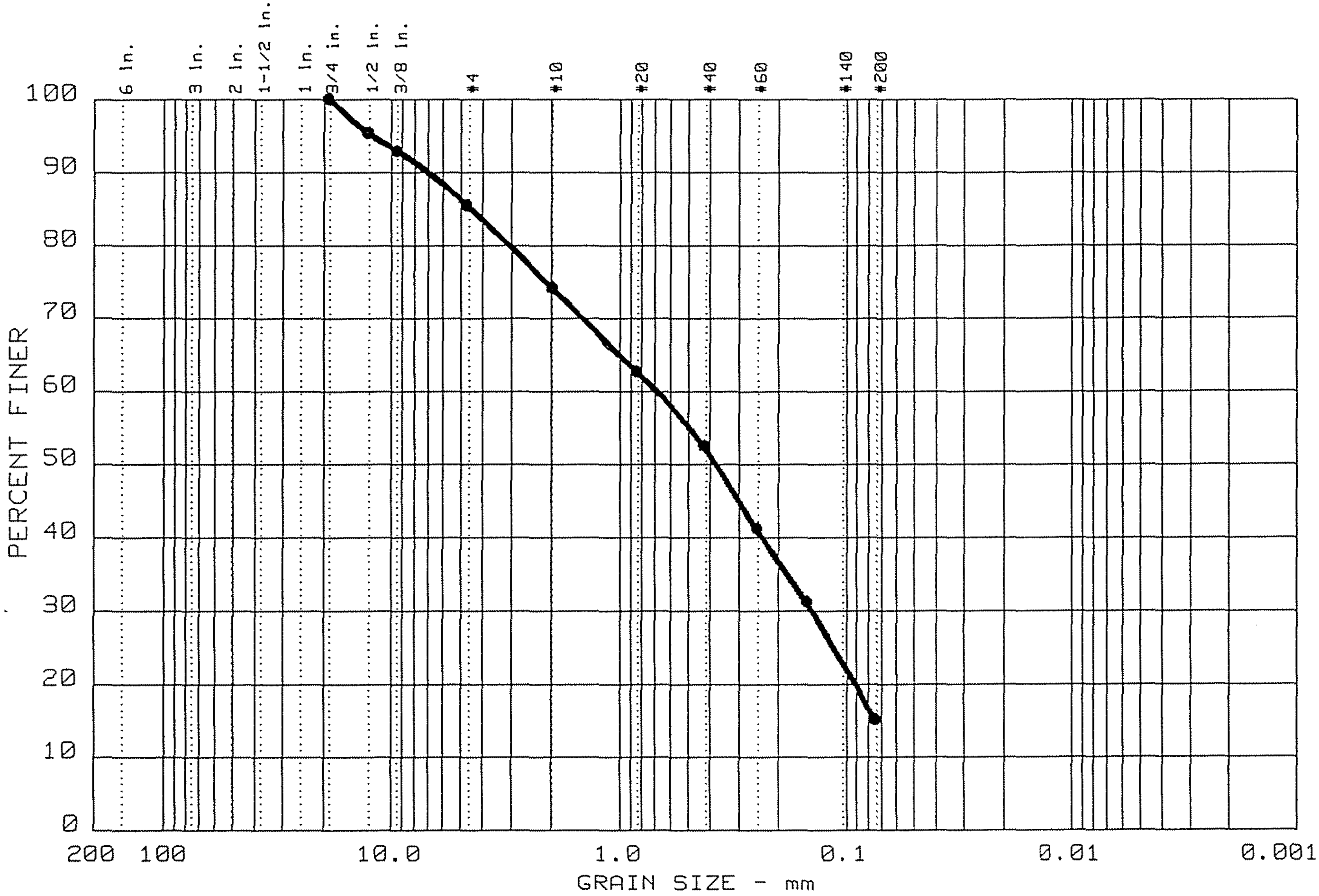
```
==============================================================================
                      GRAIN SIZE DISTRIBUTION TEST DATA         Test No.: 3
------------------------------------------------------------------------------
Date: 9/28/98
Project No.:
Project: Buffalo Color
==============================================================================

------------------------------------------------------------------------------
                                   Sample Data
------------------------------------------------------------------------------
Location of Sample: WF-045
Sample Description: Sand little fines, gravel
SCS Class: SM                           Liquid limit:
AASHTO Class: A-2-4(0.0)                Plasticity index:
------------------------------------------------------------------------------
                                      Notes
------------------------------------------------------------------------------
Remarks:

 ig. No.: 270
------------------------------------------------------------------------------
                             Mechanical Analysis Data
------------------------------------------------------------------------------
Sieve           Size, mm   Percent finer
0.75  inches     19.05      100.0
 .5   inches     12.70       95.3
 .375 inches      9.53       92.9
# 4               4.750      85.5
# 10              2.000      74.2
  20              0.850      62.7
# 40              0.425      52.5
# 60              0.250      41.2
  100             0.150      31.3
  200             0.075      15.2
------------------------------------------------------------------------------
                              Fractional Components
------------------------------------------------------------------------------
Gravel/Sand based on #4 sieve
Sand/Fines based on #200 sieve
  + 3 in. =  0.0     % GRAVEL = 14.5    % SAND = 70.3
% FINES = 15.2

 85=    4.52  D60=    0.684  D50=    0.375
 30=    0.1408
```

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	3	0.0	14.5	70.3	15.2	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			4.52	0.684	0.375	0.141				

MATERIAL DESCRIPTION	USCS	AASHTO
● Sand little fines, gravel	SM	A-2-4(0.0)

Project No.:
Project: Buffalo Color
● Location: WF-045

Date: 9/28/98

GRAIN SIZE DISTRIBUTION TEST REPORT

MAXIM TECHNOLOGIES

Remarks:

Figure No. 270

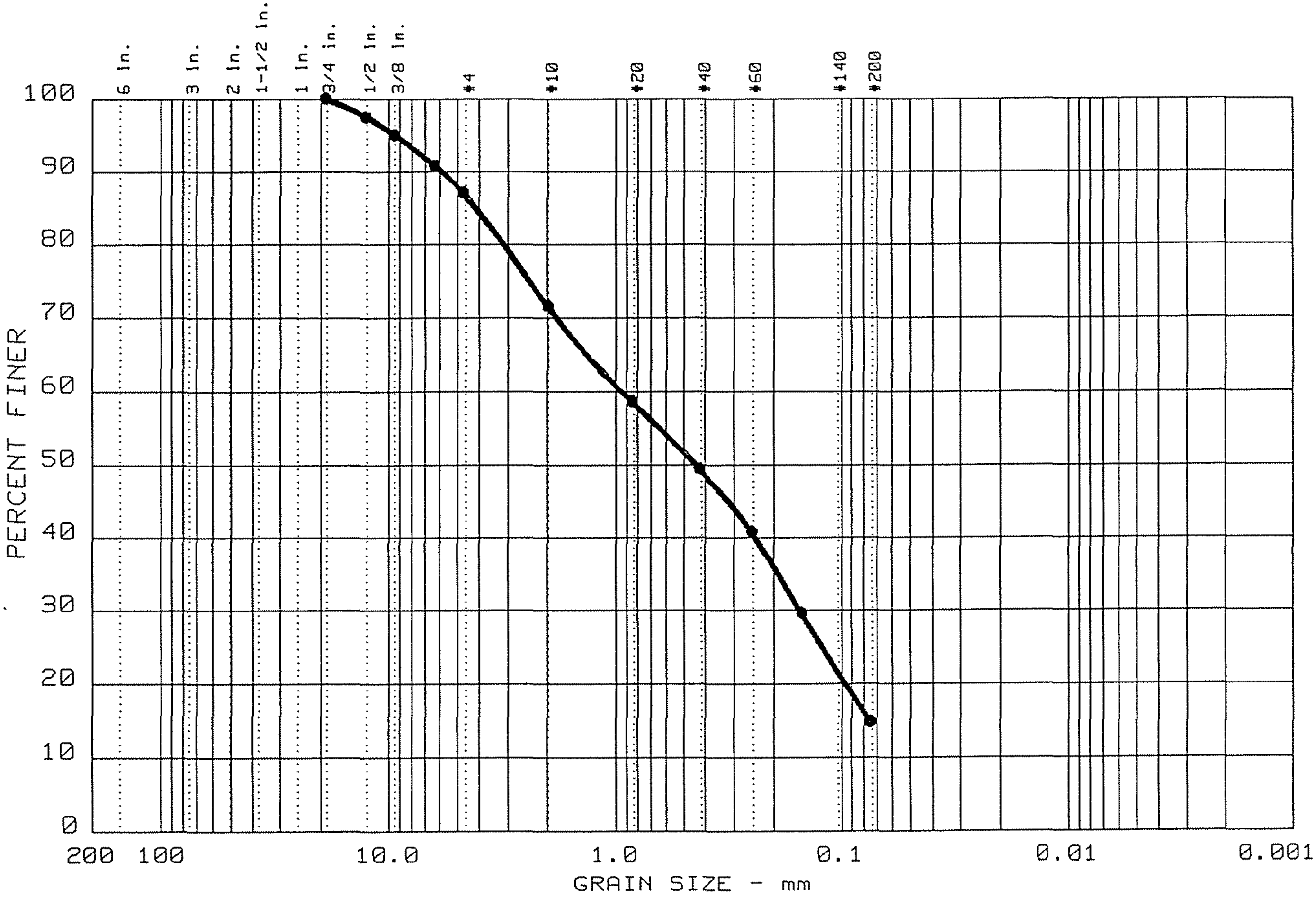
```
==============================================================================
                     GRAIN SIZE DISTRIBUTION TEST DATA        Test No.: 3
------------------------------------------------------------------------------
ate: 9/28/98
Project No.:
Project: Buffalo Color
==============================================================================

------------------------------------------------------------------------------
                                  Sample Data
------------------------------------------------------------------------------
Location of Sample: WF-065
Sample Description: Sand little fines, gravel
SCS Class: SM                          Liquid limit:
AASHTO Class: A-1-b                    Plasticity index:
------------------------------------------------------------------------------
                                     Notes
------------------------------------------------------------------------------
Remarks:

ig. No.: 272
------------------------------------------------------------------------------
                            Mechanical Analysis Data
------------------------------------------------------------------------------
Sieve            Size, mm   Percent finer
0.75  inches      19.05      100.0
 .5   inches      12.70       97.5
 .375 inches       9.53       95.0
0.25  inches       6.35       90.8
# 4                4.750      87.1
  10               2.000      71.6
# 20               0.850      58.6
# 40               0.425      49.5
  60               0.250      40.8
# 100              0.150      29.6
# 200              0.075      14.9
------------------------------------------------------------------------------
                             Fractional Components
------------------------------------------------------------------------------
Gravel/Sand based on #4 sieve
and/Fines based on #200 sieve
% + 3 in. =  0.0    % GRAVEL = 12.9   % SAND = 72.2
% FINES = 14.9

85=    4.12  D60=    0.933  D50=    0.437
D30=   0.1514
```

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	3	0.0	12.9	72.2	14.9	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			4.12	0.933	0.437	0.151				

MATERIAL DESCRIPTION	USCS	AASHTO
● Sand little fines, gravel	SM	A-1-b

Project No.:
Project: Buffalo Color
● Location: WF-065

Date: 9/28/98

GRAIN SIZE DISTRIBUTION TEST REPORT

MAXIM TECHNOLOGIES

Remarks:

Figure No. 272

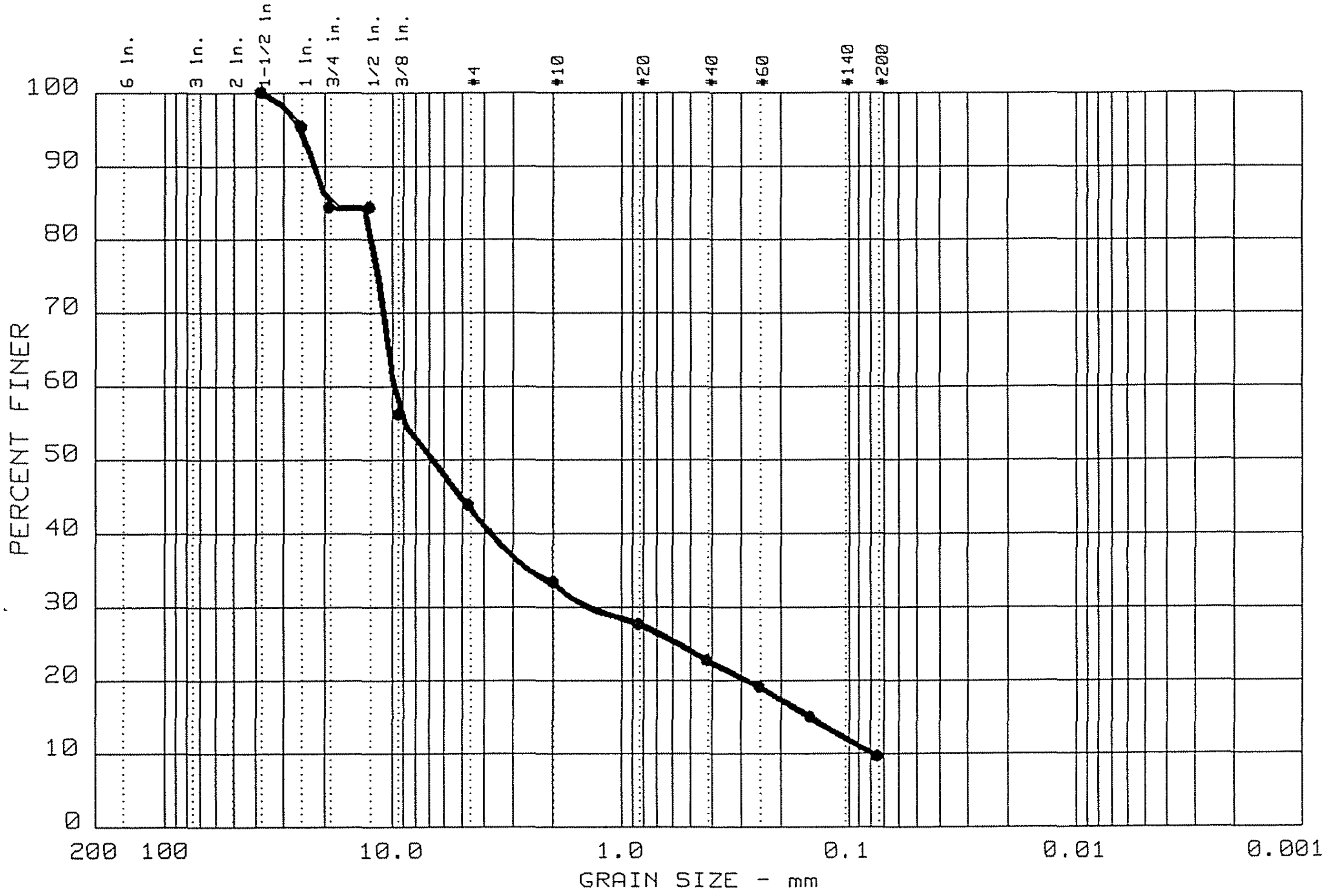
```
===============================================================================
                       GRAIN SIZE DISTRIBUTION TEST DATA          Test No.: 3
-------------------------------------------------------------------------------
 ite: 9/28/98
Project No.:
 roject: Buffalo Color
===============================================================================

-------------------------------------------------------------------------------
                                    Sample Data
-------------------------------------------------------------------------------
Location of Sample: BG-015
 ample Description: Gravel, some sand, trace fines
 SCS Class: GW-GM                      Liquid limit:
AASHTO Class: A-1-a                    Plasticity index:
-------------------------------------------------------------------------------
                                       Notes
-------------------------------------------------------------------------------
Remarks:

 ig. No.: 273
-------------------------------------------------------------------------------
                              Mechanical Analysis Data
-------------------------------------------------------------------------------
 ieve            Size, mm   Percent finer
1.5   inches      38.10     100.0
      inches      25.40      95.3
 .75  inches      19.05      84.3
0.5   inches      12.70      84.3
 .375 inches       9.53      56.2
  4                4.750     43.9
# 10               2.000     33.4
# 20               0.850     27.7
  40               0.425     22.8
  60               0.250     19.1
# 100              0.150     15.0
  200              0.075      9.7
-------------------------------------------------------------------------------
                               Fractional Components
-------------------------------------------------------------------------------
 ravel/Sand based on #4 sieve
 and/Fines based on #200 sieve
% + 3 in. =  0.0    % GRAVEL = 56.1   % SAND = 34.2
  FINES =  9.7

D85=  19.39  D60=   9.897  D50=   6.691
 30=   1.3980  D15=   0.14980  D10=  0.07771
 c =   2.5410  Cu = 127.3503
```

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	3	0.0	56.1	34.2	9.7	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			19.4	9.90	6.69	1.40	0.150	0.0777	2.54	127.4

MATERIAL DESCRIPTION	USCS	AASHTO
● Gravel, some sand, trace fines	GW-GM	A-1-a

Project No.:
Project: Buffalo Color
● Location: BG-015

Date: 9/28/98

GRAIN SIZE DISTRIBUTION TEST REPORT

MAXIM TECHNOLOGIES

Remarks:

Figure No. 273

APPENDIX C

APPENDIX C

FIELD MEASUREMENTS

APPENDIX C

BUFFALO COLOR
WASTE FILL AREA
GROUNDWATER FIELD MEASUREMENTS
BUFFALO, NEW YORK

Piezometer Location	Date	Time	pH	Temperature (°C)	Conductivity (µs/cm)	Dissolved Oxygen (mg/L)	Redox Potential (MV)	Fe^{+2} (1) (mg/L)	Comments
WF-02 (2)	8/7/98	0913	7.53	NM (3)	210	0.28	NM	NM	High turbidity, no odor
WF-02 (2)	8/7/98	0917	7.75	NM	177	0.15	NM	NM	High turbidity, no odor
WF-02 (2)	8/7/98	0922	7.93	NM	153	0.10	NM	NM	Low turbidity, odor
WF-02 (2)	8/7/98	0927	8.03	NM	141	0.08	NM	NM	Clear, odor
WF-02 (2)	8/7/98	0932	8.11	NM	135	0.07	NM	NM	Clear, odor
WF-02 (2)	8/7/98	0937	8.13	NM	130	0.10	NM	NM	Clear, odor
WF-02 (2)	8/7/98	0942	8.12	NM	130	0.07	NM	NM	Clear, odor
WF-02 (2)	8/7/98	0947	8.12	NM	129	0.05	NM	NM	Clear, odor
WF-02 (2)	8/7/98	0952	7.99	NM	130	0.04	NM	0.80 (4)	Clear, odor
WF-02 (2)	8/11/98	0855	NM	NM	NM	NM	-22	NM	Low turbidity, odor
WF-02 (2)	8/11/98	0900	NM	NM	NM	NM	-148	NM	Low turbidity, odor
WF-02 (2)	8/11/98	0905	NM	NM	NM	NM	-165	NM	Low turbidity, odor
WF-02 (2)	8/11/98	0910	NM	NM	NM	NM	-167	NM	Low turbidity, odor
WF-03	8/10/98	0858	6.67	17.3	672	0.05	NM	NM	High turbidity, no odor
WF-03	8/10/98	0905	6.92	14.4	659	0.03	NM	NM	High turbidity, no odor
WF-03	8/10/98	0910	7.00	14.4	650	0.02	NM	NM	High turbidity, no odor
WF-03	8/10/98	0915	7.03	14.4	640	0.03	NM	NM	High turbidity, no odor
WF-03	8/10/98	0920	7.05	14.4	641	0.03	NM	NM	High turbidity, no odor
WF-03	8/10/98	0925	7.08	14.7	646	0.02	NM	NM	Low turbidity, no odor

APPENDIX C (continued)

BUFFALO COLOR
WASTE FILL AREA
GROUNDWATER FIELD MEASUREMENTS
BUFFALO, NEW YORK

Piezometer Location	Date	Time	pH	Temperature (°C)	Conductivity (µs/cm)	Dissolved Oxygen (mg/L)	Redox Potential (MV)	Fe^{+2} (1) (mg/L)	Comments
WF-03	8/10/98	0930	7.09	14.5	637	0.03	NM	NM	Low turbidity, no odor
WF-03	8/10/98	0935	7.10	14.4	639	0.02	NM	NM	Low turbidity, no odor
WF-03	8/10/98	0940	7.11	14.4	636	0.03	NM	NM	Low turbidity, no odor
WF-03	8/10/98	0945	NM	14.5	666	0.03	-142	NM	Low turbidity, no odor
WF-03	8/10/98	0950	NM	14.1	637	0.03	-177	NM	Low turbidity, no odor
WF-03	8/10/98	0955	NM	14.6	635	0.03	-189	NM	Low turbidity, no odor
WF-03	8/10/98	1000	NM	15.5	632	0.03	-195	6.0	Low turbidity, no odor
WF-04	8/7/98	1430	7.28	20.7	237	0.07	NM	NM	High turbidity, odor
WF-04	8/7/98	1435	7.14	15.8	232	0.04	NM	NM	High turbidity, odor
WF-04	8/7/98	1440	7.12	16.0	241	0.03	NM	NM	High turbidity, odor
WF-04	8/7/98	1445	7.11	16.2	244	0.02	NM	NM	Moderate turbidity, odor
WF-04	8/7/98	1450	7.09	16.1	246	0.02	NM	NM	Clear, odor
WF-04	8/7/98	1455	7.09	16.0	246	0.02	NM	NM	Clear, odor
WF-04	8/7/98	1500	7.08	16.2	247	0.02	NM	NM	Clear, odor
WF-04	8/7/98	1505	7.07	16.2	246	0.02	NM	NM	Clear, odor
WF-04	8/7/98	1510	7.08	16.1	247	0.02	NM	6.0	Clear, odor
WF-04	8/11/98	0915	NM	NM	NM	NM	-48	NM	High turbidity, odor
WF-04	8/11/98	0920	NM	NM	NM	NM	-76	NM	High turbidity, odor

APPENDIX C (continued)

BUFFALO COLOR
WASTE FILL AREA
GROUNDWATER FIELD MEASUREMENTS
BUFFALO, NEW YORK

Piezometer Location	Date	Time	pH	Temperature (°C)	Conductivity (µs/cm)	Dissolved Oxygen (mg/L)	Redox Potential (MV)	Fe^{+2} (1) (mg/L)	Comments
WF-04	8/11/98	0925	NM	NM	NM	NM	-84	NM	High turbidity, odor
WF-04	8/11/98	0930	NM	NM	NM	NM	-93	NM	High turbidity, odor
WF-04	8/11/98	0935	NM	NM	NM	NM	-94	NM	High turbidity, odor
WF-05	8/10/98	1120	7.40	20.1	531	1.34	NM	NM	Low turbidity, no odor
WF-05	8/10/98	1125	7.37	15.9	529	1.14	NM	NM	Low turbidity, no odor
WF-05	8/10/98	1130	7.45	15.6	515	1.19	NM	NM	Low turbidity, no odor
WF-05	8/10/98	1135	7.51	15.5	506	1.28	NM	NM	Low turbidity, no odor
WF-05	8/10/98	1140	7.53	15.4	504	1.40	NM	NM	Low turbidity, no odor
WF-05	8/10/98	1145	NM	15.4	504	1.50	-274	NM	Low turbidity, no odor
WF-05	8/10/98	1150	NM	16.3	504	1.58	-292	0.6	Low turbidity, no odor
WF-05	8/10/98	1155	NM	16.9	505	1.60	-293	NM	Low turbidity, no odor
WF-06	8/10/98	1226	7.45	15.7	508	0.12	NM	NM	Clear, no odor
WF-06	8/10/98	1230	7.44	15.5	500	0.10	NM	NM	Clear, no odor
WF-06	8/10/98	1235	7.42	15.1	491	0.15	NM	NM	Clear, no odor
WF-06	8/10/98	1240	7.41	15.0	480	0.19	NM	NM	Clear, no odor
WF-06	8/10/98	1245	NM	15.5	479	0.25	-54	NM	Clear, no odor
WF-06	8/10/98	1250	NM	15.2	480	0.37	-75	NM	Clear, no odor
WF-06	8/10/98	1255	NM	15.1	475	0.38	-78	1.2	Clear, no odor

APPENDIX C (continued)

BUFFALO COLOR
WASTE FILL AREA
GROUNDWATER FIELD MEASUREMENTS
BUFFALO, NEW YORK

Piezometer Location	Date	Time	pH	Temperature (°C)	Conductivity (µs/cm)	Dissolved Oxygen (mg/L)	Redox Potential (MV)	Fe^{+2} (1) (mg/L)	Comments
BG-01	8/7/98	1250	9.68	25.9	53	1.04	NM	NM	Low turbidity, no odor
BG-01	8/7/98	1255	9.57	24.4	70	3.13	NM	NM	Low turbidity, no odor
BG-01	8/7/98	1300	8.96	22.1	92	0.59	NM	NM	Low turbidity, no odor
BG-01	8/7/98	1305	8.06	21.9	108	2.70	NM	NM	Low turbidity, no odor
BG-01	8/7/98	1312	7.72	22.5	123	2.62	NM	2.05	Low turbidity, no odor. Piezometer purged dry.
BG-01	8/11/98	1020	NM	NM	NM	NM	-9	NM	Low turbidity to clear, no odor.
BG-01	8/11/98	1025	NM	NM	NM	NM	-76	NM	Low turbidity to clear, no odor.
BG-01	8/11/98	1030	NM	NM	NM	NM	-60	NM	Low turbidity to clear, no odor.
BG-01	8/11/98	1035	NM	NM	NM	NM	-122	NM	Low turbidity to clear, no odor.
BG-01	8/11/98	1040	NM	NM	NM	NM	-91	NM	Low turbidity to clear, no odor.
BG-01	8/11/98	1045	NM	NM	NM	NM	-108	NM	Low turbidity to clear, no odor. Piezometer purged dry

Notes:

(1) Fe^{+2} - Iron

(2) No temperature readings were collected at WF-02 due to temperature probe problems.

(3) NM - Not measured

(4) Fe^{+2} content in groundwater only measured after purging was completed.

APPENDIX D

APPENDIX D

DATA VALIDATION REPORT

DATA VALIDATION REPORT

Prepared For:

AlliedSignal, Inc.

BUFFALO COLOR - AREA "D" SITE

Prepared By:

PARSONS ENGINEERING SCIENCE, INC.

290 Elwood Davis Road, Suite 312
Liverpool, New York 13088
Phone: (315) 451-9560
Fax: (315) 451-9570

SEPTEMBER 1998

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LIST OF ATTACHMENTS

ATTACHMENT A - VALIDATED LABORATORY DATA

SECTION 1

DATA VALIDATION SUMMARY

Groundwater and soil samples were collected from the Buffalo Color - Area "D" site in Buffalo, New York from August 3, 1998 through August 10, 1998. Analytical results from these samples were validated and reviewed by Parsons Engineering Science, Inc. (Parsons ES) for usability with respect to the following requirements:

- Work Plan,
- NYSDEC Analytical Services Protocol (ASP) dated September 1989 with October 1995 revisions, and
- USEPA Region II Standard Operating Procedures (SOP) in "CLP Organics Data Review and Preliminary Review," SOP No. HW-6, Revision #8, January 1992, and "Evaluation of Metals Data for the CLP Based on SOW 3/90," SOP No. HW-2, Revision #11, January 1992.

The analytical laboratory for this project was O'Brien and Gere Laboratories, Inc. (OB&G). This laboratory is certified by the New York State Department of Health under the Environmental Laboratory Approval Program (ELAP) to perform analyses in accordance with the NYSDEC ASP, dated September 1989 with October 1995 revisions.

1.1 LABORATORY DATA PACKAGES

The laboratory data package turnaround time, defined as the time from sample receipt by the laboratory to receipt of the analytical data packages by Parsons ES, was 15 days on average for groundwater and soil samples.

The data packages received from OB&G were paginated, complete, and overall were of good quality. Comments on specific quality control (QC) and other requirements are discussed in detail in the attached data validation reports which are summarized by sample media in Section 2.

1.2 SAMPLING AND CHAIN-OF-CUSTODY

Groundwater samples were collected, properly preserved, shipped under a chain-of-custody (COC) record, and received at OB&G within one to three days of sampling. Soil samples were collected, properly preserved, shipped under a COC record, and received at OB&G within one to two days of sampling. All samples were received intact and in good condition at OB&G.

1.3 LABORATORY ANALYTICAL METHODS

Groundwater and soil samples were collected from the Buffalo Color site and analyzed for volatile organic compounds (VOCs), semivolatile organic compounds

(SVOCs), pesticides and polychlorinated biphenyls (PCBs), metals, and other parameters. Summaries of issues concerning these laboratory analyses are presented in Subsections 1.3.1 through 1.3.5. The data qualifications resulting from the data validation review and statements on the laboratory analytical precision, accuracy, representativeness, completeness, and comparability (PARCC) are discussed for each analytical method in Section 2. The laboratory data were reviewed and qualified with the following validation flags:

"U" - not detected at the value given,

"UJ" - estimated and not detected at the value given,

"J" - estimated at the value given,

"N" - presumptive evidence at the value given, and

"R" - unusable value.

The validated laboratory data were tabulated and are presented by media in Attachment A.

1.3.1 Volatile Organic Analysis

The groundwater and soil samples collected from the Buffalo Color site were analyzed for target compound list (TCL) VOCs using the NYSDEC ASP 95-1 analytical method. Certain reported results for the TCL VOC samples were qualified as estimated due to noncompliant instrument calibrations. Therefore, the TCL VOC analyses were 100% complete with all data considered usable and valid for the groundwater and soil data presented by OB&G and PARCC requirements were met overall.

1.3.2 Semivolatile Organic Analysis

The groundwater and soil samples collected from the Buffalo Color site were analyzed for TCL SVOCs using the NYSDEC ASP 95-2 analytical method. Certain reported results for the TCL SVOC samples were qualified as estimated due to noncompliant instrument calibrations and internal standard sample responses. Certain reported TCL SVOC soil sample results were considered unusable and qualified "R" due to poor internal standard responses. Therefore, the TCL SVOC analyses were 98.9 to 100% complete for the groundwater and soil data presented by OB&G and PARCC requirements were met overall.

1.3.3 Pesticide/PCB Organic Analysis

The groundwater and soil samples collected from the Buffalo Color site were analyzed for TCL pesticide/PCBs using the NYSDEC ASP 95-3 analytical method. Certain reported results for the TCL pesticide/PCB samples were qualified as estimated due to noncompliant sample result identifications. Therefore, the pesticide/PCB data were considered 100% complete and usable for the groundwater and soil data presented by OB&G and PARCC requirements were met overall.

1.3.4 Metals Analysis

The groundwater and soil samples collected from the Buffalo Color site were analyzed for metals using the NYSDEC ASP CLP-M analytical method. Certain reported results for the metals samples were qualified as estimated due to noncompliant calibrations, matrix spike recoveries, laboratory duplicate precision, and serial dilution. All of the metals data were considered usable and 100% complete for the groundwater and soil data presented by OB&G and PARCC requirements were met overall.

1.3.5 Other Parameters

Certain groundwater samples collected from the Buffalo Color site were analyzed for methane, nitrate, nitrite, nitrate-nitrite, and sulfate, and soil samples were analyzed for pH. All calibrations, laboratory blanks, holding times, matrix spikes, duplicates, and control samples were reviewed for compliance. All soil pH results were considered estimated and qualified "J" due to holding time exceedances for this analytical parameter. Therefore, the miscellansous analytical parameters for these samples were considered usable and 100% complete for the data presented by OB&G and PARCC requirements were met overall.

SECTION 2

DATA VALIDATION REPORTS

2.1 GROUNDWATER

Data review has been completed for data packages generated by OB&G containing groundwater samples collected from the Buffalo Color site. The specific samples contained in these data packages, the analyses performed, and a usability summary are presented in Table 2.1-1. All of these samples were properly preserved, shipped under a COC record, and received intact by the analytical laboratory. The validated laboratory data are presented in Attachment A-1.

Data validation was performed for all samples in accordance with the most current editions of the USEPA Region II SOPs and the NYSDEC ASP for organic and inorganic data review. This data validation and usability report is presented by analysis type.

2.1.1 TCL Volatiles

The following items were reviewed for compliancy in the volatile analysis:

- Custody documentation
- Holding times
- Surrogate recoveries
- Matrix spike/matrix spike duplicate (MS/MSD) precision and accuracy
- Matrix spike blank (MSB) recoveries
- Laboratory method blank and trip blank contamination
- Gas chromatograph/mass spectrometer (GC/MS) instrument performance
- Sample result verification and identification
- Initial and continuing calibrations
- Internal standard area counts and retention times
- Quantitation limits
- Data completeness

These items were considered compliant and acceptable in accordance with the validation protocols with the exception of MS/MSD precision and accuracy.

MS/MSD Precision and Accuracy

MS/MSD analyses were performed for groundwater location WF-03W. All of the spike recoveries (%R; accuracy) and relative percent difference (RPD; precision) results were compliant and within QC limits with the exception of the precision result for chlorobenzene (18%;QC limit 0-13%). Validation qualification was not warranted for the unspiked sample WF-03W as a result of this noncompliance since MS/MSD recoveries were acceptable for chlorobenzene.

Usability

All TCL volatile sample results were considered usable following data validation.

Summary

The quality assurance objectives for measurement data included considerations for precision, accuracy, representativeness, completeness, and comparability. The volatile data presented by OB&G were 100% complete and all volatile data were considered usable and valid. The validated groundwater volatile laboratory data are tabulated and presented in Attachment A-1. This table presents the most representative volatile data for a sample location resulting from validation.

For example, samples WF-05W and WF-06W were reanalyzed at a secondary dilution (WF-05WDL and WF-06WDL, respectively) since the chlorobenzene concentrations exceeded instrument calibration ranges during the original analysis of these samples. Therefore, the validated results from the diluted samples for chlorobenzene were considered compliant and representative of the samples. These results were reported for the samples in the validated laboratory data table presented in Attachment A-1.

2.1.2 TCL Semivolatiles

The following items were reviewed for compliancy in the semivolatile analysis:

- Custody documentation
- Holding times
- Surrogate recoveries
- MS/MSD precision and accuracy
- MSB recoveries
- Laboratory method blank contamination
- GC/MS instrument performance
- Sample result verification and identification
- Initial and continuing calibrations
- Internal standard area counts and retention times
- Quantitation limits
- Data completeness

These items were considered compliant and acceptable in accordance with the validation protocols with the exception of MS/MSD precision and accuracy, MSB recoveries, continuing calibrations, and internal standard responses.

MS/MSD Precision and Accuracy

MS/MSD analyses were performed for groundwater location WF-03W. All of the precision and accuracy results were within QC limits with the exception of the high MS/MSD recoveries for 4-nitrophenol (87% and 84%, respectively; QC limit 10-80%) and pentachlorophenol (132% and 130%, respectively; QC limit 9-103%); and the MS recovery for 4-chloro-3-methylphenol (100%; QC limit 23-97%). Validation qualification was not warranted for the unspiked sample WF-03W due to these noncompliances since these noncompliances appear to be laboratory spiking error which were also evident from the MSB spiking results (see below).

MSB Recoveries

All MSB recoveries were compliant and within QC acceptance limits with the exception of the MSB recoveries for 2,4-dinitrotoluene (100%; QC limit 24-96%), 4-nitrophenol (99%; QC limit 10-80%), and pentachlorophenol (112%; QC limit 9-103%). Validation qualification of the semivolatile groundwater samples was not warranted since these noncompliances may be resulting from laboratory spiking error.

Continuing Calibrations

All continuing calibration compounds were compliant with a minimum relative response factor (RRF) of 0.05 and a maximum percent difference (%D) of ±25% with the exception of the %Ds for hexachlorocyclopentadiene (31% and 36.9%) associated with all groundwater samples and benzo(g,h,i)perylene (-27.3%) associated with samples WF-06W, 06WRE, 04WRE, and 03WDL. The sample results for these noncompliance compounds were considered estimated with positive results qualified "J" and nondetected results qualified "UJ" for the affected samples.

Internal Standard Responses

All internal standard (IS) responses and retention times were within specified QC ranges based on associated calibration standards (i.e., sample's area count within -50% to 100% and retention times within ±0.5 minutes of the standard) with the exception of the ISs summarized in Table 2.1-2 which responded below QC acceptance ranges. Therefore, all sample results for those compounds associated with these noncompliant ISs were considered estimated, possibly biased low, with positive results qualified "J" and nondetected results qualified "UJ" for the affected samples.

Usability

All TCL semivolatile sample results were considered usable following data validation.

Summary

The quality assurance objectives for measurement data included considerations for precision, accuracy, representativeness, completeness, and comparability. The semivolatile data presented by OB&G were 100% complete with all data considered usable and valid. The validated groundwater semivolatile laboratory data are tabulated and presented in Attachment A-1. This table presents the most representative semivolatile data for a sample location resulting from validation.

For example, sample WF-03W was reanalyzed at a secondary dilution (WF-03WDL) since naphthalene and 4-chloroaniline concentrations exceeded instrument calibration ranges during the original analysis of this sample with a noncompliant IS response. Therefore, the validated results from the diluted sample were considered compliant, representative of the sample, and reported for the sample in the validated laboratory data table presented in Attachment A-1.

In addition, samples WF-04W and WF-06W were reanalyzed (WF-04WRE and WF-06WRE, respectively) due to noncompliant internal standard responses during the original analysis. Since results from the reanalyses of these samples confirmed the presence of matrix interferences with similar (or worse) IS responses, sample results from the original analyses were reported for WF-04W and WF-06W in the validated laboratory data table.

2.1.3 TCL Pesticides/PCBs

The following items were reviewed for compliancy in the pesticide/PCB analysis:

- Custody documentation
- Holding times
- Surrogate recoveries
- MS/MSD precision and accuracy
- MSB recoveries
- Laboratory method blank contamination
- Sample result verification and identification
- Initial calibrations
- Resolution check results
- 4,4'-DDT/Endrin breakdown
- Performance evaluation mixtures
- Verification calibrations
- Analytical sequence

- Cleanup efficiency
- Chromatogram quality
- Quantitation limits
- Data completeness

These items were considered compliant and acceptable in accordance with the validation protocols with the exception of surrogate recoveries and sample result identification.

Surrogate Recoveries

Recoveries of sample surrogates were compliant and within QC advisory limits with the exception of the textrachloro-m-xylene recovery for samples WF-02W, 04W, and 05W (188%, 414%, and 162%, respectively; QC limits 30-150%). Validation qualification was not required for these samples since both surrogates on any one column were not outside QC criteria.

Sample Result Identification

All positive sample results were confirmed present using second column confirmation and verified within retention time windows. The percent differences (%D) of the sample concentrations between the primary and confirmation columns were less than 25% with the exception of those %Ds identified in Table 2.1-3. Therefore, the positive results for these compounds for the affected samples were considered estimated and qualified "J" where the %D was greater than 25%, but less than 50%. The positive results for those compounds for the affected samples where the %D was greater than 50% were considered estimated, tentatively identified, and qualified "JN".

Usability

All TCL pesticide/PCB sample results were considered usable following data validation.

Summary

The quality assurance objectives for measurement data included considerations for precision, accuracy, representativeness, completeness, and comparability. The pesticide/ PCB data presented by OB&G were 100% complete and all groundwater pesticide/PCB data were considered usable and valid. The validated data are tabulated and presented in Attachment A-1. This table presents the most representative pesticide/PCB data for a sample location resulting from validation.

For example, sample WF-03W was reanalyzed at a secondary dilution (WF-03WDL) since the heptachlor epoxide concentration exceeded instrument calibration ranges during the original analysis of this sample. Therefore, the validated result from the diluted sample was considered compliant, representative of the sample, and reported for the sample in the validated laboratory data table presented in Attachment A-1.

2.1.4 Metals (Total and Dissolved)

The following items were reviewed for compliancy in the metals analysis:

- Custody documentation
- Holding times
- Initial and continuing calibration verifications
- Initial and continuing calibration, and laboratory preparation blank contamination
- Inductively coupled plasma (ICP) interference check sample (ICS)
- Matrix spike recoveries
- Laboratory duplicate precision
- Laboratory control sample
- ICP serial dilution
- Sample result verification and identification
- Quantitation limits
- Data completeness

These items were considered compliant and acceptable in accordance with the validation protocols with the exception of calibrations and laboratory duplicate precision.

Calibrations

All initial and continuing calibration verifications associated with the groundwater samples were compliant and considered acceptable. All calibration standards were analyzed at the appropriate concentrations and frequency and considered acceptable with the exception of the standards recovered outside the 80-120% criteria for mercury (82.5%) and thallium (132.5%). All results for mercury were considered estimated, possibly biased low, with positive results qualified "J" and nondetected results qualified "UJ" for all samples since recoveries fell below QC limits. Positive results for thallium were considered estimated, possibly biased high, and qualified "J" for all samples since recoveries exceeded QC limits.

Laboratory Duplicate Precision

The laboratory duplicate precision of all of the analytes were compliant with the exception of dissolved thallium associated with all filtered groundwater samples. However, validation qualification was not warranted for these samples due to this noncompliance and sample data were not affected.

Usability

All metals sample results were considered usable following data validation.

Summary

The quality assurance objectives for measurement data included considerations for precision, accuracy, representativeness, completeness, and comparability. The metals data presented by OB&G were 100% complete and all data were considered valid and usable. The validated metals laboratory data are tabulated and presented in Attachment A-1.

2.2 SOIL

Data review has been completed for data packages generated by OB&G containing soil samples collected from the Buffalo Color site. The specific samples contained in these data packages, the analyses performed, and a usability summary are presented in Table 2.2-1. All of these samples were properly preserved, shipped under a COC record, and received intact by the analytical laboratory. The validated laboratory data are presented in Attachment A-2.

Data validation was performed for all samples in accordance with the most current editions of the USEPA Region II SOPs and the NYSDEC ASP for organic and inorganic data review. This data validation and usability report is presented by analysis type.

2.2.1 TCL Volatiles

The following items were reviewed for compliancy in the volatile analysis:

- Custody documentation
- Holding times
- Surrogate recoveries
- MS/MSD precision and accuracy
- MSB recoveries
- Laboratory method blank contamination
- GC/MS instrument performance
- Sample result verification and identification
- Initial and continuing calibrations
- Internal standard area counts and retention times
- Quantitation limits
- Data completeness

These items were considered compliant and acceptable in accordance with the validation protocols with the exception of MS/MSD precision and accuracy, blank contamination, and continuing calibrations.

MS/MSD Precision and Accuracy

MS/MSD analyses were performed for soil locations WF-03S(10-12) and BG-02S(0-1). All of the precision and accuracy results were within QC limits with the exception of the MS/MSD recoveries for benzene (419% and 302%, respectively; QC limit 66-142%) and chlorobenzene (267% and 826%, respectively; QC limit 60-133%), and the precision results for benzene (32%; QC limit 0-21%) and chlorobenzene (102%; QC limit 0-21%) associated with the spiked analyses of WF-03S(10-12). Validation qualification was not warranted for the unspiked sample WF-03S since surrogate recoveries and internal standard responses were compliant with no evidence of matrix interferences.

Blank Contamination

Only one laboratory method blank (VBLK01) associated with soil sample WF-03S(10-12) contained acetone at a concentration of 1 μg/kg. However, the associated sample result was at a concentration (24 μg/kg) greater than the validation action concentration (10 μg/kg) and was considered acceptable and reported unqualified.

Continuing Calibrations

All continuing calibration compounds were complaint with a minimum RRF of 0.05 and a maximum percent difference (%D) of ± 25% with the exception of the %Ds for acetone (-33.4%), 2-butanone (-42.2%), and 2-hexanone (-28.3%) associated with samples BG-01S(0-1), BG-02S(0-1), and WF-05S(6-8). The sample results for these non-compliant compounds were considered estimated with positive results qualified "J" and nondetected results qualified "UJ" for the affected samples.

Usability

All TCL volatile sample results were considered usable following data validation.

Summary

The quality assurance objectives for measurement data included considerations for precision, accuracy, representativeness, completeness and comparability. The TCL volatile data presented by OB&G were 100% complete with all TCL volatile data considered usable and valid. The validated soil TCL volatile laboratory data are tabulated and presented in Attachment A-2.

2.2.2 TCL Semivolatiles

The following items were reviewed for compliancy in the semivolatile analysis:

- Custody documentation
- Holding times
- Surrogate recoveries
- MS/MSD precision and accuracy
- MSB recoveries
- Laboratory method blank contamination
- GC/MS instrument performance
- Sample result verification and identification
- Initial and continuing calibrations
- Internal standard area counts and retention times
- Quantitation limits
- Data completeness

These items were considered compliant and acceptable in accordance with the validation protocols with the exception of surrogate recoveries, MS/MSD precision and accuracy, MSB recoveries, blank contamination, continuing calibrations, and internal standard responses.

Surrogate Recoveries

All semivolatile sample surrogate recoveries were compliant and within QC acceptance limits with the exception of the recovery for the semivolatile surrogate terphenyl-d14 (QC limit 18-137%) in samples BG-02S(0-1) (140%), BG-01S(144%), BG-02S(0-1)RE (146%), and WF-03S(6-14) (157%). Validation qualification was not warranted since only one surrogate was noncompliant for these samples.

MS/MSD Precision and Accuracy

All of the MS/MSD precision results (RPD) and accuracy results (%R) were within the QC limits with the exception of the MS/MSD recoveries for pyrene (151% and 164%, respectively; QC limit 35-142%), and the MSD recovery for 2,4-dinitrotoluene (90%; QC limit 28-89%) associated with the spiked analyses of sample WF-03S(6-14). Validation qualification was not warranted for the unspiked sample WF-03S(6-14) due to these noncompliances because pyrene and 2,4-dinitrotoluene were detected at large concentrations in the unspiked sample thereby masking the spiked compounds.

MSB Recoveries

All MSB recoveries were compliant and within QC acceptance limits with the exception of the MSB recoveries for 4-nitrophenol for both MSBs (99% and 96%; QC limit 10-80%). Validation qualification of the semivolatile soil samples was not warranted since these noncompliances may be resulting from laboratory spiking error.

Blank Contamination

One laboratory method blank (SBLK02) associated with soil samples BG-01S(0-1), BG-02S(0-1), BG-01S(0-1)RE, BG-02S(0-1)RE, WF-02S(6-16), and WF-02S(6-16)RE contained di-n-butylphthalate at a concentration of 130 µg/kg. Therefore, all associated sample results with concentrations greater than the validation action concentration were acceptable and reported unqualified. However, all associated sample results with concentrations less than the validation action concentration were considered not detected and qualified "U". As a result, the presence of contaminants in this blank may be indicative of semivolatile sample contamination from the laboratory.

Continuing Calibrations

All continuing calibration compounds were compliant with a minimum RRF of 0.05 and a maximum %D of ± 25% with the exception of those compounds summarized in Table 2.2-2 which were outside the ± 25% QC limit. The sample results for these noncompliant compounds were considered estimated with positive results qualified "J" and nondetected results qualified "UJ" for the affected samples.

Internal Standards

All internal standard (IS) responses and retention times were within specified QC ranges based on associated calibration standards (i.e., sample's area count within -50% to +100% and retention times within ±0.5 minutes of the standard) with the exception of the ISs summarized in Table 2.2-3 which fell below QC acceptance ranges. Therefore, sample results were considered estimated, possibly biased low, with positive results qualified "J" and nondetected results qualified “UJ”. The nondetected results for those compounds associated with IS5 and IS6 for samples BG-01S(0-1) and BG-01S(0-1)RE and with IS6 for samples WF-03S(6-14), WF-04S(2-14) and BG-02S(0-1) were considered unusable and qualified “R” due to extremely low responses for these ISs.

Usability

All TCL semivolatile sample results were considered usable following data validation with the exception of those nondetected compounds associated with the extremely low ISs in samples BG-01S(0-1), BG-01S(0-1)RE, WF-03S(6-14), WF-04S(2-14), and BG-02S(0-1).

Summary

The quality assurance objectives for measurement data included considerations for precision, accuracy, representativeness, completeness and comparability. The TCL semivolatile presented by OB&G were 98.9% complete. The validated soil TCL semivolatile laboratory data are tabulated and presented in Attachment A-2. This table presents the most representative TCL semivolatile data for a sample location resulting from validation.

For example, many samples were reextracted and/or diluted due to noncompliant internal standard responses and/or sample concentrations exceeding instrument calibration ranges during the original analysis of these samples. Matrix effects were confirmed for these samples since the reanalyzed samples also experienced noncompliant IS responses. Therefore, results from the diluted/reanalyzed and/or original sample analysis were reported in the validated laboratory data table in Attachment A-2 depending upon which analytical result was representative for the sample.

2.2.3 TCL Pesticides/PCBs

The following items were reviewed for compliancy in the pesticide/PCB analysis:

- Custody documentation
- Holding times
- Surrogate recoveries
- MS/MSD precision and accuracy
- MSB recoveries
- Laboratory method blank contamination
- Sample result verification and identification
- Initial calibrations
- Resolution check results
- 4,4-DDT/endrin breakdown
- Performance evaluation mixtures
- Verification calibrations
- Analytical sequence
- Cleanup efficiency
- Chromatogram quality
- Quantitation limits
- Data completeness

These items were considered compliant and acceptable in accordance with the validation protocols with the exception of surrogate recoveries, MS/MSD precision and accuracy, blank contamination, and sample result identification.

Surrogate Recoveries

Recoveries of sample surrogates were compliant and within QC advisory limits with the exception of decachlorobiphenyl recovery (QC limit 30-150%) for sample BG-01S(0-1) (208%). Validation qualification was not required for this sample due to only one noncompliant surrogate on any one column.

MS/MSD Precision and Accuracy

All of the RPDs and spike recoveries were within QC limits with the exception of no MS/MSD recoveries for gamma-BHC, heptachlor, endrin, and 4,4-DDT during the spiked analyses of WF-03S(6-14). Validation qualification was not warranted for the unspiked sample WF-03S due to these noncompliances since QC limits are advisory only.

Blank Contamination

The laboratory method blank (PBLK01) associated with all soil samples contained gamma-BHC, alpha-chlordane, and gamma-chlordane at concentrations of 0.02, 0.08, and 0.14 µg/kg. Therefore, all associated sample results with concentrations greater than the validation action concentration were acceptable and reported unqualified. However, all associated sample results with concentrations less than the validation action concentration were considered not detected and qualified "U". As a result, the presence of contaminants in this blank may be indicative of pesticide sample contamination from the laboratory.

Sample Result Identification

All positive sample results were confirmed present using second column confirmation and verified within retention time windows. The percent differences (%D) of the sample concentrations between the primary and confirmation columns were less than 25% with the exception of those %Ds identified in Table 2.2-4. Therefore, the positive results for these compounds for the affected samples were considered estimated and qualified "J" where the %D was greater than 25%, but less than 50%. The positive results for those compounds for the affected samples where the %D was greater than 50% were considered estimated, tentatively identified, and qualified "JN".

Usability

All TCL pesticide/PCB sample results were considered usable following data validation.

Summary

The quality assurance objectives for measurement data included considerations for precision, accuracy, representativeness, completeness, and comparability. The soil pesticide/PCB data presented by OB&G were 100% complete with all data considered usable and valid. The validated data were tabulated and presented in Attachment A-2.

It was noted that all samples were initially analyzed at a dilution and reanalyzed with no dilution to confirm matrix interferences. The diluted results for all samples were reported in the validated laboratory data table.

2.2.4 Metals

The following items were reviewed for compliancy in the metals analysis:

- Custody documentation
- Holding times
- Initial and continuing calibration verifications
- Initial and continuing calibration, laboratory preparation, and field blank contamination
- Inductively coupled plasma (ICP) interference check sample (ICS)
- Matrix spike recoveries
- Laboratory duplicate precision
- Laboratory control sample
- ICP serial dilution
- Sample result verification and identification
- Quantitation limits
- Data completeness

These items were considered compliant and acceptable in accordance with the validation protocols with the exception of calibration standard recoveries, matrix spike recoveries, laboratory duplicate precision, and ICP serial dilution.

Calibrations

All calibration standards were analyzed at the appropriate concentrations and frequency and considered acceptable with the exception of the standards which were recovered outside the 80-120% criteria for manganese (134.9%) associated with samples BG-01S(0-1), BG-02S(0-1), WF-05S(4-11), and WF-06S(3.5-8); and mercury associated with samples BG-01S(0-1), BG-02S(0-1), and WF-05S(4-11). Positive sample results for manganese were considered estimated, possibly biased high, and qualified "J" for the affected samples since the recovery exceeded 120%. All results for mercury for the affected samples were considered estimated, possibly biased low, with positive results qualified "J" and nondetected results qualified "UJ" since the recovery fell below 80%.

Matrix Spike Recoveries

All the MS recoveries were within the 75-125% control limits and have concentrations less than four times the spiking concentration with the exception of the recoveries for antimony (55.9%) associated with all soil samples. All sample results for antimony were considered estimated possibly biased low, with positive results qualified "J" and nondetected results qualified "UJ" since the recovery fell below the QC limit.

Laboratory Duplicate Precision

The precision of all of the analytes were compliant with the exception of aluminum, arsenic, cadmium, nickel, and zinc associated with all soil samples. Validation qualification was not warranted for these analytes for the affected samples with the exception of cadmium. Therefore, the cadmium results for the affected samples were considered estimated with positive results qualified "J" and nondetected results qualified "UJ".

ICP Serial Dilution

QC serial dilution results for target metals were compliant except for cadmium, nickel, and vanadium associated with all soil samples. Therefore, positive results greater than ten times the instrument detection limit for the affected metal for these samples were considered estimated and qualified "J".

Usability

All metals sample results were considered usable following data validation.

Summary

The quality assurance objectives for measurement data included considerations for precision, accuracy, representativeness, completeness, and comparability. The metals data presented by OB&G were 100% complete and all metals data were considered valid and usable. The validated soil metals laboratory data are tabulated and presented in Attachment A-2.

TABLE 2.1-1

SUMMARY OF SAMPLE ANALYSES AND USABILITY

GROUNDWATER - BUFFALO COLOR

SAMPLE ID	MATRIX	SAMPLE DATE	TCL VOC	TCL SVOC	TCL PESTICIDE/PCB	METALS(1)	OTHER (2)
WF-02W	Water	08/07/98	OK	OK	OK	OK	OK
BG-01W	Water	08/07/98	OK	OK	OK	OK	OK
WF-04W	Water	08/07/98	OK	OK	OK	OK	OK
TRIP BLANK	Water	08/07/98	OK				
WF-03W	Water	08/10/98	OK	OK	OK	OK	OK
WF-05W	Water	08/10/98	OK	OK	OK	OK	
WF-06W	Water	08/10/98	OK	OK	OK	OK	
TRIP BLANK	Water	08/10/98	OK				
TOTAL SAMPLES:			8	6	6	6	4

NOTES:
OK - Sample analysis considered valid and usable.
(1) - Sample analysis includes total and dissolved metals.
(2) - Sample analysis includes methane, nitrate, nitrite, nitrate-nitrite, and sulfate

TABLE 2.1-2

TCL SEMIVOLATILE INTERNAL STANDARD (IS) OUTLIERS

GROUNDWATER - BUFFALO COLOR

Sample ID	IS 1 Area	IS 2 Area	IS 3 Area	IS 4 Area	IS 5 Area	IS 6 Area
WF-04W	*	*	*	*	*	68196
WF-04WRE	*	*	*	*	77241	43181
WF-03W	*	*	*	*	*	45694
WF-06W	*	*	*	*	*	66056
WF-06WRE	*	*	*	*	71983	45156

INTERNAL STANDARD	**QC LIMITS**
IS1 = 1,4-Dichlorobenzene-d4	
IS2 = Naphthalene-d8	
IS3 = Acenaphthene-d10	
IS4 = Phenanthrene-d10	
IS5 =Chrysene-d12	84930-339720 for WF-04WRE and WF-06WRE
IS6 = Perylene-d12	73251-293002 for WF-04W and WF-03W 81403-324612 for WF-04WRE, WF-06W, and WF-06WRE

NOTES: * - Internal standard response within QC limits.

TABLE 2.1-3

TCL PESTICIDE/PCB SAMPLE IDENTIFICATION OUTLIERS

GROUNDWATER - BUFFALO COLOR

SAMPLE ID	COMPOUND	%D
WF-03WDL	delta-BHC	161
	Aldrin	469
	Dieldrin	850
	4,4'-DDD	225
	4,4'-DDT	1150
	Endrin Aldehyde	1074
	Methoxychlor	27
WF-02W	Alpha-BHC	76
	Aldrin	85
	Endosulfan Sulfate	26
	Endrin Ketone	797
BG-01W	Aldrin	2694
	Endrin	156
	Endosulfan II	109
	Endrin Aldehyde	37
	Endosulfan Sulfate	1162
WF-04W	Aldrin	46
	Heptachlor epoxide	90
	alpha-Chlordane	622
	Dieldrin	310
	4,4'-DDT	29
	Endosulfan Sulfate	625
	Endrin Ketone	60
WF-03W	Alpha-BHC	108
	Aldrin	417
	Dieldrin	251
	4,4'-DDD	177
	4,4'-DDT	379
	Endrin Ketone	5138
WF-05W	Heptachlor Epoxide	100
	gamma-Chlordane	567
	Endosulfan II	200
WF-06W	gamma-BHC (Lindane)	1233
	delta-BHC	422
	Aldrin	52
	Endrin	678
	Ensodulfan II	29
	4,4'-DDT	153

NOTES: %D = Percent difference.

TABLE 2.2-1

SUMMARY OF SAMPLE ANALYSES AND USABILITY

SOIL - BUFFALO COLOR

SAMPLE ID	MATRIX	SAMPLE DATE	TCL VOCs	TCL SVOCs	TCL PESTICIDES/PCBs	METALS	OTHER$^{(1)}$	FOOTNOTES
WF-02S(12-14)	Soil	8/3/98	OK					
WF-02S(6-16)	Soil	8/3/98		OK	OK	OK	OK	
WF-03S(10-12)	Soil	8/4/98	OK					
WF-03S(6-14)	Soil	8/4/98		NO	OK	OK	OK	1
WF-04S(8-10)	Soil	8/5/98	OK					
WF-04S(2-14)	Soil	8/5/98		NO	OK	OK	OK	2
WF-05S(6-8)	Soil	8/5/98	OK					
WF-05S(4-11)	Soil	8/5/98		OK	OK	OK	OK	
WF-06S(2-4)	Soil	8/5/98	OK					
WF-06S(3.5-8)	Soil	8/5/98		OK	OK	OK	OK	
BG-01S(0-1)	Soil	8/6/98	OK	NO	OK	OK		1
BG-02S(0-1)	Soil	8/6/98	OK	NO	OK	OK		2
	TOTAL SAMPLES:		7	7	7	7	5	

NOTES: (1) - Sample analysis includes pH.

OK - Sample analysis considered valid and usable.

NO - Sample analysis has noncompliance(s) resulting in unusable data. See appropriate footnote.

FOOTNOTES: 1 - Poor semivolatile internal standard responses.

2 - Poor semivolatile internal standard responses. Reanalysis considered OK.

TABLE 2.2-2
TCL SEMIVOLATILE CONTINIUNG CALIBRATION OUTLIERS

SOIL - BUFFALO COLOR

CONTINUING CALIBRATION DATE - TIME	FILE ID	COMPOUND	%D	AFFECTED SAMPLES
8/12/98-12:17	E2443	2,4-Dinitrophenol	-29.2	WF-03S(6-14), WF-04S(2-14), WF-05S(4-11), WF-06S(3.5-8), BG-01S(0-1), BG-02S(0-1)
8/13/98-13:33	E2463	Hexachlorocyclopentadiene	31.0	WF-02S(6-16), WF-04S(2-14)RE, WF-05S(4-11)RE, WF-06S(3.5-8)RE, BG-01S(0-1)RE, BG-02S(0-1)RE
8/14/98-08:37	E2483	Hexachlorocyclopentadiene Benzo(g,h,i)perylene	36.9 -27.3	WF-06S(3.5-8)DL, WF-02S(6-16)RE

NOTES: %D = Percent Difference.

TABLE 2.2-3

TCL SEMIVOLATILE INTERNAL STANDARD (IS) OUTLIERS

SOIL - BUFFALO COLOR

Sample ID	IS 1 Area	IS 2 Area	IS 3 Area	IS 4 Area	IS 5 Area	IS 6 Area
WF-03S(6-14)	*	*	*	*	*	47989
WF-04S(2-14)	*	*	*	*	87055	39458
WF-05S(4-11)	*	*	*	*	*	77680
WF-06S(3.5-8)	*	*	*	*	*	54165
BG-02S(0-1)	*	*	*	*	98602	44561
BG-01S(0-1)	*	*	*	137429	35316	27748
WF-02S(6-16)	*	*	*	*	*	63547
WF-04S(2-14)RE	*	*	*	*	80045	46071
WF-05S(4-11)RE	*	*	*	*	*	56495
WF-06S(3.5-8)RE	*	*	*	*	*	54863
BG-02S(0-1)RE	*	*	*	*	72464	40065
BG-01S(0-1)RE	*	*	*	95887	35780	29839
WF-06S(3.5-8)DL	*	*	*	*	*	80482
WF-02S(6-16)RE	*	*	*	*	67252	46301

INTERNAL STANDARD	QC LIMITS
IS1 = 1,4-Dichlorobenzene-d4	
IS2 = Naphthalene-d8	
IS3 = Acenaphthene-d10	
IS4 = Phenanthrene-d10	144387-577548 for BG-01S(0-1), 127925-511698 for BG-01S(0-1)RE
IS5 = Chrysene-d12	105303-421210 for BG-01S(0-1), BG-02S(0-1), and WF-04S(2-14) 84187-336746 for BG-01S(0-1)RE, BG-02S(0-1)RE, and WF-04S(2-14)RE 84930-339720 for WF-02S(6-16)RE
IS6 = Perylene-d12	97873-391490 for BG-01S(0-1), BG-02S(0-1), WF-03S(6-14), WF-04S(2-14), WF-05S(4-11), and WF-06S(3.5-8) 73251-293002 for WF-02S(6-16), WF-04S(2-14)RE, WF-05S(4-11)RE, WF-06S(3.5-8)RE, BG-01S(0-1)RE, and BG-02S(0-1)RE 81403-325612 for WF-06S(3.5-8)DL and WF-02S(6-16)RE

NOTES: * - Internal standard response within QC limits.

TABLE 2.2-4

TCL PESTICIDE/PCB SAMPLE IDENTIFICATION OUTLIERS

SOIL - BUFFALO COLOR

SAMPLE ID	COMPOUND	%D[(1)]
WF-02S(12-14)DL	beta-BHC	323
	Alpha-Chlordane	1282
	Endrin	141
	Endosulfan II	467
	Methoxychlor	408
	Endrin ketone	757
WF-02S(12-14)	beta-BHC	248
	Heptachlor	31
	delta-BHC	158
	Heptachlor Epoxide	861
	Endrin	40
	Endosulfan II	453
	Methoxychlor	357
	Endrin ketone	746
WF-03S(6-14)DL	Heptachlor	1186
	Dieldrin	1163
	4,4'-DDD	42
	Endosulfan II	7253
	Endosulfan Sulfate	841
	Methoxychlor	820
WF-03S(6-14)	alpha-BHC	1742
	beta-BHC	227
	Heptachlor	153
	delta-BHC	280
	Dieldrin	744
	Endrin	38
	4,4'-DDD	64
	Endosulfan II	90809
	Endosulfan Sulfate	900
	Methoxychlor	820

TABLE 2.2-4 (CONTINUED)

TCL PESTICIDE/PCB SAMPLE IDENTIFICATION OUTLIERS

SOIL - BUFFALO COLOR

SAMPLE ID	COMPOUND	%D[1]
WF-04S(2-14)DL	Heptachlor Epoxide	35
	Endrin	26
	Endosulfan Sulfate	475
WF-04S(2-14)	alpha-BHC	1090
	Helpthachlor Epoxide	26
	Endrin	47
	Endosulfan II	1588
	Endosulfan Sulfate	243
WF-05S(4-11)DL	Heptachlor Epoxide	211
	Endosulfan I	33
	Endrin	945
	4,4'-DDD	580
	Endosulfan II	1900
	Ensosulfan Sulfate	1452
WF-05S(4-11)	delta-BHC	678
	Heptachlor Epoxide	29
	Dieldrin	2200
	Endrin	500
	4,4'-DDD	48
	Endosulfan II	1127
WF-06S(3.5-8)DL	Aldrin	373
	Dieldrin	1400
	4,4'-DDD	106
	Endosulfan II	67
	Methoxychlor	56
WF-06S(3.5-8)	alpha-BHC	729
	Heptachlor	33
	Aldrin	33
	Dieldrin	653
	4,4'-DDD	109
	Endosulfan II	455
	Methoxychlor	67

TABLE 2.2-4 (CONTINUED)

TCL PESTICIDE/PCB SAMPLE IDENTIFICATION OUTLIERS

SOIL - BUFFALO COLOR

SAMPLE ID	COMPOUND	%D(1)
BG-02S(0-1)DL	Heptachlor Epoxide	445
	4,4'-DDE	878
	Dieldrin	3996
BG-02S(0-1)	beta-BHC	440
	Aldrin	261
	Heptachlor Epoxide	44
	gamma-Chlordane	67
	Dieldrin	498
	Endrin	339
	4,4'-DDD	97
	Endosulfan Sulfate	39
	Endrin Ketone	123
BG-01S(0-1)DL	Hepthachlor Epoxide	208
	gamma-Chlordane	114
	4,4'-DDE	43
	4,4'-DDD	1991
	Endosulfan Sulfate	177
BG-01S(0-1)	alpha-BHC	38
	delta-BHC	700
	Aldrin	3650
	Heptachlor Epoxide	75
	gamma-Chlordane	56
	4,4'-DDE	31
	Dieldrin	1204
	Endrin	100
	4,4'-DDD	73
	Endosulfan II	400
	4,4'-DDT	338
	Endosulfan Sulfate	212

NOTES: (1) - Percent difference.

ATTACHMENT A

VALIDATED LABORATORY DATA

ATTACHMENT A-1

VALIDATED LABORATORY DATA FOR GROUNDWATER

AlliedSignal, Inc.		SAMPLE ID:	BG-01W	WF-02W	WF-03W	WF-04W	WF-05W
Buffalo Color Area D Site		LAB ID:	J3617/J3623/J3628	J3616/J3622/J3627	J3771/J3773/J3778	J3618/J3624/J3629	J3774/J3779
Validated Water Sample Data		SOURCE:	OB&G	OB&G	OB&G	OB&G	OB&G
SDG: 8757/8780		SDG:	8757/8780	8757/8780	8757/8780	8757/8780	8757/8780
		MATRIX:	Water	Water	Water	Water	Water
		SAMPLED:	8/7/98	8/7/98	8/10/98	8/7/98	8/10/98
		VALIDATED:	9/4/98	9/4/98	9/4/98	9/4/98	9/4/98
CAS NO.	COMPOUND	UNITS:					
	VOLATILES						
74-87-3	Chloromethane	ug/L	10 U	10 U	10 U	10 U	10 U
74-83-9	Bromomethane	ug/L	10 U	10 U	10 U	10 U	10 U
75-01-4	Vinyl chloride	ug/L	10 U	10 U	10 U	10 U	10 U
75-00-3	Chloroethane	ug/L	10 U	10 U	10 U	10 U	10 U
75-09-2	Methylene chloride	ug/L	10 U	10 U	10 U	10 U	10 U
67-64-1	Acetone	ug/L	10	5 J	3 J	3 J	10 U
75-15-0	Carbon disulfide	ug/L	10 U	10 U	10 U	10 U	10 U
75-35-4	1,1-Dichloroethene	ug/L	10 U	10 U	10 U	10 U	10 U
75-35-3	1,1-Dichloroethane	ug/L	10 U	10 U	10 U	10 U	10 U
540-59-0	1,2-Dichloroethene (total)	ug/L	10 U	10 U	10 U	10 U	10 U
67-66-3	Chloroform	ug/L	10 U	10 U	10 U	10 U	10 U
107-06-2	1,2-Dichloroethane	ug/L	10 U	10 U	10 U	10 U	10 U
78-93-3	2-Butanone	ug/L	5 J	2 J	10 U	10 U	10 U
71-55-6	1,1,1-Trichloroethane	ug/L	10 U	10 U	10 U	10 U	10 U
56-23-5	Carbon tetrachloride	ug/L	10 U	10 U	10 U	10 U	10 U
75-27-4	Bromodichloromethane	ug/L	10 U	10 U	10 U	10 U	10 U
78-87-5	1,2-Dichloropropane	ug/L	10 U	10 U	10 U	10 U	10 U
10061-01-	cis-1,3-Dichloropropene	ug/L	10 U	10 U	10 U	10 U	10 U
79-01-6	Trichloroethene	ug/L	10 U	10 U	10 U	10 U	10 U
71-43-2	Benzene	ug/L	12	49	68	12	11
124-48-1	Dibromochloromethane	ug/L	10 U	10 U	10 U	10 U	10 U
10061-02-	*trans*-1,3-Dichloropropene	ug/L	10 U	10 U	10 U	10 U	10 U
79-00-5	1,1,2-Trichloroethane	ug/L	10 U	10 U	10 U	10 U	10 U
75-25-2	Bromoform	ug/L	10 U	10 U	10 U	10 U	10 U
108-10-1	4-Methyl-2-pentanone	ug/L	10 U	10 U	10 U	10 U	10 U
591-78-6	2-Hexanone	ug/L	10 U	10 U	10 U	10 U	10 U
127-18-4	Tetrachloroethene	ug/L	10 U	10 U	10 U	10 U	10 U
79-34-5	1,1,2,2-Tetrachloroethane	ug/L	10 U	10 U	10 U	10 U	10 U
108-88-3	Toluene	ug/L	10 U	5 J	10 U	10 U	10 U
108-90-7	Chlorobenzene	ug/L	57	22	130	67	220
100-41-4	Ethylbenzene	ug/L	10 U	10 U	10 U	10 U	10 U
100-42-5	Styrene	ug/L	10 U	10 U	10 U	10 U	10 U
1330-20-7	Xylene (total)	ug/L	10 U	9 J	10 U	10 U	11

AlliedSignal, Inc.
Buffalo Color Area D Site
Validated Water Sample Data
SDG: 8757/8780

		SAMPLE ID:	BG-01W	WF-02W	WF-03W	WF-04W	WF-05W
		LAB ID:	J3617/J3623/J3628	J3616/J3622/J3627	J3771/J3773/J3778	J3618/J3624/J3629	J3774/J3779
		SOURCE:	OB&G	OB&G	OB&G	OB&G	OB&G
		SDG:	8757/8780	8757/8780	8757/8780	8757/8780	8757/8780
		MATRIX:	Water	Water	Water	Water	Water
		SAMPLED:	8/7/98	8/7/98	8/10/98	8/7/98	8/10/98
		VALIDATED:	9/4/98	9/4/98	9/4/98	9/4/98	9/4/98
CAS NO.	COMPOUND	UNITS:					
	SEMIVOLATILES						
111-44-4	bis(2-Chloroethyl)ether	ug/L	11 U	11 U	10 U	10 U	10 U
108-95-2	Phenol	ug/L	3 J	4 J	2 J	4 J	10 U
95-57-8	2-Chlorophenol	ug/L	2 J	11 U	10 U	10 U	10 U
541-73-1	1,3-Dichlorobenzene	ug/L	2 J	11 U	3 J	10 U	10 U
106-46-7	1,4-Dichlorobenzene	ug/L	13	11 U	3 J	9 J	10 U
95-50-1	1,2-Dichlorobenzene	ug/L	11 U	11 U	10 J	35	10 U
108-60-1	2,2'-oxybis(1-Chloropropane)	ug/L	11 U	11 U	10 U	10 U	10 U
95-48-7	2-Methylphenol	ug/L	11	11 U	10 U	10 U	10 U
67-72-1	Hexachloroethane	ug/L	11 U	11 U	10 U	10 U	10 U
621-64-7	N-Nitroso-di-n-propylamine	ug/L	11 U	11 U	10 U	10 U	10 U
106-44-5	4-Methylphenol	ug/L	3 J	11 U	1 J	1 J	2 J
98-95-3	Nitrobenzene	ug/L	11 U	11 U	10 U	10 U	10 U
78-59-1	Isophorone	ug/L	11 U	11 U	10 U	10 U	10 U
88-75-5	2-Nitrophenol	ug/L	11 U	11 U	10 U	10 U	10 U
105-67-9	2,4-Dimethylphenol	ug/L	6 J	15	10 U	10 U	4 J
111-91-1	bis(2-Chloroethoxy)methane	ug/L	11 U	11 U	10 U	10 U	10 U
120-83-2	2,4-Dichlorophenol	ug/L	11 U	11 U	10 U	10 U	10 U
120-82-1	1,2,4-Trichlorobenzene	ug/L	11 U	11 U	1 J	10 U	10 U
91-20-3	Naphthalene	ug/L	2 J	44	190	10	3 J
106-47-8	4-Chloroaniline	ug/L	11 U	72	110	33	22
87-68-3	Hexachlorobutadiene	ug/L	11 U	11 U	10 U	10 U	10 U
59-50-7	4-Chloro-3-methylphenol	ug/L	11 U	11 U	10 U	10 U	10 U
91-57-6	2-Methylnaphthalene	ug/L	8 J	4 J	10 U	10 U	10 U
77-47-4	Hexachlorocyclopentadiene	ug/L	11 UJ	11 UJ	10 UJ	10 UJ	10 UJ
88-06-2	2,4,6-Trichlorophenol	ug/L	11 U	11 U	10 U	10 U	10 U
95-95-4	2,4,5-Trichlorophenol	ug/L	27 U	26 U	25 U	25 U	26 U
91-58-7	2-Chloronaphthalene	ug/L	11 U	11 U	10 U	10 U	2 J
88-74-4	2-Nitroaniline	ug/L	27 U	26 U	25 U	25 U	26 U
208-96-8	Acenaphthylene	ug/L	11 U	11 U	10 U	10 U	10 U
131-11-3	Dimethyl phthalate	ug/L	11 U	11 U	10 U	10 U	10 U
606-20-2	2,6-Dinitrotoluene	ug/L	11 U	11 U	10 U	10 U	10 U
83-32-9	Acenaphthene	ug/L	2 J	3 J	1 J	10 U	10 U
99-09-2	3-Nitroaniline	ug/L	27 U	26 U	25 U	2 J	26 U
51-28-5	2,4-Dinitrophenol	ug/L	27 U	26 U	25 U	25 U	26 U
132-64-9	Dibenzofuran	ug/L	11 U	2 J	1 J	10 U	10 U
121-14-2	2,4-Dinitrotoluene	ug/L	11 U	11 U	10 U	2 J	10 U
100-02-7	4-Nitrophenol	ug/L	27 U	26 U	25 U	25 U	26 U
86-73-7	Fluorene	ug/L	11 U	3 J	2 J	7 J	10 U
7005-72-3	4-Chlorophenyl phenyl ether	ug/L	11 U	11 U	10 U	10 U	10 U
84-66-2	Diethyl phthalate	ug/L	11 U	11 U	10 U	10 U	10 U
100-01-6	4-Nitroaniline	ug/L	27 U	26 U	25 U	25 U	26 U
534-52-1	4,6-Dinitro-2-methylphenol	ug/L	27 U	26 U	25 U	25 U	26 U
86-30-6	N-Nitrosodiphenylamine	ug/L	6 J	76	37	12	10 U
101-55-3	4-Bromophenyl phenyl ether	ug/L	11 U	11 U	10 U	10 U	10 U
118-74-1	Hexachlorobenzene	ug/L	11 U	11 U	10 U	10 U	10 U
87-86-5	Pentachlorophenol	ug/L	27 U	26 U	25 U	25 U	26 U
85-01-8	Phenanthrene	ug/L	3 J	3 J	2 J	10 U	10 U
120-12-7	Anthracene	ug/L	11 U	11 U	10 U	10 U	10 U
84-74-2	Di-n-butyl phthalate	ug/L	11 U	11 U	10 U	10 U	10 U
86-74-8	Carbazole	ug/L	1 J	5 J	2 J	10 U	10 U
206-44-0	Fluoranthene	ug/L	11 U	1 J	2 J	10 U	10 U
129-00-0	Pyrene	ug/L	11 U	11 U	2 J	10 U	10 U
85-68-7	Butyl benzyl phthalate	ug/L	11 U	11 U	10 U	10 U	10 U
91-94-1	3,3'-Dichlorobenzidine	ug/L	11 U	11 U	10 U	10 U	10 U
56-55-3	Benzo[a]anthracene	ug/L	11 U	11 U	10 U	10 U	10 U
218-01-9	Chrysene	ug/L	11 U	11 U	2 J	10 U	10 U
117-81-7	bis(2-Ethylhexyl)phthalate	ug/L	11 U	11	2 J	4 J	10 U
117-84-0	Di-n-octyl phthalate	ug/L	11 U	11 U	30 U	10 UJ	10 U
205-99-2	Benzo[b]fluoranthene	ug/L	11 U	11 U	30 U	10 UJ	10 U
207-08-9	Benzo[k]fluoranthene	ug/L	11 U	11 U	30 U	10 UJ	10 U
50-32-8	Benzo[a]pyrene	ug/L	11 U	11 U	30 U	10 UJ	10 U
193-39-5	Indeno[1,2,3-cd]pyrene	ug/L	11 U	11 U	30 U	10 UJ	10 U
53-70-3	Dibenz[a,h]anthracene	ug/L	11 U	11 U	30 U	10 UJ	10 U
191-24-2	Benzo[g,h,i]perylene	ug/L	11 U	11 U	30 UJ	10 UJ	10 U

AlliedSignal, Inc.
Buffalo Color Area D Site
Validated Water Sample Data
SDG: 8757/8780

		SAMPLE ID:	BG-01W	WF-02W	WF-03W	WF-04W	WF-05W
		LAB ID:	J3617/J3623/J3628	J3616/J3622/J3627	J3771/J3773/J3778	J3618/J3624/J3629	J3774/J3779
		SOURCE:	OB&G	OB&G	OB&G	OB&G	OB&G
		SDG:	8757/8780	8757/8780	8757/8780	8757/8780	8757/8780
		MATRIX:	Water	Water	Water	Water	Water
		SAMPLED:	8/7/98	8/7/98	8/10/98	8/7/98	8/10/98
		VALIDATED:	9/4/98	9/4/98	9/4/98	9/4/98	9/4/98
CAS NO.	COMPOUND	UNITS:					
	PESTICIDES/PCBs						
319-84-6	alpha-BHC	ug/L	0.051 U	0.017 J	0.0037 JN	0.052 U	0.051 U
319-95-7	beta-BHC	ug/L	0.051 U	0.051 U	0.051 U	0.052 U	0.051 U
319-86-8	delta-BHC	ug/L	0.051 U	0.051 U	0.051 U	0.052 U	0.014 J
58-89-9	gamma-BHC (Lindane)	ug/L	0.051 U	0.051 U	0.051 U	0.052 U	0.051 U
76-44-8	Heptachlor	ug/L	0.051 U	0.051 U	0.051 U	0.052 U	0.051 U
309-00-2	Aldrin	ug/L	0.00068 JN	0.054 J	0.012 JN	0.026 J	0.051 U
1024-57-3	Heptachlor epoxide	ug/L	0.069	0.051 U	0.94	0.029 J	0.002 JN
959-98-8	Endosulfan I	ug/L	0.051 U	0.019 J	0.051 U	0.052 U	0.051 U
60-57-1	Dieldrin	ug/L	0.1 U	0.1 U	0.074 JN	0.039 JN	0.1 U
72-55-9	4,4'-DDE	ug/L	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
72-20-8	Endrin	ug/L	0.018 JN	0.1 U	0.1 U	0.1 U	0.1 U
33213-65-	Endosulfan II	ug/L	0.0045 JN	0.1 U	0.1 U	0.1 U	0.0025 JN
72-54-8	4,4'-DDD	ug/L	0.1 U	0.1 U	0.026 JN	0.1 U	0.1 U
1031-07-8	Endosulfan sulfate	ug/L	0.0042 JN	0.038 J	0.1 U	0.04 JN	0.1 U
50-29-3	4,4'-DDT	ug/L	0.1 U	0.1 U	0.0094 JN	0.093 J	0.0085 J
72-43-5	Methoxychlor	ug/L	0.51 U	0.51 U	0.51 U	0.52 U	0.51 U
53494-70-	Endrin ketone	ug/L	0.1 U	0.029 JN	0.021 JN	0.1 J	0.1 U
7421-36-3	Endrin aldehyde	ug/L	0.03 J	0.1 U	0.1 U	0.1 U	0.1 U
5103-71-9	alpha-Chlordane	ug/L	0.051 U	0.051 U	0.051 U	0.018 JN	0.051 U
5103-74-2	gamma-Chlordane	ug/L	0.051 U	0.051 U	0.051 U	0.052 U	0.0024 JN
8001-35-2	Toxaphene	ug/L	5.1 U	5.1 U	5.1 U	5.2 U	5.1 U
12674-11-	Aroclor-1016	ug/L	1 U	1 U	1 U	1 U	1 U
11104-28-	Aroclor-1221	ug/L	2 U	2 U	2 U	2.1 U	2 U
11141-16-	Aroclor-1232	ug/L	1 U	1 U	1 U	1 U	1 U
53469-21-	Aroclor-1242	ug/L	1 U	1 U	1 U	1 U	1 U
12672-29-	Aroclor-1248	ug/L	1 U	1 U	1 U	1 U	1 U
11097-69-	Aroclor-1254	ug/L	1 U	1 U	1 U	1 U	1 U
11096-82-	Aroclor-1260	ug/L	1 U	1 U	1 U	1 U	1 U
	METALS						
7429-90-5	Aluminum	ug/L	6750	145 J	1210	770	458
7440-36-0	Antimony	ug/L	4.4 J	32.7 J	101	22 J	90.8
7440-38-2	Arsenic	ug/L	39.6	16.5	37.7	4.5 J	54.5
7440-39-3	Barium	ug/L	400	71.6 J	159 J	68.4 J	166 J
7440-41-7	Beryllium	ug/L	0.54 J	1.4 J	0.33 J	0.21 J	0.12 U
7440-43-9	Cadmium	ug/L	1 J	1.6 J	12.3	3 J	0.5 U
7440-70-2	Calcium	ug/L	238000	155000	486000	438000	333000
7440-47-3	Chromium	ug/L	54.8	36.2	18400	375	23.3
7440-48-4	Cobalt	ug/L	7.8 J	2.3 U	3.2 J	2.3 U	2.3 U
7440-50-8	Copper	ug/L	54.5	21.9 J	1330	109	7.2 J
7439-89-6	Iron	ug/L	25100	2950	61600	28600	1550
7439-92-1	Lead	ug/L	119	88.2	1060	163	4.5
7439-95-4	Magnesium	ug/L	43000	19500	53400	80500	66700
7439-96-5	Manganese	ug/L	1710	271	1880	1920	514
7439-97-6	Mercury	ug/L	0.55 J	16 J	5.6 J	1.5 J	0.09 UJ
7440-02-0	Nickel	ug/L	22.3 J	9.5 J	46.4	43.2	1.6 J
7440-09-7	Potassium	ug/L	17300	17400	31700	17600	42800
7782-49-2	Selenium	ug/L	4.9 J	4.8 U	4.8 U	4.8 U	4.8 U
7440-22-4	Silver	ug/L	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
7440-23-5	Sodium	ug/L	63100	114000	132000	127000	97300
7440-28-0	Thallium	ug/L	7.4 U	7.4 U	7.4 U	7.4 U	7.4 U
7440-62-2	Vanadium	ug/L	23.4 J	2.3 J	13.5 J	3.8 J	2.1 J
7440-66-6	Zinc	ug/L	177	127	2570	2910	30.8

AlliedSignal, Inc.		SAMPLE ID:	BG-01W	WF-02W	WF-03W	WF-04W	WF-05W
Buffalo Color Area D Site		LAB ID:	J3617/J3623/J3628	J3616/J3622/J3627	J3771/J3773/J3778	J3618/J3624/J3629	J3774/J3779
Validated Water Sample Data		SOURCE:	OB&G	OB&G	OB&G	OB&G	OB&G
SDG: 8757/8780		SDG:	8757/8780	8757/8780	8757/8780	8757/8780	8757/8780
		MATRIX:	Water	Water	Water	Water	Water
		SAMPLED:	8/7/98	8/7/98	8/10/98	8/7/98	8/10/98
		VALIDATED:	9/4/98	9/4/98	9/4/98	9/4/98	9/4/98
CAS NO.	COMPOUND	UNITS:					
	FILTERED METALS						
7429-90-5	Aluminum	ug/L	43.3 J	30 J	17.7 J	36.8 J	15.8 U
7440-36-0	Antimony	ug/L	4 J	28.1 J	4.5 J	4.1 J	4.2 J
7440-38-2	Arsenic	ug/L	30.3	16.1	4.2 U	4.2 U	4.2 U
7440-39-3	Barium	ug/L	390	75.7 J	6.6 J	38.1 J	143 J
7440-41-7	Beryllium	ug/L	0.12 U	0.12 U	0.15 J	0.14 J	0.12 U
7440-43-9	Cadmium	ug/L	0.49 U	0.49 U	1.1 J	1.1 J	0.49 U
7440-70-2	Calcium	ug/L	232000	168000	486000	469000	315000
7440-47-3	Chromium	ug/L	8.3 J	8.3 J	16.6	13.6	9.8 J
7440-48-4	Cobalt	ug/L	6.4 J	2.3 U	2.3 U	3.9 J	2.3 U
7440-50-8	Copper	ug/L	3.4 J	3.8 J	0.84 U	4.7 J	1.3 J
7439-89-6	Iron	ug/L	7580	2250	20900	21800	239
7439-92-1	Lead	ug/L	1.8 U	6.7	1.8 U	2.1 J	1.8 U
7439-95-4	Magnesium	ug/L	39500	22700	54500	86700	63100
7439-96-5	Manganese	ug/L	1250	292	1650	1940	447
7439-97-6	Mercury	ug/L	0.09 UJ	0.85 J	0.09 UJ	0.09 UJ	0.09 UJ
7440-02-0	Nickel	ug/L	6.1 J	7.5 J	1.4 U	34.9 J	1.4 U
7440-09-7	Potassium	ug/L	17000	20700	34500	18300	44300
7782-49-2	Selenium	ug/L	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U
7440-22-4	Silver	ug/L	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
7440-23-5	Sodium	ug/L	66700	135000	137000	135000	91300
7440-28-0	Thallium	ug/L	7.4 U	7.4 U	7.4 U	7.4 U	7.4 U
7440-62-2	Vanadium	ug/L	2.6 J	1.1 J	0.69 U	1.9 J	0.69 U
7440-66-6	Zinc	ug/L	8.8 J	26	6.3 J	2600	2.5 J
	OTHER						
	Methane	mg/L	3	2	0.4	0.2	
	Nitrate-nitrogen	mg/L	0.66	0.08	0.05 U	0.16	
	Nitrite nitrogen	mg/L	0.12	0.05 U	0.05 U	0.05 U	
	Nitrite-nitrate nitrogen	mg/L	0.78	0.08	0.05 U	0.16	
	Sulfate-B	mg/L	33	280	1000	930	

AlliedSignal, Inc.		SAMPLE ID:	WF-06W	QC Trip Blank	QC Trip Blank
Buffalo Color Area D Site		LAB ID:	J3775/J3780	J3619/J3626	J3772/J3777
Validated Water Sample Data		SOURCE:	OB&G	OB&G	OB&G
SDG: 8757/8780		SDG:	8757/8780	8757/8780	8757/8780
		MATRIX:	Water	Water	Water
		SAMPLED:	8/10/98	8/7/98	8/10/98
		VALIDATED:	9/4/98	9/4/98	9/4/98
CAS NO.	COMPOUND	UNITS:			
	VOLATILES				
74-87-3	Chloromethane	ug/L	10 U	10 U	10 U
74-83-9	Bromomethane	ug/L	10 U	10 U	10 U
75-01-4	Vinyl chloride	ug/L	10 U	10 U	10 U
75-00-3	Chloroethane	ug/L	10 U	10 U	10 U
75-09-2	Methylene chloride	ug/L	10 U	10 U	10 U
67-64-1	Acetone	ug/L	4 J	10 U	10 U
75-15-0	Carbon disulfide	ug/L	10 U	10 U	10 U
75-35-4	1,1-Dichloroethene	ug/L	10 U	10 U	10 U
75-35-3	1,1-Dichloroethane	ug/L	10 U	10 U	10 U
540-59-0	1,2-Dichloroethene (total)	ug/L	10 U	10 U	10 U
67-66-3	Chloroform	ug/L	10 U	10 U	10 U
107-06-2	1,2-Dichloroethane	ug/L	10 U	10 U	10 U
78-93-3	2-Butanone	ug/L	10 U	10 U	10 U
71-55-6	1,1,1-Trichloroethane	ug/L	10 U	10 U	10 U
56-23-5	Carbon tetrachloride	ug/L	10 U	10 U	10 U
75-27-4	Bromodichloromethane	ug/L	10 U	10 U	10 U
78-87-5	1,2-Dichloropropane	ug/L	10 U	10 U	10 U
10061-01-	cis-1,3-Dichloropropene	ug/L	10 U	10 U	10 U
79-01-6	Trichloroethene	ug/L	10 U	10 U	10 U
71-43-2	Benzene	ug/L	14	10 U	10 U
124-48-1	Dibromochloromethane	ug/L	10 U	10 U	10 U
10061-02-	trans-1,3-Dichloropropene	ug/L	10 U	10 U	10 U
79-00-5	1,1,2-Trichloroethane	ug/L	10 U	10 U	10 U
75-25-2	Bromoform	ug/L	10 U	10 U	10 U
108-10-1	4-Methyl-2-pentanone	ug/L	10 U	10 U	10 U
591-78-6	2-Hexanone	ug/L	10 U	10 U	10 U
127-18-4	Tetrachloroethene	ug/L	10 U	10 U	10 U
79-34-5	1,1,2,2-Tetrachloroethane	ug/L	10 U	10 U	10 U
108-88-3	Toluene	ug/L	10 U	10 U	10 U
108-90-7	Chlorobenzene	ug/L	1000	10 U	10 U
100-41-4	Ethylbenzene	ug/L	10 U	10 U	10 U
100-42-5	Styrene	ug/L	10 U	10 U	10 U
1330-20-7	Xylene (total)	ug/L	10 U	10 U	10 U

AlliedSignal, Inc. Buffalo Color Area D Site Validated Water Sample Data SDG: 8757/8780		SAMPLE ID:	WF-06W	QC Trip Blank	QC Trip Blank
		LAB ID:	J3775/J3780	J3619/J3626	J3772/J3777
		SOURCE:	OB&G	OB&G	OB&G
		SDG:	8757/8780	8757/8780	8757/8780
		MATRIX:	Water	Water	Water
		SAMPLED:	8/10/98	8/7/98	8/10/98
		VALIDATED:	9/4/98	9/4/98	9/4/98
CAS NO.	COMPOUND	UNITS:			
	SEMIVOLATILES				
111-44-4	bis(2-Chloroethyl)ether	ug/L	10 U		
108-95-2	Phenol	ug/L	2 J		
95-57-8	2-Chlorophenol	ug/L	6 J		
541-73-1	1,3-Dichlorobenzene	ug/L	10 U		
106-46-7	1,4-Dichlorobenzene	ug/L	8 J		
95-50-1	1,2-Dichlorobenzene	ug/L	5 J		
108-60-1	2,2'-oxybis(1-Chloropropane)	ug/L	10 U		
95-48-7	2-Methylphenol	ug/L	10 U		
67-72-1	Hexachloroethane	ug/L	10 U		
621-64-7	N-Nitroso-di-n-propylamine	ug/L	10 U		
106-44-5	4-Methylphenol	ug/L	2 J		
98-95-3	Nitrobenzene	ug/L	10 U		
78-59-1	Isophorone	ug/L	10 U		
88-75-5	2-Nitrophenol	ug/L	10 U		
105-67-9	2,4-Dimethylphenol	ug/L	2 J		
111-91-1	bis(2-Chloroethoxy)methane	ug/L	10 U		
120-83-2	2,4-Dichlorophenol	ug/L	10 U		
120-82-1	1,2,4-Trichlorobenzene	ug/L	10 U		
91-20-3	Naphthalene	ug/L	3 J		
106-47-8	4-Chloroaniline	ug/L	9 J		
87-68-3	Hexachlorobutadiene	ug/L	10 U		
59-50-7	4-Chloro-3-methylphenol	ug/L	10 U		
91-57-6	2-Methylnaphthalene	ug/L	10 U		
77-47-4	Hexachlorocyclopentadiene	ug/L	10 UJ		
88-06-2	2,4,6-Trichlorophenol	ug/L	10 U		
95-95-4	2,4,5-Trichlorophenol	ug/L	26 U		
91-58-7	2-Chloronaphthalene	ug/L	10 U		
88-74-4	2-Nitroaniline	ug/L	26 U		
208-96-8	Acenaphthylene	ug/L	10 U		
131-11-3	Dimethyl phthalate	ug/L	10 U		
606-20-2	2,6-Dinitrotoluene	ug/L	10 U		
83-32-9	Acenaphthene	ug/L	10 U		
99-09-2	3-Nitroaniline	ug/L	26 U		
51-28-5	2,4-Dinitrophenol	ug/L	26 U		
132-64-9	Dibenzofuran	ug/L	10 U		
121-14-2	2,4-Dinitrotoluene	ug/L	10 U		
100-02-7	4-Nitrophenol	ug/L	26 U		
86-73-7	Fluorene	ug/L	10 U		
7005-72-3	4-Chlorophenyl phenyl ether	ug/L	10 U		
84-66-2	Diethyl phthalate	ug/L	10 U		
100-01-6	4-Nitroaniline	ug/L	26 U		
534-52-1	4,6-Dinitro-2-methylphenol	ug/L	26 U		
86-30-6	N-Nitrosodiphenylamine	ug/L	10 U		
101-55-3	4-Bromophenyl phenyl ether	ug/L	10 U		
118-74-1	Hexachlorobenzene	ug/L	10 U		
87-86-5	Pentachlorophenol	ug/L	26 U		
85-01-8	Phenanthrene	ug/L	10 U		
120-12-7	Anthracene	ug/L	10 U		
84-74-2	Di-n-butyl phthalate	ug/L	10 U		
86-74-8	Carbazole	ug/L	10 U		
206-44-0	Fluoranthene	ug/L	10 U		
129-00-0	Pyrene	ug/L	10 U		
85-68-7	Butyl benzyl phthalate	ug/L	10 U		
91-94-1	3,3'-Dichlorobenzidine	ug/L	10 U		
56-55-3	Benzo[a]anthracene	ug/L	10 U		
218-01-9	Chrysene	ug/L	10 U		
117-81-7	bis(2-Ethylhexyl)phthalate	ug/L	10 U		
117-84-0	Di-n-octyl phthalate	ug/L	10 UJ		
205-99-2	Benzo[b]fluoranthene	ug/L	10 UJ		
207-08-9	Benzo[k]fluoranthene	ug/L	10 UJ		
50-32-8	Benzo[a]pyrene	ug/L	10 UJ		
193-39-5	Indeno[1,2,3-cd]pyrene	ug/L	10 UJ		
53-70-3	Dibenz[a,h]anthracene	ug/L	10 UJ		
191-24-2	Benzo[g,h,i]perylene	ug/L	10 UJ		

AlliedSignal, Inc. Buffalo Color Area D Site Validated Water Sample Data SDG: 8757/8780		SAMPLE ID:	WF-06W	QC Trip Blank	QC Trip Blank
		LAB ID:	J3775/J3780	J3619/J3626	J3772/J3777
		SOURCE:	OB&G	OB&G	OB&G
		SDG:	8757/8780	8757/8780	8757/8780
		MATRIX:	Water	Water	Water
		SAMPLED:	8/10/98	8/7/98	8/10/98
		VALIDATED:	9/4/98	9/4/98	9/4/98
CAS NO.	COMPOUND	UNITS:			
	PESTICIDES/PCBs				
319-84-6	alpha-BHC	ug/L	0.053 U		
319-95-7	beta-BHC	ug/L	0.053 U		
319-86-8	delta-BHC	ug/L	0.0023 JN		
58-89-9	gamma-BHC (Lindane)	ug/L	0.0021 JN		
76-44-8	Heptachlor	ug/L	0.053 U		
309-00-2	Aldrin	ug/L	0.025 J		
1024-57-3	Heptachlor epoxide	ug/L	0.053 U		
959-98-8	Endosulfan I	ug/L	0.053 U		
60-57-1	Dieldrin	ug/L	0.11 U		
72-55-9	4,4'-DDE	ug/L	0.11 U		
72-20-8	Endrin	ug/L	0.018 JN		
33213-65-	Endosulfan II	ug/L	0.0035 J		
72-54-8	4,4'-DDD	ug/L	0.11 U		
1031-07-8	Endosulfan sulfate	ug/L	0.11 U		
50-29-3	4,4'-DDT	ug/L	0.0015 JN		
72-43-5	Methoxychlor	ug/L	0.53 U		
53494-70-	Endrin ketone	ug/L	0.11 U		
7421-36-3	Endrin aldehyde	ug/L	0.11 U		
5103-71-9	alpha-Chlordane	ug/L	0.053 U		
5103-74-2	gamma-Chlordane	ug/L	0.053 U		
8001-35-2	Toxaphene	ug/L	5.3 U		
12674-11-	Aroclor-1016	ug/L	1.1 U		
11104-28-	Aroclor-1221	ug/L	2.1 U		
11141-16-	Aroclor-1232	ug/L	1.1 U		
53469-21-	Aroclor-1242	ug/L	1.1 U		
12672-29-	Aroclor-1248	ug/L	1.1 U		
11097-69-	Aroclor-1254	ug/L	1.1 U		
11096-82-	Aroclor-1260	ug/L	1.1 U		
	METALS				
7429-90-5	Aluminum	ug/L	362		
7440-36-0	Antimony	ug/L	4.6 J		
7440-38-2	Arsenic	ug/L	5.7 J		
7440-39-3	Barium	ug/L	71.7 J		
7440-41-7	Beryllium	ug/L	0.13 J		
7440-43-9	Cadmium	ug/L	0.49 U		
7440-70-2	Calcium	ug/L	200000		
7440-47-3	Chromium	ug/L	9.8 J		
7440-48-4	Cobalt	ug/L	2.3 U		
7440-50-8	Copper	ug/L	12.5 J		
7439-89-6	Iron	ug/L	1400		
7439-92-1	Lead	ug/L	2.1 J		
7439-95-4	Magnesium	ug/L	23200		
7439-96-5	Manganese	ug/L	467		
7439-97-6	Mercury	ug/L	0.09 UJ		
7440-02-0	Nickel	ug/L	2.3 J		
7440-09-7	Potassium	ug/L	24800		
7782-49-2	Selenium	ug/L	6.5		
7440-22-4	Silver	ug/L	1.1 U		
7440-23-5	Sodium	ug/L	319000		
7440-28-0	Thallium	ug/L	7.4 U		
7440-62-2	Vanadium	ug/L	11.6 J		
7440-66-6	Zinc	ug/L	37.5		

AlliedSignal, Inc.		SAMPLE ID:	WF-06W	QC Trip Blank	QC Trip Blank
Buffalo Color Area D Site		LAB ID:	J3775/J3780	J3619/J3626	J3772/J3777
Validated Water Sample Data		SOURCE:	OB&G	OB&G	OB&G
SDG: 8757/8780		SDG:	8757/8780	8757/8780	8757/8780
		MATRIX:	Water	Water	Water
		SAMPLED:	8/10/98	8/7/98	8/10/98
		VALIDATED:	9/4/98	9/4/98	9/4/98
CAS NO.	COMPOUND	UNITS:			
	FILTERED METALS				
7429-90-5	Aluminum	ug/L	133 J		
7440-36-0	Antimony	ug/L	4.5 J		
7440-38-2	Arsenic	ug/L	4.6 J		
7440-39-3	Barium	ug/L	65.5 J		
7440-41-7	Beryllium	ug/L	0.14 J		
7440-43-9	Cadmium	ug/L	0.49 U		
7440-70-2	Calcium	ug/L	194000		
7440-47-3	Chromium	ug/L	9.9 J		
7440-48-4	Cobalt	ug/L	2.3 U		
7440-50-8	Copper	ug/L	6 J		
7439-89-6	Iron	ug/L	830		
7439-92-1	Lead	ug/L	1.8 U		
7439-95-4	Magnesium	ug/L	21700		
7439-96-5	Manganese	ug/L	442		
7439-97-6	Mercury	ug/L	0.09 UJ		
7440-02-0	Nickel	ug/L	2 J		
7440-09-7	Potassium	ug/L	27900		
7782-49-2	Selenium	ug/L	5.2		
7440-22-4	Silver	ug/L	1.1 U		
7440-23-5	Sodium	ug/L	348000		
7440-28-0	Thallium	ug/L	7.4 U		
7440-62-2	Vanadium	ug/L	12.3 J		
7440-66-6	Zinc	ug/L	20		
	OTHER				
	Methane	mg/L		0.002 U	0.002 U
	Nitrate-nitrogen	mg/L			
	Nitrite nitrogen	mg/L			
	Nitrite-nitrate nitrogen	mg/L			
	Sulfate-B	mg/L			

ATTACHMENT A-2

VALIDATED LABORATORY DATA FOR SOIL

AlliedSignal, Inc.		SAMPLE ID:	BG-01S	BG-02S	WF-02S	WF-02S	WF-03S
Buffalo Color Area D Site		DEPTH:	(0-1')	(0-1')	(12-14')	(6-16')	(10-12')
Validated Soil Samples		LAB ID:	J3372/J3373	J3370/J3371	J3126	J3127/J3131	J3128
SDG: 8690/8737		SOURCE:	OB&G	OB&G	OB&G	OB&G	OB&G
		SDG:	8690/8737	8690/8737	8690/8737	8690/8737	8690/8737
		MATRIX:	SOIL	SOIL	SOIL	SOIL	SOIL
		SAMPLED:	8/6/98	8/6/98	8/3/98	8/3/98	8/4/98
		VALIDATED:	9/4/98	9/4/98	9/4/98	9/4/98	9/4/98
CAS NO.	COMPOUND	UNITS:					
	VOLATILES						
74-87-3	Chloromethane	ug/Kg	12 U	14 U	34 U		17 U
74-83-9	Bromomethane	ug/Kg	12 U	14 U	34 U		17 U
75-01-4	Vinyl chloride	ug/Kg	12 U	14 U	34 U		17 U
75-00-3	Chloroethane	ug/Kg	12 U	14 U	34 U		17 U
75-09-2	Methylene chloride	ug/Kg	12 U	14 U	34 U		17 U
67-64-1	Acetone	ug/Kg	12 J	10 J	43		24
75-15-0	Carbon disulfide	ug/Kg	12 U	14 U	34 U		17 U
75-35-4	1,1-Dichloroethene	ug/Kg	12 U	14 U	34 U		17 U
75-35-3	1,1-Dichloroethane	ug/Kg	12 U	14 U	34 U		17 U
540-59-0	1,2-Dichloroethene (total)	ug/Kg	12 U	14 U	34 U		17 U
	cis-1,2-Dichloroethene	ug/Kg	12 U	14 U	34 U		17 U
	trans-1,2-Dichloroethene	ug/Kg	12 U	14 U	34 U		17 U
67-66-3	Chloroform	ug/Kg	12 U	14 U	34 U		17 U
107-06-2	1,2-Dichloroethane	ug/Kg	12 U	14 U	34 U		17 U
78-93-3	2-Butanone	ug/Kg	42 J	4 J	79		24
71-55-6	1,1,1-Trichloroethane	ug/Kg	12 U	14 U	34 U		17 U
56-23-5	Carbon tetrachloride	ug/Kg	12 U	14 U	34 U		17 U
75-27-4	Bromodichloromethane	ug/Kg	12 U	14 U	34 U		17 U
78-87-5	1,2-Dichloropropane	ug/Kg	12 U	14 U	34 U		17 U
10061-01-	cis-1,3-Dichloropropene	ug/Kg	12 U	14 U	34 U		17 U
79-01-6	Trichloroethene	ug/Kg	12 U	14 U	34 U		17 U
71-43-2	Benzene	ug/Kg	12 U	14 U	170		61
124-48-1	Dibromochloromethane	ug/Kg	12 U	14 U	34 U		17 U
10061-02-	trans-1,3-Dichloropropene	ug/Kg	12 U	14 U	34 U		17 U
79-00-5	1,1,2-Trichloroethane	ug/Kg	12 U	14 U	34 U		17 U
75-25-2	Bromoform	ug/Kg	12 U	14 U	34 U		17 U
108-10-1	4-Methyl-2-pentanone	ug/Kg	12 U	14 U	34 U		17 U
591-78-6	2-Hexanone	ug/Kg	12 UJ	14 UJ	34 U		17 U
127-18-4	Tetrachloroethene	ug/Kg	12 U	14 U	34 U		17 U
79-34-5	1,1,2,2-Tetrachloroethane	ug/Kg	12 U	14 U	34 U		17 U
108-88-3	Toluene	ug/Kg	2 J	14 U	62		6 J
108-90-7	Chlorobenzene	ug/Kg	2 J	14 U	70		220
100-41-4	Ethylbenzene	ug/Kg	12 U	14 U	14 J		2 J
100-42-5	Styrene	ug/Kg	12 U	14 U	34 U		17 U
1330-20-7	Xylene (total)	ug/Kg	12 U	14 U	150		5 J

AlliedSignal, Inc. Buffalo Color Area D Site Validated Soil Samples SDG: 8690/8737		SAMPLE ID:	BG-01S	BG-02S	WF-02S	WF-02S	WF-03S
		DEPTH:	(0-1')	(0-1')	(12-14')	(6-16')	(10-12')
		LAB ID:	J3372/J3373	J3370/J3371	J3126	J3127/J3131	J3128
		SOURCE:	OB&G	OB&G	OB&G	OB&G	OB&G
		SDG:	8690/8737	8690/8737	8690/8737	8690/8737	8690/8737
		MATRIX:	SOIL	SOIL	SOIL	SOIL	SOIL
		SAMPLED:	8/6/98	8/6/98	8/3/98	8/3/98	8/4/98
		VALIDATED:	9/4/98	9/4/98	9/4/98	9/4/98	9/4/98
CAS NO.	COMPOUND	UNITS:					
	SEMIVOLATILES						
111-44-4	bis(2-Chloroethyl)ether	ug/Kg	440 U	510 U		4500 U	
108-95-2	Phenol	ug/Kg	440 U	510 U		4500 U	
95-57-8	2-Chlorophenol	ug/Kg	440 U	510 U		4500 U	
541-73-1	1,3-Dichlorobenzene	ug/Kg	440 U	510 U		4500 U	
106-46-7	1,4-Dichlorobenzene	ug/Kg	72 J	510 U		4500 U	
95-50-1	1,2-Dichlorobenzene	ug/Kg	440 U	510 U		4500 U	
108-60-1	2,2'-oxybis(1-Chloropropane)	ug/Kg	440 U	510 U		4500 U	
95-48-7	2-Methylphenol	ug/Kg	440 U	510 U		4500 U	
67-72-1	Hexachloroethane	ug/Kg	440 U	510 U		4500 U	
621-64-7	N-Nitroso-di-n-propylamine	ug/Kg	440 U	510 U		4500 U	
106-44-5	4-Methylphenol	ug/Kg	440 U	88 J		4500 U	
98-95-3	Nitrobenzene	ug/Kg	440 U	510 U		1200 J	
78-59-1	Isophorone	ug/Kg	440 U	510 U		4500 U	
88-75-5	2-Nitrophenol	ug/Kg	440 U	510 U		4500 U	
105-67-9	2,4-Dimethylphenol	ug/Kg	440 U	510 U		4500 U	
111-91-1	bis(2-Chloroethoxy)methane	ug/Kg	440 U	510 U		4500 U	
120-83-2	2,4-Dichlorophenol	ug/Kg	440 U	510 U		4500 U	
120-82-1	1,2,4-Trichlorobenzene	ug/Kg	440 U	510 U		4500 U	
91-20-3	Naphthalene	ug/Kg	160 J	510 U		7200	
106-47-8	4-Chloroaniline	ug/Kg	440 U	510 U		990 J	
87-68-3	Hexachlorobutadiene	ug/Kg	440 U	510 U		4500 U	
59-50-7	4-Chloro-3-methylphenol	ug/Kg	440 U	510 U		4500 U	
91-57-6	2-Methylnaphthalene	ug/Kg	440 U	510 U		1400 J	
77-47-4	Hexachlorocyclopentadiene	ug/Kg	440 U	510 U		4500 UJ	
88-06-2	2,4,6-Trichlorophenol	ug/Kg	440 U	510 U		4500 U	
95-95-4	2,4,5-Trichlorophenol	ug/Kg	1100 U	1300 U		11000 U	
91-58-7	2-Chloronaphthalene	ug/Kg	440 U	510 U		4500 U	
88-74-4	2-Nitroaniline	ug/Kg	1100 U	1300 U		3600 J	
208-96-8	Acenaphthylene	ug/Kg	440 U	510 U		4500 U	
131-11-3	Dimethyl phthalate	ug/Kg	440 U	510 U		4500 U	
606-20-2	2,6-Dinitrotoluene	ug/Kg	440 U	510 U		4500 U	
83-32-9	Acenaphthene	ug/Kg	210 J	510 U		640 J	
99-09-2	3-Nitroaniline	ug/Kg	1100 U	1300 U		2000 J	
51-28-5	2,4-Dinitrophenol	ug/Kg	1100 UJ	190 J		11000 U	
132-64-9	Dibenzofuran	ug/Kg	150 J	510 U		980 J	
121-14-2	2,4-Dinitrotoluene	ug/Kg	440 U	510 U		2400 J	
100-02-7	4-Nitrophenol	ug/Kg	1100 U	1300 U		11000 U	
86-73-7	Fluorene	ug/Kg	160 J	60 J		1100 J	
7005-72-3	4-Chlorophenyl phenyl ether	ug/Kg	440 U	510 U		4500 U	
84-66-2	Diethyl phthalate	ug/Kg	440 U	510 U		4500 U	
100-01-6	4-Nitroaniline	ug/Kg	1100 U	1300 U		11000 U	
534-52-1	4,6-Dinitro-2-methylphenol	ug/Kg	1100 UJ	1300 U		11000 U	
86-30-6	N-Nitrosodiphenylamine	ug/Kg	440 UJ	510 U		3900 J	
101-55-3	4-Bromophenyl phenyl ether	ug/Kg	440 UJ	510 U		4500 U	
118-74-1	Hexachlorobenzene	ug/Kg	440 UJ	510 U		4500 U	
87-86-5	Pentachlorophenol	ug/Kg	1100 UJ	270 J		11000 U	
85-01-8	Phenanthrene	ug/Kg	790 J	470 J		5500	
120-12-7	Anthracene	ug/Kg	190 J	84 J		1800 J	
84-74-2	Di-n-butyl phthalate	ug/Kg	440 UJ	510 U		4500 U	
86-74-8	Carbazole	ug/Kg	130 J	510 U		660 J	
206-44-0	Fluoranthene	ug/Kg	880 J	650		5500	
129-00-0	Pyrene	ug/Kg	1900 J	1100 J		6700	
85-68-7	Butyl benzyl phthalate	ug/Kg	R	510 UJ		4500 U	
91-94-1	3,3'-Dichlorobenzidine	ug/Kg	R	510 UJ		4500 U	
56-55-3	Benzo[a]anthracene	ug/Kg	730 J	340 J		3300 J	
218-01-9	Chrysene	ug/Kg	990 J	510 J		3700 J	
117-81-7	bis(2-Ethylhexyl)phthalate	ug/Kg	270 J	410 J		950 J	
117-84-0	Di-n-octyl phthalate	ug/Kg	R	510 U		4500 UJ	
205-99-2	Benzo[b]fluoranthene	ug/Kg	1300 J	600 J		4000 J	
207-08-9	Benzo[k]fluoranthene	ug/Kg	520 J	180 J		1700 J	
50-32-8	Benzo[a]pyrene	ug/Kg	1000 J	390 J		3100 J	
193-39-5	Indeno[1,2,3-cd]pyrene	ug/Kg	880 J	240 J		1700 J	
53-70-3	Dibenz[a,h]anthracene	ug/Kg	270 J	510 UJ		4500 UJ	
191-24-2	Benzo[g,h,i]perylene	ug/Kg	1400 J	250 J		1900 J	

AlliedSignal, Inc. Buffalo Color Area D Site Validated Soil Samples SDG: 8690/8737		SAMPLE ID:	BG-01S	BG-02S	WF-02S	WF-02S	WF-03S
		DEPTH:	(0-1')	(0-1')	(12-14')	(6-16')	(10-12')
		LAB ID:	J3372/J3373	J3370/J3371	J3126	J3127/J3131	J3128
		SOURCE:	OB&G	OB&G	OB&G	OB&G	OB&G
		SDG:	8690/8737	8690/8737	8690/8737	8690/8737	8690/8737
		MATRIX:	SOIL	SOIL	SOIL	SOIL	SOIL
		SAMPLED:	8/6/98	8/6/98	8/3/98	8/3/98	8/4/98
		VALIDATED:	9/4/98	9/4/98	9/4/98	9/4/98	9/4/98
CAS NO.	COMPOUND	UNITS:					
	PESTICIDES/PCBs						
319-84-6	alpha-BHC	ug/Kg	22 U	19 U		110 U	
319-85-7	beta-BHC	ug/Kg	22 U	19 U		26 JN	
319-86-8	delta-BHC	ug/Kg	22 U	19 U		110 U	
58-89-9	gamma-BHC (Lindane)	ug/Kg	22 U	19 U		110 U	
76-44-8	Heptachlor	ug/Kg	22 U	19 U		19 J	
309-00-2	Aldrin	ug/Kg	22 U	19 U		110 U	
1024-57-3	Heptachlor epoxide	ug/Kg	3.9 JN	3.3 JN		110 U	
959-98-8	Endosulfan I	ug/Kg	22 U	19 U		110 U	
60-57-1	Dieldrin	ug/Kg	44 U	0.83 JN		220 U	
72-55-9	4,4'-DDE	ug/Kg	6.5 J	4.5 JN		220 U	
72-20-8	Endrin	ug/Kg	12 J	39 U		58 JN	
33213-65-	Endosulfan II	ug/Kg	44 U	39 U		12 JN	
72-54-8	4,4'-DDD	ug/Kg	11 JN	39 U		220 U	
1031-07-8	Endosulfan sulfate	ug/Kg	2.6 JN	39 U		220 U	
50-29-3	4,4'-DDT	ug/Kg	44 U	39 U		220 U	
72-43-5	Methoxychlor	ug/Kg	220 U	190 U		59 JN	
53494-70-	Endrin ketone	ug/Kg	12 J	39 U		21 JN	
7421-36-3	Endrin aldehyde	ug/Kg	44 U	39 U		220 U	
5103-71-9	alpha-Chlordane	ug/Kg	22 U	19 U		110 U	
5103-74-2	gamma-Chlordane	ug/Kg	22 U	19 U		110 U	
8001-35-2	Toxaphene	ug/Kg	2200 U	1900 U		11000 U	
12674-11-	Aroclor-1016	ug/Kg	440 U	390 U		2200 U	
11104-28-	Aroclor-1221	ug/Kg	880 U	780 U		4500 U	
11141-16-	Aroclor-1232	ug/Kg	440 U	390 U		2200 U	
53469-21-	Aroclor-1242	ug/Kg	440 U	390 U		2200 U	
12672-29-	Aroclor-1248	ug/Kg	440 U	390 U		2200 U	
11097-69-	Aroclor-1254	ug/Kg	440 U	390 U		2200 U	
11096-82-	Aroclor-1260	ug/Kg	440 U	390 U		2200 U	
	METALS						
7429-90-5	Aluminum	mg/Kg	6850	7500		5900	
7440-36-0	Antimony	mg/Kg	0.76 UJ	0.98 J		25.4 J	
7440-38-2	Arsenic	mg/Kg	6.3	9		38.7	
7440-39-3	Barium	mg/Kg	71	73		118	
7440-41-7	Beryllium	mg/Kg	0.74 J	0.47 J		0.82 J	
7440-43-9	Cadmium	mg/Kg	0.47 J	0.49 J		2 J	
7440-70-2	Calcium	mg/Kg	56200	16500		25900	
7440-47-3	Chromium	mg/Kg	96.7	15.6		419	
7440-48-4	Cobalt	mg/Kg	5.5 J	9.5 J		10.3 J	
7440-50-8	Copper	mg/Kg	34.2	46.6		132	
7439-89-6	Iron	mg/Kg	28300	24000		55700	
7439-92-1	Lead	mg/Kg	62.6	71.2		5080	
7439-95-4	Magnesium	mg/Kg	9400	6100		7020	
7439-96-5	Manganese	mg/Kg	3500 J	390 J		557	
7439-97-6	Mercury	mg/Kg	0.08 J	0.12 J		161	
7440-02-0	Nickel	mg/Kg	17.4 J	25.1 J		36.6 J	
7440-09-7	Potassium	mg/Kg	321 J	460 J		428 J	
7782-49-2	Selenium	mg/Kg	2.4	1.5 U		2.2	
7440-22-4	Silver	mg/Kg	0.3 U	0.34 U		0.3 U	
7440-23-5	Sodium	mg/Kg	224 J	139 J		398 J	
7440-28-0	Thallium	mg/Kg	9.9 U	2.3 U		2 U	
7440-62-2	Vanadium	mg/Kg	47.3 J	13 J		18.2 J	
7440-66-6	Zinc	mg/Kg	139	176		429	
	OTHER						
SOLIDS	% Total Solids	%	75.4	65.5	73.6	74.7	58.3
PH	pH	STD u				7.6 J	

AlliedSignal, Inc.		SAMPLE ID:	WF-03S	WF-04S	WF-04S	WF-05S	WF-05S
Buffalo Color Area D Site		DEPTH:	(6-14')	(2-14')	(8-10')	(4-11')	(6-8')
Validated Soil Samples		LAB ID:	J3129/J3132	J3365/J3374	J3364	J3367/J3375	J3366
SDG: 8690/8737		SOURCE:	OB&G	OB&G	OB&G	OB&G	OB&G
		SDG:	8690/8737	8690/8737	8690/8737	8690/8737	8690/8737
		MATRIX:	SOIL	SOIL	SOIL	SOIL	SOIL
		SAMPLED:	8/4/98	8/5/98	8/5/98	8/5/98	8/5/98
		VALIDATED:	9/4/98	9/4/98	9/4/98	9/4/98	9/4/98
CAS NO.	COMPOUND	UNITS:					
	VOLATILES						
74-87-3	Chloromethane	ug/Kg			15 U		60 U
74-83-9	Bromomethane	ug/Kg			15 U		60 U
75-01-4	Vinyl chloride	ug/Kg			15 U		60 U
75-00-3	Chloroethane	ug/Kg			15 U		60 U
75-09-2	Methylene chloride	ug/Kg			15 U		60 U
67-64-1	Acetone	ug/Kg			20		210 J
75-15-0	Carbon disulfide	ug/Kg			15 U		60 U
75-35-4	1,1-Dichloroethene	ug/Kg			15 U		60 U
75-35-3	1,1-Dichloroethane	ug/Kg			15 U		60 U
540-59-0	1,2-Dichloroethene (total)	ug/Kg			15 U		60 U
	cis-1,2-Dichloroethene	ug/Kg			15 U		60 U
	trans-1,2-Dichloroethene	ug/Kg			15 U		60 U
67-66-3	Chloroform	ug/Kg			15 U		60 U
107-06-2	1,2-Dichloroethane	ug/Kg			15 U		60 U
78-93-3	2-Butanone	ug/Kg			6 J		75 J
71-55-6	1,1,1-Trichloroethane	ug/Kg			15 U		60 U
56-23-5	Carbon tetrachloride	ug/Kg			15 U		60 U
75-27-4	Bromodichloromethane	ug/Kg			15 U		60 U
78-87-5	1,2-Dichloropropane	ug/Kg			15 U		60 U
10061-01-	cis-1,3-Dichloropropene	ug/Kg			15 U		60 U
79-01-6	Trichloroethene	ug/Kg			15 U		60 U
71-43-2	Benzene	ug/Kg			35		400
124-48-1	Dibromochloromethane	ug/Kg			15 U		60 U
10061-02-	trans-1,3-Dichloropropene	ug/Kg			15 U		60 U
79-00-5	1,1,2-Trichloroethane	ug/Kg			15 U		60 U
75-25-2	Bromoform	ug/Kg			15 U		60 U
108-10-1	4-Methyl-2-pentanone	ug/Kg			15 U		60 U
591-78-6	2-Hexanone	ug/Kg			15 U		60 UJ
127-18-4	Tetrachloroethene	ug/Kg			15 U		9 J
79-34-5	1,1,2,2-Tetrachloroethane	ug/Kg			15 U		60 U
108-88-3	Toluene	ug/Kg			15 U		60 U
108-90-7	Chlorobenzene	ug/Kg			280		30 J
100-41-4	Ethylbenzene	ug/Kg			15 U		180
100-42-5	Styrene	ug/Kg			15 U		60 U
1330-20-7	Xylene (total)	ug/Kg			15 U		160

AlliedSignal, Inc.		SAMPLE ID:	WF-03S	WF-04S	WF-04S	WF-05S	WF-05S
Buffalo Color Area D Site		DEPTH:	(6-14')	(2-14')	(8-10')	(4-11')	(6-8')
Validated Soil Samples		LAB ID:	J3129/J3132	J3365/J3374	J3364	J3367/J3375	J3366
SDG: 8690/8737		SOURCE:	OB&G	OB&G	OB&G	OB&G	OB&G
		SDG:	8690/8737	8690/8737	8690/8737	8690/8737	8690/8737
		MATRIX:	SOIL	SOIL	SOIL	SOIL	SOIL
		SAMPLED:	8/4/98	8/5/98	8/5/98	8/5/98	8/5/98
		VALIDATED:	9/4/98	9/4/98	9/4/98	9/4/98	9/4/98
CAS NO.	COMPOUND	UNITS:					
	SEMIVOLATILES						
111-44-4	bis(2-Chloroethyl)ether	ug/Kg	12000 U	14000 U		10000 U	
108-95-2	Phenol	ug/Kg	12000 U	14000 U		10000 U	
95-57-8	2-Chlorophenol	ug/Kg	12000 U	14000 U		10000 U	
541-73-1	1,3-Dichlorobenzene	ug/Kg	12000 U	14000 U		10000 U	
106-46-7	1,4-Dichlorobenzene	ug/Kg	12000 U	3700 J		10000 U	
95-50-1	1,2-Dichlorobenzene	ug/Kg	2600 J	17000		10000 U	
108-60-1	2,2'-oxybis(1-Chloropropane)	ug/Kg	12000 U	14000 U		10000 U	
95-48-7	2-Methylphenol	ug/Kg	12000 U	14000 U		10000 U	
67-72-1	Hexachloroethane	ug/Kg	12000 U	14000 U		10000 U	
621-64-7	N-Nitroso-di-n-propylamine	ug/Kg	12000 U	14000 U		10000 U	
106-44-5	4-Methylphenol	ug/Kg	12000 U	14000 U		10000 U	
98-95-3	Nitrobenzene	ug/Kg	5400 J	26000		10000 U	
78-59-1	Isophorone	ug/Kg	12000 U	14000 U		10000 U	
88-75-5	2-Nitrophenol	ug/Kg	12000 U	14000 U		10000 U	
105-67-9	2,4-Dimethylphenol	ug/Kg	12000 U	14000 U		10000 U	
111-91-1	bis(2-Chloroethoxy)methane	ug/Kg	12000 U	14000 U		10000 U	
120-83-2	2,4-Dichlorophenol	ug/Kg	12000 U	14000 U		10000 U	
120-82-1	1,2,4-Trichlorobenzene	ug/Kg	8000 J	2200 J		10000 U	
91-20-3	Naphthalene	ug/Kg	44000	13000 J		9300 J	
106-47-8	4-Chloroaniline	ug/Kg	7700 J	3900 J		10000 U	
87-68-3	Hexachlorobutadiene	ug/Kg	12000 U	14000 U		10000 U	
59-50-7	4-Chloro-3-methylphenol	ug/Kg	12000 U	14000 U		10000 U	
91-57-6	2-Methylnaphthalene	ug/Kg	2300 J	14000 U		10000 U	
77-47-4	Hexachlorocyclopentadiene	ug/Kg	12000 U	14000 U		10000 U	
88-06-2	2,4,6-Trichlorophenol	ug/Kg	12000 U	14000 U		10000 U	
95-95-4	2,4,5-Trichlorophenol	ug/Kg	29000 U	34000 U		26000 U	
91-58-7	2-Chloronaphthalene	ug/Kg	12000 U	14000 U		10000 U	
88-74-4	2-Nitroaniline	ug/Kg	29000 U	34000 U		26000 U	
208-96-8	Acenaphthylene	ug/Kg	12000 U	14000 U		10000 U	
131-11-3	Dimethyl phthalate	ug/Kg	12000 U	14000 U		10000 U	
606-20-2	2,6-Dinitrotoluene	ug/Kg	3000 J	13000 J		4300 J	
83-32-9	Acenaphthene	ug/Kg	1300 J	14000 U		10000 U	
99-09-2	3-Nitroaniline	ug/Kg	29000 U	2700 J		26000 U	
51-28-5	2,4-Dinitrophenol	ug/Kg	29000 UJ	34000 UJ		26000 UJ	
132-64-9	Dibenzofuran	ug/Kg	2300 J	14000 U		10000 U	
121-14-2	2,4-Dinitrotoluene	ug/Kg	11000 J	24000		18000	
100-02-7	4-Nitrophenol	ug/Kg	29000 U	34000 U		26000 U	
86-73-7	Fluorene	ug/Kg	2800 J	11000 J		10000 U	
7005-72-3	4-Chlorophenyl phenyl ether	ug/Kg	12000 U	14000 U		10000 U	
84-66-2	Diethyl phthalate	ug/Kg	12000 U	14000 U		10000 U	
100-01-6	4-Nitroaniline	ug/Kg	29000 U	34000 U		26000 U	
534-52-1	4,6-Dinitro-2-methylphenol	ug/Kg	29000 U	34000 U		26000 U	
86-30-6	N-Nitrosodiphenylamine	ug/Kg	11000 J	10000 J		10000 U	
101-55-3	4-Bromophenyl phenyl ether	ug/Kg	12000 U	14000 U		10000 U	
118-74-1	Hexachlorobenzene	ug/Kg	3500 J	24000		10000 U	
87-86-5	Pentachlorophenol	ug/Kg	29000 U	34000 U		26000 U	
85-01-8	Phenanthrene	ug/Kg	12000	11000 J		10000 U	
120-12-7	Anthracene	ug/Kg	3400 J	3200 J		10000 U	
84-74-2	Di-n-butyl phthalate	ug/Kg	12000 U	14000 U		10000 U	
86-74-8	Carbazole	ug/Kg	2500 J	1700 J		10000 U	
206-44-0	Fluoranthene	ug/Kg	9900 J	13000 J		10000 U	
129-00-0	Pyrene	ug/Kg	17000	19000 J		10000 U	
85-68-7	Butyl benzyl phthalate	ug/Kg	12000 U	14000 UJ		10000 U	
91-94-1	3,3'-Dichlorobenzidine	ug/Kg	12000 U	14000 UJ		10000 U	
56-55-3	Benzo[a]anthracene	ug/Kg	6800 J	10000 J		10000 U	
218-01-9	Chrysene	ug/Kg	7600 J	11000 J		10000 U	
117-81-7	bis(2-Ethylhexyl)phthalate	ug/Kg	2500 J	2400 J		10000 U	
117-84-0	Di-n-octyl phthalate	ug/Kg	R	14000 UJ		10000 UJ	
205-99-2	Benzo[b]fluoranthene	ug/Kg	9600 J	12000 J		10000 UJ	
207-08-9	Benzo[k]fluoranthene	ug/Kg	3600 J	5100 J		10000 UJ	
50-32-8	Benzo[a]pyrene	ug/Kg	9100 J	8400 J		10000 UJ	
193-39-5	Indeno[1,2,3-cd]pyrene	ug/Kg	2700 J	4400 J		10000 UJ	
53-70-3	Dibenz[a,h]anthracene	ug/Kg	R	14000 UJ		10000 UJ	
191-24-2	Benzo[g,h,i]perylene	ug/Kg	2900 J	4700 J		10000 UJ	

AlliedSignal, Inc.		SAMPLE ID:	WF-03S	WF-04S	WF-04S	WF-05S	WF-05S
Buffalo Color Area D Site		DEPTH:	(6-14')	(2-14')	(8-10')	(4-11')	(6-8')
Validated Soil Samples		LAB ID:	J3129/J3132	J3365/J3374	J3364	J3367/J3375	J3366
SDG: 8690/8737		SOURCE:	OB&G	OB&G	OB&G	OB&G	OB&G
		SDG:	8690/8737	8690/8737	8690/8737	8690/8737	8690/8737
		MATRIX:	SOIL	SOIL	SOIL	SOIL	SOIL
		SAMPLED:	8/4/98	8/5/98	8/5/98	8/5/98	8/5/98
		VALIDATED:	9/4/98	9/4/98	9/4/98	9/4/98	9/4/98
CAS NO.	COMPOUND	UNITS:					
	PESTICIDES/PCBs						
319-84-6	alpha-BHC	ug/Kg	420 U	1300 U		200 U	
319-95-7	beta-BHC	ug/Kg	420 U	1300 U		200 U	
319-86-8	delta-BHC	ug/Kg	420 U	1300 U		200 U	
58-89-9	gamma-BHC (Lindane)	ug/Kg	420 U	1300 U		200 U	
76-44-8	Heptachlor	ug/Kg	4.9 JN	1300 U		200 U	
309-00-2	Aldrin	ug/Kg	420 U	1300 U		200 U	
1024-57-3	Heptachlor epoxide	ug/Kg	130 J	510 J		27 JN	
959-98-8	Endosulfan I	ug/Kg	420 U	1300 U		40 J	
60-57-1	Dieldrin	ug/Kg	380 JN	2500 U		400 U	
72-55-9	4,4'-DDE	ug/Kg	830 U	980 J		400 U	
72-20-8	Endrin	ug/Kg	750 J	6900 J		44 JN	
33213-65-	Endosulfan II	ug/Kg	34 JN	2500 U		23 JN	
72-54-8	4,4'-DDD	ug/Kg	500 J	2500 U		25 JN	
1031-07-8	Endosulfan sulfate	ug/Kg	170 JN	4000 JN		29 JN	
50-29-3	4,4'-DDT	ug/Kg	1300	2500 U		150 J	
72-43-5	Methoxychlor	ug/Kg	100 JN	13000 U		2000 U	
53494-70-	Endrin ketone	ug/Kg	830 U	2500 U		400 U	
7421-36-3	Endrin aldehyde	ug/Kg	830 U	2500 U		400 U	
5103-71-9	alpha-Chlordane	ug/Kg	420 U	1300 U		200 U	
5103-74-2	gamma-Chlordane	ug/Kg	420 U	1300 U		200 U	
8001-35-2	Toxaphene	ug/Kg	42000 U	130000 U		20000 U	
12674-11-	Aroclor-1016	ug/Kg	8300 U	25000 U		4000 U	
11104-28-	Aroclor-1221	ug/Kg	17000 U	50000 U		8100 U	
11141-16-	Aroclor-1232	ug/Kg	8300 U	25000 U		4000 U	
53469-21-	Aroclor-1242	ug/Kg	8300 U	25000 U		4000 U	
12672-29-	Aroclor-1248	ug/Kg	8300 U	25000 U		4000 U	
11097-69-	Aroclor-1254	ug/Kg	8300 U	25000 U		4000 U	
11096-82-	Aroclor-1260	ug/Kg	8300 U	25000 U		4000 U	
	METALS						
7429-90-5	Aluminum	mg/Kg	4030	3910		6120	
7440-36-0	Antimony	mg/Kg	311 J	1700 J		6 J	
7440-38-2	Arsenic	mg/Kg	32.5	65.1		9.8	
7440-39-3	Barium	mg/Kg	192	226		67.7	
7440-41-7	Beryllium	mg/Kg	0.37 J	0.44 J		0.36 J	
7440-43-9	Cadmium	mg/Kg	9.5 J	68.3 J		0.63 J	
7440-70-2	Calcium	mg/Kg	33700	24200		4150	
7440-47-3	Chromium	mg/Kg	9190	12600		194	
7440-48-4	Cobalt	mg/Kg	8.8 J	15.9		7.8 J	
7440-50-8	Copper	mg/Kg	738	1330		96.3	
7439-89-6	Iron	mg/Kg	66300	150000		22700	
7439-92-1	Lead	mg/Kg	914	2830		180	
7439-95-4	Magnesium	mg/Kg	9280	4540		2980	
7439-96-5	Manganese	mg/Kg	581	1220		218 J	
7439-97-6	Mercury	mg/Kg	18.4	44.1		1 J	
7440-02-0	Nickel	mg/Kg	65.7 J	149 J		30.9 J	
7440-09-7	Potassium	mg/Kg	283 J	415 J		442 J	
7782-49-2	Selenium	mg/Kg	2.1	7.1		1.3	
7440-22-4	Silver	mg/Kg	0.28 U	0.34 U		0.27 U	
7440-23-5	Sodium	mg/Kg	318 J	464 J		140 J	
7440-28-0	Thallium	mg/Kg	1.9 U	2.2 U		1.8 U	
7440-62-2	Vanadium	mg/Kg	19.9 J	34.3 J		14.7 J	
7440-66-6	Zinc	mg/Kg	2000 J	23000		243	
	OTHER						
SOLIDS	% Total Solids	%	80.3	66.3	64.7	82.8	82.8
PH	pH	STD u	7.7 J	7.1 J		7.6 J	

AlliedSignal, Inc.		SAMPLE ID:	WF-06S	WF-06S
Buffalo Color Area D Site		DEPTH:	(2-4')	(3.5-8')
Validated Soil Samples		LAB ID:	J3368	J3369/J3376
SDG: 8690/8737		SOURCE:	OB&G	OB&G
		SDG:	8690/8737	8690/8737
		MATRIX:	SOIL	SOIL
		SAMPLED:	8/5/98	8/5/98
		VALIDATED:	9/4/98	9/4/98
CAS NO.	COMPOUND	UNITS:		
	VOLATILES			
74-87-3	Chloromethane	ug/Kg	12 U	
74-83-9	Bromomethane	ug/Kg	12 U	
75-01-4	Vinyl chloride	ug/Kg	12 U	
75-00-3	Chloroethane	ug/Kg	12 U	
75-09-2	Methylene chloride	ug/Kg	12 U	
67-64-1	Acetone	ug/Kg	34	
75-15-0	Carbon disulfide	ug/Kg	12 U	
75-35-4	1,1-Dichloroethene	ug/Kg	12 U	
75-35-3	1,1-Dichloroethane	ug/Kg	12 U	
540-59-0	1,2-Dichloroethene (total)	ug/Kg	12 U	
	cis-1,2-Dichloroethene	ug/Kg	12 U	
	trans-1,2-Dichloroethene	ug/Kg	12 U	
67-66-3	Chloroform	ug/Kg	1 J	
107-06-2	1,2-Dichloroethane	ug/Kg	12 U	
78-93-3	2-Butanone	ug/Kg	7 J	
71-55-6	1,1,1-Trichloroethane	ug/Kg	12 U	
56-23-5	Carbon tetrachloride	ug/Kg	12 U	
75-27-4	Bromodichloromethane	ug/Kg	12 U	
78-87-5	1,2-Dichloropropane	ug/Kg	12 U	
10061-01-	cis-1,3-Dichloropropene	ug/Kg	12 U	
79-01-6	Trichloroethene	ug/Kg	12 U	
71-43-2	Benzene	ug/Kg	76	
124-48-1	Dibromochloromethane	ug/Kg	12 U	
10061-02-	trans-1,3-Dichloropropene	ug/Kg	12 U	
79-00-5	1,1,2-Trichloroethane	ug/Kg	12 U	
75-25-2	Bromoform	ug/Kg	12 U	
108-10-1	4-Methyl-2-pentanone	ug/Kg	12 U	
591-78-6	2-Hexanone	ug/Kg	12 U	
127-18-4	Tetrachloroethene	ug/Kg	12 U	
79-34-5	1,1,2,2-Tetrachloroethane	ug/Kg	12 U	
108-88-3	Toluene	ug/Kg	12 J	
108-90-7	Chlorobenzene	ug/Kg	150	
100-41-4	Ethylbenzene	ug/Kg	3 J	
100-42-5	Styrene	ug/Kg	12 U	
1330-20-7	Xylene (total)	ug/Kg	8 J	

AlliedSignal, Inc.		SAMPLE ID:	WF-06S	WF-06S
Buffalo Color Area D Site		DEPTH:	(2-4')	(3.5-8')
Validated Soil Samples		LAB ID:	J3368	J3369/J3376
SDG: 8690/8737		SOURCE:	OB&G	OB&G
		SDG:	8690/8737	8690/8737
		MATRIX:	SOIL	SOIL
		SAMPLED:	8/5/98	8/5/98
		VALIDATED:	9/4/98	9/4/98
CAS NO.	COMPOUND	UNITS:		
	SEMIVOLATILES			
111-44-4	bis(2-Chloroethyl)ether	ug/Kg		11000 U
108-95-2	Phenol	ug/Kg		11000 U
95-57-8	2-Chlorophenol	ug/Kg		11000 U
541-73-1	1,3-Dichlorobenzene	ug/Kg		11000 U
106-46-7	1,4-Dichlorobenzene	ug/Kg		11000 U
95-50-1	1,2-Dichlorobenzene	ug/Kg		3200 J
108-60-1	2,2'-oxybis(1-Chloropropane)	ug/Kg		11000 U
95-48-7	2-Methylphenol	ug/Kg		11000 U
67-72-1	Hexachloroethane	ug/Kg		11000 U
621-64-7	N-Nitroso-di-n-propylamine	ug/Kg		11000 U
106-44-5	4-Methylphenol	ug/Kg		11000 U
98-95-3	Nitrobenzene	ug/Kg		11000 U
78-59-1	Isophorone	ug/Kg		11000 U
88-75-5	2-Nitrophenol	ug/Kg		11000 U
105-67-9	2,4-Dimethylphenol	ug/Kg		11000 U
111-91-1	bis(2-Chloroethoxy)methane	ug/Kg		11000 U
120-83-2	2,4-Dichlorophenol	ug/Kg		11000 U
120-82-1	1,2,4-Trichlorobenzene	ug/Kg		1900 J
91-20-3	Naphthalene	ug/Kg		150000
106-47-8	4-Chloroaniline	ug/Kg		11000 U
87-68-3	Hexachlorobutadiene	ug/Kg		11000 U
59-50-7	4-Chloro-3-methylphenol	ug/Kg		11000 U
91-57-6	2-Methylnaphthalene	ug/Kg		3000 J
77-47-4	Hexachlorocyclopentadiene	ug/Kg		11000 U
88-06-2	2,4,6-Trichlorophenol	ug/Kg		11000 U
95-95-4	2,4,5-Trichlorophenol	ug/Kg		29000 U
91-58-7	2-Chloronaphthalene	ug/Kg		11000 U
88-74-4	2-Nitroaniline	ug/Kg		29000 U
208-96-8	Acenaphthylene	ug/Kg		11000 U
131-11-3	Dimethyl phthalate	ug/Kg		11000 U
606-20-2	2,6-Dinitrotoluene	ug/Kg		4100 J
83-32-9	Acenaphthene	ug/Kg		1400 J
99-09-2	3-Nitroaniline	ug/Kg		29000 U
51-28-5	2,4-Dinitrophenol	ug/Kg		29000 UJ
132-64-9	Dibenzofuran	ug/Kg		1900 J
121-14-2	2,4-Dinitrotoluene	ug/Kg		12000
100-02-7	4-Nitrophenol	ug/Kg		29000 U
86-73-7	Fluorene	ug/Kg		2400 J
7005-72-3	4-Chlorophenyl phenyl ether	ug/Kg		11000 U
84-66-2	Diethyl phthalate	ug/Kg		11000 U
100-01-6	4-Nitroaniline	ug/Kg		29000 U
534-52-1	4,6-Dinitro-2-methylphenol	ug/Kg		29000 U
86-30-6	N-Nitrosodiphenylamine	ug/Kg		2100 J
101-55-3	4-Bromophenyl phenyl ether	ug/Kg		11000 U
118-74-1	Hexachlorobenzene	ug/Kg		11000 U
87-86-5	Pentachlorophenol	ug/Kg		29000 U
85-01-8	Phenanthrene	ug/Kg		17000
120-12-7	Anthracene	ug/Kg		5700 J
84-74-2	Di-n-butyl phthalate	ug/Kg		11000 U
86-74-8	Carbazole	ug/Kg		1600 J
206-44-0	Fluoranthene	ug/Kg		13000
129-00-0	Pyrene	ug/Kg		18000
85-68-7	Butyl benzyl phthalate	ug/Kg		11000 U
91-94-1	3,3'-Dichlorobenzidine	ug/Kg		11000 U
56-55-3	Benzo[a]anthracene	ug/Kg		10000 J
218-01-9	Chrysene	ug/Kg		7900 J
117-81-7	bis(2-Ethylhexyl)phthalate	ug/Kg		1800 J
117-84-0	Di-n-octyl phthalate	ug/Kg		11000 UJ
205-99-2	Benzo[b]fluoranthene	ug/Kg		9400 J
207-08-9	Benzo[k]fluoranthene	ug/Kg		4000 J
50-32-8	Benzo[a]pyrene	ug/Kg		15000 J
193-39-5	Indeno[1,2,3-cd]pyrene	ug/Kg		2500 J
53-70-3	Dibenz[a,h]anthracene	ug/Kg		11000 UJ
191-24-2	Benzo[g,h,i]perylene	ug/Kg		2600 J

AlliedSignal, Inc.		SAMPLE ID:	WF-06S	WF-06S
Buffalo Color Area D Site		DEPTH:	(2-4')	(3.5-8')
Validated Soil Samples		LAB ID:	J3368	J3369/J3376
SDG: 8690/8737		SOURCE:	OB&G	OB&G
		SDG:	8690/8737	8690/8737
		MATRIX:	SOIL	SOIL
		SAMPLED:	8/5/98	8/5/98
		VALIDATED:	9/4/98	9/4/98
CAS NO.	COMPOUND	UNITS:		
	PESTICIDES/PCBs			
319-84-6	alpha-BHC	ug/Kg		210 U
319-95-7	beta-BHC	ug/Kg		210 U
319-86-8	delta-BHC	ug/Kg		210 U
58-89-9	gamma-BHC (Lindane)	ug/Kg		210 U
76-44-8	Heptachlor	ug/Kg		210 U
309-00-2	Aldrin	ug/Kg		11 JN
1024-57-3	Heptachlor epoxide	ug/Kg		88 J
959-98-8	Endosulfan I	ug/Kg		210 U
60-57-1	Dieldrin	ug/Kg		140 JN
72-55-9	4,4'-DDE	ug/Kg		410 U
72-20-8	Endrin	ug/Kg		410 U
33213-65-	Endosulfan II	ug/Kg		72 J
72-54-8	4,4'-DDD	ug/Kg		360 JN
1031-07-8	Endosulfan sulfate	ug/Kg		410 U
50-29-3	4,4'-DDT	ug/Kg		410 U
72-43-5	Methoxychlor	ug/Kg		520 J
53494-70-	Endrin ketone	ug/Kg		410 U
7421-36-3	Endrin aldehyde	ug/Kg		410 U
5103-71-9	alpha-Chlordane	ug/Kg		210 U
5103-74-2	gamma-Chlordane	ug/Kg		210 U
8001-35-2	Toxaphene	ug/Kg		21000 U
12674-11-	Aroclor-1016	ug/Kg		4100 U
11104-28-	Aroclor-1221	ug/Kg		8200 U
11141-16-	Aroclor-1232	ug/Kg		4100 U
53469-21-	Aroclor-1242	ug/Kg		4100 U
12672-29-	Aroclor-1248	ug/Kg		4100 U
11097-69-	Aroclor-1254	ug/Kg		4100 U
11096-82-	Aroclor-1260	ug/Kg		4100 U
	METALS			
7429-90-5	Aluminum	mg/Kg		16000
7440-36-0	Antimony	mg/Kg		55.5 J
7440-38-2	Arsenic	mg/Kg		148
7440-39-3	Barium	mg/Kg		756
7440-41-7	Beryllium	mg/Kg		0.77 J
7440-43-9	Cadmium	mg/Kg		36.9 J
7440-70-2	Calcium	mg/Kg		31500
7440-47-3	Chromium	mg/Kg		586
7440-48-4	Cobalt	mg/Kg		9.4 J
7440-50-8	Copper	mg/Kg		926
7439-89-6	Iron	mg/Kg		64800
7439-92-1	Lead	mg/Kg		4340
7439-95-4	Magnesium	mg/Kg		6010
7439-96-5	Manganese	mg/Kg		860 J
7439-97-6	Mercury	mg/Kg		14.4
7440-02-0	Nickel	mg/Kg		85.4 J
7440-09-7	Potassium	mg/Kg		9940
7782-49-2	Selenium	mg/Kg		2.4
7440-22-4	Silver	mg/Kg		0.42 J
7440-23-5	Sodium	mg/Kg		2440
7440-28-0	Thallium	mg/Kg		1.8 U
7440-62-2	Vanadium	mg/Kg		34.9 J
7440-66-6	Zinc	mg/Kg		14500
	OTHER			
SOLIDS	% Total Solids	%	80.5	80.9
PH	pH	STD u		7.5 J

APPENDIX E

APPENDIX E

NATURAL ATTENUATION EVALUATION

APPENDIX E

NATURAL ATTENUATION EVALUATION
E.C. GLAZA, P.E.

E.1 Biodegradation Potential

Numerous laboratory and field studies have shown that many organic compounds are readily biodegraded via naturally occurring processes. A brief literature review was conducted to evaluate the natural biodegradation potential for organic compounds (volatiles, semivolatiles, PAHs and phenols) detected in porewater samples in excess of NYSDEC Class C Surface Water Standards/Guidelines, as presented in Table 4.1. In summary, all of the organic compounds detected in excess of the NYSDEC criteria have been shown to be readily biodegraded aerobically under naturally occurring conditions, while six of the eight have been shown to be biodegradable under anaerobic conditions as well. To assess whether natural biodegradation of site compounds is occurring, the results for geochemical indicators of biodegradation are evaluated below.

E.2 Review of Biodegradation Processes

Microorganisms obtain energy for cell production and maintenance by facilitating thermodynamically advantageous reduction-oxidation (redox) reactions involving the transfer of electrons from electron donors to available electron acceptors. This results in oxidation of the electron donor and reduction of the electron acceptor. Electron donors may be natural organic carbon or organic compounds such as petroleum hydrocarbon compounds and less-chlorinated solvents such as di-chlorinated benzenes. Petroleum hydrocarbons or solvents are completely degraded or detoxified if they are utilized as the primary electron donor (i.e., as a primary substrate or carbon source) for microbial metabolism (Bouwer, 1992). Electron acceptors are elements or compounds that occur in relatively oxidized states, and include oxygen, nitrate, ferric iron, sulfate, manganese, carbon dioxide, and highly chlorinated solvents such as polychlorinated benzenes, such as hexachlorobenzene and pentachlorobenzene, and other solvents such as tetrachloroethene, trichloroethene, tetrachloroethane, and trichloroethane.

The driving force of biodegradation is electron transfer, which is quantified by the Gibbs free energy of the reaction ($\Delta G°_r$) (Bouwer, 1994). The value of $\Delta G°_r$ represents the quantity of free energy consumed ($\Delta G°_r>0$) or yielded ($\Delta G°_r<0$) to the system during the reaction. Although thermodynamically favorable, most of the reactions involved in biodegradation of petroleum or chlorinated hydrocarbons cannot proceed abiotically because of the lack of activation energy. Microorganisms are capable of providing the necessary activation energy; however, they will facilitate only those redox reactions that have a net yield of energy (i.e. $\Delta G°_r < 0$). Most reactions involving biodegradation of compounds do yield energy to the microbes; however, in many cases, specific geochemical conditions are necessary for this reaction to be favorable and to allow the appropriate microbial population to develop and grow.

Microorganisms preferentially utilize electron acceptors while metabolizing hydrocarbons (Bouwer, 1992). Dissolved oxygen (DO) is utilized first as the prime electron acceptor. It is under these conditions (i.e., aerobic conditions) that compounds such as petroleum hydrocarbons and the less chlorinated solvents are most commonly used as electron donors. After the DO is consumed, anaerobic microorganisms use native electron acceptors in the following order of preference: nitrate, manganese, ferric iron hydroxide, sulfate, and finally carbon dioxide. Under anaerobic conditions, compounds such as petroleum compounds are still used as electron donors. Chlorinated solvents that are susceptible to reductive dehalogenation generally are used as electron acceptors as an aquifer becomes more reducing, such as under sulfate-reducing or methanogenic conditions.

In addition to being controlled by the energy yield of the reaction, the expected sequence of redox processes also is a function of the oxidation/reduction potential (ORP) of the groundwater. This potential is a measure of the relative tendency of a solution or chemical reaction to accept or transfer electrons. As each subsequent electron acceptor is utilized, the groundwater becomes more reducing, and the ORP of the water decreases. The main force driving this change in ORP is microbially-mediated redox reactions. ORP can be used as an indicator of which redox reactions may be operating at a site. Environmental conditions and microbial competition ultimately determine which processes will dominate.

Depending on the types and concentrations of electron acceptors present (e.g., nitrate, sulfate, carbon dioxide), pH conditions, and ORP, anaerobic biodegradation can occur by denitrification, manganese reduction, ferric iron reduction, sulfate reduction, or methanogenesis. Other, less common anaerobic degradation mechanisms such as manganese or nitrate reduction may dominate if the physical and chemical conditions in the subsurface favor use of these electron acceptors.

E.3 Geochemical Indicators of Biodegradation

Analytical data concerning potential electron acceptors, biodegradation by-products and related analytes can be used to show that organic compounds are biodegrading in saturated soil and groundwater. Depressed concentrations of oxidized chemical species (electron acceptors) such as nitrate, oxygen and sulfate that are used by microorganisms to facilitate the oxidation of organic compounds within groundwater are geochemical indicators that compounds are biodegrading. Similarly, elevated concentrations of biodegradation by-products such as iron II and methane within groundwater are also geochemical indicators that compounds are biodegrading.

Ideally, concentrations of geochemical indicators in groundwater collected in the contaminated zone are compared to background concentrations collected from an uncontaminated upgradient area. The groundwater sample (BG-01W) collected from the piezometer installed in an area assumed to be free from contamination showed concentrations of several organic compounds, and was not collected from a location immediately upgradient of the waste fill area. Therefore, no comparison with background is possible for purposes of evaluating geochemical data, and the significance of the geochemical indicators could be evaluated based on the absolute value of each parameter only, as detailed below.

E.3.1 Oxidizing Potential

Background Discussion

Microorganisms facilitate the biodegradation of organic compounds to produce energy for their use. The amount of energy that can be released when a reaction occurs or is required to drive the reaction to completion is quantified by the free energy of the reaction. By coupling the oxidation of organic compounds, which requires energy, to the reduction of other compounds (e.g., oxygen, nitrate, manganese, ferric iron, sulfate, and carbon dioxide), which yield energy, the overall reaction will yield energy. Figure E.1 illustrates the sequence of microbially-mediated redox processes based on the amount of free energy released for microbial use. In general, reactions yielding more energy tend to take precedence over processes that yield less energy.

The expected sequence of redox processes is also a function of the oxidizing potential (Eh) of the groundwater. The oxidizing potential measures the relative tendency of a solution or chemical reaction to accept or transfer electrons. The oxidizing potential of the groundwater can be measured in the field. This field measurement can then be expressed as pe, which is the hypothetical measure of the electron activity associated with a specific Eh. High pe means that the solution has a relatively high oxidizing potential. The reduction of highly oxidized species results in an overall decrease in the oxidizing potential of the groundwater. As shown in Figure E.1, the reduction of oxygen and nitrate will reduce the oxidizing potential to levels at which manganese and ferric iron (Fe^{3+}) reduction can occur. As each chemical species that can be used to oxidize the compounds is exhausted, the microorganisms are forced to use other available electron acceptors with lower oxidizing capacity.

Site-Specific Evaluation

Figure E.1 shows the range of pe in the porewater samples collected from the waste fill area, based on Eh measurements (converted to dimensionless pe values). These data imply that oxygen, nitrate, manganese, ferric iron and sulfate may be being used to biodegrade compounds in the waste fill area. The pe values do not indicate that methanogenesis is occurring. However, field experience at other sites has shown that the Eh probes used for field measurement are not sensitive to all redox pairs present. Methanogenesis, therefore, can not be ruled out.

E.3.2 Dissolved Oxygen Concentrations

Background Discussion

All of the organic compounds detected in porewater samples in excess of NYSDEC criteria can be biodegraded under aerobic conditions (Table 4.1). The reduction of molecular oxygen during the oxidation of organic compounds yields a significant amount of free energy to the system for use by microorganisms. Reduction in molecular oxygen via microbial respiration also will cause anaerobic conditions and reduce the oxidizing potential of the aquifer, and thus bring about a change in the types of microorganisms that facilitate biodegradation of the compounds.

Site-Specific Evaluation

Depressed dissolved oxygen (DO) concentrations at the site indicate that any DO being transported via groundwater flow or hydraulic communication with the river into the contaminated zone is being consumed via biodegradation of site organic compounds. DO levels were measured at all five porewater sampling locations within the waste fill. As shown in

Table 4.2, DO concentrations were below one mg/L in four of the five sampling locations, indicating that anaerobic conditions predominate in most areas of the waste fill.

E.3.3 Dissolved Nitrate Concentrations

Background Discussion

Once anaerobic conditions prevail in the groundwater, nitrate can be used as an electron acceptor by facultative anaerobic microorganisms to mineralize organic compounds via either denitrification or nitrate reduction processes. Denitrification is the most energetically favorable of the redox reactions likely to be involved in the oxidation of the compounds. However, nitrate reduction may take precedence over denitrification as the groundwater becomes more reducing. Nitrate can only function as an electron acceptor in microbially-facilitated degradation reactions if the groundwater system has been depleted of oxygen (i.e., the biologically active zones in soils and groundwater must be functionally anaerobic). Oxygen is toxic to the enzyme systems used for electron transfer and energy production of nitrate-reducing microorganisms.

Site-Specific Evaluation

Depressed nitrate levels at the site indicate that any nitrate being transported via groundwater flow into the contaminated zone is being used as an electron acceptor during biodegradation of site organic compounds. Nitrate concentrations were measured at three of the five porewater sampling locations within the waste fill. In all samples, nitrate concentrations were less than one mg/L.

E.3.4 Dissolved (Ferrous) Iron Concentrations

Background Discussion

The anaerobic metabolic pathways involving the reduction of ferric iron (Fe^{3+}, Iron III) to ferrous iron (Fe^{2+}, Iron II) have been shown to be a major metabolic pathway for some microorganisms. Elevated concentrations of ferrous iron are often found in anaerobic groundwater systems. Concentrations of dissolved ferrous iron once were attributed to the spontaneous and reversible reduction of ferric oxyhydroxides, which are thermodynamically unstable in the presence of organic compounds such as BTEX. Recent evidence suggests, however, that the reduction of ferric iron to ferrous iron cannot proceed without microbial mediation (Lovley and Phillips, 1988; Lovley et al., 1991; Chapelle, 1993). This means that the reduction of ferric iron to ferrous iron requires mediation by microorganisms with the appropriate enzymatic capabilities.

Site-Specific Evaluation

The elevated ferrous iron concentrations at the site indicate that the iron-reducing microorganisms are using ferric iron as an electron donor during biodegradation of site organic compounds. Ferrous iron concentrations were measured at all five of the porewater sampling locations within the waste fill, and ranged from 0.6 to 6.0 mg/L, with an average of 2.9 mg/L. As discussed above, the reduction of ferric iron to ferrous iron cannot proceed without microbial mediation. The ferric iron source is likely dissolution from the surrounding aquifer or waste fill material.

E.3.5 Sulfate Concentrations

Background Discussion

Sulfate also may be used as an electron acceptor during microbial degradation of organic compounds under anaerobic conditions. This redox reaction is commonly called sulfate reduction. Sulfate is reduced to sulfide during the oxidation of organic compounds. The presence of decreased concentrations of sulfate in an area of elevated contamination indicates that sulfate may be participating in redox reactions at a site.

Site-Specific Evaluation

Sulfate concentrations were measured at three of the five porewater sampling locations within the waste fill. Concentrations ranged from 280 to 1000 mg/L. As discussed above, sulfate concentrations depressed from background would be expected if compounds were being biodegraded via sulfate reduction. Because the measured sulfate levels can not be compared to background levels, the contribution of sulfate reduction to biodegradation can not be determined. However, there is a significant supply of sulfate to be used by bacteria once oxygen, nitrate, and ferric iron are depleted.

E.3.6 Methane Concentrations

Background Discussion

The carbon dioxide-methane (CO_2-CH_4) redox couple also can be used to biodegrade organic compounds once the groundwater is sufficiently reducing. To attain these reducing levels, other highly oxidizing chemical species such as oxygen, nitrate, and manganese must be reduced. This redox reaction is called methanogenesis or methane fermentation. Methanogensis yields the least free energy to the system in comparison to other chemical species (Figure E.1). The presence of methane in groundwater is a good indicator of methane fermentation.

Site-Specific Evaluation

The presence of methane suggests that methanogenesis is occurring due to biodegradation of site organic compounds. Methane concentrations were measured at three of the five porewater sampling locations within the waste fill. Concentrations ranged from 0.2 to 2 mg/L. As discussed above, the presence of methane would be expected if compounds were being biodegraded via methanogenesis.

E.4 Summary

Based on numerous field and laboratory evaluations completed at other sites, all of the organic compounds (VOCs, SVOCs, PAHs and phenols) detected in waste fill area porewater samples in excess of NYSDEC criteria have been shown to be readily biodegraded aerobically under naturally occurring conditions. Six of the eight compounds have been shown to be biodegradable under anaerobic conditions as well. Specific evidence that biodegradation, likely of site compounds, is occurring includes:

- Site DO levels are general less than one mg/L, indicating that any oxygen being transported into the waste fill area via groundwater flow or hydraulic communication with the river is being consumed. The consumption of oxygen is most likely due to biodegradation of site organic compounds.

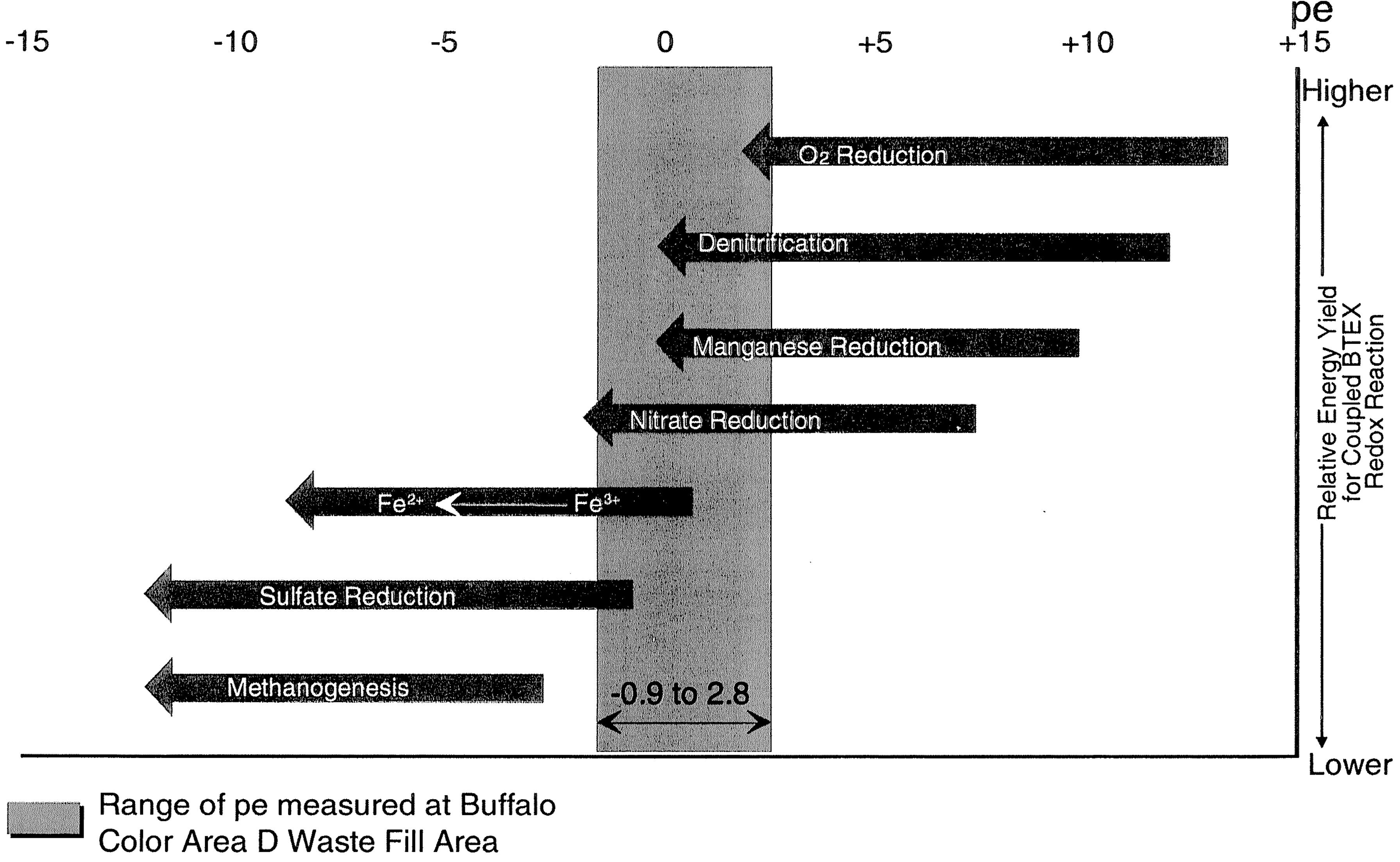
- Site nitrate levels are general less than one mg/L, indicating that any nitrate being transported into the waste fill area via groundwater flow or hydraulic communication with the river is being consumed. The consumption of nitrate, if occurring, is most likely due to biodegradation of site organic compounds.
- Significant levels of ferrous iron were detected at the site. Because reduction of ferric iron to ferrous iron cannot proceed without microbial mediation, the presence of ferrous iron is a strong indicator that biodegradation of site organic compounds is occurring via iron reduction.
- Methane was detected in all porewater samples where methane was analyzed for, indicating that biodegradation of site organic compounds is occurring via methanogenesis.
- The redox potential, expressed as pe, is sufficiently depressed to indicate that the full range of natural biodegradation processes is likely occurring.

For biodegradation to occur, an ongoing supply of electron acceptors (oxygen, nitrate, sulfate, etc.) is required. As discussed in Section 4.5, groundwater flow is likely occurring parallel to the river current, providing one potential ongoing source of electron acceptors. In addition, sulfate and ferric iron may be dissolving from the waste fill material providing additional electron acceptor

s. Finally, the electron acceptor for methanogenesis is carbon dioxide, which is also a byproduct of biological activity, providing another potential source of electron acceptors.

In summary, it is expected that site organic compound concentrations will decrease over time due to natural biological processes. This conclusion is based on the demonstrated biodegradability of all of the organic compounds (VOCs, SVOCs, PAHs and phenols) detected in waste fill area porewater samples in excess of NYSDEC Class C Surface Water Standards/Guidelines, and on site-specific geochemical indicators of natural biodegradation,.

Figure E.1
Sequence of Microbially Mediated Redox Processes



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