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RECRA RESEARCH, INC.

Hazardous Waste And Toxic Substance Control

RECRA RESEARCH, INC.

4248 Ridge Lea Road
Amherst, New York 14226

SUPPLEMENTAL HYDROGEOLOGIC INVESTIGATION

ALLTIFT - 1982

RECRA RESEARCH, INC.
Hazardous Waste And Toxic Substance Control

July 12, 1982

Mr. Peter J. Burke
Regional Attorney
New York State Department of
Environmental Conservation
600 Delaware Avenue
Buffalo, NY 14202

Dear Mr. Burke:

Enclosed please find two copies of the Supplemental Hydrogeologic Investigation for the Alltift Site.

If you have any questions on the enclosed, please contact Mr. Greenfield at 823-9900 or the undersigned at 885-7703.

Sincerely,

RECRA RESEARCH, INC.

John Banaszak

John E. Banaszak, P.E.

JEB/jlh
Enclosure

4246 Ridge Lea Road, Amherst, New York 14226 Telephone (716) 838-6200

RECRA RESEARCH, INC.

Hazardous Waste And Toxic Substance Control

SUPPLEMENTAL
HYDROGEOLOGIC INVESTIGATION

ALLTIFT - 1982

Prepared for:

Alltift, Inc.

Prepared by:

J. E. Banaszak, P. E.
Recra Research, Inc.

4248 Ridge Lea Road, Amherst, New York 14226 Telephone (716) 838-6200

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1.0 INTRODUCTION

In May of 1980, an engineering design and attendant application forms were submitted to the New York State Department of Environmental Conservation in pursuit of a Permit to Operate in accordance with 6 NYCRR 360. In November of that year, a determination of nonsignificance, a SEQR negative declaration, and a notice of complete application for this project was issued by the State. In January of 1981, Alltift was further advised that their application would not be approved unless:

1. a cut-off wall and leachate collection system was installed through the old fill material along their property line

   or

2. the adjacent properties were acquired so that the cut-off wall and leachate system could be installed along the toe of slope of the old landfill, thus remediating the entire site.

The first alternate was neither economically viable, nor was it preferred from an environmental standpoint. It was therefore decided to investigate the second alternative to see if acquisition of the adjacent parcels would provide both, a source of on-site clay, and enough additional landfill capacity to help offset the costs involved with remediation of the old site. After many months of discussion with the owners of the property to the west of Alltift's, permission was finally granted to enter that property for purposes of conducting the field portion of the investigation. The field work planned consisted of staking of the property lines and generation of a topographic map for each parcel. A number of test borings were also planned to evaluate subsurface conditions underlying the study areas. Because a drilling rig

was to be utilized to advance the test borings, it was decided that some of the borings would be converted to deep monitoring wells screened below the underlying clay layer. Data from these wells would provide information relative to ground water quality and direction of flow within the underlying aquifer.

All of the above work was performed at Alltift's expense. This report presents the results of that investigation. Conceptual redesign of the facility, based on these results, will be presented in a forthcoming report.

2.0 SURVEY WORK

Survey work performed as a part of this investigation involved field staking of the property lines for the two parcels to the east and west of the Alltift property, which would constitute the proposed site expansion. Additionally, existing ground contours for the two adjoining parcels were surveyed and plotted, as well as the updated topography for the existing Alltift site. This information was generated so that the extent of the old landfill area could be determined in relation to the expanded site property lines.

Results of this survey work are presented on plan sheets No. 2 and 3. These plan sheets will also serve as the base map for development of the proposed revised landfill design. All survey work was performed by Soderholm Engineering in the spring of this year.

3.0 TEST BORINGS AND GROUNDWATER MONITORING WELLS

Seven (7) exploratory borings were performed at various locations along the periphery of the proposed expansion of the Alltift site. The test borings provided the necessary visual characterization of the fill, natural soils, and bedrock underlying the site and also provided the method to simultaneously determine the proper well placement and development techniques that are necessary for groundwater monitoring and sampling. Four (4) of the test borings were constructed as groundwater monitoring wells and have been designated as W-1, W-2, W-3, and W-4 (see Plan Sheets 2 and 3 of 3).

Each exploratory boring was constructed by utilizing a 3 3/4 inch inner diameter (I.D.) hollowstem auger. Drilling was accomplished by either a CME truck or an ATV mounted drilling rig. Split spoon samples obtained by the standard penetration test procedure ASTM D-1586 and thin walled tube (shelby) samples obtained by the test procedure ASTM D-1587 were collected at maximum five foot depth intervals. This sampling procedure allowed for characterization of the soil/fill profile at each location and functioned as a guideline for monitoring well construction at each respective well location. All samples were visually classified in the field and stored in moisture-tight glass jars. Unconfined compressive strength tests of the silty-clay and clay soil samples were performed in the field with a Soiltest CL-700 Pocket Penetrometer and recorded on the respective soil boring logs.

Exploratory borings #W-2, W-4, TB-1, and TB-2 were continued into the consolidated bedrock formations by means of NX coring. The use of coring at these locations provided for the visual characterization of the underlying bedrock. At #W-2 and W-4, coring was also utilized as a means

of establishing well screen placement in the uppermost water bearing zone below the clayey strata.

The groundwater monitoring wells were provided with five feet of two-inch I.D. stainless steel well screen within the uppermost water bearing zone beneath lacustrine clay sediments. At #W-4, a six-foot stainless steel screen was used. These wells were completed with:

a. two-inch I.D. carbon steel casing to a minimum two feet above existing grade,

b. #4 sand back-fill in the annular space around the well screen,

c. bentonite pellet seal around the casing in the annular space above the well screen, and

d. cement grout back-fill in the annular space around the casing from the bentonite seal to existing grade.

Each well was constructed through the 3 3/4 inch I.D. auger drilled into the boring locations. These wells are diagrammed on the respective subsurface logs (Appendix A) and Table 1 provides the well construction details. All test borings not converted to monitoring wells were backfilled with a cement/bentonite mixture. All drilling and well construction were performed by the Rochester Drilling Company, Inc. of Rochester, New York, under the supervision of Recra Research, Inc. (Recra).

TABLE 1. MONITORING WELL CONSTRUCTION DETAILS*

Well No.	Ground Surface Elevation (ft.)	Depth of Well (ft.)	Well Screen Length (ft.)	Exposed Casing Length (ft.)
W-1	588.4	59.0	5.0	3.49
W-2	587.4	68.0	5.0	2.09
W-3	583.3	50.5	5.0	3.39
W-4	585.2	52.0	6.0	3.71

* Ground surface elevations and exposed well casing measurements as provided by Soderholm Engineering; dated May 6, 1982.

4.0 SITE GEOLOGY

4.1 Fill Materials

Each boring location, with the exception of #W-4, encountered a layer of assorted fill and debris overlying the naturally occurring soil strata. The depth and composition of this fill varied across the areas tested.

Test borings located west of the landfill revealed fill closely related to observable material on the adjoining railway; that is, distinctly different from waste materials sampled within the landfill. The possibility exists that this material was placed, by sources unknown, atop the original soil surface to contain ponded surface water contiguous to the Alltift landfill.

Boring #W-2, although located along the western portion of the investigated sites, revealed approximately 13 feet of a saturated, coarse textured fill. The boring was located on the landfill proper and consequently, this material represents prior landfilling activities. Soft, saturated surficial soil conditions prohibited any drilling activity west of this location (beyond the landfill).

Borings #W-1 and #W-4 were located on the adjacent property east of the landfill. Boring #W-1, on the Abby Street parcel, revealed 3 feet of soil and assorted debris. This sequence presumably extends eastward to the fence that separates the Abby Street parcel from property reputedly owned by Skyway Auto Parts. No evidence of fill or disturbed soil was encountered at #W-4.

4.2 Glaciolacustrine Sediments

Glaciolacustrine sediments were encountered at each of the boring locations. Within borings #W-1, W-2, W-3, W-4, and TB-2, three strata of differing

sediments were encountered as follows:

- an uppermost coarse to fine silty soil with slight plasticity,
- inorganic clays of low to medium plasticity,
- inorganic clays with high plasticity with intermittent silt and fine sand lenses (ranging from 1/8 inch to 1/2 inch in thickness), and often exhibiting a varying sequence of gray and reddish brown laminae at the base.

At each boring location, the contacts between these sedimentary beds were transitional and could not be precisely determined.

Boring #TB-1 exhibited an upper sandy-clay stratum above the aforementioned zones of clay. While at boring #TB-3, a silty-sand soil was encountered throughout most of the entire length of the unconsolidated soil deposits.

4.3 Glacial Till

Glacial till is a highly variable, often heterogeneous mixture of unconsolidated materials deposited by the advance and/or retreat of glacial ice. At the Alltift and adjacent parcels, glacial till underlies the lacustrine clay in a distinct, yet unconformable contact. This glacial deposit, in turn, unconformably overlies consolidated bedrock units of shale and limestone.

Samples of the glacial till consisted of varying amounts of clay, silt, sand, and gravel. Of particular importance is the absence of till at location #TB-3 and the varying till thickness across the site (Figure 1 and Appendix A). In location #W-1, the till was sufficiently coarse textured to allow for well screen installation at the contact with the underlying bedrock. During the test borings for wells #W-4 and W-3, a till of finely textured, highly compacted materials was encountered which precluded an adequate recharge rate of free-moving interstitial water necessary for groundwater monitoring. At well #W-2, the existence of one foot of glacial till eliminated the possibility

of setting the well screen solely within this zone. Therefore, wells #W-2, W-3, and W-4 were screened both within the till and underlying bedrock.

4.4 Bedrock

4.4.1 Oatka Creek Shale

Previous investigative work by Wehran Engineering (Ref.) classified much of the underlying shale bedrock as the Oatka Creek Shale member of the Marcellus Formation. The Oatka Creek Shale is of middle Devonian age and is locally estimated to be 30-55 feet thick by Buehler and Tesmer (Ref.). This formation has been described (Ref.) as follows:

> "A dense, black, fissle shale with a petroliferous odor. There are some beds of gray shale and several concretionary layers. Nodules of pyrite occur in the black shale near the base."

The shale, as encountered in this investigation, is consistent with the preceding description of Buehler and Tesmer (Ref.) and with the previous findings of Wehran Engineering, P.C. (Ref.).

4.4.2 Moorehouse Limestone

Limestone cores obtained from test borings #W-2, W-4, and TB-2 have been identified as belonging to the Moorehouse Limestone member of the middle Devonian series Onondaga Limestone. The location of these limestone cores with respect to identified samples of the Oatka Creek Shale indicate that the limestone unit underlies the shale. This factor, coupled with minor amounts of chert obtained from boring #W-4, identify the Moorehouse Limestone locally beneath the investigated sites.

Buehler and Tesmer (Ref.) describe the Moorehouse Limestone Member as follows:

> "...bears a coral-brachiopod-bryozoan fauna. The texture varies from coarse to very finely crystalline and the color from dark gray to tan. Chert, some light buff in color, and disseminated bituminous matter are present."

The previous investigative effort by Wehran Engineering, P.C. (Ref.) has identified the Stafford Limestone (a member of the Skaneateles Formation) at the extreme southern section of the Alltift site. This formation overlies the Oatka Creek Shale. It is probable that the depth contrasts and bedrock ledge located within the investigated sites (Figure 1 and Appendix A) represents a prior erosional surface of the Oatka Creek Shale; bounded below (northerly) by the more resistant Moorehouse Limestone and above (southerly) by the resistant Stafford Limestone.

4.5 Groundwater

Groundwater within the investigated site was found to occur under three differing conditions. Firstly, an unconfined, perched groundwater table within the surficial fill materials and the underlying permeable sediments. This zone is bounded below by lacustrine clays and is directly influenced by factors of precipitation, evapotranspiration, atmospheric pressure, and topographic characteristics. Second, a zone of largely immobile, interstitial water is contained within the glacio-lacustrine clays. Finally, water is confined within the permeable zones of glacial till and adjoining fractured bedrock surfaces by the overlying clay layer.

In this investigation, the final, lower confined waterbearing zone was monitored for groundwater occurrence, direction of flow, and quality pertaining to the New York State Department of Environmental Conservation Baseline Water Quality Parameters (Ref.). Locations of the four (4) monitoring wells established around the Alltift, Inc. landfill (see Plan Sheet 1 of 2) were predicated on the anticipated hydraulic gradients and concurrently with the potentiometric levels of wells #W-1 and W-3 (first and second wells constructed). Potentiometric contours of this aquifer are presented on Plan Sheets 2 and 3. The horizontal component of flow within this zone is directed toward a general NNW direction.

5.0 FIELD SAMPLING

Field sampling of the newly installed monitoring wells involved two separate days for the selected procedures associated with the procurement of groundwater samples for analysis of N.Y.S.D.E.C. Baseline Water Quality Parameters (Ref.). On May 5, 1982, all water levels were measured and each well was bailed to insure a representative sampling of formation water. Well #W-3 was bailed dry, while at least three (3) volumes of water (within the well casing and screen) were removed from the three (3) remaining wells. On the following day, a fraction of water was removed from the well standpipes and each well was subsequently sampled.

All water samples were obtained using a bailer. Prior to obtaining the required sample volume at each well and to preclude cross-contamination of samples, the bailer was cleaned with de-ionized water, air-dried, and flushed with water from the well to be sampled.

At each well, groundwater samples were placed in a pre-cleaned glass bottle, in a pre-cleaned plastic bottle, and in pre-cleaned glass sterilized jar. Each container was identified by well number. The samples were subsequently transported to the Tonawanda, New York, based laboratory of Recra Research, Inc.

The field reports from the above work are included in the Appendix.

6.0 ANALYTICAL PROGRAM

The groundwater samples collected on May 6, 1981, were analyzed for the N.Y.S.D.E.C. baseline water quality parameters. The procedures utilized were in basic accordance with one or both of the following reference texts:

- Methods for Chemical Analysis of Water and Waste, United States Environmental Protection Agency.
- Standard Methods for the Examination of Water and Wastewater, 14th Edition, APHA, AWWA, WPCF.

Analytical results of the groundwater samples obtained from the four (4) monitoring wells are presented in Table 2.

TABLE 2

ANALYTICAL RESULTS

ALLTIFT, INC.
DEEP WELLS

Report Date: 6/4/82
Date Received: 5/6/82

PARAMETER	UNITS OF MEASURE	SAMPLE IDENTIFICATION (DATE)			
		W-1 (5/6/82)	W-2 (5/6/82)	W-3 (5/6/82)	W-4 (5/6/82)
Ammonia	mg N/l	2.5	0.95	0.74	2.1
Nitrate	mg N/l	<0.05	0.12	<0.05	0.17
Biochemical Oxygen Demand (5 day)	mg/l	10	6	<5	<5
Chemical Oxygen Demand	mg/l	16	24	11	23
Total Kjeldahl Nitrogen	mg N/l	4.4	2.2	1.7	2.8
Sulfate	mg/l	29	52	45	54
Methylene Blue Active Substances	mg/l	0.029	<0.02	0.072	0.16
Total Recoverable Phenolics	mg/l	<0.01	<0.01	<0.01	<0.01
Alkalinity (pH 4.5)	mg/l as $CaCO_3$	590	310	350	700
Total Filterable Residue (180°C)	mg/l	1,000	480	540	890
pH	Standard Units	7.73	8.11	7.99	12.31
True Color	Pt-Co Units	15	15	17.5	2.5
Total Hardness	mg/l as $CaCO_3$	390	250	270	451
Chloride	mg/l	260	88	83	88
Odor	T.O.N.	1.8	3.2	9.0	1.4
Specific Conductance (25°C)	µmhos/cm	1,780	820	822	2,990
Total Organic Carbon	mg/l	5.0	4.5	2.5	9.0
Total Coliform	Organisms/100 ml	<3	<3	<3	<3

COMMENTS: Samples were collected by Recra personnel on 5/6/82. Analyses were performed according to U.S. Environmental Protection Agency methodologies. Values reported as "less than" (<) indicate the working detection limit for the particular sample or parameter.

FOR RECRA RESEARCH, INC. R. V. Zumo

DATE 6/4/82

RECRA RESEARCH, INC.
I.D. #82-480

ANALYTICAL RESULTS

ALLTIFT, INC.
DEEP WELLS

Report Date: 6/4/82
Date Received: 5/6/82

Exceeds gw GA standards

PARAMETER	UNITS OF MEASURE	SAMPLE IDENTIFICATION (DATE)			
		W-1 (5/6/82)	W-2 (5/6/82)	W-3 (5/6/82)	W-4 (5/6/82)
Total Aluminum	mg/l	4.3	7.3	2.0	2.2
Total Arsenic -	µg/l	<4	<4	<4	<4
Total Chromium	mg/l	0.040	0.050	0.064	0.040
Hexavalent Chromium -	mg/l	0.006	0.012	0.008	<0.004
Total Cadmium	mg/l	<0.004	<0.004	<0.004	0.004
Total Zinc	mg/l	1.1	0.803	1.4	0.109
Total Selenium	µg/l	<5	<5	<5	<5
Total Copper	mg/l	0.100	0.038	0.022	0.040
Total Lead	mg/l	0.03	<0.03	<0.03	<0.03
Total Mercury -	µg/l	<1	<1	<1	<1
Total Sodium	mg/l	540	150	14	18
Total Calcium	mg/l	68	46	28	170
Total Silver	mg/l	<0.01	<0.01	<0.01	<0.01
Total Manganese	mg/l	0.22	0.23	0.20	0.16
Total Iron	mg/l	88	28	35	54
Nitrogen-Phosphorus Scan	µg/l as Nitrogen; N,N'-Dimethylaniline Standard	<1	<1	<1	<1

COMMENTS: The Nitrogen-Phosphorus Scan is used for screening purposes only and is not designed for qualification or quantification of any specific compounds. Ths results are calculated based upon the response factor and nitrogen content of N,N'-Dimethylaniline but do not imply either the presence or absence of the compound itself. Nitrogen-Phosphorus scan results generally do not include volatile organic constituents.

FOR RECRA RESEARCH, INC. R. V. Zimm

DATE 6/14/82

RECRA RESEARCH, INC.

I.D. #82-480

7.0 DISCUSSION OF RESULTS

7.1 Survey Work

Results of the topographic and property line surveys are presented on plan sheets No. 2 and 3. The contours indicate that the old landfill appears to extend east beyond the Alltift property line up to and in some areas, possibly beyond, the eastern boundary of the Abby Street parcel. On the western side, it appears to extend to within 50' of the B.R. & P. Railroad property for the northern half of the site. Along the southern half (of the western property line), the old toe of slope coincides with Alltift's existing property line, while standing water covers the Chessie parcel in this area.

The result of this alignment, i.e. the old landfill occupying most of the adjacent parcels, is that there is very little room for expansion of the landfill area for additional capacity or for excavation of clay. Along the eastern Abby Street boundary there is not enough room to maintain a 50' buffer from the property line to the waste. A 50' buffer along the Chessie parcel, especially the northern portion, would leave only a minimal amount of land for remedial work (grading, capping and trenching), or for expansion.

7.2 Hydrogeology

Data from the hydrogeologic investigation performed for the May, 1980, submission indicated that the entire Alltift property was underlain by a layer of glaciolacustrine clay. It was felt that this clay layer was acting as a bowl to contain the wastes from the old landfill. One objective of this supplemental subsurface work was to verify the extent and depth of this clay layer and the depth to the underlying bedrock. This information would

allow an estimate to be made of the amount of clay that could be mined for remedial work at the landfill and the additional landfill capacity that could be gained from filling in the resulting excavation.

The results of the survey work indicated that there is very little horizontal area on the Chessie property available for excavation, and then only on the southern portion of this parcel. The results of the boring program indicates that the clay layer thins, and the depth to bedrock decreases in a southerly direction along the site, making excavation of any significant amount of the underlying clay unpracticable.

Perhaps the most disturbing result of this supplemental work was lack of the underlying clay layer at the very southern portion of the Chessie property in the area of TB-3. The absence of the confining clay layer, coupled with the presence of silty sand sediments overlying the bedrock formation, raises an immediate concern over the apparent hydraulic connection between the surface water and bedrock aquifer in this area. TB-3 is the only location on the parcels under study where the confining clay layer was not encountered.

7.3 Groundwater Quality

As stated in the May, 1980, Engineering report, it was felt that the entire site was underlain by the confining clay layer which was acting as a bowl to contain the wastes from the old landfill. One reason for the installation of the deep monitoring wells during this investigation was to verify the integrity of the underlying clay by demonstrating the lack of contamination in the bedrock aquifer. Needless to say, the analytical results presented in Table 2 for groundwater samples obtained for these wells were not expected, because they do show the presence of contamination in this aquifer.

Comparison of the results from these deep wells (W-1 through W-4) indicates that the water quality sampled is fairly consistent, with no major increasing or decreasing trends as the flow traverses under the site. Values for ammonia, alkalinity, total filterable residue, total hardness and specific conductance were somewhat higher in wells W-1 and W-4, located along the eastern portion of the site, relative to the samples from wells W-2 and W-3, along the western boundary.

For purposes of trying to identify the source of the bedrock aquifer contamination, a summary of some of the past analytical results for this site was compiled. This summary is presented in Table No. 3. The columns labeled W-1 through W-4 represent the groundwater quality in the deep aquifer. Columns labeled SS-2 contain analytical data from two sampling events from the ponded water south of the landfill and upstream of TB-3. This data was collected in July of 1978 when Ramco Steel was still discharging to this water body. Column SS-3 represents the quality of the ponded surface water after it had been impacted by leachate discharges from the old landfill and downstream of TB-3. The B-2 and B-4 columns contain data from wells screened within the landfill. B-4 is the well closest to the southern tip of the site and TB-3. B-4 had generally the highest concentration of contaminants of all the wells screened within the fill.

If the table is studied, it can be seen that the concentrations or relative magnitude of many of the parameters listed for the deep wells are more similar to those of the surface water upstream of the landfill, than to the values representing the downstream water quality or the landfill leachate itself. This is true for ammonia, BOD, TKN, and to a lesser extent for COD, chlorides and TOC. In the case of metals, which tend to be attenuated as they pass through soil, it would be necessary to find higher concentrations at the source

TABLE NO. 3

COMPARISON OF ANALYTICAL RESULTS

PARAMETER	UNITS OF MEASURE	SAMPLE IDENTIFICATION (DATE)								
		W-1 (5/6/82)	W-2 (5/6/82)	W-3 (5/6/82)	W-4 (5/6/82)	SS-2 (7/17/78)	SS-2 (7/5/78)	SS-3 (7/5/78)	B-2 (7/31/78)	B-4 (7/31/78)
Ammonia	mg N/l	2.5	0.95	0.74	2.1	2.10	1.80	31.9	1930	73.9
Nitrate 10	mg N/l	<0.05	0.12	<0.05	0.17	18	21	0.20	<0.5	<0.5
Biochemical Oxygen Demand (5 day)	mg/l	10	6	<5	<5	12.3	21.6	150	7020	96.5
Chemical Oxygen Demand	mg/l	16	24	11	23	70.7	70.7	495	2580	593
Total Kjeldahl Nitrogen	mg N/l	4.4	2.2	1.7	2.8	3.99	1.96	39.3	1490	106
Sulfate 250	mg/l	29	52	45	54	5930	6130	592	441	2660
Methylene Blue Active Substances	mg/l	0.029	<0.02	0.072	0.16	<0.02	<0.02	0.13	0.05	0.19
Total Recoverable Phenolics	mg/l	<0.01	<0.01	<0.01	<0.01	0.036	0.027	0.039	0.696	0.050
Alkalinity (pH 4.5)	mg/l as $CaCO_3$	590	310	350	700	-	-	1620	8270	915
Total Filterable Residue (180°C)	mg/l	1,000	480	540	890	10,400	9,310	4,470	30,000	9,590
pH 6.5 8.5	Standard Units	7.73	8.11	7.99	12.31	2.36	1.93	7.78	7.47	6.43
True Color	Pt-Co Units	15	15	17.5	2.5	1500	1250	1250	-	200
Total Hardness	mg/l as $CaCO_3$	390	250	270	451	650	530	740	1250	2260
Chloride 250 mg/l	mg/l	260	88	83	88	13.1	18	1140	8450	3880
Odor	T.O.N.	1.8	3.2	9.0	1.4	-	-	-	-	-
Specific Conductance (25°C)	µmhos/cm	1,780	820	822	2,990	9,400	8,200	5,700	21,000	11,000
Total Organic Carbon	mg/l	5.0	4.5	2.5	9.0	30.5	27.0	415	1,400	313
Total Coliform	Organisms/100 ml	<3	<3	<3	<3	<200	<200	14,000	24,000	230
Total Aluminum	mg/l	4.3	7.3	2.0	2.2	4.87	2.64	0.27	0.05	0.24
Total Arsenic 25	µg/l	<4	<4	<4	<4	34	57	46	1.31	<4
Total Chromium	mg/l	0.040	0.050	0.064	0.040	0.874	0.751	0.039	0.546	<0.003
Hexavalent Chromium .05 mg/l	mg/l	0.006	0.012	0.008	<0.004	0.82	0.71	0.03	0.04	<0.01
Total Cadmium .01 mg/l	mg/l	<0.004	<0.004	<0.004	0.004	-	-	-	-	-
Total Zinc 5	mg/l	1.1	0.803	1.4	0.109	-	-	-	-	-
Total Selenium 20	µg/l	<5	<5	<5	<5	-	-	-	-	-
Total Copper 1 mg/l	mg/l	0.100	0.038	0.022	0.040	1.3	1.71	0.130	0.026	0.015
Total Lead .025 mg/l	mg/l	0.03	<0.03	<0.03	<0.03	0.51	0.38	<2	<0.03	<0.03
Total Mercury 2	µg/l	<1	<1	<1	<1	<1	<1	<1	3.8	<1.3
Total Sodium	mg/l	540	150	14	18	70	68	1,360	3,080	2,020
Total Calcium	mg/l	68	46	28	170	652	600	88	54	760
Total Silver .05	mg/l	<0.01	<0.01	<0.01	<0.01	0.008	0.021	0.006	<0.002	<0.002
Total Manganese .3	mg/l	0.22	0.23	0.20	0.16	-	-	-	-	-
Total Iron .3 mg/l	mg/l	88	28	35	54	1,770	1,144	18.3	2.43	5.08

of contamination than at the monitoring points in the deep aquifer. This is the case for the total and hexavalent chromium, copper, lead, calcium, and iron parameters.

It is therefore believed that the source of bedrock aquifer contamination found during this study is primarily a function of the ponded water south of the landfill. This agrees well with the results of the supplemental hydrogeologic investigation which indicated a possible hydraulic connection between the ponded surface water and the bedrock aquifer in the vicinity, or south of, TB-3. While the above data is not conclusive, it does present a rather strong argument that a source, other than the old landfill, may be responsible for the groundwater degradation.

8.0 REFERENCES

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Appendix A:

Test Boring and Monitoring Well Construction Logs, Field Reports

FIELD REPORT

Project Code: 2C042028 Client's Name: Alltift, Inc.

Date: May 5, 1982

Weather: Warm, sunny

Crew: J. Stachowski

Discussion: Measurements and evacuation of groundwater monitoring wells prior to sampling

Location	Time (5/5/82)	Water Level (Top Case)	Groundwater Elevation
Well #1	10:30	16'6"	575.39
45 bails (7.3 gal.) completed at: (bailing rate of 0.24 gal./min.)	11:00	18'7"	573.31
Well #2	12:09	14'7"	574.91
45 bails (7.3 gal.) completed at: (bailing rate of 0.29 gal./min.)	12:34	14'9 1/2"	574.70
Well #3	12:51	10'4 1/2"	576.31
40.5 bails (6.5 gal.) completed at: (bailing rate of 0.21 gal./min.)	13:22	dry well	-
Well #4	11:08	13'11 1/2"	574.95
45 bails (7.3 gal.) completed at: (bailing rate of 0.21 gal./min.)	11:43	49'3"	539.66

FIELD REPORT

Project Code: 2C042028 Client's Name: Alltift, Inc.

Date: May 6, 1982

Weather: warm, sunny

Crew: J. Stachowski

Discussion: Measurements and sampling of groundwater monitoring wells

Location	Time (5/6/82)	Water Level (Top Case)	Comments
Well #1	11:35	16'5"	Evacuated 6 bails (approx. 1 gal.), then sampled
Well #2	12:48	14'6 1/2"	Evacuated 6 bails (approx. 1 gal.), then sampled
Well #3	13:42	10'9 1/2"	Evacuated 4 bails (approx. 0.64 gal.), then sampled
Well #4	12:09	13'10"	Evacuated 6 bails (approx. 1 gal.), then sampled

DATE STARTED 4/19/82
FINISHED 4/20/82
SHEET 1 OF 3

RECRA RESEARCH, INC.

SUBSURFACE LOG

HOLE NO. W-1
SURFACE ELEV. 588.4
G.W. DEPTH 575.39

PROJECT Alltift 2C042028

LOCATION East of existing landfill (Abby Rd.)

DEPTH-FT	LOG PPT	LOG USCS	SAMPLE TYPE	SAMPLE NO	BLOWS ON SAMPLER 0/6	BLOWS ON SAMPLER 6/12	BLOWS ON SAMPLER 12/18	BLOWS ON SAMPLER 18/24	DESCRIPTION	NOTES
									Moist black CLAYEY-SILT with glass, metal, assorted fill	Traces of apparent yellow/white powdery waste material (grab sample) 3.0'
5	-	SM	SS	1	WOH		-		5 - 6 1/2' Wet black SANDY-SILT, trace GRAVEL, nonstratified, very loose.	Saturated at 3.0' Appears to be original horizon of organic material
10	-	SC		2	1	3	2		10 - 11 1/2' Extremely moist, distinctly mottled green/lt. brown CLAYEY-SAND, trace GRAVEL, slightly plastic, firm, massive (nonstratified)	
15	1.3 1.25	SM		3	2	3	7		-------grades downward to -------- 15 - 16 1/2' Wet gray SANDY-SILT, non-plastic, nonstratified, loose to firm consistency	
20	0.125 0.125	CL, ML		4	3	3	2		20 - 21 1/2' Wet gray SILT and CLAY with two (2) approx. 1/2" layers of SILTY-SAND; SILTY-CLAY is plastic, firm	Transition between 16 1/2' and 20' Fine sandy lenses noted in sample #4 occur at approximately 21.0' & 21.3'
25	.25 .25	CL		5	8	7	4		25 - 26 1/2' Wet gray SILTY-CLAY, stiff, homogeneous massive structure, plastic	
30	.4 .4	CL		6	4	4	5			

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METHOD OF INVESTIGATION ASTM Specifications

DATE STARTED 4/19/82
FINISHED 4/20/82
SHEET 2 OF 3

RECRA RESEARCH, INC.

SUBSURFACE LOG

HOLE NO. W-1
SURFACE ELEV. 588.4
G.W. DEPTH 575.39

PROJECT Alltift 2C042028

LOCATION East of existing landfill (Abby Rd.)

DEPTH-FT	LOG PPT	LOG USCS	SAMPLE TYPE	SAMPLE NO	BLOWS ON SAMPLER 0/6	BLOWS ON SAMPLER 6/12	BLOWS ON SAMPLER 12/18	BLOWS ON SAMPLER 18/24	DESCRIPTION	NOTES
35	0.14	CH	SS	7	WOR	1	1		35-36 1/2' Saturated grey SILTY-CLAY with occasional SILT & (f) SAND lense, soft, plastic	
	0.14									
40	0.14	CH		8	2	3	3		40-41 1/2' Medium stiff (firm)	
	0.14									
45				9	WOR		-		45-46 1/2' Very soft	No sample recovered (#9)
									-------grades downward to----------	
	0.09	CH		10	2	2	2		49/50 1/2' Saturated reddish brown CLAY with two (2) gray (f) SAND lenses (1/4") CLAY is soft, plastic	Sand lenses occur at approximately 49.5' & 50.0'
50	0.09									
	>4.5	SM		11		100/4"			-------sharp transition to---------- Extremely moist brown SILTY-SAND some (C-F), GRAVEL non-stratified, massive structure, very dense	53.5' Coarse and medium textured gravels are predominantly angular black shale
55	>4.5	SM		12		100/2"				
										59.0'
60									Refusal on presumed shale bedrock	Augering encountered two (2) approx. 0.5' "soft" zones within glacial till stratum

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METHOD OF INVESTIGATION ASTM Specifications

DATE STARTED 4/19/82
FINISHED 4/20/82
SHEET 3 OF 3

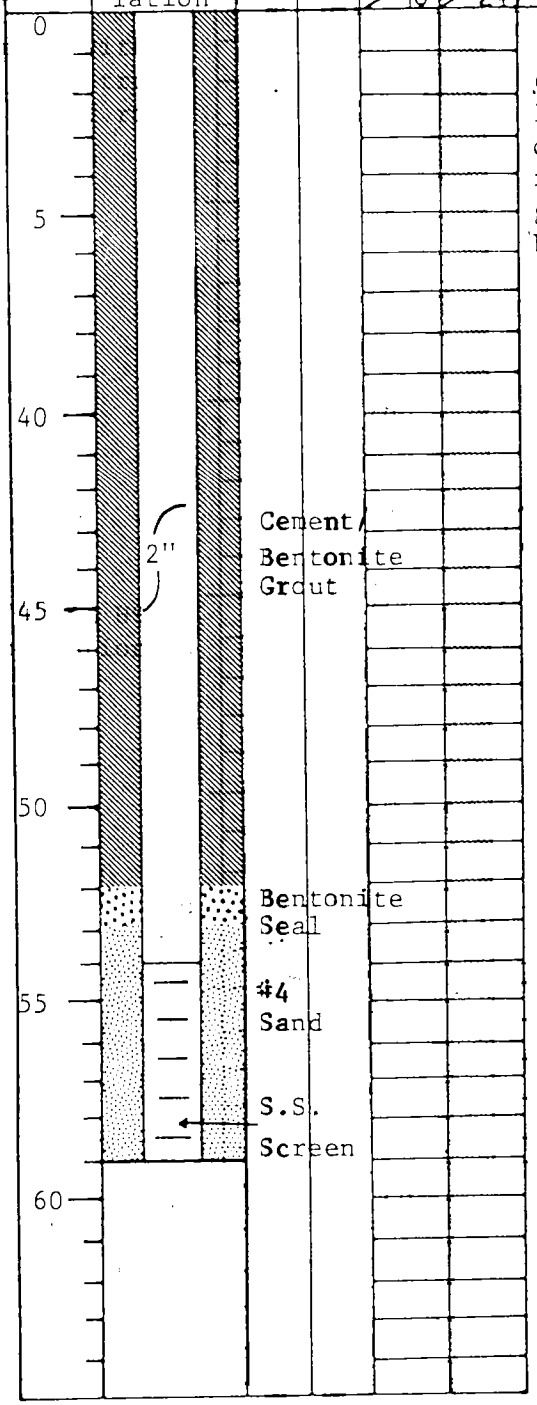
RECRA RESEARCH, INC.

SUBSURFACE LOG

HOLE NO. W-1
SURFACE ELEV. 588.4
G.W. DEPTH 575.39

PROJECT Alltift
2C042028

LOCATION East of existing landfill (Abby Rd.)



DESCRIPTION

Supplemental Notes:

Assorted fill to 3.0', over coarse silty and fine sandy glacio lacustrine sediments to 16.5/20', over clayey glacio lacustrine sediments to 53.5', over fine sandy glacial till to refusal on presumed bedrock @ 59.0'

NOTES

Boring advanced with 3 3/4" I.D. HSA, truck mounted CME drill rig

Water at 14'9" in HSA at boring completion

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METHOD OF INVESTIGATION ASTM Specifications

DATE STARTED 4/29/82
FINISHED 4/30/82
SHEET 1 OF 3

RECRA RESEARCH, INC.

SUBSURFACE LOG

HOLE NO. W-2
SURFACE ELEV. 587.4
G.W. DEPTH 574.91

PROJECT Alltift
2C042028

LOCATION NW property corner

DEPTH-FT	LOG PPT	USCS	SAMPLE TYPE	SAMPLE NO	BLOWS ON SAMPLER 0/6	6/12	12/18	18/24	DESCRIPTION	NOTES
									Saturated black fill, sandy and gravelly textured, loose	- slight odor - no recovery on S #1, similar to S #2
5			SS	1	1	-	-			
10				2	1	-	-			
									-----approximate transition---------13.0'	
15	3.65 2.50	ML CL		3	4	7	7		Extremely moist gray CLAY & SILT slightly plastic, stiff, laminated	
20	.80 .80	ML		4	2	6	8			
									------grades downward to----------	
25	0.16	CL		5	3	3	3		25-26 1/5' Gray SILTY-CLAY, firm, plastic, saturated, homogeneous massive structure	
30	.75 .50	CL		6	2	2	3			
35										

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METHOD OF INVESTIGATION ASTM Specifications

DATE STARTED 4/29/82
FINISHED 4/30/82
SHEET 2 OF 3

RECRA RESEARCH, INC.

SUBSURFACE LOG

HOLE NO. W-2
SURFACE ELEV. 587.4
G.W. DEPTH 574.91

PROJECT Alltift 2C042028

LOCATION NW property corner

DEPTH-FT	LOG PPT	LOG USCS	SAMPLE TYPE	SAMPLE NO	BLOWS ON SAMPLER 0/6	BLOWS ON SAMPLER 6/12	BLOWS ON SAMPLER 12/18	BLOWS ON SAMPLER 18/24	DESCRIPTION	NOTES
35	0.23	CL	SS	7	3	3	3		Saturated gray SILTY-CLAY, firm, plastic, two (2) (f) SAND lenses at approx. 36'0" & 35'9"	
	0.25	CH								
40	0.14	CH		8	2	3	3		-------grades downward to----------	(f) SAND lenses not detected in sample no. 8
45	0.09	CH		9	WOR		-		45 - 46 1/2' Saturated CLAY, alternating red and gray beds (approx. 1/2" thick) very soft, plastic	Apparent higher SILT fraction in gray colored beds
	0.10									
50	0.10	CH		10	WOH	1	1		Gray (f) SAND lense at 50'9" (S.S. #10)	Sequences of red and gray colored beds decrease with depth; clay is reddish brown at transition to glacial till
55	0.07	CH		11	WOH		1		-------grades downward to---------- 55 - 56 1/2' Saturated reddish brown CLAY, very soft, plastic, homogeneous massive structure	
60									------sharp transition to----------	62.0'
			NX	Run #1	100% Recovery				Saturated brown CLAYEY-SAND with 5-7% GRAVEL, loose, non-plastic, massive	
65									Gray limestone, fossiliferous, 9 horizontally orientated fractures, evidence of solutioning	63.0'
					RQD=	100%				68.0' Boring comp.@68.0'

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METHOD OF INVESTIGATION ASTM Specifications

DATE STARTED 4/29/82
FINISHED 4/30/82
SHEET 3 OF 3

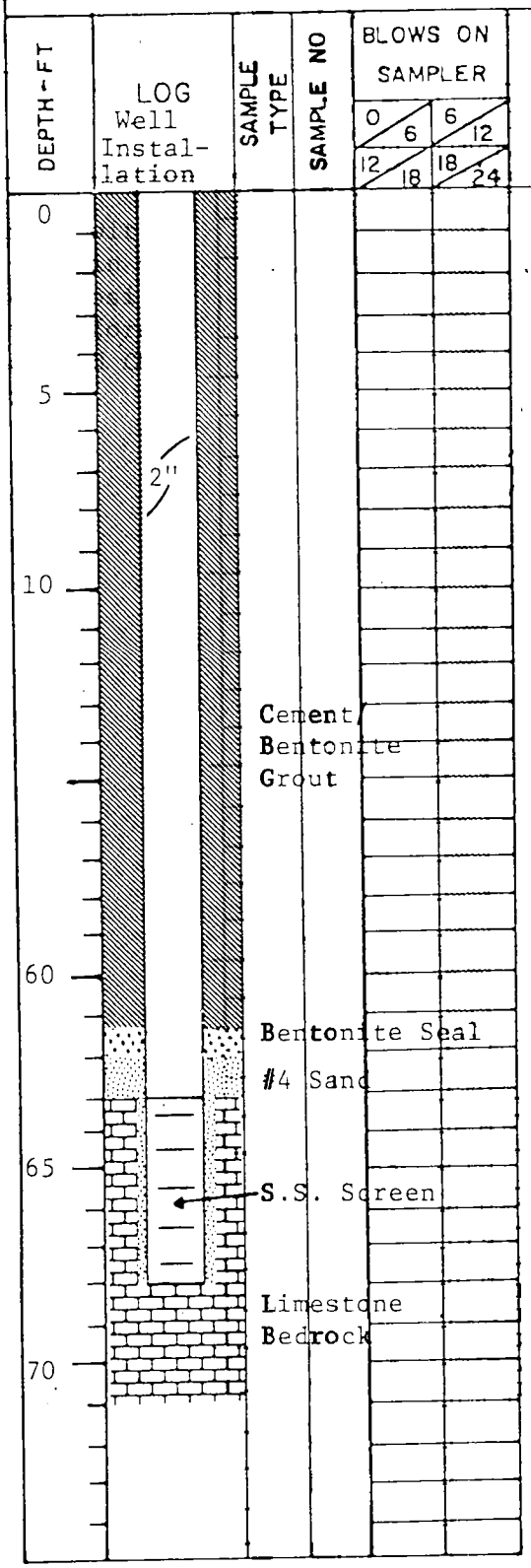
RECRA RESEARCH, INC.

SUBSURFACE LOG

HOLE NO. W-2
SURFACE ELEV 587.4
G.W. DEPTH 574.91

PROJECT Alltift

LOCATION NW Property Corner



DESCRIPTION

Supplemental Notes:

Sandy and gravelly fill to approximately 13.0' over silty and clayey glacio lacustrine sediments to 62.0' over clayey and sandy glacial till to 63.0' over limestone bedrock to completion at 68.0'

NOTES

Boring advanced with 3 3/4" I.D. HSA in unconsolidated deposits, NX zone in rock formation, ATV mounted CME drilling rig

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METHOD OF INVESTIGATION ASTM Specifications

DATE STARTED 4/26/82
FINISHED 4/27/82
SHEET 1 OF 3

RECRA RESEARCH, INC.

SUBSURFACE LOG

HOLE NO. W-3
SURFACE ELEV. 583.3
G.W. DEPTH 576.31

PROJECT Alltift
2C042028

LOCATION West of landfill

DEPTH-FT	LOG PPT	LOG USCS	SAMPLE TYPE	SAMPLE NO	BLOWS ON SAMPLER 0/6	BLOWS ON SAMPLER 6/12	BLOWS ON SAMPLER 12/18	BLOWS ON SAMPLER 18/24	DESCRIPTION	NOTES
									Black cindery and silty fill, loose	Saturated at 1.0'
									- traces of brick, wood	
5			SS	1		1	1	1		
									--------approx. transition to-------	8.0'
									Moist gray-green mottled CLAYEY-SILT, little (f) SAND slightly plastic, stiff	
10	4.25	ML		2		4	8	8		
									14 1/2 - 16' Extremely moist gray CLAYEY-SILT, plastic, firm	Upper SILT strata liquifies with auger disturbance
15	0.3	ML		3		2	2	2		
	0.4								-------grades downward to----------	
									19 1/2 - 21' Saturated gray SILTY-CLAY, firm, plastic, two (2) gray (f) SAND lenses at approx. 20' & 20'3"	Sand lenses are 1/4" thick
20	1.85	CL		4		3	3	3		
	2.25									
25	0.10	CH		5		WOH	1	1	Gray (f) SAND lense at approx. 25'	
30	0.11	CH		6		3	3	6	29 1/2 - 30 1/2' Saturated gray CLAY, stiff, plastic, massive	
	0.75	SM								30.5'
									Extremely moist brown SILTY-SAND with occasional GRAVEL, massive, dense, non-plastic	
35										

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METHOD OF INVESTIGATION ASTM Specifications

DATE STARTED 4/26/82
FINISHED 4/27/82
SHEET 2 OF 3

RECRA RESEARCH, INC.

SUBSURFACE LOG

HOLE NO. W-3
SURFACE ELEV. 583.3
G.W. DEPTH 576.31

PROJECT Alltift
2C042028

LOCATION West of landfill

DEPTH-FT	LOG PPT	LOG USCS	SAMPLE TYPE	SAMPLE NO	BLOWS ON SAMPLER 0/6	BLOWS ON SAMPLER 6/12	BLOWS ON SAMPLER 12/18	BLOWS ON SAMPLER 18/24	DESCRIPTION	NOTES
35	>4.5	SM	SS	7	28	21			Extremely moist brown SILTY-SAND with 5-10% GRAVEL, very dense, massive	
40	>4.5	SM		8		66/5"				Occasional cobble
45	>4.5	SM		9		66	75			Gravel retained in sampler ranges from angular to sub-angular in shape, generally limestone and shale fragments
50				10		100/4"				49'8"
									Dense black fissle shale bedrock	52'0"
									Boring completed at 52'0"	Rotary drilled bedrock with 2 7/8" ∅ tricone roller bit

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METHOD OF INVESTIGATION ASTM Specifications

DATE STARTED 4/26/82
FINISHED 4/27/82
SHEET 3 OF 3

RECRA RESEARCH, INC.

SUBSURFACE LOG

HOLE NO. W-3
SURFACE ELEV. 583.3
G.W. DEPTH 576.31

PROJECT Alltift
2C042028

LOCATION West of landfill

DEPTH-FT	LOG Well Installation	SAMPLE TYPE	SAMPLE NO	BLOWS ON SAMPLER (0/6, 6/12, 12/18, 18/24)	DESCRIPTION	NOTES
0					Supplemental Notes:	
5	Cement/bentonite grout				Cindery and silty fill to 8.0' over silty and clayey glacio lacustrine sediments to 30.5', over fine sandy glacial till to 49.67', over shale bedrock to completion at 52.0'	Boring advanced with 3 3/4" I.D. HSA in unconsolidated deposits, 2 7/8"ϕ roller bit in rock formation; ATV mounted CME drilling rig
40	2"					
45	#4 sand					
50	Stainless steel screen					
55	Shale bedrock Collapsed material					

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METHOD OF INVESTIGATION ASTM Specifications

DATE STARTED 4/30/82
FINISHED 4/30/82
SHEET 1 OF 3

RECRA RESEARCH, INC.

SUBSURFACE LOG

HOLE NO. W-4
SURFACE ELEV. 585.2
G.W. DEPTH 574.95

PROJECT Alltift
2C042028

LOCATION NE Corner of Landfill

DEPTH-FT	LOG PPT	LOG USCS	SAMPLE TYPE	SAMPLE NO	BLOWS ON SAMPLER 0/6	BLOWS ON SAMPLER 6/12	BLOWS ON SAMPLER 12/18	BLOWS ON SAMPLER 18/24	DESCRIPTION	NOTES
	-	OL							Moist black organic CLAYEY-SILT topsoil, friable, frequent roots, wood, etc.	
5	-	OL	SS	1	1	1	1		------approximate transition to----	7.0'
10	-	SM		2	7	11	12		10-11 1/2' Extremely moist black SANDY-SILT with intermittent yellow CLAYEY-SILT nodules and occasional (M-C) GRAVEL; formation is non-stratified, medium dense.	Transition between 11 1/2' and 15'
15	1.1 1.4	ML		3	5	6	7		15-16 1/2' Extremely moist yellow-grading to gray, CLAYEY-SILT, laminated, slightly plastic, firm ---------grades downward to---------	
20	0.14	CL		4	3	3	3		20-21 1/2' Saturated gray SILTY-CLAY, laminated, plastic, firm	
25	1.4 1.3 1.2	CL	ST	5	PUSH	24"	100%	Rec.		
30	0.13	CL	SS	6	WOR	-			30-31 1/2' Intermittent gray (f) sand lenses (approx. 1/4"),	Clay from sample #6 was firm in sampler, N count & PPT test indicate a very soft consistency

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METHOD OF INVESTIGATION ASTM Specifications

DATE STARTED 4/30/82
FINISHED 4/30/82
SHEET 2 OF 3

RECRA RESEARCH, INC.

SUBSURFACE LOG

HOLE NO. W-4
SURFACE ELEV. 585.2
G.W. DEPTH 574.95

PROJECT Alltift
2C042028

LOCATION NE Corner of Landfill

DEPTH-FT	LOG PPT	LOG USCS	SAMPLE TYPE	SAMPLE NO	BLOWS ON SAMPLER 0/6	BLOWS ON SAMPLER 6/12	BLOWS ON SAMPLER 12/18	BLOWS ON SAMPLER 18/24	DESCRIPTION	NOTES
35	0.15	CH	ST	7	PUSH	24"				
	0.16				75% Rec.					
									-----grades downward to ----------	
									40-41 1/2' Saturated reddish-brown CLAY with six (6) (f) SAND lenses (1/4" - 1/2" thick) dispersed throughout sample; clay is soft, plastic	
40	0.15	CH	SS	8	2	2				
	0.14	SM			3					
									45-46 1/2' Saturated gray-brown CLAY, soft, plastic, massive	
45		CH SC		9	7	5				
					3				——sharp transition to——	46.5'
									Saturated brown SANDY-CLAY with 2-5% (M-F) GRAVEL, firm, plastic, massive	
50				10	5	100/6"				
										51.75'
			NX	Run #1	62% Rec.				Gray limestone, some chert	52.85' Drilling water laden with (C-F) SAND
									Unconsolidated material	54.75'
55									Gray limestone, fine crystalline	56.75'
									Boring completed at 56'9"	

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METHOD OF INVESTIGATION ASTM Specifications

DATE STARTED 4/30/82
FINISHED 4/30/82
SHEET 3 OF 3

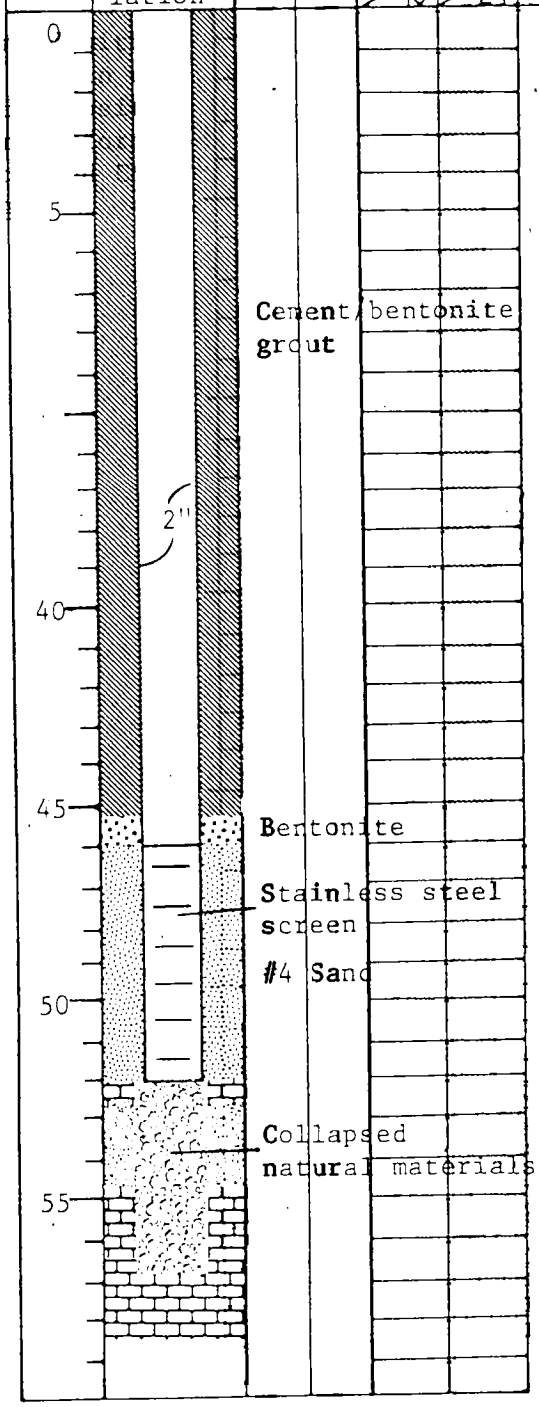
RECRA RESEARCH, INC.

SUBSURFACE LOG

HOLE NO. W-4
SURFACE ELEV. 585.2
G.W. DEPTH 574.95

PROJECT Alltift
2C042028

LOCATION NE Corner of Landfill



DESCRIPTION

Supplemental Notes:

Organic clayey and silty topsoil and fill to approx. 7.0', over coarse silty sediments to 11.5/15' over silty and clayey glacio-lacustrine sediments to 46.5', over sandy and clayey glacial till to 54.75', over gray limestone to completion at 56.75'

NOTES

Boring advanced with 3 3/4" I.D. HSA in unconsolidated deposits, NX zone in rock formation; ATV mounted CME drilling rig

CLASSIFICATION Visual by James R. Stachowski

METHOD OF INVESTIGATION ASTM Specifications

DATE STARTED 4/27/82
FINISHED 4/27/82
SHEET 1 OF 2

RECRA RESEARCH, INC.

SUBSURFACE LOG

HOLE NO. TB-1
SURFACE ELEV. 583.6
G.W. DEPTH

PROJECT Alltift
2C042028

LOCATION West of landfill

DEPTH-FT	LOG PPT	LOG USCS	SAMPLE TYPE	SAMPLE NO	BLOWS ON SAMPLER 0-6	BLOWS ON SAMPLER 6-12	BLOWS ON SAMPLER 12-18	BLOWS ON SAMPLER 18-24	DESCRIPTION	NOTES
									Extremely moist SILTY and SANDY fill, some cinders	
5			SS	1	3	2	2			No recovery on sample #1
									--------approx. transition---------	7.5'
									Moist, yellow/gray mottled SANDY-CLAY, laminated, slightly plastic	
10	3.1 3.0	SC		2	3	4	4			Groundwater at 10 ft. upon completion of soil boring
										Transition between 11.5' and 15'
15	0.5	CL SM		3	3	3	3		15-16 1/2' Extremely moist gray SILTY-CLAY firm, plastic, one (1) yellow (f) SAND lense (1/4")	
20	0.11	CL		4	1	1	1		20-21 1/2' Saturated gray SILTY-CLAY, very soft, plastic, homogeneous massive structure	Boring advanced with 3 3/4" I.D. HSA in unconsolidated material, NX core in rock; ATV mounted CME drilling rig
									-------grades downward to----------	Silty and sandy fill to approx. 7.5', over sandy silty, and clayey glacio lacustrine sediments to 27.0', over fine sandy glacial till to 28.0' over shale bedrock to completion at 33.0'
25	0.09	CH		5	1	2	1		25-26 1/2' Saturated reddish brown SILTY-CLAY occasional gray (f) SAND lense; CLAY is soft, plastic, with occasional (f) GRAVEL	
				6		100/6"				
			NX	Run #1	74% Recovery		RQD=20.8%		Extremely moist brown SILTY-SAND with 5-10% GRAVEL, very dense, massive	27'
30									Dense black fissle shale, slight petroliferous odor; frequent horizontal fracturing	28'
										33'
35									Boring completed at 33.0'	

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METHOD OF INVESTIGATION ASTM Specifications

DATE STARTED 4/28/82
FINISHED 4/28/82
SHEET 1 OF 3

RECRA RESEARCH, INC.

SUBSURFACE LOG

HOLE NO. TB-2
SURFACE ELEV. 582.5
G.W. DEPTH

PROJECT Alltift
2C042028

LOCATION West of landfill

DEPTH-FT	LOG PPT	LOG USCS	SAMPLE TYPE	SAMPLE NO	BLOWS ON SAMPLER 0/6	BLOWS ON SAMPLER 6/12	BLOWS ON SAMPLER 12/18	BLOWS ON SAMPLER 18/24	DESCRIPTION	NOTES
									Extremely moist black cindery SAND and GRAVEL fill, traces of brick, metal	
										No recovery on Sample #1
5			SS	1	2	3	3		-------approx. transition---------- 5.0'	
									Extremely moist gray/light brown mottled CLAYEY-SILT, slightly plastic, stiff, massive	
									-------grades downward to----------	
10	2.7 3.7	ML		2	5	6	11		11-11 1/2' Extremely moist gray CLAYEY-SILT, slightly plastic, stiff	
									-------grades downward to----------	
15	0.8 0.8	CL SM		3	3	4	6		15-16' Extremely moist gray SILTY-CLAY, firm, plastic 16-16 1/2' Two (2) saturated (1") layers of (f) SAND interbedded in SILTY-CLAY strata	
20	0.17 0.15	CL		4	1	1	2		-------grades downward to----------	
									20-21 1/2' Extremely moist gray SILTY-CLAY, laminated with occasional SILT lense, plastic, soft	
25	0.13 0.16	CH		5	WOR		-		--------grades downward to----------	
									25-26 1/2' Saturated gray CLAY, very soft, plastic, massive	
30	0.09 0.09	CH		6	3	3	3			

CLASSIFICATION Visual by James R. Stachowski

METHOD OF INVESTIGATION ASTM Specifications

DATE STARTED 4/28/82
FINISHED 4/28/82
SHEET 2 OF 3

RECRA RESEARCH, INC.

SUBSURFACE LOG

HOLE NO. TB-2
SURFACE ELEV. 582.5
G.W. DEPTH

PROJECT Alltift
2C042028

LOCATION West of landfill

DEPTH-FT	LOG PPT	LOG USCS	SAMPLE TYPE	SAMPLE NO	BLOWS ON SAMPLER 0/6	BLOWS ON SAMPLER 6/12	BLOWS ON SAMPLER 12/18	BLOWS ON SAMPLER 18/24	DESCRIPTION	NOTES
35	0.23 0.24	CH	SS	7	WOH	2	2			Clay is firm
									---------grades to----------	
40	0.22	CH		8	WOR	1	2		40-41 1/2' Alternating layers of reddish brown and gray CLAY, soft, plastic, saturated	
45	0.13	CH		9	WOR	2	4			One gray SILT lense (1/4") in sample #9
50	0.18 0.13	CH		10	WOR	2	3			Six (6) gray SILT lenses (approx. 1/4") throughout 18" sample (#10)
55				11	WOH	2	3	40/4"	Saturated brown CLAYEY-SAND with 2-5% (M-F) GRAVEL, occasional (c) GRAVEL, soft, massive	55.67' Very dense at 56'6" - 56'10"
60			NX	Run #1	100% Recovery RQD=97%				Dark gray limestone, 4 horizontal fractures, highly fractured (crumbled) zone at 61.0' - 61.25'	60.0' 65.0'
65									Boring completed at 65.0'	

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METHOD OF INVESTIGATION ASTM Specifications

DATE STARTED 4/28/82
FINISHED 4/28/82
SHEET 3 OF 3

RECRA RESEARCH, INC.

SUBSURFACE LOG

HOLE NO. TB-2
SURFACE ELEV. 582.5
G.W. DEPTH

PROJECT Alltift
2C042028

LOCATION West of landfill

DEPTH-FT	LOG	SAMPLE TYPE	SAMPLE NO	BLOWS ON SAMPLER (0/6, 6/12, 12/18, 18/24)	DESCRIPTION	NOTES
					Supplemental Notes: Cinder, sand, and gravel fill to approximately 5.0', over silty and clayey glacio-lacustrine sediments to 55.67', over clayey and sandy glacial till to 60.0' over limestone bedrock to completion at 65.0'	Boring advanced with 3 3/4" I.D. HSA in unconsolidated desposits, NX core in rock formation; ATV mounted CME drill rig

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DATE STARTED 4/28/82
FINISHED 4/28/82
SHEET 1 OF 1

RECRA RESEARCH, INC.

SUBSURFACE LOG

HOLE NO. TB-3
SURFACE ELEV. 583.2
G.W. DEPTH

PROJECT Alltift
2C042028

LOCATION SW of landfill

DEPTH-FT	LOG PPT USCS	SAMPLE TYPE	SAMPLE NO	BLOWS ON SAMPLER 0/6 6/12 12/18 18/24	DESCRIPTION	NOTES
					Saturated black cindery SILT and GRAVEL fill	
					-------approx. transition----------	4.0'
5	OL SM	SS	1	2 3 4	Saturated black organic CLAYEY-SILT Extremely moist yellow/brown SILTY-SAND	5.0' No Recovery on Sample #1 Soil profile derived from residual soil on augers
10	- -		2	20 41 44	Dense black fissle shale rock	10.5' Boring advanced with 3 3/4" I.D. HSA, ATV mounted CME drilling rig
15						Silt and gravel fill to 4.0', over organic silt to 5.0', over fine sandy glacio-lacustrine sediments to 10.5', over shale to completion at 11.5'

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