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UNION CARBIDE CORPORATION CARBON PRODUCTS DIVISION

P.O. BOX 887, NIAGARA FALLS, N.Y. 14302

November 10, 1987

Mr. R.J. Mitrey New York State Dept. of Environmental Conservation 600 Delaware Avenue Buffalo, New York 14202

Dear Mr. Mitrey:

We are enclosing for your review the Final Landfill Closure Report, Solid Waste Management Facility, as prepared by Conestoga-Rovers and Associates.

We will begin implementation of the post-closure activities, groundwater monitoring and maintenance program as soon as we are informed of your acceptance of our report.

Very truly yours,

Rick Bolton

R.A. Bolton

R.A. Bolton

Enclosure

CC: Mr. A.C. Ogg

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FINAL LANDFILL CLOSURE
Solid Waste Management Facility
Union Carbide Corporation
Republic Plant
Town of Niagara, New York

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1.0 INTRODUCTION

Over the past 40 years, Union Carbide has operated a Solid Waste Management Facility (SWMF) at its Republic Plant in the Town of Niagara. The Site has operated under Permit Number 2020 issued in 1978 by the New York State Department of Environmental Conservation (NYSDEC). In 1981, a supplemental operation plan stating planned landfill progression was also prepared and submitted to the NYSDEC.

The 16.5-acre Site is located on Union
Carbide's Republic Plant located on the east side of Hyde
Park Boulevard in the Town of Niagara, as shown on the key
map on the cover page of the accompanying set of plans. The
Site is bounded on the north and east by a Niagara Mohawk
power transmission corridor; on the west by Union Carbide's
former production facility; and on the south by wooded and
vacant land owned by Union Carbide. A second landfill site,
owned and operated by SKW, is located north of the Union
Carbide Site. The nearest residential area is located
approximately 400 feet south of the landfill.

Throughout the life of the Site, waste materials, generally consisting of carbonaceous materials, fire brick, wood, and plant construction/demolition debris (common brick, concrete, excavated soils), have been disposed in the Site. Union Carbide personnel indicate that no

production by-product wastes or equipment are known to have been disposed at the Site.

Recently, Union Carbide announced plans for the closure of both the Republic and National production facilities. As a result of these closure plans, Union Carbide closed the SWMF. The purpose of this document is to describe the closure details for the SWMF.

2.0 SCOPE OF CLOSURE

This document provides the details for the following aspects of the SWMF Closure:

- Construction of a low permeable final cover and key
- Quality assurance of construction
- Provisions for surface water drainage
- Security and Site access
- Boundary conditions
- Post-closure monitoring plans
- Post-closure maintenance plan
- Environmental contingency plans
- Closure schedule.

Each of these aspects of the SWMF closure is presented in a subsequent section of this document. The accompanying set of drawings form an integral part of this closure report. These plans include:

- Plan 1 Pre-Closure Conditions October 1986
- Plan 2 Limits of Waste Disposal
- Plan 3 Pre-Closure Conditions November 1986
- Plan 4 Final Landfill Contours
- Plan 5 Monitoring Well Locations
- Plan 6 Miscellaneous Details
- Plan 7 Field Testing Locations

3.0 PRE-CLOSURE CONDITIONS

The pre-closure conditions at the SWMF are presented on Plan 1 - Pre-Closure Conditions - October 1986. Plan 2 - Limits of Waste Disposal also identifies some additional pre-closure conditions. From these plans, it can be seen that landfilling had been concentrated in the eastern half of the Site and progressed in a westerly direction. The wooded areas along the eastern and southern boundaries have been left in place for conservation reasons and to act as a buffer with surrounding areas. The eastern areas of fill placement were basically in compliance with planned final grades previously submitted to the NYSDEC on Union Carbide drawing number AX-1A-16. These areas had been capped by a final cover with vegetative growth, but this cover has been deemed inappropriate by present-day landfill closure quidelines.

Progressing westward across the Site, work crews were bringing the central sector of the Site to the previously proposed final grade. However, this central area had not yet reached final elevation. The westernmost 250-foot section of the Site has generally not been used for waste disposal although the entire Landfill area is covered with a thin layer of carbonaceous materials.

It is to be noted that historical waste disposal generally followed along the alignment of the wooded area in the eastern and southeastern areas of the Site. As a result, the final limit of waste disposal does extend beyond the defined Site boundaries in the southeast corner. The maximum distance of waste placement beyond the Site boundary is approximately 100 feet. Along the northern boundary, the waste materials have also encroached beyond the Site boundary onto another parcel of Union Carbide property by approximately 15 feet.

4.0 BOUNDARY CONDITIONS

Given the pre-closure conditions at the Site, and the fact that waste disposal operations were ongoing at the Site prior to the advent of State landfill operating regulations, it will be necessary to revise the planned boundary conditions for the Site to accommodate historic waste placement on the Site. Buffer zone allowances have been developed for the Site, as shown on Plan 2, and are briefly described as follows:

West Side - 250 feet was not used for landfilling, but was capped.

North Side - West Section - 50 feet was not used for landfilling, but was capped.

- East Section - since the pre-closure limit of fill extended to the Site boundary, the parcel of land between the Site boundary and the Union Carbide/SKW property boundary was added to the Site. This strip of land (28.89 feet in width) would serve solely as a buffer zone, and was capped.

East Side - the entire wooded area was not used for landfilling, and was not capped.

South Side - East Section - Due to the presence of waste beyond this boundary, the southern boundary of the Site was extended an additional 150 feet south to accommodate the placed fill and provide a minimum 50-foot buffer zone. This boundary adjustment extends approximately 760 feet west of the east Site boundary, as shown on Plan 2. The landfilled area was capped.

- West Section - 50 feet was not used for landfilling, but was capped.

It is to be noted that the plan for continued waste placement after submission of the landfill Closure Plan and prior to cap construction did not extend the areal limits of waste disposal beyond the area in use at that time. All waste disposal was placed in areas which had already been partially used. The intent of the plan was to continue to fill only in those areas where additional fill was required to bring the waste cell up to proposed final grade.

Prior to submittal of the Final Closure Plan, approximately 98 percent of all materials planned for disposal at the Site were already in place. Typically, the only additional waste material placed in the landfill was additional carbonaceous waste.

Landfilling activities were completed by November 30, 1986. No additional waste was deposited in the landfill after this date.

5.0 SURFACE PREPARATION

Review of the existing ground elevations prior to closure of the Landfill indicated that some regrading of the Site was necessary in order to comply with the proposed grading plan and good engineering practices. The major area of concern was the steepness of the existing sideslopes on the north, east and southern sides of the Landfill. In order to reduce the severity of the slopes, a bulldozer was used to trim the upper section of the sideslopes and push the excess material on to the top of the This material was placed and compacted to comply with the grade requirements for the top grades of the Site. Through the sideslope trimming process, the sideslopes were reduced to a maximum of 3:1 steepness which is more appropriate to address maintenance concerns. The material disturbed as a result of this regrading was consistent with the types of materials expected to be found (i.e. carbonaceous waste, construction rubble, wood, etc). During the regrading, no effort was made to recover the cover material that had historically been placed on the sideslopes due to the inconsistency of the material.

The additional waste material being brought from the plant was placed in the western portion of the landfill to fill in the existing access road and to shape the western sideslope. Some regrading of the western segment of

the SWMF was also required to achieve the minimum two percent grade to the Site boundary.

At the conclusion of the pregrading program, all of the sideslopes had been reduced to the maximum allowable 33 percent (3:1) and where possible to 4:1; and the surface slopes were graded to greater than the minimum allowable slope (2 percent) or less than the maximum allowable slope (5 percent).

October and November 1986. Plan 3 illustrates the Site conditions following the regrading. The construction process was then halted until April 1987 due to weather limitations. Prior to final cap installation, the entire Site was proof-rolled with a 10-ton vibratory compactor. No settlement or subsidence was noted following proof-rolling.

6.0 FINAL COVER

The entire 16.5-acre Site (with the exception of the wooded areas) was covered with a low-permeability cap to reduce precipitation infiltration into the SWMF. The limits of the final cap are presented in Plan 4. The final cover consisted of:

- 6-inch thick topsoil layer with vegetative cover (grass) overlying
- 3-inch thick sand/gravel layer (drainage layer) overlying
- 18-inch thick clay layer.

The clay was placed and compacted to a hydraulic conductivity of less than 1 x 10-7 cm/sec. At the edge of the waste disposal area, the clay cover was keyed approximately two feet into the existing native fine-grained soils, as detailed in Plan 6. Plan 4 illustrates the location of the installed clay key. The spot elevations given in Plan 4 are for the top of existing native fine-grained soil along the clay key alignment. The clay was keyed 2 feet beyond this depth except in several locations where bedrock was encountered within 2 feet of the top of the fine-grained native soils. The key was installed to bedrock in these locations.

A three-inch drainage layer was spread over the entire clay cap to laterally drain precipitation and reduce infiltration.

A six-inch thick topsoil layer was placed on top of the drainage layer and was seeded with a persistent vegetative species that will effectively minimize erosion. The vegetative cover has a shallow root system which will not penetrate beyond the lateral drainage layer.

The surface slope of the final cover was designed at 3 percent slope. The final slope and thus the final contour elevations vary slightly in order to accommodate the total amount of fill, but never exceeded 5 percent or was less than 2 percent.

- MOTE

The western area of the SWMF was never used for waste disposal, but as previously mentioned, was covered with a thin layer of carbonaceous material. This area was regraded and capped at a 2 percent slope with final contour elevations matching existing ground elevations around the perimeter of the Site. In order to accomplish this, the thickness of the clay, drainage and topsoil layers was reduced over the last 100 feet to a total thickness of 1.5 ft (+) toward the edge of the Site, as detailed on Plan 6.

Side slopes around the landfill portions of the Site were maintained at a 3:1 slope (33 percent) or less.

at the SWMF, the potential for subsidence is minimal as noted during the proofrolling prior to capping. The equipment spreading the waste material at the time of disposal provided some compaction of the waste and the entire clay cap was compacted as well. Any settlement, should it occur, is expected to be relatively uniform. Therefore, the integrity of the clay cover should not be significantly impacted.

Due to the nature of the fill disposed at the Site, biodegradation is not a concern. As a result, it was not be necessary to install a venting system to relieve generated gases.

7.0 MATERIAL SPECIFICATIONS AND QUALITY ASSURANCE PLAN

7.1 MATERIAL SPECIFICATIONS

All materials used in the construction of the final cover were tested to ensure they met the required specifications as described in the following:

a) Clay

Clay for the final cover construction was clayey soil obtained from two sources. Initially, the clay was obtained from Wolfs Pit in Lewiston, New York. Extensive testing was done to determine the suitability of this clay, as follows:

- all 57 samples tested had 80 percent or more passing the #200 sieve.
- all 48 samples tested had 43 percent or more clay and all would be designated as CL by the United Classification
 System.
- all 55 samples tested had between 13.2 and 27.2 percent moisture.

- all 15 samples tested had a liquid limit of 34 percent or greater.
- 14 samples tested had a plasticity index of 16 or greater.

 One sample had a plasticity index of 13.
- all 8 samples tested had maximum densities between 110.3 and 115.0 pcf and optimum moistures between 15.7 and 17.5 percent.
- all 8 samples tested had permeabilities between 8.66 x 10^{-9} and 2.66 x 10^{-9} cm/sec.

All of the above indicates that the clay meets the NYSDEC requirements for both quantity of testing and soil guidelines. Appendix A contains a summary of the testing results.

Although all of the testing of the clay from the Wolf Pit had been performed prior to excavation from the pit, the owner of the pit sold some of the clay designated for use at the UCC Landfill during the winter months while the UCC Landfill had ceased closure activities.

Consequently, CRA undertook an analysis of the geotechnical data to determine the uniformity of the clay material across the Wolf Pit area (see Appendix B). This analysis concluded that the clay was fairly uniform and, therefore, the clay

adjacent to the tested area would be essentially identical to the tested clay. The NYSDEC was notified of these events in a letter from UCC on February 2, 1987 (also in Appendix B) which requested approval to use the adjacent clay. Mr. Mike Ballant of UCC received verbal approval from the NYSDEC following inspection of the pit by NYSDEC personnel. With its approval, the NYSDEC directed that the clay be taken directly east of the tested area.

During construction of the cap, the Town of Lewiston ordered the Wolf Pit be closed May 14, 1987, and again on May 19, 1987 in compliance with recently passed Town bylaws prohibiting the mining of clay within the Town. Up until May 19, clay from the Wolf Pit had been used for all of the first 9-inch lift of clay except part of the north slope (Area P), and also for the second lift along the western slope and western portion of the southern slope (Areas F and G). This amounted to approximately 22,500 cubic yards of clay.

In order to continue construction, UCC and CRA proposed to the NYSDEC to use clay from Shevlin-Manning's pit located at the Summit Park Mall Lake in Wheatfield, New York. CRA conducted a visual examination of the clay material and concluded that it would be suitable for clay capping (see Appendix C). Mr. Mike Ballant of UCC verbally requested approval from the NYSDEC to use the clay from Summit Park Mall Lake without any further testing. Beginning

on May 20, 1987, clay from this second source was used to finish the first lift on the north slope (Area P) and the majority of the second lift. Approximately 16,900 cubic yards of Summit Park Mall Lake clay was used for the clay cap construction.

b) Sand/Fine Gravel

Following testing of sand samples from four different sources, sand was obtained from Niagara Stone
No. 1B (sample #4). This sand source was recommended for the following reasons:

- lowest amount of fines (0.9 percent passing #200 sieve),
- lowest optimum moisture content (5.5 percent),
- low maximum dry density (106.6 pcf), and
- highest hydraulic conductivity (2.68 x 10^{-2} cm/sec).

The analytical results of the sand sample testing are presented in Appendix D. $\,$

c) <u>Topsoil</u>

The topsoil was a fertile loamy material obtained from an abandoned cornfield at Shevlin-Manning's mining operation. The topsoil was inspected and approved by

the Field Engineer as it showed it could support growth.

During a recent visual inspection of the Site, the topsoil
was observed to be supporting growth, as expected.

The topsoil was observed to be free from roots, vegetation, weed, parts of weeds, weed seeds and other debris. The topsoil was free from stones and clods over two inches in diameter.

7.2 CONSTRUCTION QUALITY ASSURANCE PLAN

a) Clay Placement

Clay for the final cover was placed in two nine-inch horizontal lifts compacted to a Modified Proctor Density of at least 90 percent. The testing requirements for the clay were as follows:

- in-place moisture density tests nine tests per acre per
 lift 301 tests in total were completed.
- falling head permeability test (Shelby Sample) one test
 per acre per lift 34 tests in total were completed.

The in-place moisture density tests results are presented in Appendix E along with the technician's Daily Site Observation Reports. The in-place moisture results were

between -8 and +5 percent of the optimum moisture content, while the in-place density tests indicated greater than 92 percent compaction over the entire Site. During construction, two areas (Areas F and P) required recompaction of the first lift because of insufficient compaction due to excessive moisture content. Moisture content was only adjusted when 90 percent compaction could not be obtained.

The clay component of the final cover was placed in lifts to maintain the approximate 3 percent slope on the top of the landfill and 2 percent slope on the western portion of the SWMF.

Appendix F presents the shelby tube Constant Head Triaxial Permeability results of the in-place clay. The determined permeabilities were between 3.23×10^{-8} cm/sec and 6.89×10^{-8} cm/sec, with the average permeability being 1.32×10^{-8} cm/sec. The results are all less than the NYSDEC guideline of 1×10^{-7} cm/sec.

Table 1 summarizes the percent compaction and permeability results for all 16 areas and both lifts. Plan 7 presents the locations of all of the in-place testing performed on the clay at the Site.

TABLE 1

COMPACTION AND PERMEABILITY RESULTS

	lst Lift Compaction Permeability		2nd L % Compaction	ift Permeability
Area	(%)	$(x 10^{-8} cm/s)$	(%)	$(x 10^{-8} cm/s)$
A	98.0	1.35	99.6	1.15
В	97.7	0.75	100.0	1.55
С	94.9	1.84	99.3	0.88
D	93.3	1.11	99.8	0.97
E	94.5 (12)*	1.61	100.0 (12)*	3.23
F	93.8	0.88	92.3	1.21
G	94.0	1.37	96.1	0.91
Н	96.8	1.49	100.0	2.27
I	94.7	0.78	99.3	0.69
J	95.7	1.34	100.0	1.00
K	97.6	2.54	100.0	1.54
L	99.3	0.94	99.0	1.70
М	98.9	1.28	100.0	1.60
N	99.8	3.17	100.0	0.93
0	94.9 (11)*	2.89	100.0 (14)*	1.35
P	100.0	0.83	100.0	1.05
min	93.3	0.75	92.3	0.69
max	100.0	3.17	100.0	3.23

^{*} indicates number of individual tests undertaken, all other areas had 9 tests as required.

b) Seeding and Mulching

Prior to seeding, fertilizer with a nitrogen/phosphoric acid/pot ash rating of 10/20/20 was applied to the topsoil for purposes of soil enhancement. The fertilizer application rate was 700 lb/acre, as recommended by the landscaper. The addition of lime was not necessary.

A combination of Kentucky Bluegrass and rye grass (at a ratio of 4:1) was planted on the covered areas to reduce infiltration and erosion from wind and rainfall. Rye grass is an especially fast grower, able to survive dry conditions, and is a perennial plant. The Kentucky Bluegrass has a shallow and strong root system, requires moderate maintenance, and is also a perennial plant. In combination, this should provide an effective vegetative cover.

c) Dimensional Conformity

The components of the final cover were constructed to the dimensions, lines, and elevations shown on the detail drawings. A tolerance of plus or minus 0.2 feet was allowed on the finished elevations of the clay component, sand/gravel drainage blanket and selected protective cover.

All work completed at the landfill used the benchmark monument located at the southwest corner of the SWMF. This benchmark is based on the U.S. Corporation Datum (Elevation = 604.13)

d) Construction Certification

Following cap construction, some discrepancy as to the clay cover thickness developed. Referencing the Record Drawings provided by the surveyor (Bissell) for before clay placement and after clay placement, there appears to be only an average of 13 inches of clay over the site. resolve this discrepancy, 18 test holes were dug through the finished cap on June 9, 1987. These were in addition to the field testing during construction conducted by the Field Engineer. Table 2 lists the individual results of these tests which are also presented on Plan 7. The results of these confirmatory test holes revealed that in fact, 17 to 21 inches of clay was present across the Site and that the surveyor Record Drawings are in error. It is evident that some of the base of clay elevations assumed on the surveyor Record Drawings were taken after the first lift of clay had already been placed.

In summary, the thickness of the clay cover was confirmed to be approximately 18 inches in depth. One east-west and one north-south cross-section (Figures 1 and 2) through the completed area have been prepared for cap certification. The final landfill contours for the entire Site are presented on Plan 4.

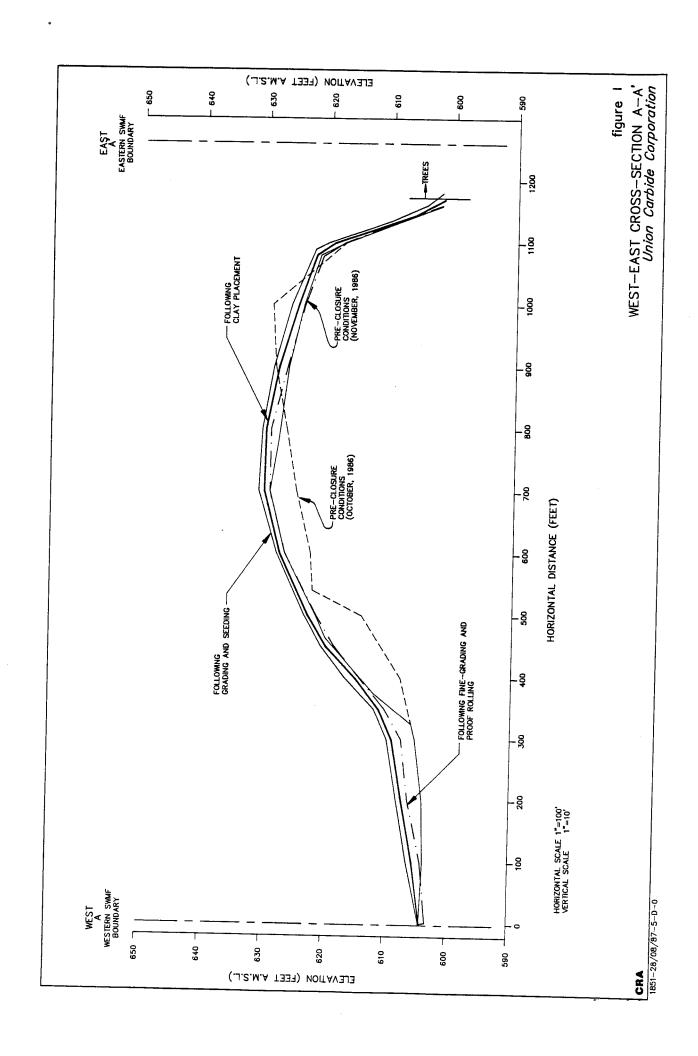
TABLE 2

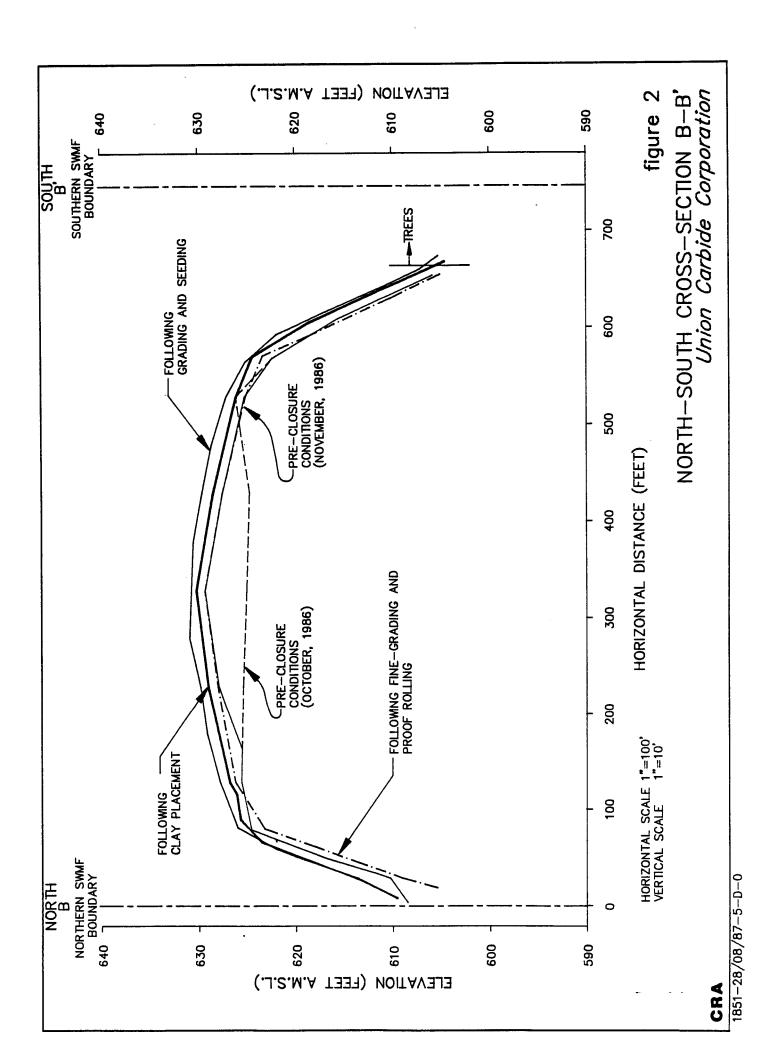
CAP THICKNESS TEST HOLE RESULTS

<u>Station</u>	Offset-South (feet)	Clay Thickness (inches)
2 + 00	200	19
2 + 00	400	19+
3 + 00	400	20
4 + 00	400	19
6 + 00	100	18.5+
6 + 00	300	21
7 + 00	100	18+
8 + 00	100	17.5+
8 + 00	200	20
8 + 00	300	18.5
8 + 00	400	<u> </u>
8 + 00	500	19
9 + 00	200	18
9 + 00	300	19
9 + 00	400	19+
9 + 00	500	18+
10 + 00	200	(17+
10 + 00	300	17.5+

Note:

⁺ indicates clay thickness may have been greater but measurement was impeded by some sloughing of material back into the test hole.





8.0 SURFACE WATER DRAINAGE

The area around the Site is relatively flat with no defined drainage swales or ditches.

The final contour elevations of the Site generally direct flow in all directions, as shown on Plan 4. The slope on the top of the Site is generally consistent with typical surface slopes noted around the area and as a result, surface water flow characteristics from the top of the site should be similar to that of the surrounding areas. Some accelerated flow would be expected from the surface area comprising the Site side slopes. The side slope area accounts for approximately three acres of the Site.

Although the Site is covered with a low-permeability cap, the surrounding area is also underlain by fine-grained soils of similar permeability. As a result, the runoff characteristics would also be expected to be similar.

The Site itself is located on a 62-acre \pm parcel of undeveloped land owned by Union Carbide. In addition, the Niagara Mohawk property bounding the north and east property lines also remains undeveloped.

Given the fact that:

- i) slopes and runoff characteristics will be similar both on and off-site;
- ii) the surrounding area will remain undeveloped, and,
- iii) pre- and post-development runoff characteristics are
 very similar;

the surface water flow was allowed to continue to follow the natural drainage paths as it has historically.

9.0 ACCESS AND SECURITY

Union Carbide has retained the 62-acre + parcel of land (including the SWMF) east of the former Republic production facility. In order to maintain access within the Site, an access road was constructed to the northwestern corner of the landfill from the western entrance to the Site, as shown in the inset figure on Plan 4.

Access road construction materials consisted of six inches of 2B gradation stone from Niagara Stone. The material was chosen by UCC and approved by the Field Engineer. No geotextile fabric was used as the road was built on top of the existing road which already had a good base. The typical road width is 12 feet, with some spots extending to 20 feet in width. The maximum slope does not exceed 10 percent.

Site security at the SWMF will consist of the existing seven-foot high industrial grade security fence which surrounds the 62-acre + parcel of land retained by Union Carbide. In addition, a new security fence, of identical specification, was constructed near the western boundary as shown on the inset figure on Plan 4. A set of access gates were provided along the access road at the

northwestern corner of the SWMF. The gates shall be kept locked at all times. The fence specifications are detailed on Plan 6.

10.0 MONITORING PLANS

A hydrogeologic investigation has been conducted at the SWMF to identify and collect data which was necessary for a complete evaluation and characterization of Site conditions including geologic stratigraphy, hydrogeologic conditions and geochemical conditions. This program supplemented available data from a previous investigation of the Site which included the installation of three overburden wells at the Site. The investigation activities included:

- installation of six groundwater monitoring wells set into the upper bedrock regime. The locations of these wells are shown in Plan 5.
- installation of one groundwater monitoring well set into the waste materials. The location of this well is also shown on Plan 5.
- priority pollutant analysis of groundwater samples collected from the wells. (Analytical data has been submitted to the NYSDEC.)
- development of a set of Site-specific parameters.

- collection of groundwater samples for Site-specific parameter analysis. (Analytical data has been submitted to the NYSDEC.)

As a result of the hydrogeologic investigation, a post-closure monitoring program has been developed which involves the collection of groundwater samples from the six bedrock wells and three overburden wells. The groundwater samples will be analyzed for the following Site-specific parameters:

- Hazardous Substance List Volatiles
- Hazardous Substance List Semi-Volatiles
- Nitrate Nitrogen
- Ammonia Nitrogen
- Total Kjeldahl Nitrogen
- Iron (total and soluble)
- Potassium
- Zinc (total and soluble)

Samples will be collected according to the following schedule:

- Year 1 following closure quarterly
- Years 2 and 3 following closure semi-annually
- Years 4 and 5 following closure annually

Should none of the parameters identified be of any environmental concern, the post-closure monitoring program would terminate after five years. If there is an environmental concern regarding the presence of any Site-specific parameters, a feasibility study will be undertaken to determine an appropriate remedial course of action and a revised monitoring program will be developed. Up to 30 years of post-closure monitoring may be required due to any environmental concern.

Any change in sampling parameters or frequencies will be submitted to the NYSDEC in writing for approval.

11.0 MAINTENANCE PROGRAM

For the first five years following Site closure, a routine Site maintenance program shall be initiated which will include a general inspection to ascertain status of cap integrity, slope conditions, drainage conditions, and fence conditions. This inspection shall be conducted semi-annually.

After the first five years, the maintenance program will be reassessed and a determination made in conjunction with NYSDEC personnel regarding maintenance requirements for the next 25 years.

A log will be maintained of the inspections for a minimum of three years from the date of inspection.

The log will indicate the name of the inspector, item of inspection, date and time of inspection, observations, and date and nature of remedial action(s).

In accordance with the regulations concerning Landfill closure, the deed to the Landfill property will be revised to include a clause detailing UCC's use of the Site as a Solid Waste Management Facility. This will serve to inform any potential subsequent purchasers of UCC's use of the property in the event of property transfer.

12.0 SCHEDULE

Initial waste movement took place in October/November 1986. Work recommenced in late April 1987 with the fine grading and proof-rolling of the Site and the construction of the clay key. The clay cover was placed and compacted from April 26 to June 4, 1987, followed by sand placement, topsoil placement and seeding and mulching. All construction was completed on July 2, 1987.

APPENDIX A

CLAY TESTING RESULTS

UNION CARBIDE CORPORATION - NIAGARA FALLS, NEW YORK

STAGE I SAMPLING - INDIVIDUAL SAMPLES

Permeability								7.14x10 ⁻⁹ cm/sec @ 5 PSI 6.55x10 ⁻⁹ cm/sec @ 10 PSI	6.27x10 ⁻⁹ cm/sec @ 5 PSI 6.27x10 ⁻⁹ cm/sec @ 10 PSI
clay								61	63.5
& Passing #200 Sieve	88	92 91	06	06 06	06	90 6		68	06
8 Moisture	27.7	20.4 22.6	23.0	24.6 25.4	21.8	21.7 15.4	SAMPLES		
mits <u>Plasticity</u>	21	19 21	50	81 91	70	21 18	STAGE I SAMPLING - COMPOSITE SAMPLES		
Atterburg Limits	19	21	20	18 20	70	50 20	I SAMPLIN		
Ati	40	4 0 4 5	40	36 36	40	41 38	STAGE		
Sample Depth (ft.)	5 - 20	5 - 20 20	5 - 20	5 - 20 20	5 - 20	5 - 20 20		5 - 20	5 - 20
Sample Number		2A 2B	m	4A 4B	ហ	6A 6B		Composite 1,2A,2B,3	Composite 4A,4B,5,6A,6B
Sample Location	Sample 1	Sample 2	Sample 3	Test Pit 1	Test Pit 2	Test Pit 3		*Sample 1, 2, 3	**Test Pits 1,2,3

* Composite G ** Composite A

UNION CARBIDE CORPORATION - NIAGARA FALLS, NEW YORK

		Permeability					
		e Clay	48.8 55.8 49.8 69.2 63.7	47.2 47.0 67.1 61.0 60.6	47.0 69.0 64.5 68.7 60.1	46.5 62.9 67.8 63.0 60.5	51.0 57.8 61.0 68.0 57.9
		& Passing #200 Sieve	94 88 87 90 90	85 87 89 89	8 5 5 5 4 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	83 83 83 83 83 83 83 83 83 83	8 8 8 8 8 8 8 8 8 8
1	I. SAMPLES	% Moisture	17.6 19.2 16.7 25.8 26.3	19.7 20.0 25.2 25.9 26.9	13.2 18.9 19.2 25.1 25.9	16.4 19.3 22.5 23.3 23.6	16.2 20.5 22.6 26.2 26.0
UNION CARBIDE CORPORATION - MISSISS THE	STACE II SAMPLING - INDIVIDUAL SAMPLES	Atterburg Limits Liquid Plastic Plasticity					
		Sample Depth (ft.)	2	2 2 2 2 5	2 0 0 4 0	2	0 1 4 61
		Sample Number	A2 A6 A10 A14 A19	B2 B6 B10 B14 B19	62 66 610 614 619	D2 D10 D14 D19	E2 E6 E14 E19
		Sample Location	Test Pit A	Test Pit B	Test Pit C	Test Pit D	Test Pit E

UNION CARBIDE CORPORATION - NIAGARA FALLS, NEW YORK

STAGE II SAMFLING - INDIVIDUAL SAMFLES - Continued

Permeability				8.16x10-9cm/sec @ 10 PSI 7.00x10-9cm/sec @ 10 PSI 2.66x10-9cm/sec @ 10 PSI? 8.66x10-9cm/sec @ 10 PSI 7.37x10-9cm/sec @ 10 PSI			7.79x10 ⁻⁹ cm/sec @ 10 PSI
e Clay	51.0 48.5 67.2 67.9 65.1 65.1	51.1 43.0 65.3 64.0 59.0		48.5 64.0 61.0 58.5 61.3		58.9 58.5 50.0	59.1
& Passing #200 Sieve	88 92 93 95 95	83 90 90 88		84.3 90.2 89.6 90.3	SITE	87.0 88.0 89.0	90.3
& Moisture	16.9 18.7 19.9 23.5 24.3 24.5	16.9 17.3 20.5 23.6	SAMPLES*	22.5 22.2 22.7 19.6 20.1	DUAL AND COMPO	22.1 20.6 17.8	19.0
Limits ic Plasticity			STAGE II SAMPLING - COMPOSITE SAMPLES*	13 17 17 18	STOCKPILE, INDIVIDUAL AND COMPOSITE		11
Atterburg Limits Liquid Plastic Pla			STAGE II SAM	34 21 39 22 37 20 38 20 39 21	SAMPLING -		38 21
Sample Depth (ft.)	1 4 7 0 E 1 1 9 1 9 1 9 1 9 1 9 1 9 1 9 1 9 1 9	2 9 <u>0 1 1 6</u>		2 - 1 19 2 - 19 2 - 19 1 - 19	STAGE 11		
Sample Number	F F F F F F F F F F F F F F F F F F F F	62 66 610 614					te
Sample Location	Test Pit F	Test Pit G		B Composite C Composite D Composite E Composite F Composite		Stockpile 1 Stockpile 2 Stockpile 3	Stockpile Composite

*See "Stage I Sampling - Individual Samples" table for A and G composites.

APPENDIX B

ANALYSIS OF GEOTECHNICAL DATA



UNION CARBIDE CORPORATION P.O. BOX BB7, NIAGARA FALLS, NY 14302 CARBON PRODUCTS DIVISION

February 2, 1987

f /

Mr. R.J. Mitrey New York State Department of Environmental Conservation 600 Delaware Avenue Buffalo, New York 14202

Subject: Republic Solid Waste Management Facility - Closure Cap Material

Dear Mr. Mitrey:

As per our phone conversation on January 28, 1987, this is to inform you that Union Carbide Corporation would like to designate a new additional area within the irrigation pond at the Albright Road site as its source for closure clay cap material. This new area is adjacent to the originally designated area. High demand and limited supply of quality capping material makes this request necessary at this time.

If approved, Union Carbide Corporation's cover material source would then consist of two components, that is:

- (a) Material from the originally designated area
- (b) Material from a new adjacent area

All of the above material would be excavated from the planned irrigation pond at that site. Attached for your review is a detailed report prepared by Conestoga-Rovers and Associates, Limited for Union Carbide Corporation justifying this request.

Please note that an expeditious review is requested and required in order for Union Carbide Corporation to maintain its proposed closure schedule. As agreed, I will call your office on Friday, February 6, 1987 for your response to this request.

As always, if you have any questions or need any additional information, do not hesitate to contact me.

Very truly yours, Mickel a. Balent

Chief Plant Engineer

最新なながあるので使うできた。 Page Andread Andread

M.A. Balent, P.E.

nmd Attach.

CC: Messrs. G.A. Hamm

A.C. Ogg

H.T. Prosser



CONESTOGA-ROVERS & ASSOCIATES LIMITED

651 Colby Drive, Waterloo, Ontario, Canada N2V 1C2 (519) 884-0510

January 29, 1987

Reference No. 1851

Mr. Michael Balent Chief Plant Engineer UNION CARBIDE CORPORATION P.O. Box 887 Niagara Falls, New York 14302

Dear Mike:

Re: Review and Analysis of Geotechnical Test Data
"Evaluation of Soil Suitability for Landfill Cap Materials"
from the Pless Trucking Site on Albright Road, Lewiston, NY

Background:

Union Carbide Corporation undertook an extensive investigation of a clay borrow site proposed by the Pless Trucking Company. As shown on Figure 1, the site is located off Albright Road in the Town of Lewiston, New York. The investigation was undertaken to determine the suitability of the clay material from this site for use as capping material for landfill closures pending at Union Carbide's Republic Plant in Niagara Falls, New York. The investigation focused on the western half of the site, an area of approximately 190 ft. x 260 ft. as shown on Figure 2 and Figure 3.

Since the time of the investigation, the site owner sold almost all of the material included within the 400 ft x 360 ft. boundaries (as shown on Figure 2) to another client. Approximately 10 percent of the area shown within the 190 ft x 260 ft boundaries, as shown on Figure 3, remains. If this site is to remain as the source for capping material, excavation will now have to shift to adjacent areas.

Purpose:

The purpose of this data review is to show the uniformity of the site through the data that has already been generated with the intention of significantly reducing or eliminating the need for further testing of material found in areas immediately adjacent to the borrow site.

Data Review:

In order to view the consistency of the site overall, an examination of the ranges of values for all sample data points has been made and is provided in the following.

Reference No. 1851

-2-

Atterberg Limits:

Provided for 15 samples, including composites. The range of values for Atterburg limits are as follows:

- ° liquid limit 34 to 42 ° plastic limit - 18 to 22
- ° plastic limit 18 to 22 ° plasticity index - 13 to 21

Atterburg limits are all within a narrow range.

Percent Moisture:

Values are provided for 51 samples including composites. The range of values for all data is 13.2 to 27.7 which indicates a difference of 14.5 percent for all samples. A trend toward uniformity might best be shown by comparing the range of moisture present according to the depth of the individual samples (not composites).

Sample Depth	% Moisture	Difference	No. of Data Values
1-2 ft.	13.2 - 19.7	6.5	7
4-7 ft.	17.3 - 20.5	3.2	8
10 ft.	16.7 - 25.2	8.5	7
13-14 ft.	22.6 - 26.2	3.6	7
19-20 ft.	15.4 - 26.9	11.5	10

Also, a comparison of percent moisture values for all of the composited samples:

Sample Depth	% Moisture	Difference	No. of Data Values
2-20 ft.	19.6 - 27.7	8.1	11

When comparing ranges for values of data according to sample depth, the largest range in values occurs at 19 - 20 feet at 11.5 (compared to 14.5 for all values reported) while this range in values is significantly lower from 1 - 15 feet of depth.

Reference No. 1851

-3-

Percent of Material Passing a #200 Sieve:

The range here for all available samples including composites (51 data values) is 80-94 percent, a difference of 14 percent. In all cases the percent passing through #200 sieve significantly exceeds the required minimum. Again, a closer examination by sample depth indicates stronger trends:

Sample Depth	Range of Values	Difference	No of Data Values
1-2 ft.	83 - 94	11	7
4-7 ft.	80 - 92	12	8
10 ft.	87 - 93	6	7
13-14 ft.	89 - 93	4	7
19-20 ft.	88 - 92	4	10

Examination of the data by depth shows both a lower maximum difference amongst values and also some very strong trends for the test zones between 10 and 20 feet.

Review of data for percent of material passing a #200 sieve for composited samples:

Sample Depth	Range of Values	Difference	# of Data Values
2-20 ft.	84.3 - 92	7.7	11

The range of values for percent of material passing through a #200 sieve is narrow, indicative of uniform material composition across the area.

Percent Clay and Unified Soil Classification:

The range of percent clay for 37 individual samples is 43 - 69.2 percent or a difference of 26.2 percent. Although this may appear to be a large range of values, only 8 of the 37 samples had less than 50 percent clay.

The range of values for percent clay for 7 composite samples is 48.5 - 64 percent or a difference of 15.5 percent.

Based on the results shown, all samples would be designated as CL by the Unified Classification System.

Reference No. 1851

-4-

Maximum Density and Optimum Moisture:

For the 7 composite samples for which this testing was performed, the range of values is extremely narrow. Values for maximum density range from 110.3 - 115.0 or a difference of 4.7. The values for optimum moisture range from 15.7 - 17.5 percent, or a difference of only 1.8 percent.

Permeability:

The permeabilities reported from the testing of 7 composite samples were all of the magnitude of 10^{-9} cm/sec.

Comparison of Geotechnical Results vs. NYSDEC Guidelines for Soil Materials for a Clay Cap

NYSDEC GUIDELINE

GEOTECHNICAL RESULTS

Material designed CL or CH by Unified Classification System

Soil should contain more than 50 percent by weight passing a #200 sieve

Soil should have more than 25 percent clay

The liquid limit should be 30 percent or greater

The plasticity index should be 15 or greater

Compacted soil permeability of 1x10⁻⁷ cm/sec or less

All samples fall into the CL classification

All samples had 80 percent or more passing the #200 sieve

44 samples analyzed for this parameter had 43 percent or more of clay

For 14 samples analyzed for Atterberg limits, the liquid limit was 34 percent or greater

For 13 samples analyzed for Atterberg limits, the plasticity index was 16 or greater. One sample had a plasticity index below 15 (13).

All permeabilities determined during testing were on the order of magnitude of 10^{-9} cm/sec.

Reference No. 1851

Review of Geographical Distribution of Sampling Locations:

Although the investigation focused on the western "half" of the site, there are three valid data points crossing the northern and southern boundaries of the site from the east to west. These are TP-1, TP-2, TP-3 and Sample 1, Sample 2 and Sample 3 respectively. Comparison of geotechnical results from one sample location to the next shows uniformity in the east-west direction.

-5-

Similarly, comparison of data from TP-1 to Sample 1, TP-2 to Sample 2 and TP-3 to Sample 3 shows uniformity in the north-south direction.

In addition, test pits A through G, concentrated on the western side of the site, show more detailed uniformity in both the north-south and east-west directions.

Although there are admittedly minor variations from location to location, all parameters fall within narrow, well defined ranges, many conclusions regarding uniformity are evident and all parameters exceed the NYSDEC guidelines (except 1).

Brief Discussion of Local Geology:

The site being considered as the source for capping material was once below the surface of a large glacial lake which covered most of western New York. The clayey lake sediments which have been tested and analyzed were formed at the bottom of the lake, as the glaciers melted and receeded and the soil material on the glaciers was carried into the lake by melting water runoff. From the high percentages of material by weight passing through a #200 sieve, it is evident that at the time these clayey sediments were deposited, the lake was quiescient (quiet, slow moving) and these very fine-grained sediments settled out of the water and formed the clay which exists on the site today.

Since the sediments were formed in a quiescient body of water covering a very large area, it is logical to assume that the composition of the sediments formed below this lake were very uniform. Also, since the lake did cover a very large area, it is possible to conclude that a shift of approximately 200 feet in either direction (material would now have to be removed from areas that are immediately adjacent to the site) would yield material of the same composition and physical and chemical properties as the material already tested.

Reference No. 1851

-6-

Conclusions:

Based on a review of geotechnical properties, NYSDEC quidelines, geographical distribution of sample locations and having basic knowledge of how these clayey sediments were formed, it is reasonable to conclude that the material immediately adjacent to the site will be essentially identical to the material tested on the western half of the site. As a result of this review, it is reasonable for Union Carbide Corporation to ask the NYSDEC to waive any additional testing of the material for procurement waive any additional testing of the material for procurement purposes. Union Carbide will provide results as required for inplace testing during the construction phase of the project.

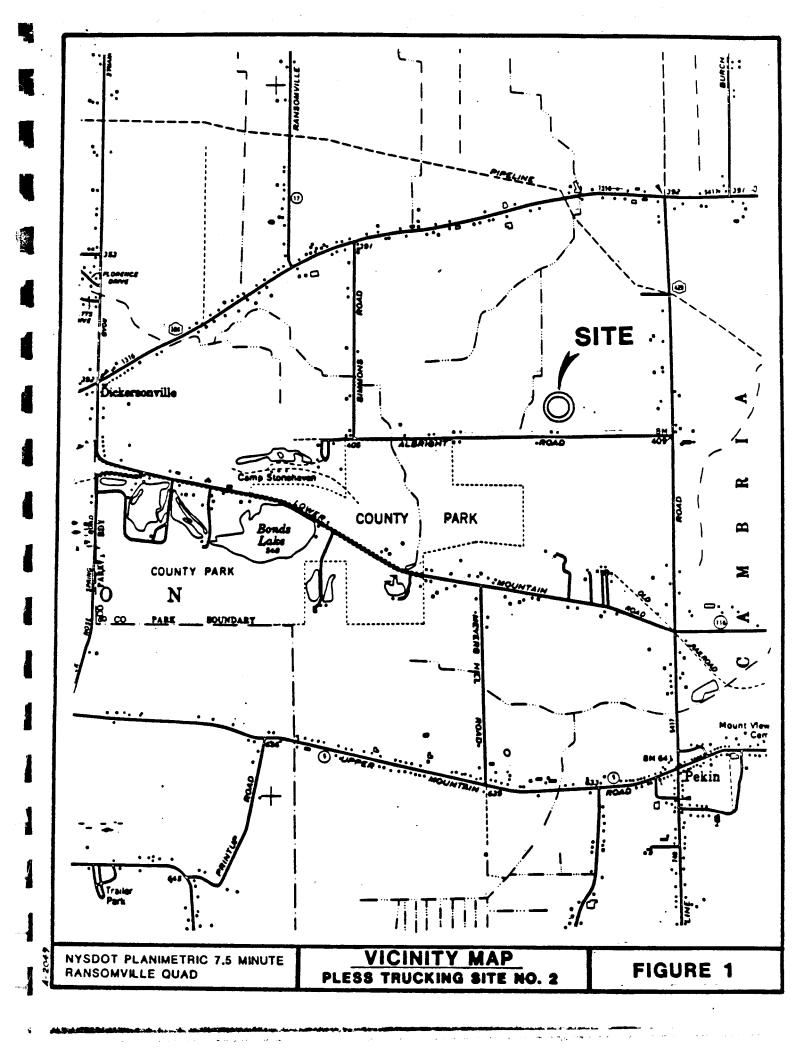
We hope this material is helpful to you, Mike. If we can be of further assistance, please do not hesitate to call.

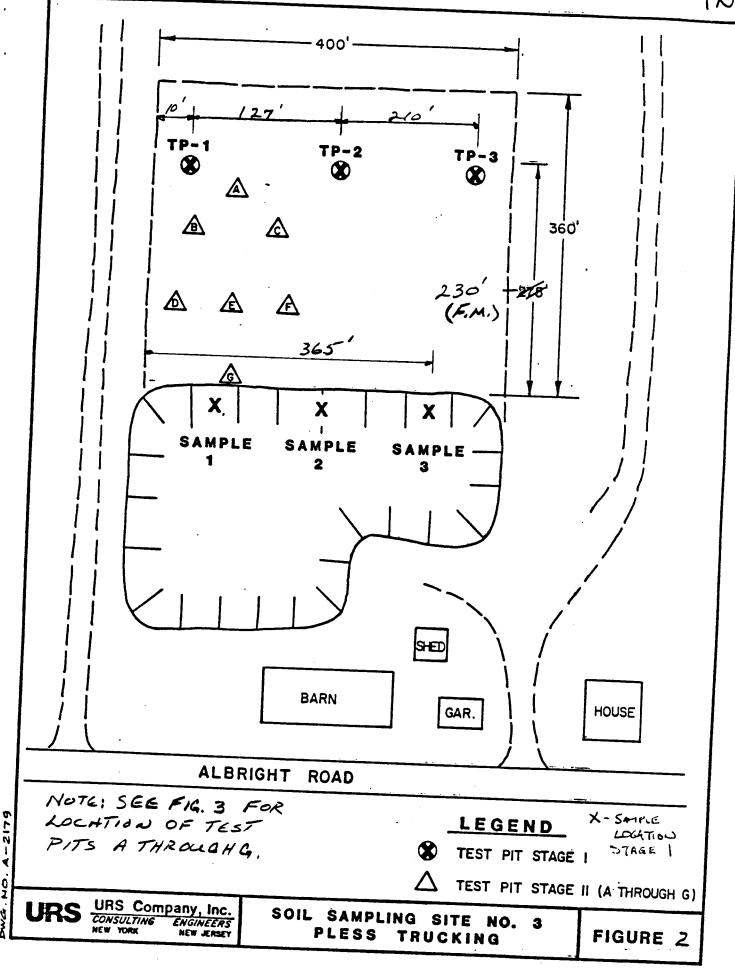
Yours very truly,

CONESTOGA-ROVERS & ASSOCIATES

Douglas J. Oscar

DJO:jd Enclosures cc: J. Kay

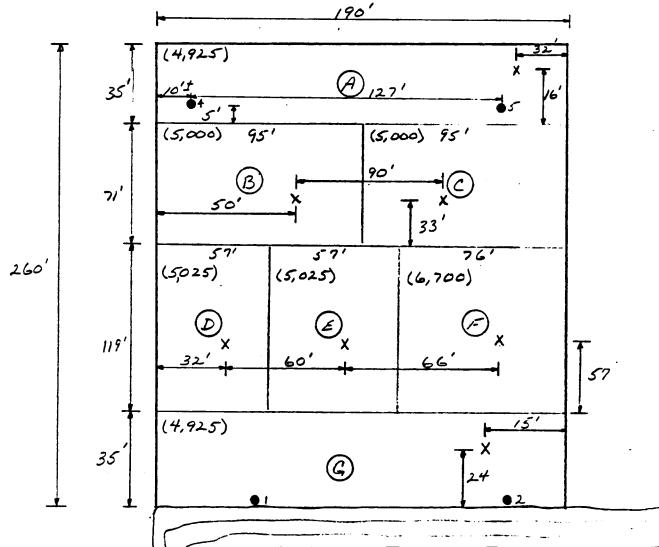




1,5,5,

| LEGEND 01-5AM X-5AM (5000) = T

01-SAMPLE LOCATION OF 10/1/66 X-SAMPLE LOCATION OF 10/22-23/86 (5,000) - INDICATES QUANT. OF CLAY REPRESENTED BY EACH SAMPLING BLOCK (ASSUME 20' DEEP)



NOTE: SOUTH & WEST BOUNDARIES COINCIDE WITH TOP OF EXISTING EXCAUNTION.

EXISTING EXCAUATION

FIGURE 3

APPENDIX C

INSPECTION OF SUMMIT PARK MALL CLAY

WAT. FILE COPY

CRA Consulting Engineers

CONESTOGA-ROVERS & ASSOCIATES LIMITED

651 Colby Drive, Waterloo, Ontario, Canada N2V 1C2 (519) 884-0510

May 15, 1987

Reference No. 1851

Mr. Michael Balent Chief Plant Engineer UNION CARBIDE CORPORATION P.O. Box 887 Niagara Falls, New York 14302

Dear Mike:

Re: Clay Cap Material from Summit Lake Park Property

This memo is further to our conversation of Thursday, May 14, 1987 regarding the possible use of excavated materials from the above noted property as clay cap fill for the Union Carbide Landfill.

On May 14, 1987, four test pits were excavated on the property in the area directly west of the lake where we examined some of our clay material during the meeting at the Site. Field observations made during the excavations of these pits indicate this material to be suitable for use in a clay cap for UCC's landfill.

The lithology of the site consists of lacustrine clays overlying clay till. However, the upper clay unit is visibly divided into three zones of which only one would be acceptable without prior preparation. The zone from 1 foot to approximately 8 feet below existing grade appears to have a moisture content at or near its optimum moisture content. This clay also has very little permeable material in small and negligible pastings. The zone beneath this depth has a moisture content at or near its plastic limit and is, therefore, unacceptable unless the moisture content can be drastically reduced. The top foot of the pit is dry and should therefore be stripped and held at the pit for other uses.

Based on the information provided and a visual examination of the materials, it appears that this clay will meet the capping criteria. However, it must be noted that this opinion is based on visual examination and that some physical testing should be conducted to confirm these characteristics.

May 15, 1987

-2-

Reference No. 1851

If clay material from this pit is to be used, the following criteria must be maintained:

- Only clay excavated from intervals between 1-8 feet be used as cap material if it meets design criteria;
- quality control be provided at the landfill site in the form of a materials inspector who would have the authority to accept or reject individual loads;
- that the material placed on the landfill cap be disced and compacted at or near its optimum moisture content; and
- 4. as these types of clay have a tendency to form desication cracks when dried it is required that the sand drainage blanket and a suitable topsoil covering be placed as soon as possible after completion of the cap and only when moisture content and compaction control has been exercised.

If you have any questions regarding this matter please feel free to contact our office at your earliest convenience.

Yours very truly,

CONESTOGA-ROVERS & ASSOCIATES

Steve Crossman, C.E.T. per Je

sc:ja

cc: D. Miller

APPENDIX D

SAND TESTING RESULTS

URS

AN INTERNATIONAL PROFESSIONAL SERVICES DRGANIZAT

URS COMPANY, INC.

CONSULTING ENGINEERS

570 DELAWARE AVENUE BUFFALO, NEW YORK 14202

TEL: (716) 883-5525

NEW YORK
MONTVALE, NJ
BUFFALO
ATLANTA
TAMPA
HATO REY, PR
WASHINGTON, DC
BOSTON
CLEVELAND
DENVER
DALLAS
SEATTLE
SAN FRANCISCO
SAN MATEO, CA

Rec'd CRA

MAR 3 1 1987

Mr. Michael Balent Union Carbide Corporation Carbon Products Division P.O. Box 887 Niagara Falls, New York 14302

RE: LANDFILL CLOSURE

Dear Mr. Balent:

March 27, 1987

Enclosed please find the laboratory report of the geotechnical tests performed on the four sand samples collected on January 8, 1987. A summary of test results is presented in Table 1 enclosed.

Although April 12, 1985 draft guidelines by the New York State DEC do not specify any quantitative criteria, it is our judgement that these materials will be suitable for the drainage layer.

Please call if you have any questions.

Very truly yours,

URS COMBANY, INC.

Vern Sing, P.E. Project Manager

Enc.

VS/bc 3/27/87L 35113

TABLE 1

GEOTECHNICAL LABORATORY TEST DATA SURVEY - DRAINAGE MATERIAL

Cu* Cc**	2.42 1.15	1.51	1.27	06.0
*n0	2.42	10.0	6.06 1.27	3.21 0.90
% Passing #200 Sieve	3.6	5.4	2.5	6.0
Permeability (cm/sec)	2.23×10^{-3} @ 0.073 psi 2.12×10^{-3} @ 0.122 psi	2.15×10^{-2} @ 0.02 psi 2.38×10^{-2} @ 0.05 psi	1.69 × 10^{-2} @ 0.034 psi 1.41 × 10^{-2} @ 0.057 psi	2.78×10^{-2} @ 0.014 psi 2.68×10^{-2} @ 0.032 psi
Optimum Moisture Content	13.6%	7.0%	9.5%	5.5%
Max. Dry Density (ASTM D-698)	101.6 pcf	116.0 pcf	110.0 pcf	106.6 pcf
nscs	gS G	MS.	MS	SP
Sample	1	~	က	4

Note: SW - < 5% passing #200 sieve, Cu > 4, and (Cc < 3 SP - < 5% passing #200 sieve

 $^{^{\}star}$ Cu - Uniformity Coefficient, $^{0}60/^{0}10$

^{**} Cc - Curvature Coefficient, $0_{30}^2/(0_{60} \times 0_{10})$

USCS - Unified Soil Classification System



PROJECT:

Union Carbide

CLIENT:

URS Company, Inc.

DATE:

February 25, 1987

PROJECT NO:

BT-86-6

REPORT NO:

L-11

This report presents the results of laboratory testing conducted on four separate sand materials delivered to our laboratory in Hamburg, New York on January 9, 1987.

This work was requested by Mr. Virenda Singh, representing the URS Company.

Sample identification and tests requested are as follows:

Sample

Identification

Tests Performed (Each Sample)

UC-NE-870108-1

UC-NS-870108-2

UC-GG-870108-3

UC-GG-870108-4

Mechanical Analysis

Maximum Density-Optimum Moisture

Remolded Permeability

All tests were conducted in accordance with applicable ASTM standards as stated. A summary of test data is contained in Tables #1 thru #3 with specific test data regarding each sample contained in the attached Optimum Moisture-Maximum Density and permeability test reports.

If you have any questions or wish to discuss the data as presented, please feel free to contact our office.

Respectfully submitted,

EMPIRE SOILS INVESTIGATIONS, INC.

Charles C. Keipper Laboratory Manager

s11



UNION CARBIDE TEST DATA SUMMARY

TABLE #1

Mechanical Analysis - ASTM D-422.

Sieve Size	Sample #1	Perce Sample #2	ent Finer Sample #3	<u>S</u> ample #4
1" 1/2" 3/8" #4 #8 #16 #50 #100	100 98.5 98.4 97.1 95.8 93.7 68.2 17.1 3.6	100 99.4 78.5 43.0 14.5 8.9 5.4	100 87.1 61.4 17.0 7.1 2.5	100 99.9 81.4 39.2 3.1 1.3

TABLE #2

Maximum Density - Optimum Moisture - ASTM D-698

Sample #1 - 101.6 pcf @ 13.6% moisture. Sample #2 - 116.0 pcf 0 7.0% moisture. Sample #3 - 111.0 pcf @ 9.2% moisture.

Sample #4 - 106.6 pcf 0 5.5% moisture.

TABLE #3

Constant Head Permeability:

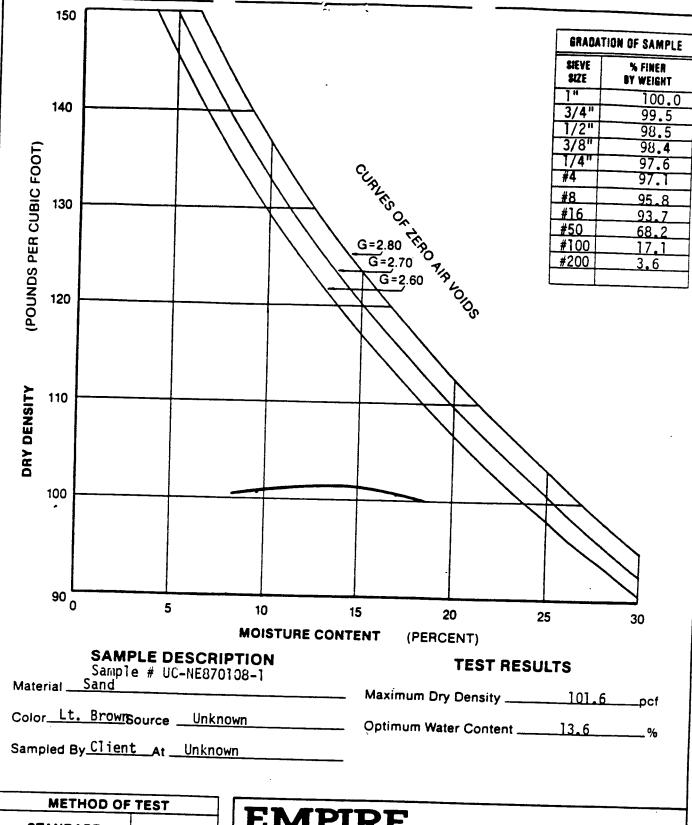
Sample #1 - 2.23 x 10-3 CM/SEC @ .073 PSI.

2.12 x 10-3 CM/SEC @ .122 PSI.

Sample #2 - 2.15 x 10-2 CM/SEC @ .02 PSI. 2.38 x 10-2 CM/SEC @ .05 PSI.

Sample #3 - 1.69×10^{-2} CM/SEC @ .034 PSI. 1.41 x 10^{-2} CM/SEC @ .057 PSI.

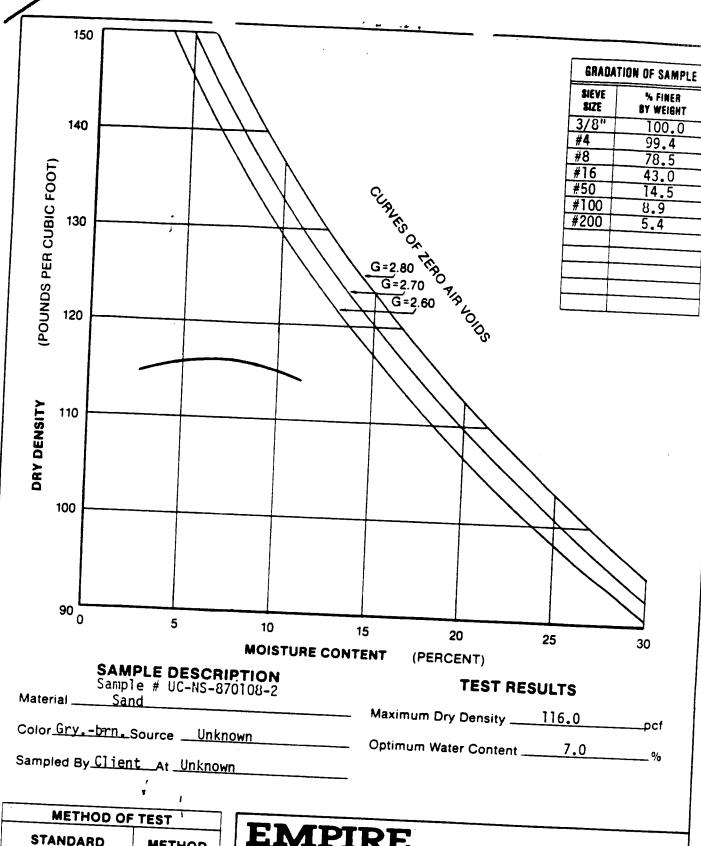
Sample #4 - 2.78×10^{-2} CM/SEC @ .014 PSI. 2.68 x 10^{-2} CM/SEC @ .032 PSI.



METHOD OF TEST			
STANDARD ASTM	METHOD A		
AASHTO			
MILITARY			
OTHER			

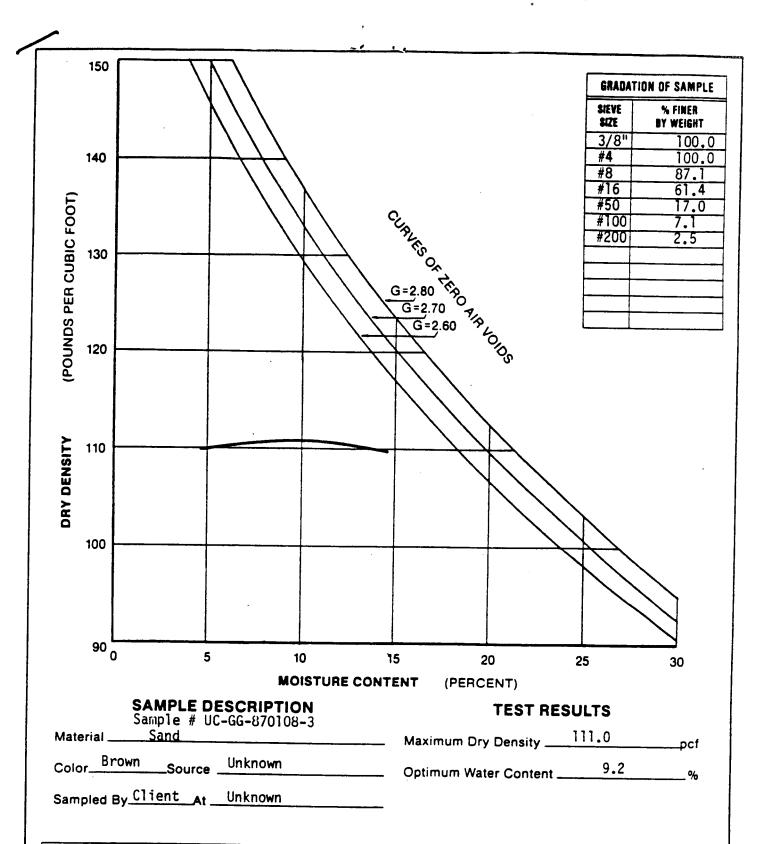
R/T Form E

EMP SOIL SINVESTE A OPTIM	UM MOISTURE—MAX	XIMUM DENSITY
	Union Carbide URS Company,	
DR. BY: PJA CK'D. BY: UC	DATE SAMPLED: 1/8/8 K TESTED BY: JK	87 PROJ. NO. BT-86-6 CURVE NO. L-11A



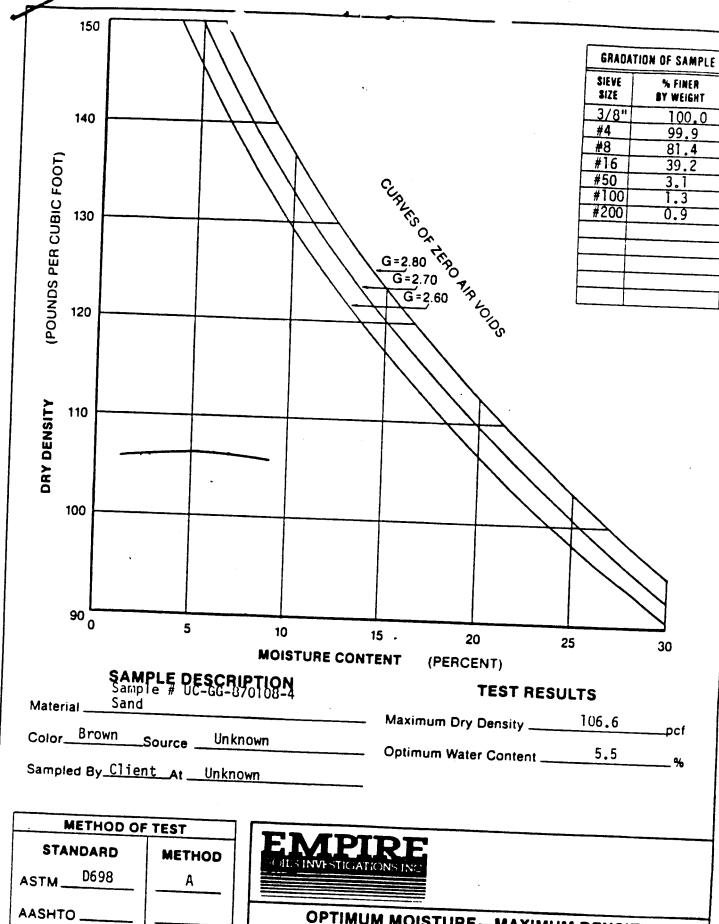
<u> </u>	METHOD OF TEST				
	STANDARD	METHOD			
A	STM_ <u>D698</u>	A			
A	ASHTO				
М	ILITARY				
0	THER				

I	MPI JI - INVENIGATI	RE	
	OPTIMU	M MOISTURE—MAXI	MUM DENSITY
		Union Carbide URS Company	-
DR. B		DATE SAMPLED 1/8/87	PROJ. NO BT-86-6
CK.D	BY CCK	TESTED BY: JK	CURVE NO. L-11B



METHOD OF TEST		
STANDARD	METHOD	
ASTM	A	
AASHTO		
MILITARY		
OTHER		

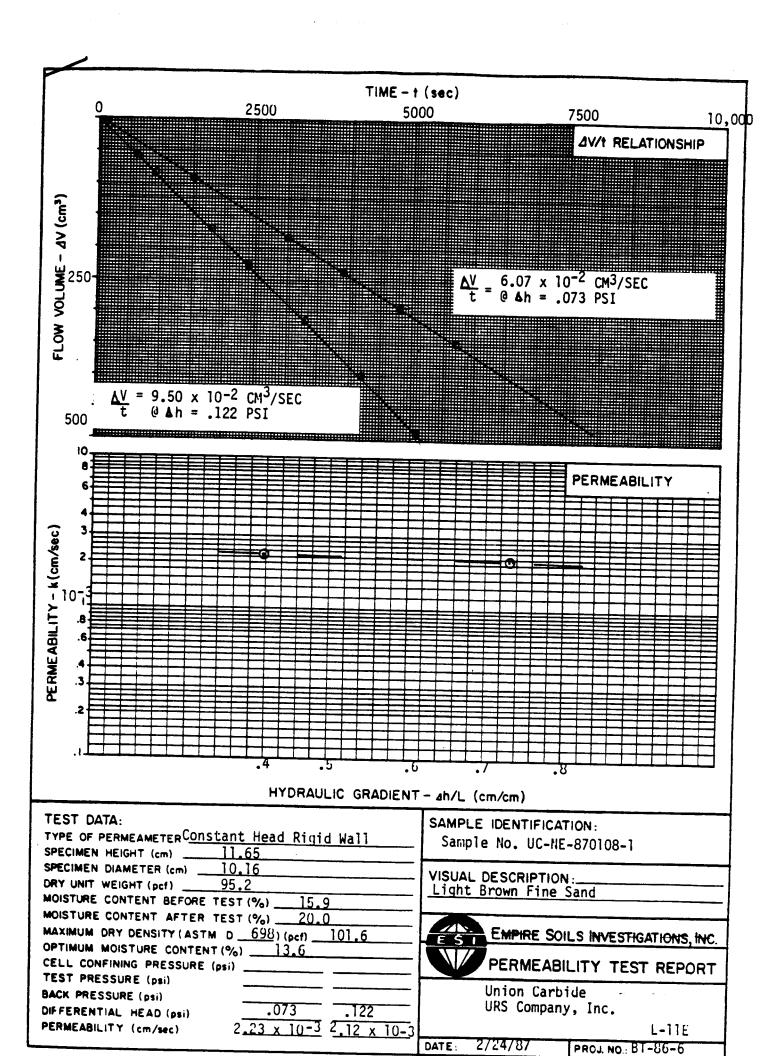
EMPT FILS INVESTIGATE	
OPTIMU	MOISTURE—MAXIMUM DENSITY
	Union Carbide URS Company, Inc.
DR BY: PJA	DATE SAMPLED: 1/8/87 PPROJ. NO. BT-86-6
CK'D BY: CCK	TESTED BY: JK LOUDYENG

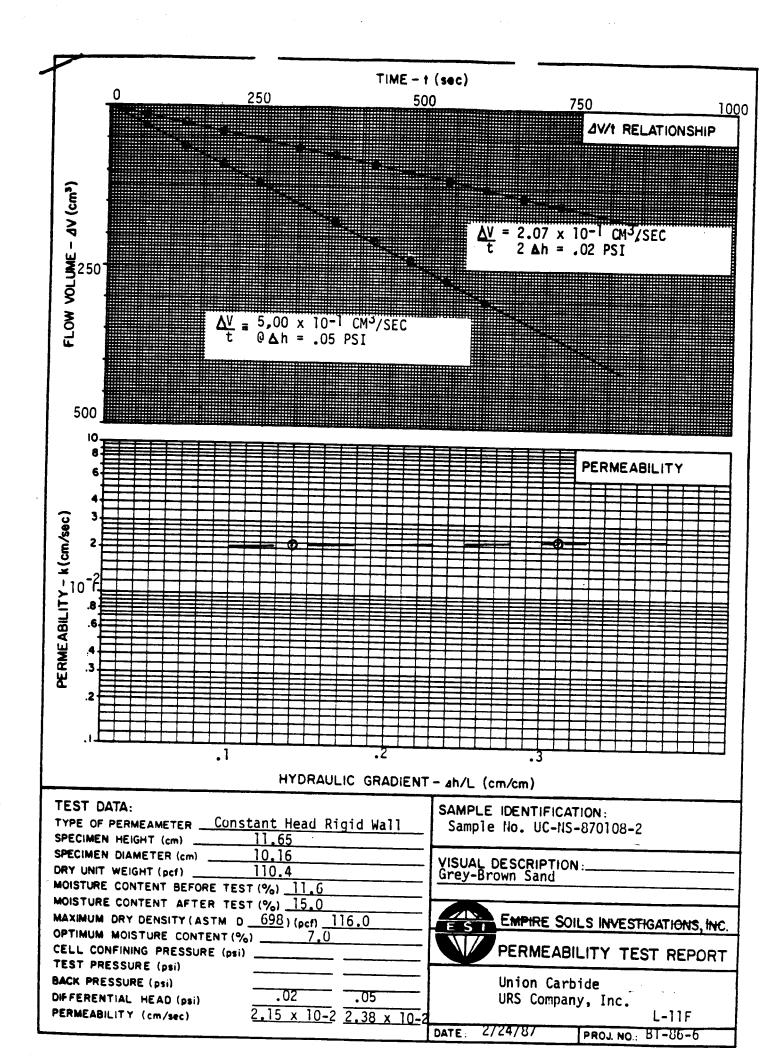


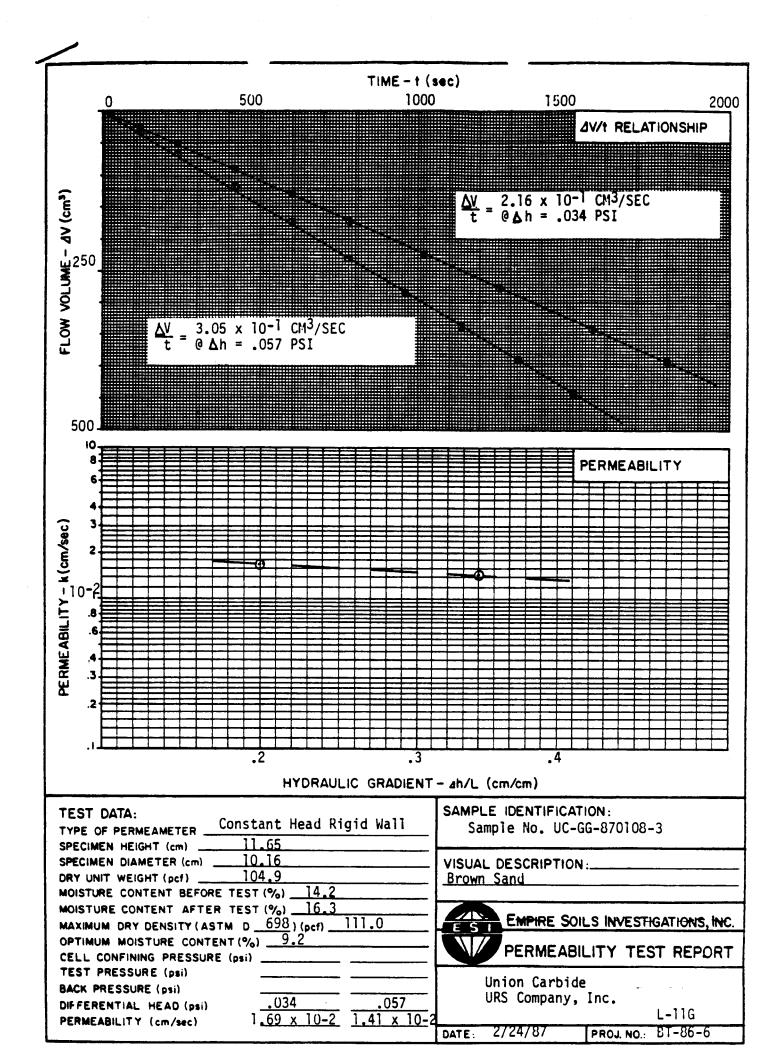
	OPTIMU	M MOISTURE—MAXIMUM DENSITY
		Union Carbide URS Company, Inc.
OR. BY:	PJA	DATE SAMPLED 1/8/87 PROJ NO BT-86-6

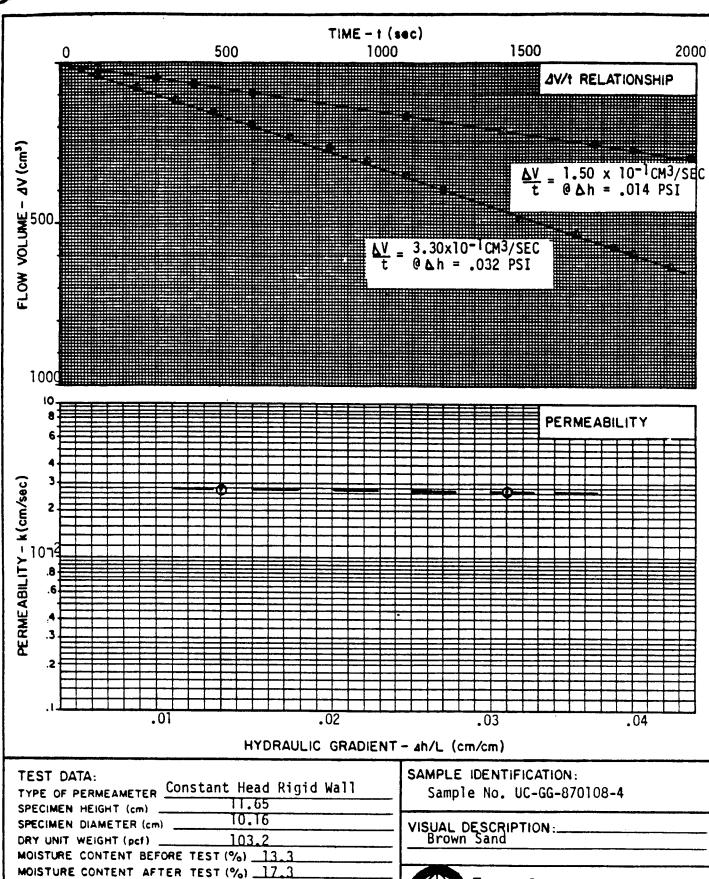
MILITARY ____

OTHER .









MAXIMUM DRY DENSITY (ASTM D 698) (pcf) 111.0 OPTIMUM MOISTURE CONTENT (%) ____ CELL CONFINING PRESSURE (psi) TEST PRESSURE (psi) BACK PRESSURE (psi) .014 .032 DIFFERENTIAL HEAD (psi) 2.78x10-2 2.68 x 10-2 PERMEABILITY (cm/sec)



DATE:

EMPIRE SOILS INVESTIGATIONS, INC.

PERMEABILITY TEST REPORT

Union Carbide URS Company, Inc.

2/24/87

L-11H

PROJ. NO.:

BT-86-6

APPENDIX E

IN-PLACE MOISTURE DENSITY TEST RESULTS

D' .Y SITE OBSERVATION REPORT



585 TROY-SCHENECTADY RD., LATHAM, NY 12110 518-783-1555	
S-5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY 14075	716-649-81
105 CORONA AVENUE, GROTON, NY 13073 607-898-5881	

□ 303 CLEVELAND AVENUE, HIGHLAND PARK, NJ 08904 201-846-5200

כ	1164 RIDGE RD.	EAST, ROCHESTER.	NY 14621	718-342-5320

Project: Union Carbide	Location: N. Falls, NY		
Client:Conestoga-Rovers & Assoc.	Contractor:	SLC	
Report No.: DS-1 Project No.: BT-87-85	Date: _	4/24/87	
Weather & Temperature: Overcast and cool, 35 to 450			
Arrived at Site: 8:30	Left Site:	2:30	

This Empire Soils Investigation Technician was on the above mentioned site to perform In-Place Densities (nuclear method) of a test pad constructed in the same manner in which the contractor proposes to construct the clay cap over the entire area of the disposal area.

The contractor placed the first lift of the test pad (approximately 9") and made 1 pass (1 back, 1 forward) with a sheepsfoot roller and made a second pass after which this technician obtained a shelby tube in at the East end of the test pad (shelby tube #1 or ST-1). The contractor then repeated the above mentioned procedure twice more and after the fourth pass, this technician obtained another Shelby Tube sample (ST-2) from the same area.

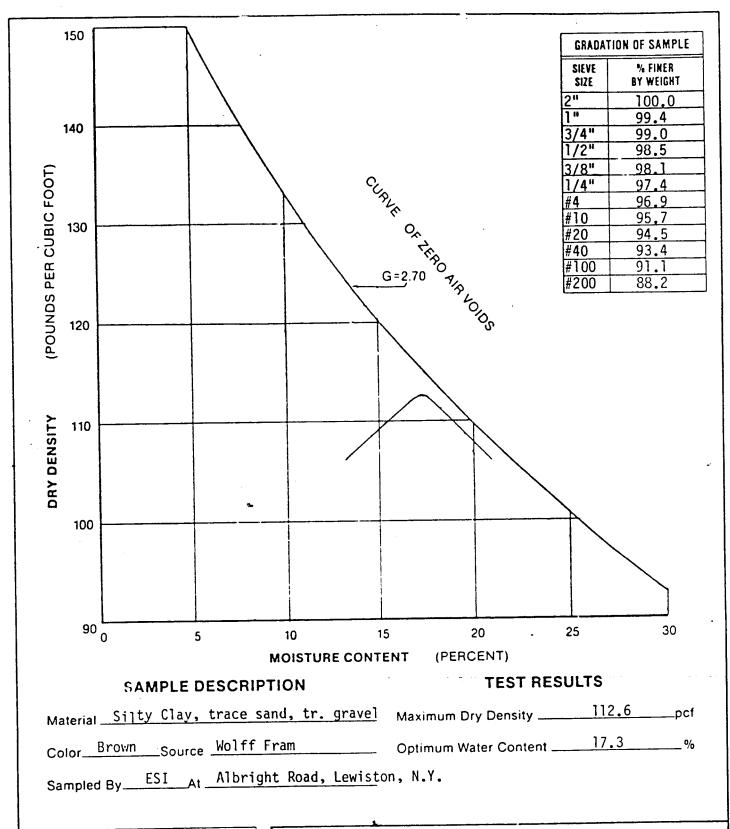
The contractor then placed another 9" lift and compacted it as above (making 1 pass with the sheepsfoot roller(see In-Place Density test 17 to 20) and then made the second pass with the sheepsfoot roller followed by 2 passes with a smooth drummed roller after which this technician obtained shelby tube sample ST-3.

This technician returned the shelby tube samples (3) to the Empire Soils laboratory to have the permeability of the material determined.

This technician also obtained a sample of this clay at the client's request to have a proctor and gradation analysis performed.

3

Jeff Benson



METHOD OF TEST	
STANDARD	METHOD
ASTM	<u>B</u>
AASHTO	
MILITARY	
OTHER	

EMPIRE SOILS INVESTIGATIONS INC			
(OPTIMUM	MOISTURE—MAXIMUM DENSITY	
		on Carbide estoga-Rovers and Associates	
DR. BY:	PJA	DATE SAMPLED4/24/87 PPOJ NO. BT-87-85	
CK'D BY	CCK	TESTED BY BIT & JB CURVE NO L-1A	

FIELD N-PLACE DENSITY TEST RETORT

	EMPIR SOILS INVESTIGATIONS	INC.
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Technician: ___

☐ 585 TROY-SCHENECTADY RD., LATHAM, NY 12110 518-783-1555

☐ \$-5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY 14075 716-649-8110

☐ 105 CORONA AVENUE, GROTON, NY 13073 607-898-5881 ☐ RARITAN CENTER, 300 McGAW DRIVE, EDISON, NJ 08837

201-225-0202

☐ 1164 RIDGE RD. EAST, ROCHESTER, NY 14621 716-342-5320

Proje	ect:	<u>Un</u>	ion Carl	oide	Ide Report No. <u>UI-I</u>					
Clier	it <u>C</u>	ones	toga-Ro	Date:4/24/87						
Contractor: SLC							Job No. <u>BT-87-85</u>			
Test No.	Date of Test	Dept Eleva	ition (pcf)	y Moisture		Proctor Code	Location and Remarks Test pad for landfill cap			
1	4/24	lst lay	;	17.4	84.1	L-1	lst. layer, lst. pass, South 1/2, West end			
2	4/24	"	99.6	15.5	88.5	L-1	lst. layer, lst. pass, North 1/2, West end			
3	4/24	ti .	106.	6 17.5	94.7	L-1	lst. layer, 1st pass, North 1/2, East end			
4	4/24	"	96.	15.4	85.7	L-1	lst. layer, lst. pass, South 1/2, East end			
5	4/24	11	103.	9 14.4	92.3	L-1	lst. layer, 2nd. pass, South 1/2, West end			
6	4/24	11	104.	5 15.8	92.8	L-1	1st. layer, 2nd. pass, South 1/2, West end			
7	4/24	11	107.	7 17.1	95.6	L-1	lst. layer, 2nd. pass, North 1/2, East end			
8	4/24	11	105,	5 16.9	93.7	L-1	1st. layer, 2nd. pass, South 1/2 East end			
9	4/24	н	102.	4 16.7	90.9	L-1	lst. layer, 3rd. pass, South 1/2 West end			
10	4/24	11	105.	9 16.7	94.9	L-1	lst. layer, 3rd. pass, North 1/2, West end			
11	4/24	11	110.	9 16.4	98.5	L-1	lst. layer, 3rd. pass, North 1/2, East end			
12	4/24		105.	9 17.6	94.9	<u>L-1</u>	1st. layer, 3rd. pass, South 1/2, East end			
13	4/24	11	105.	4 17.0	93.6	L-1	1st. layer, 4th. pass, South, 1/2, West end			
Proctor Code						Material Type and Source				
L-1	L-1 112.6 17.3		17.3	Sil	Silty CLAY, trace sand and gravel, Wolfes Pit, Lewiston, N.Y.					
							•			
•				r						

	Hespectfully submitted,
Remarks:	EMPIRE SOILS INVESTIGATIONS, INC.
8:30 - 2:30 Technician Time:	
Jeff Benson	Jeff Renson

FIELD 'N-PLACE DENSITY TEST REPORT



☐ 585 TROY-SCHENECTADY RD., LATHAM, NY 12110 518-783-1555

S-5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY 14075 716-649-8110

☐ 105 CORONA AVENUE, GROTON, NY 13073 607-898-5881

RARITAN CENTER, 300 McGAW DRIVE, EDISON, NJ 08837 201-225-0202

Proje	ct:		Union	Carbi	de		Report No. DT-1 Page 2
Clien	Client Conestoga-Royers & Associa						tes Date: <u>4/24/87</u>
Contr	ractor:		SL	.C			Job No. <u>BT-87-85</u>
Test No.	Date of Test	Depth or Elevation	In-place Density (pcf)	in-place Moisture (%)	% Compaction	Proctor Code	Location and Remarks
14	4/24	lst. layer	104.8	17.9	93.1	L-1	lst. Layer, 4th. pass, North 1/2, West end
15	4/24	11	106.2	17.3	94.3	L-1	1st. layer, 4th. pass, North 1/2, East end
16	4/24		110.8	15.3	98.4	L-1	1st. layer, 4th. pass, South 1/2, East end
17	4/24	2nd. layer	101.5	13.2	90.1	L-1	1st. layer, 1st. pass, 1/2, West end
18	4/24	11	101.4	15.6	90.1	L-1	1st. layer, 1st. pass, North 1/2, East end
19	4/24	11	101.4	15.6	90.1	L-1	1st. layer, 1st. pass, North 1/2, East end
20	4/24	11	97.9	19.8	86.9	L-1	
21	4/24	lii .	112.1	16.9	99.6	L-1	1st. layer, 1st. pass, South 1/2, West end 2nd. pass with sheepsfoot, 4th. pass with Smooth
22	4/24	п	108.8	18.0	96.6	1-1	Drummed
	·						
Proctor Code	Maxim Density		Optimum pisture (%)		<u> </u>	<u> </u>	Material Type and Source
			ty Clay	, tra	ace sand and gravel		
						·	
<u> </u>	L	1		1			Respectfully submitted,
Remai	rks:		,				_ EMPIRE SOILS INVESTIGATIONS, INC.
			· · · · · · · · · · · · · · · · · · ·				
Techni	ician Tim	ne:8	:30 - 2	2:30			-

SUBSURFACE EXPLORATION & CONSTRUCTION QUALITY CONTROL & ENGINEERING SPECIALTY SERVICES

Jeff Benson

Jeff Benson

Technician: _

D. / SITE OBSERVATION REPOF



585 TROY-SCHENECTADY RD., LATHAM, NY	/ 12110 518-783-1555	
8-5167 SOUTH PARK AVENUE, P.O. BOX 091	13, HAMBURG, NY 14075	718-649-8110
105 CORONA AVENUE GROTON NY 13073.	607_RQR_5881	

☐ 303 CLEVELAND AVENUE, HIGHLAND PARK, NJ 08904 201-846-5200

☐ 1164 RIDGE RD. EAST, ROCHESTER, NY 14621 716-342-5320

Project: Union Carbide	Location: N. Falls, NY		
Client:Conestoga-Rovers & Associates	Contractor: SLC		
Report No.: DS-1 Project No.: BT-87-89	Date: <u>5/1/87</u>		
Weather & Temperature: Clear and breezy, 55 to 650			
Arrived at Site: 8:00	Left Site:3:30		

This Empire Soils Investigation Technician was on the above mentioned site to test In-Place Densities (nuclear method) and material placed and compacted as a cap for the graphite disposal area of this plant.

This technician ran nine(9) tests (IPD's) in area "A"(station 6+40', 100' to 200' South to station 8+00', 100' to 200' South). Based on a maximum dry density of 115.0 pcf, this area tested to approximately 98.0 compaction. This technician then drove a shelby tube at station 7+20', 140' South (ST-4) 11". This tube was returned to Empire Soils Investigations laboratory for undisturbed permeability testing.

This technician also ran nine (9) tests (IPD's) in area "B", station 6+40', 240' to 310' South to station 8+00, 240' to 390' South. This area tested to approximately 97.7% compaction. This technician then drove a shelby tube at station 7+20', 310' South (ST-5) to 11". This tube was returned to Empire Soils Investigations Laboratory for undisturbed permeability testing.

This technician also ran nine (9) tests (IPD's) in area "C", station 8+60', 100' to 350' South to station 9+20', 150' to 240' South. This area tested to approximately 94.9% compaction. This technician then drove a shelby tube at station 9+00', 270' South (ST-6) to 11''. This tube was also returned to Empire Soils Investigations laboratory for undisturbed permeability testing. The required permeability for this material is 10^{-7} cm/sec.

It should also be noted in this report that the value of 115.0 pcf maximum dry density at 15.7% optimum moisture content was obtained from Don Millers(on-site engineer, Union Carbides' representative of Don Miller P.E.subcontractor), copy of soils properties report prepared for URS Engineers on the Wolf's Pit clay supply.

FIELD '-PLACE DENSITY TEST RF ORT

SOILS	VIP INVESTIG	TRE	
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☐ 585 TROY-SCHENECTADY RD., LATHAM, NY 12110 518-783-1555 ☐ S-5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY 14075 ☐ 105 CORONA AVENUE, GROTON, NY 13073 607-898-5881

716-649-8110

RARITAN CENTER, 300 McGAW DRIVE, EDISON, NJ 08837 20 1164 RIDGE RD. EAST, ROCHESTER, NY 14621 716-342-5320 201-225-0202

Proied	et:	Unior	Carbid	e			Report No. DT-2	
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0					s Date:5/1/87			
				SLC			Job NoBT-87-85	
Test No.	Date of Test	Bepth o	in-place Density	In-place Moisture (%)	% Compaction	Proctor Code	Location and Remarks Area "A" (Tests 1-9) Area "3" (Tests 10-18)	
1	5/1	lst. Lift	118.3	11.5	100+	L-5	Station 6+40', 100' South	
2	5/1	11	108.0	11.5	93.9	L-5	Station 6 + 40', 140' South	
3	5/1	11	114.8	12.7	99.8		Station 6+40', 200' South	
. 4	5/1		110.1	14.0	95.7	L-5	Station 7+00, 100' South	
5	5/1	11	114.1	13.3	99.2	L-5	Station 7+00, 140' South	
6	5/1	16	113.5	12.0	98.7	L-5	Station 7+00, 200' South	
7	5/1	11	113.3	13.4	98.5	L-5	Station 8+00, 100' South	
8	5/1	11	112.7	14.3	98.0	L-5	Station 8+00, 140' South	
9	5/1	11	112.7	11.2	98.0	L-5	Station 8+00, 200' South	
10	5/1	ti .	111.2	12.7	96.7	L-5	Station 6+40, 240' South	
11	5/1	11	114.1	13.3	99.2	L-5	Station 6+30, 310' South	
12	5/1	"	112.3	13.8	97.7	L-5	Station 7+00, 240' South	
13	5/1	11	110.5	12.9	96.1	L-5	Station 7+00, 310' South	
Proctor Maximum Optimum Code Density (pcf) Moisture (%)				Material Type and Source				
L-5 115		0	15.7	Clay, Wolfs Pit (Lewiston, New York)				
	-							
	<u> </u>							

•		Respectfully submitted,	
Remarks:		EMPIRE SOILS INVESTIGATIONS	, INC.
Technician Time:	8:00 - 3:30		<u> </u>
Technician:	Jeff Benson	Jeff Benson	
1001111010111.	CHROLIDEACE EVELOPATION E CONSTRUCTION C	HALITY CONTROL E ENGINEERING SPECIALTY SERVICES	

FIELD 1-PLACE DENSITY TEST R' ORT

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SOIL	SINVES	IIGAI	'IONS I	NC.

☐ 585 TROY-SCHENECTADY RD., LATHAM, NY 12110 518-783-1555

☐ S-5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY 14075 716-649-8110

☐ 105 CORONA AVENUE, GROTON, NY 13073 607-898-5881

☐ RARITAN CENTER, 300 McGAW DRIVE, EDISON, NJ 08837 201-225-0202 ☐ 1164 RIDGE RD. EAST, ROCHESTER, NY 14621 716-342-5320

Union Carbide Project: _ DT-2 Page 2 Report No. _ Conestoga-Rovers & Associates 5/1/87 Client ____ Date: _

SLC Contractor: _____ BT-87-85 Job No.

Job No Job No							
Date of Test	Depth or Elevation	in-place Density (pcf)	In-place Moisture (%)	% Compaction	Proctor Code	Location and Remarks	
5/1	Lift	108.5	15.2	95.3	L-5	Station ₹+00', 390' South	
5/1	11	113.1	12.9	98.3	L-5	Station 7+50', 340' South	
5/1	II.	115.9	12.1	100+	L-5	Station 8+00', 240' South	
5/1	H.	113.3	12.5	98.5	L-5	Station 8+00', 310' South	
5/1	81	113.3	13.4	98.5	L-5	Station 8+00', 390' South	
5/1	11	109.1	13.8	94.9	L-5	Station 8+60', 100' South	
5/1	H	110.3	15.2	95.9	L-5	Station 8+60', 200' South	
5/1	ıı .	110.0	14.2	95.7	L-5	Station 8+60', 270' South	
5/1	11	106.7	14.8	92.8	L-5	Station 8+60', 350' South	
5/1	11	110.2	14.1	95.8	L-5	Station 9+00', 100' South	
5/1	ıı .	112.9	13.9	98,2	L-5	Station 9+00, 200' South	
5/1	11	110.7	15.0	96.3	L-5	Station 9+00', 300' South	
5/1	11	102.9	16.6	89.5	L-5	Station 9+20', 150' South	
Maximum Cotimum			Material Type and Source				
-5 115.0 15.7		5.7	Clay, Wolfs Pit, Lewiston, New York				
	Date of Test	Date of Test	Date of Test Depth or Elevation (pcf) In-place Density (pcf) 5/1 I st. 108.5 5/1 " 113.1 5/1 " 115.9 5/1 " 113.3 5/1 " 109.1 5/1 " 109.1 5/1 " 110.3 5/1 " 110.2 5/1 " 110.2 5/1 " 110.2 5/1 " 110.7 5/1 " 102.9 Maximum Density (pcf) Optimum Moisture (%)	Date of Test Depth or Elevation In-place Density (pcf) In-place Moisture (%) 5/1 Ist. Lift 108.5 15.2 5/1 " 113.1 12.9 5/1 " 115.9 12.1 5/1 " 113.3 12.5 5/1 " 113.3 13.4 5/1 " 109.1 13.8 5/1 " 109.1 13.8 5/1 " 100.1 14.2 5/1 " 110.0 14.2 5/1 " 106.7 14.8 5/1 " 110.2 14.1 5/1 " 110.7 15.0 5/1 " 102.9 16.6 Maximum Density (pcf) Optimum Moisture (%)	Date of Test Depth or Elevation In-place Moisture (%) Compaction	Date of Test Depth or Elevation Test In-place Density (pcf) In-place (%) Moisture (%) Proctor Code 5/1 Ist. Lift 108.5 15.2 95.3 L-5 5/1 " 113.1 12.9 98.3 L-5 5/1 " 115.9 12.1 100+ L-5 5/1 " 113.3 12.5 98.5 L-5 5/1 " 113.3 13.4 98.5 L-5 5/1 " 109.1 13.8 94.9 L-5 5/1 " 110.3 15.2 95.9 L-5 5/1 " 110.0 14.2 95.7 L-5 5/1 " 106.7 14.8 92.8 L-5 5/1 " 110.2 14.1 95.8 L-5 5/1 " 110.7 15.0 96.3 L-5 5/1 " 102.9 16.6 89.5 L-5 Maximum Density (pcl)	

Remarks:	Respectfully submitted, EMPIRE SOILS INVESTIGATIONS, INC.
Technician Time: 8:00 - 3:30	
Technician: Jeff Benson	Jeff Renson

FIELT I-PLACE DENSITY TEST R" ORT

roie	ct:	Union	Carbide	<u> </u>			Report	No. DT-2 Page 3
					Associa	tes	Date:	5/01/87
		SL					Job No	o. <u>BT-87-85</u>
Test No.	Date of Test	Depth or Elevation	in-place Density (pci)	in-place Moisture (%)	% Compaction	Proctor Code		nd Remarks
27	5/1	lst. Lift	109.5	17.7	95.2	L-5	Station 9+20', 240' Sou	th
•								
·								
Proctor	Maxim	<u> </u>	Optimum	<u> </u>				
Code	Density		pisture (%)				Material Type and Sour	ce
L-5	115.	0	15.7	Cla	Clay, Holfs Pit, Lewiston, N			
							Respectfully submitted,	
Rema	rks:						. EMPIRE SOILS INVEST	rigations, INC.

SUBSURFACE EXPLORATION - CONSTRUCTION QUALITY CONTROL - ENGINEERING SPECIALTY SERVICES

Jeff Benson

8:00 - 3:30

Jeff Benson

Technician Time:

Technician: __

D Y SITE OBSERVATION REPO!



	585 TROY-SCHENECTADY	RD., LATHAM,	NY 12110	518-783-1555
_				

☐ S-5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY 14075 716-649-8110

☐ 105 CORONA AVENUE, GROTON, NY 13073 607-898-5881

□ 303 CLEVELAND AVENUE, HIGHLAND PARK, NJ 08904 201-846-5200

☐ 1164 RIDGE RD. EAST, ROCHESTER, NY 14821 716-342-5320

Project: <u>Union Carbide</u>	Location: N. Falls, NY
Client:Conestoga-Rovers & Associates	Contractor: SLC
Report No.: DS-2 Project No.: BT-87-85	Date:5/4/87
Weather & Temperature: Clear and pleasant, 45 to	60 ⁰
Arrived at Site: 8:00	Left Site: 12:00

This Empire Soils Investigation Technician was on the above mentioned site to test In-Place Densities(nuclear method) of material placed and compacted as a cap for the graphite disposal area of this plant.

This technician tested area "D", station 9+60', 50' to 300' South to station 10+80', 50' to 350' South (IPD tests 1-9). Based on a maximum dry density of 115.0 pcf, this area tested to approximately 93.3% compaction.

This technician then drove a shelby tube at station 10+20', 200' South (ST-7) to 11". This tube was returned to the Empire Soils Investigations laboratory for undisturbed permeability testing.

R-T Form D

	Jeff Benson	
bv		

FIELD PLACE DENSITY TEST REPORT

SOI	SINVE	RE	

•	585 TROY-SCHENECTADY RD., LATHAM, NY 12110	518-783-1555
J	383 THO I SOME MEDITAL TIME TO THE TANKEN	IDC NV 14075

☐ S-5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY 14075☐ 105 CORONA AVENUE, GROTON, NY 13073 607-898-5881 718-649-8110

rolos	٠.	Union	Carbid				, ROCHESTER, NY 14621 716-342-5320 Report No.	DT-3
rojec Liont	ı (Conesto	ga-Rove	ers & /	Associa	tes		5/4/87
		S					Job No	BT-87-85
Test No.	Date of Test	Depth or Elevation	in-place Density (pcf)	in-place Moisture (%)	% Compaction	Proctor Code	Area "D" Location and Re	emarks
1	5/4	lst. Lift	105.1	16.2	91.2	L-5	Station 9+60', 50' South	
2	5/4	11	113.5	14.0	98.7	L-5	Station 9+60', 200' South	
3	5/4	11	109.9	13.4	95.6	L-5	Station 9+60', 300' South	
4	5/4_	"	104.8	16.8	91.1	L-5	Station 10+20', 50' South	
5	5/4	16	109.8	17.0	95.5	L-5	Station 10+20', 200' South	
6	5/4	11	107.4	17.1	93.4	L-5	Station 10+20', 350' South	
7	5/4	u	107.8	19.1	93.7	L-5	Station 10+80, 50' South	
8	5/4	11	101.5	21.8	88.2		Station 10+80', 200' South	
9	5/4	11	105.8	18.4	92.0	L-!	Station 10+80', 350' South	1
			<u> </u>			-		
			ļ			-		
			-			 	-	
Proctor Code	Maxin Density	1	Optimum loisture (%)		<u></u>	<u> </u>	Material Type and Source	
		15.7	Clay, Wolfs Pit, Lewiston, NY					

•	v	Respectfully submitted,
Remarks:		EMPIRE SOILS INVESTIGATIONS, INC.
Technician Time:	8:00 - 12:00	
Technician:	Jeff Benson	

D/ SITE OBSERVATION REPORT



585 TROY-SCHENECTADY RD., LATHAM, NY 12110 518-783-15	1555	5
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☐ S-5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY 14075 716-649-8110

☐ 105 CORONA AVENUE, GROTON, NY 13073 607-898-5881

☐ 303 CLEVELAND AVENUE, HIGHLAND PARK, NJ 08904 201-848-5200

☐ 1164 RIDGE RD. EAST, ROCHESTER, NY 14621 716-342-5320

Project: Union Carbide	_ Location: N. Falls, NY
Client: Conestoga-Rovers & Associates	_ Contractor: SLC
Report No.: DS-3 Project No.: BT-87-8	5 Date: <u>5/5/87</u>
Weather & Temperature: Clear and pleasa	nt, 50 to 60 ⁰
Arrived at Site: 8:00	Left Site:1:00

This Empire Soils Investigation Technician was on the above mentioned site to test In-Place Densities (nuclear method) of material placed as a cap for the graphite disposal area of this plant.

This technician ran nine (9) tests(1 thru 9) in Area "E" (station 6+40', 340' to 400' South to station 5+00', 400' to 500' South). Based on a maximum dry density of 115.0 pcf this area tested approximately 95.0 compaction. One shelby tube(ST-8) was driven to 11" at station 7+20, 450' South. This tube was returned to Empire Soils Investigations laboratory for permeability testing.

Area "F" (Station 10+80', 160' to 465' South to station 11+60, 160' to 465' South) was tested (IPD tests 10 thru 18) and excessive moisture contents were encountered yielding 85 to 90% compaction. These areas are to be retested tomorrow(5/6/87) by this Technician.

R/T Form D

	Jeff Benson	
by		

FIELE -PLACE DENSITY TEST RI ORT

EMPIRE SOILS INVESTIGATIONS INC.

Technician: .

585 TROY-SCHENECTADY RD., LATHAM, NY 12	110 518-783-1555	
S-5167 SOUTH PARK AVENUE, P.O. BOX 0913,		716-649-8110
105 CORONA AVENUE, GROTON, NY 13073	607-898-5881	

☐ RARITAN CENTER, 300 McGAW DRIVE, EDISON, NJ 08837 201-225-0202 ☐ 1184 RIDGE RD. EAST, ROCHESTER, NY 14821 716-342-5320

Project:	. Union Carbide	Report No.	DT-4	
•	Conestoga-Rovers & Associates	Date:	5/5/87	
Client .	0011000000	Date		

Contractor: SLC Job No. BT-87-85

Contractor:							Job No
Test No.	Date of Test	Depth c		In-place Moisture (%)	% Compaction	Proctor Code	Location and Remarks
1	5/5	lst. Lift	112.5	14.0	97.8	L- 5	Station 6+40', 340' South
2	5/5	11	110.9	10.8	96.4	L- 5	Station 6+40', 400' South
* 3	5/5	11	107.4	20.4	93.4	L - 5	Station 7+00, 360' South
4	5/5	11	109.1	11.7	94.9	L-5	Station 7+00, 410' South
5	5/5	II	116.1	13.0	100+	L-5	Station 7+00, 460' South
6	5/5	11	110.3	11.9	95.9	L-5	Station 8+00, 400° South
7	5/5_	11	102.9	19.5	89.5	L-5	Station 8+00, 450' South
8	5/5	"	103.8	20.8	90.3	L-5	Station 8+00, 490' South
9	5/5	11	109.7	14.9	95.4	L-5	Station 8+00, 500' South
10	5/5	н	100.7	24.4	87.6	L-5	Station 10+80', 160' South
11	5/5	11	102.5	22.2	89.1	L-5	Station 10+80', 200' South
12	5/5		Remarks				Station 10+80', 460' South
13	5/5	lst. Lift	103.1	23.0	89.7	L-5	Station 11+20', 160' South
Proctor Code	Maximi Density		Optimum Moisture (%)	Material Type and Source			
L-5	5 115.0 15.7		Clay	: Wolf	s Pit	, Lewiston	

Respectfully submitted,

Remarks: Th	rks: This test will be taken tomorrow EMPIRE SOILS INVESTIGATIONS, INC.						
5/6/87. T	oday % moisture excessiv	e on material here with #10, #11, #13	to be retested				
Technician Tim	ne: 8:00 - 1:00		• • •				
	Jeff Benson	Jeff Benson					

FIELD -PLACE DENSITY TEST RY ORT

SOILS	INVESTIG	TRE ATIONS INC

☐ 585 TROY-SCHENECTADY RD., LATHAM, NY 12110 518-783-1555
☐ S-5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY 14075 716-649-8110
☐ 105 CORONA AVENUE, GROTON, NY 13073 607-898-5881

☐ RARITAN CENTER, 300 McGAW DRIVE, EDISON, NJ 08837 201-225-0202 ☐ 1164 RIDGE RD. EAST, ROCHESTER, NY 14621 716-342-5320

Proje	Project: <u>Union Carbide</u>							Report No.	DT-4 Page 2
Clier	nt	Conesto	ga-Rov		Date:				
Cont	ractor:		SLC					Job No	
Test No.	Date of Test	Depth or Elevation	In-place Density (pcf)	in-piace Moisture (%)		Proctor Code	Lo	ocation and Rem	arks
14	5/5	lst. Lift	102.9	20.7	89.5	L-5	Station 11+20',	200° South	
15	5/5	See Re	marks				Station 11+20',		
16	5/5	lst. Lift	103.3	22.4	89.8	L-5	Station 11+60',		
17	5/5	11	100.7	21.0	87.6	L-5	Station 11+60*,	200' South	
18	5/5	See Re	marks				Station 11+60',	465' South	
	7.11.								
	·								
								-	
Proctor Code	Maximur Density (p	. , -,	otimum sture (%)				Material Type ar	nd Source	
L-5	115.0		15.7	5.7 Clay, Wolfs Pit, Lewiston					
		-		- 					
									- · · · · · · · · · · · · · · · · · · ·
•							Respectfully sub	mitted,	

	T1	Respectfully submitted,
Remarks:	These tests will be taken tomorrow	EMPIRE SOILS INVESTIGATIONS, INC.
	Today % moisture excessive on materia	
Technician	Time: 8:00 - 1:00	•
Technician:	Jeff Benson	Jeff Benson

D. / SITE OBSERVATION REPOR



Ō	585 TROY-SCHENECTADY RD., LATHAM, NY 12110 518-783-1555 S-5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY 14075 105 CORONA AVENUE, GROTON, NY 13073 607-898-5881	716-649-8110
	303 CLEVELAND AVENUE, HIGHLAND PARK, NJ 08904 201-848-5200 1164 RIDGE RD. EAST, ROCHESTER, NY 14621 716-342-5320	

Project:Union Carbide	Location: N. Falls, NY
Client:Conestoga-Rovers & Associates	
Report No.: DS-4 Project No.: BT-87-85	
Weather & Temperature: Clear and pleasant, 45	
Arrived at Site: 8:00	0.00

This Empire Soils Investigation Technician was on the above mentioned site to test In-Place Densities (nuclear method) of material placed and compacted as a cap for the graphite disposal area of this plant.

This technician retested area "F" (station 10+80', 160' to 465' South to station 11+60', 160' to 465' South) tests 1 thru 9, and found acceptable moisture contents and compaction values. One (1) shelby tube for this area was driven at station 11+20', 250' South (ST-9) and returned to our laboratory for undisturbed permeability testing.

This technician also tested In-Place Densities (nuclear method) of Area "G" (Tests 10 thru 18) from station 8+50', 400' to 650' South to station 10+60', 480' South and found compaction to % moisture values obtained acceptable. This technician then drove a shelby tube at station 9+00, 500' South (ST-10) and returned this sample to the laboratory for undisturbed permeability testing.

FIELF I-PLACE DENSITY TEST ROORT

E SOI	SINVE	P	IR TIONS	INC.

☐ 585 TROY-SCHENECTADY RD., LATHAM, NY 12110 518-783-1555
☐ S-5187 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY 14075 716-649-8110
☐ 105 CORONA AVENUE, GROTON, NY 13073 607-898-5881
☐ RARITAN CENTER, 300 McGAW DRIVE, EDISON, NJ 08837 201-225-0202
☐ 1164 RIDGE RD. EAST ROCHESTER NY 14821 718 242 5220

	Union Couldida	716-342-5320
Project:	Union Carbide	. Report No
Client	Conestoga-Rovers & Associates	Date:5/6/87
Contractor:	SLC	Job No. <u>BT-87-85</u>

	JOB NO						000110.		
Test No.	Date of Test	Depth or Elevation	In-place Density (pcl)	In-place Moisture {%}	% Compaction	Proctor Code	Location and Remarks Area "F"(1 thru 9) Area "G" (10 thru 18)		
1	5/6	lst. Lift	108.9	17.2	94.7	ľ	Station 10+80', 160' South		
2	5/6	ii.	108.3	19.3	94.1	L-5	Station 10+80', 200' South		
3	5/6	It .	103.6	20.5	90.1	L-5	Station 10+80', 465' South		
4	5/6	11	108.7	17.4	94.5	L-5	Station 11+20, 160' South		
5	5/6	11	113.9	13.9	99.0	L-5	Station 11+20, 200' South		
6	5/6	11	105.2	16.7	94.5	L-5	Station 11+20, 465' South		
7	5/6	ıı .	102.9	23.7	89.5	L-5	Station 11+60, 160' South		
8	5/6	11	107.4	18.7	93.4	L-5	Station 11+60, 200' South		
9	5/6	11	108.9	17.2	94.7	ĺ	Station 11+60, 465' South		
10	5/6	11	112.7	14.6	98.0	L-5	Station 8+50', 400' South		
11	5/6	11	108.9	14.4	94.7	L-5	Station 8+50', 600' South		
12	5/6	11	104.6	20.3	91.0	L-5	Station 8+50', 650' South		
13	5/6	"	112.0	13.7	97.4	L-5	Station 9+50', 360' South		
Proctor Code	Maximus Density (p		Isture (%) Material Type and Source						
L - 5	-5 115.0 15.7			Clay, Wolfs Pit, Lewiston					
•									

Remarks:		Respectfully submitted, EMPIRE SOILS INVESTIGATIONS, INC.		
Technician Time:	8:00 - 2:00	- -		
Technician:	Jeff Benson	Jeff_Benson		

SUBSURFACE EXPLORATION # CONSTRUCTION OUT TO CO.

FIELD 1-PLACE DENSITY TEST RECORD

SOILS	INVESTI	GATIONS	E INC.

585 TROY-SCHENECTADY RD., LATHAM, NY 12110 518-783 S-5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY		716-649-8110
105 CORONA AVENUE, GROTON, NY 13073 607-898-5881 RARITAN CENTER, 300 McGAW DRIVE, EDISON, NJ 08837	201-225-0	202

				= 0	1164 RIDGE	RD. EAS	00 McGAW DRIVE, EDISON, NJ 00037 201-225-0202 T, ROCHESTER, NY 14621 716-342-5320
Projec	ct:	Uni	on Carb	ide			Report No. DT-5 Page 2
Client		Cor	estoga-	Rovers	& Asso	ciate	es Date:5/6/87
Contr	actor:		SL	С			Job No. <u>BT-87-85</u>
Test No.	Date of Test	Depth or Elevation		In-place Moisture (%)	% Compaction	Proctor Code	Location and Remarks
14	5/6	Tst. Lift	108.9	15.4	94.7	L - 5	Station 9+50', 500' South
15	5/6	u	109.2	13.7	95.0	L-5	Station 9+50', 600' South
16	5/6		104.2	20.6	90.6	L-5	Station 9+50', 620' South
17	5/6		105.7	17.1	91.9	L - 5	Station 10+40', 440' South
18	5/6	11	106.2	20.0	92.5	L-5	Station 10+60', 480' South
							•
Proctor	Maxim		Optimum loisture (%)			<u> </u>	Material Type and Source
Code	Density				'lav Wo	lfs P	Pit, Lewiston
L-5	115.0	1 12	.7		iuy y no		10, 20, 10, 10, 10, 10, 10, 10, 10, 10, 10, 1
	<u> </u>						
L	L			<u> </u>			
							Respectfully submitted,
Rema	rks:						EMPIRE SOILS INVESTIGATIONS, INC.
			1-66	Bensor	1		
Techn	ician Tir	ne:	Jeff	ספווטט			— . Jeff Benson
Techn	ician: _				TION E CONS	TRUCTIO	N QUALITY CONTROL # ENGINEERING SPECIALTY SERVICES

D/ 'SITE OBSERVATION REPOR'



585 TROY-SCHENECTADY RD., LATHAM, NY 12110 518-783-1555 S-5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY 14075 105 CORONA AVENUE, GROTON, NY 13073 607-898-5881	716-649-8110
303 CLEVELAND AVENUE, HIGHLAND PARK, NJ 08904 201-846-5200	
1164 RIDGE RD. EAST, ROCHESTER, NY 14621 716-342-5320	

Project:Union Carbide	Location: N. Falls, NY
Client:Conestoga-Rovers & Associates	Contractor:SLC
Report No.: DS-5 Project No.: BT-87-85	
Weather & Temperature:Clear and cool, 45 to 550	
Arrived at Site: 8:00	Left Site: 11:15

This Empire Soils Investigation Technician was on the above mentioned site to test In-Place Densities (nuclear method) of material placed and compacted as a cap for the graphite disposal area of this plant.

This technician ran nine (9) tests (IPD's) in area "F" from station 10+80', 160' to 465' South to station 11+60', 160' to 465' South. This area tested to approximately 92.3% compaction. This technician then drove a shelby tube at station 11+20', 250' South (ST-9) to 11". This tube was returned to our laboratory for undisturbed permeability testing.

This technician also ran three (3) tests (IPD 10=12) as a supplement to area "E" compaction testing (5/5/87).

R/T Form D

FIELD N-PLACE DENSITY TEST REPORT



☐ 585 TROY-SCHENECTADY RD., LATHAM, NY 12110 518-783-1555 ☐ S-5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY 14075 ☐ 105 CORONA AVENUE, GROTON, NY 13073 607-898-5881 ☐ RARITAN CENTER 300 McGAW DRIVE EDISON N 1 08827

201-225-0202

716-649-8110

3	RARITAN CENTER, 300 McGAW DRIVE, EDISON	, NJ 08837	201-225
_	1164 RIDGE RD. EAST, ROCHESTER, NY 14621	718-342-53	320
٦.	1184 RIDGE RD. EAST, ROUTESTER, ITT THE		

					1164 RIDGE	RD. EAS	T, ROCHESTER, NY 14821 718-342-5320
^o rojec	t:	Union	Carbide				Report No. DT-6
Client Conestoga-Rovers & Associates Date:5/7/87							
Contra	actor:		SLC				Job No. <u>BT-87-85</u>
Test No.	Date of Test	Dapth or Elevation		in-place Moisture {%}	% Compaction	Proctor Code	Location and Remarks Area "F" IPD 1-9, Supplement to area "E" IPD 10
1	5/7	2nd. Lift	107.5	17.1	93.5	L-5	Station 10+80', 160' South
2	5/7	11	109.3	17.6	95.0	L - 5	Sation 10+80', 200' South
3	5/7	11	108.2	19.6	94.1	L-5	Station 10+80', 465' South
4	5/7	11	102.6	20.6	89.2	L-5	Station 11+20', 160' South
5	5/7	u .	101.9	26.0	88.6	L-5	Station 11+20', 200' South
6	5/7	н	106.0	22.8	92.2	L-5	Station 11+20', 465' South
7	5/7	11	105.3	20.6	91.6	L-5	Station 11+60', 160' South
8	5/7	11	109.1	20.5	94.9	L-5	Station 11+60', 200' South
9	5/7	11	101.0	25.5	87.9	L-5	Station 11+60', 465' South
10	5/7	lst. Lift	106.2	17.9	92.3	L-5	Station 6+50', 400' South
11	5/7	11	110.1	15.6	95.7	L-5	Station 6+50', 450' South
12	5/7	11	105.8	20.0	92.0	L-5	Station 6+50', 500' South
						<u></u>	
Proctor Code							
L-5 115.0 15.7 Clay, Wolfs Pit, Lewiston				Cla	ay, Wolf	t, Lewiston	
							·
	Respectfully submitted,						
Remarks: Three additional tests(10-12) are EMPIRE SOILS INVESTIGATIONS, INC.							

supplemental to area "E" tested 5/5/87 8:00 - 11:15 Technician Time: __ Jeff Benson Jeff Benson Technician: ___ SUBSURFACE EXPLORATION & CONSTRUCTION QUALITY CONTROL & ENGINEERING SPECIALTY SERVICES

D/ 'SITE OBSERVATION REPOR'



☐ 585 TROY-SCHENECTADY RD., LATHAM, NY 12110 518-783-1555 ☐ S-5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY 14075	718-849-8110
☐ 105 CORONA AVENUE, GROTON, NY 13073 607-898-5881	710-0-10-0110
303 CLEVELAND AVENUE, HIGHLAND PARK, NJ 08904 201-846-5200)
TI 1184 PINGE PRI EACT POCUESTED ANY 14004	

Project: Union Carbide	Location:N.	Falls, NY
Client:Conestoga-Rovers & Associates		
Report No.: DS-6 Project No.: BT-87-85		
Weather & Temperature: Clear and pleasant, 60 to 650		
Arrived at Site: 12:30	Left Site:	4:00

This Empire Soils Investigation Technician was on the above mentioned site to test In-Place Densities (nuclear method) of material placed and compacted as in cap for the graphite disposal aera of this plant.

This technician ran nine (9) tests in area "G", station 8+50', 400' to 650' South to station 10+60', 480' South. Based on 115.0 pcf, this area tested to approximately 96.1% compaction.

This technician then drove a shelby tube at station 9+00', 500' South to 18"(ST-12). This tube was returned to our laboratory to have an undisturbed permeability test run on the top 9" of this sample(in as much as the lst. lift, bottom 9", was already tested.

A/T Form D

by _____

FIELD -PLACE DENSITY TEST RF ORT

SOII	SINVESTI	CATIONS INC.

☐ 585 TROY-SCHENECTADY RD., LATHAM, NY 12110 518-783-1555
☐ S-5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY 14075 716-649-8110
☐ 105 CORONA AVENUE, GROTON, NY 13073 607-898-5881
☐ RARITAN CENTER, 300 McGAW DRIVE, EDISON, NJ 08837 201-225-0202
☐ 1164 RIDGE RD. EAST, ROCHESTER, NY 14621 716-342-5320

	Union Carbida	Report NoDT-7
Project: .	officer care.	Date:5/8/87
Client _	Conestoga-Rovers & Associates	Date.

Contractor: SLC Job No. BT-87-85

Contr	actor:	SL	.C				Job No
Test No.	Date of Test	Depth or Elevation	in-place Density (pcf)	In-place Moisture [%]	% Compaction	Proctor Code	Location and Remarks
1	5/8	2nd. Lift	106.6	17.1	92.6	L-5	Station 8+50', 400' South
2	5/8	11	114.0	13.4	99.1	L - 5	Station 8+50', 600' South
3	5/8	11	108.5	16.7	94.3	L-5	Station 8+50', 650' South
4	5/8	11	110.9	15.6	96.4	L-5	Station 9+50', 360' South
5	5/8	11	114.4	13.3	99.5	L-5	Station 9+50', 500' South
_6	5/8	u	108.2	16.1	99.1	L-5	Station 9+50', 600' South
7_	5/8	ıı .	107.0	18.4	93.0	L-5	Station 9+50', 620' South
8	5/8	n	113.3	13.9	98.5	L-5	Station 10+40', 440' South
9_	5/8	11	111.6	13.6	97.0	L-5	Station 10+60', 480' South
			ļ	ļ	-	-	
			ļ	ļ	<u> </u>	 	
		<u></u>		-		-	
0	Maxin		Optimum		<u> </u>		Material Type and Source
Proctor Code	Density		loisture (%)	Material Type and Source			
L-	5 115	.0	15.	7 Clay, Wolfs Pit, Lewiston			

	Respectfully submitted,
Remarks:	EMPIRE SOILS INVESTIGATIONS, INC.
Technician Time: 2:30 - 4:00	
Technician:	Jeff Benson

D/ SITE OBSERVATION REPORT



585 TROY-SCHENECTADY RD., LATHAM, NY 12110 518-783-1555	
8-5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY 14075	716-649-8110
105 CORONA AVENUE, GROTON, NY 13073 607-898-8881	1.00400110

303 CLEVELAND AVENUE, HIGHLAND PARK, NJ 08904 201-846-5200

- TO THE PROPERTY OF THE PARTY IN	00804	201-040-020
☐ 1164 RIDGE RD. EAST, ROCHESTER, NY 14621	716-34	2-5320 +

Project: Union Carbide	Location: N. F	alls, NY
Client:Conestoga-Rovers & Assoc.		
Report No.: DS-7 Project No.: BT-87-85	Date:	5/11/87
	, 60 to 75 ⁰	
Arrived at Site:12:30		

This Empire Soils Investigation Technician was on the above mentioned site to test In-Place Densities of material placed and compacted as a cap for the graphite disposal area of this plant.

This technician ran nine (9) tests (IPD 1 thru 9) in area "H", (station 0+25', 200' to 380' South to station 2+00, 200' to 380' South. This area tested to approximately 96.8% compaction based on 115.0 pcf maximum dry density.

This technician then drove a shelby tube at station 1+00', 300' South (ST-13) to 11" and returned this tube the Empire Soils laboratory for undisturbed permeability testing.

R/T Form D

h	Jeff Benson	
by		

FIELD 'N-PLACE DENSITY TEST REPORT

EMPIRE SOILS INVESTIGATIONS INC.

☐ 585 TROY-SCHENECTADY RD., LATHAM, NY 12110

716-649-8110

□ 585 INOT-SCHENECIADT NO., LATHAM, NT 12110 518785-1955
□ 5-5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY 14075
□ 105 CORONA AVENUE, GROTON, NY 13073 607-898-5881
□ RARITAN CENTER, 300 McGAW DRIVE, EDISON, NJ 08837 201-22

☐ 1164 RIDGE RD. EAST, ROCHESTER, NY 14621 716-342-5320

rojec	:t:	Jnion (Carbide				Report NoDT-8	
					Associa	tes	Date:5/11/87	
				SLC			Job NoBT-87-85	
Test No.	Date of Test	Depth or Elevation	In-place Density	in-place Moisture (%)	% Compaction	Proctor Code	Location and Remarks Area "H"	
1	5/11	lst. Lift	116.8	8.5	100+	L - 5	Station 0+25', 200' South	
2	5/11	u	106.9	17.4	93.0	L - 5	Station 0+25', 300' South	
3	5/11	11	111.4	15.2	96.9	L-5	Station 0+25', 380' South	
4	5/11	"	119.8	13.7	100+	L-5	Station 1+00', 200' South	
5	5/11	11	108.9	15.4	94.7	L-5	Station 1+00', 300' South	
6	5/11	11	111.6	16.2	97.0	L-5	Station 1+00', 380' South	
7	5/11	п	116.7	15.4	100+	L - 5	Station 2+00', 200' South	
8	5/11	11	110.2	13.2	95.8	L-5	Station 2+00', 300' South	
9	5/11	"	108.8	15.6	94.6	L-5	Station 2+00', 380' South	
							·	
Proctor Code	Maxim Density		Optimum Voisture (%)		Material Type and Source			
	-5 115.0 15.7 Clay, Wolfs Pit, Lewiston				it, Lewiston			
	•							
	1						Respectfully submitted,	
	Pro	octor	L-5 obta	ained	from ES	I rep	· · ·	

to URS Eng. per Wolfs Pit clay 12:30 - 4:00 Technician Time: _ Jeff Benson Jeff Benson Technician: _ SUBSURFACE EXPLORATION . CONSTRUCTION QUALITY CONTROL . ENGINEERING SPECIALTY SERVICES

DA SITE OBSERVATION REPORT



585 TROY-SCHENECTADY RD., LATHAM, NY 12110 518-783-1555 S-5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY 14075 105 CORONA AVENUE, GROTON, NY 13073 607-898-5881	71 8-649-8 110
303 CLEVELAND AVENUE, HIGHLAND PARK, NJ 08904 201-848-5200	
1164 RIDGE RD. EAST, ROCHESTER, NY 14821 718-342-5320	

Project:Union Carbide	Location: N. Falls, NY
Client:Conestoga-Rovers & Assoc.	
Report No.: DS-8 Project No.: BT-87-85	Date:5/12/87
Weather & Temperature:Clear and breezy	
Arrived at Site: 8:00	Left Site:3:30

This Empire Soils Investigation Technician was on the above mentioned site to test In-Place Densities (nuclear method) of material placed and compacted as a cap for the graphite disposal area of this plant.

Nine (9) tests were taken in each of the areas; "I", "J", and "K". The average compaction percentages respectively to these areas were; 94.7%, 95.7%, and 97.6% based on 115.0 pcf maxium dry density.

This technician then drove one shelby tube in each of the areas to ll" and returned these tubes to Empire Soils Investigations laboratory to have undisturbed permeability tests run on them. The location from which these shelby tubes were acquired are listed below.

Area "I" - ST-14, Station 1+00, 480' South.

Area "J" - ST-15, Station 1+00, 100' South.

Area "K" - ST-17, Station 5+50, 200' South.

R/T Form D

FIELD 1-PLACE DENSITY TEST ROORT



☐ 585 TROY-SCHENECTADY RD., LATHAM, NY 12110 716-649-8110 S-5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY 14075

☐ 105 CORONA AVENUE, GROTON, NY 13073 607-898-5881 ☐ RARITAN CENTER, 300 McGAW DRIVE, EDISON, NJ 08837 201-225-0202

718-342-5320 ☐ 1164 RIDGE RD. EAST, ROCHESTER, NY 14621

Project:	<u> Inion Carbide</u>		Report No.	DT-9
. •	Conestoga-Rovers &	Associates	Date:	5/12/87
Contractor:	SLC		Job No	BT-87-85

Contractor:SLC						Job No		
Date of Test	Elevatio		in-place Moisture (%)	% Compaction	Proctor Code	Location and Remarks		
5/12		109.1	17.3	94.9	L-5	Station 0+25', 450' South		
5/12		105.2	15.6	94.1	L-5	Station 0+25', 500' South		
5/12	14	112.9	13.0	98.2	L-5	Station 0+25', 550' South		
5/12	11	105.4	17.8	91.7	L-5	Station 1+00', 450' South		
5/12	11	112.2	14.3	97.6	L-5	Station 1+00, 500' South		
5/12	16	109.7	14.0	95.4	L-5	Station 1+00', 550' South		
5/12	H	107.6	18.9	93.6	L-5	Station 2+00', 450' South		
5/12	11	110.4	15.9	96.0	L-5	Station 2+00', 500' South		
5/12	11	104.5	21.1	90.9	L-5	Station 2+00', 550' South		
5/12	11	102.7	19.3	89.3	L-5	Station 0+25', 50' South		
5/12	11	106.6	19.4	92.7	L-5	Station 0+25', 100' South		
5/12	11	114.1	12.7	99.2	L-5	Station 0+25', 150' South		
5/12	ıı	106.0	18.2	92.2	L-5	Station 1+00', 50' South		
octor Maximum Optimum ode Denzity (pcf) Molsture (%)			Material Type and Source					
115.0	0 15.7		Cla	Clay, Wolfs Pit, Lewiston				
	Date of Test 5/12 5/12 5/12 5/12 5/12 5/12 5/12 5/12 5/12 5/12 5/12 5/12 5/12 5/12 5/12 5/12 5/12	Date of Test Depth of Elevation Ist. Lift 5/12 " 5/12 " 5/12 " 5/12 " 5/12 " 5/12 " 5/12 " 5/12 " 5/12 " 5/12 " 5/12 " 5/12 " 5/12 " 6/12 "	Date of Test Depth or Test Depth or Televation Depth or Televation Depth or Televation Density (pct)	Date of Test Depth or Elevation In-place Density (pct)	Date of Test Depth or Test Lift 109.1 17.3 94.9	Date of Test Depth or Elevation Density (pcf) Density		

		Respectfully submitted,
Remarks:		EMPIRE SOILS INVESTIGATIONS, INC.
Tank sision Times	8:00 - 3:30	
	Jeff Benson	Jeff Benson
Technician:	SUBSURFACE EXPLORATION CONSTRU	TION QUALITY CONTROL . ENGINEERING SPECIALTY SERVICES

FIELD "'-PLACE DENSITY TEST REPORT



☐ 585 TROY-SCHENECTADY RD., LATHAM, NY 12110 518-783-1555 ☐ S-5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY 14075 ☐ 105 CORONA AVENUE, GROTON, NY 13073 607-898-5881 716-649-8110

DT-9 Page 2

	☐ RARITAN CENTER, 300 McGAW DRIVE, EDISON, ☐ 1164 RIDGE RD. EAST, ROCHESTER, NY 14621	NJ 08837 201-225-0202 718-342-5320	
Project: Union Carbide		Report No.	DT-9 Pa

0111011	carbiae					. Report No	o. <u>DT-9 Page 2</u>
	(Conesto	ga-Rove	rs &	Assoc.	Date:	
r:			SLC			Job No	BT-87-85
Test Date of Depth or Density No. Test Elevation (pcf)			in-place Moisture % Proctor [%] Compaction Code		Location and R	emarks	
4		15.2	97.6	L-5	Station 1+00',	100' South	
н	111.3	15.9	96.8	L-5			
11	109.0	16.7	94.8	L-5	Station 1+50',	50' South	
ıı .	114.2	13.2	99.3	L-5			
11	114.4	14.4	99.5	L-5			
11	108.2	15.5	94.1	L-5	Station 5+20',	100' South	
n	112.1	13.8	97.5	L-5	Station 5+20',	250' South	
11	112.7	7.8	98.0	L-5	Station 5+20',	350' South	
11	105.7	21.1	91.9	L-5	Station 5+50',	100' South	
n	105.5	17.8	91.7	L-5	Station 5+50', 250' South		
11	117.8	11.2	100+	L-5	Station 5+50, 3	50' South	
tt .	111.0	17.4	96.6	L-5	Station 6+00',	100' South	
		14.2	100+	L-5	Station 6+00',	250' South	
octor Maximum Optimum ode Density (pcf) Moisture (%)					Material Type	and Source	
.0	15.7	Clay, Wolfs Pit, Lewiston			Lewiston		
		·····					
					Respectfully su	bmitted.	
	of Depth Elevate Lift IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	Depth or Elevation In-place Density (pcf)	Conesto or:	Conestoga-Rove SLC SLC Of Depth or Elevation Density (pcf) 1/6 Compaction (pcf) 1/6 1/6 Compaction (pcf) 1/6 1/6 Compaction (pcf) 1/6 1/6 Compaction (pcf) 1/6 1/6 1/6 Compaction (pcf) 1/6 1/6 Compaction (pcf) 1/6 1/6 1/6 Compaction (pcf) 1/6 1/6 1/6 Compaction (pcf) 1/6	Conestoga-Rovers & SLC SLC Or:	Conestoga-Rovers & Assoc. SLC SLC SLC SLC SLC	Conestoga-Rovers & Assoc. Date:

Remarks:		EMPIRE SOILS INVESTIG	ATIONS, INC.
Technician Time:	8:00 - 3:30		
Technician:	Jeff Benson	Jeff Benson	-
	SUBSUIDENCE EXPLODATION = CONSTR.		

FIELD PLACE DENSITY TEST REPORT



0	585 TROY-SCHENECTADY RD., LATHAM, NY 12110 518-783-1555 S-5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY 14075	716-649-8110
	105 CORONA AVENUE, GROTON, NY 13073 607-898-5881 RARITAN CENTER, 300 McGAW DRIVE, EDISON, NJ 08837 201-225-4)202

ojec	at: l	<u>Jnion</u>	Carbide						Report No.	DT-9 Page 3
ient			oga-Rovi	ers &	Associa	tes			Date:5/1	2/87
	actor:								Job No	BT-87-85
Test No.	Date of Test	Depth o	In-place Density	in-place Moisture (%)	% Compaction	Proctor Code			Location and Ren	
27	5/12	lst. Lift	119.6	9.3	100+	L-5	Station 6+00	0,	350' South	
				.*						
			*					 .		
	-				·				•	
						-				
						-				
Proctor	Maxim	ועשו	Optimum	-		1	Material	Тур	e and Source	
Code L-5	Density 115.0		Moisture (%)	C	lay, Wo	lfs P	it, Lewiston			
							·			
	<u> </u>									
				•			·		y submitted,	TIONS INC
Rema	ırks:						EMPIRE	SC	DILS INVESTIGAT	IONS, INC.
Techr	nician Ti	me:	8:0	00 - 3	:30					
			.14	eff Ber	nson		Je	ff	Benson	

FIELD TO PLACE DENSITY TEST REPORT

EMPTRI SOILS INVESTIGATIONS IN	
	Ξ

☐ 585 TROY-SCHENECTADY RD., LATHAM, NY 12110 518-783-1555 ☐ S-5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY 14075

☐ 105 CORONA AVENUE, GROTON, NY 13073 607-898-5881 ☐ RARITAN CENTER, 300 McGAW DRIVE, EDISON, NJ 08837

716-649-8110

☐ 1164 RIDGE RD. EAST, ROCHESTER, NY 14621 716-342-5320

Proje	roject: <u>Union Carbide</u> Report No. <u>DT-10</u>										
Clie	nt	Conest	oga-Ro	vers &	Assoc.		Date: 5/21/87				
Cont	ractor:		LC				Job NoBT-87-85				
Test No.	Date of Test	Depth or Elevation	in-place Density (pcf)	In-place Moisture (%)		Proctor Code	Location and Remarks				
1	5/21	1st. 9"	104.9	16.9	91.2	L-5	200' West of station 11+100 and 50' North of station line				
2	5/21	11	96.8	21.9	84.2	L-5	200' W. of station 11+100 and 100' North				
3	5/21	11	101.3	22.2	0.88	L-5	200' W. of station 11+1-0 and 150' North				
4	5/21	п	103.1	22.5	89.6	L-5	200' W. of station 11+100 and 200' North				
5	5/21	12	101.9	20.4	88.6	L-5	100' W. of station 11+100 and 50' North				
6	5/21	н	97.4	21.6	84.7	L-5	100' W. of station 11+100 and 100' North				
7	5/21	11	109.1	19.9	87.0	L-5	100' W. of station 11+100 and 175' North				
8	5/21	"	103.1	21.8	89.6	L-5	300' W. of station 11+100 and 75' North				
roctor	Maximun) Oni	timum								
Code	Density (pr		ture (%)				Material Type and Source				
5	115.0		15.7	Clay,	. Wolf F	it					
	·						•				

Respectfully submitted,

EMPIRE SOILS INVESTIGATIONS, INC.

Material was wet, could not achieve reg. compaction 8:00 - 1:30 Technician Time: _ Peter Romano, Jr. Technician: _

Peter Romano Jr.

D/ "Y SITE OBSERVATION REPORT



7	585 TROY-SCHENECTADY RD., LATHAM, NY 12110 518-783-1555 S-5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY 14075 105 CORONA AVENUE, GROTON, NY 13073 607-898-5881	716-849-8110
_	105 COHONA AVENUE, GROTON, NY 1508 NJ 08904 201-848-5200	

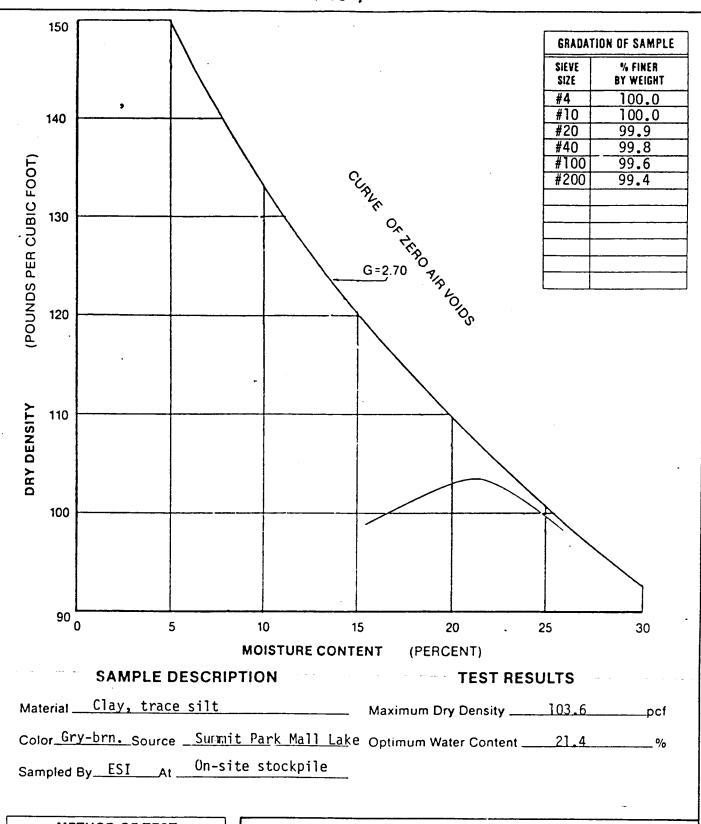
☐ 303 CLEVELAND AVENUE, HIGHLAND PARK, NJ 08904 ☐ 1164 RIDGE RD. EAST, ROCHESTER, NY 14621 718-342-5320

Project:	Union Car	bide	Location: N. Fall, NY				
	Conestoga-Rovers	& Associates	Contractor: SLC				
	DS-10		BT-87-85 Date: 5/22/87				
	emperature:	63 and 60	ol, 65 to 70 ⁰				
	te: 8:00		Left Site:2:00				

This Empire Soils Investigation Technician was on the above mentioned site to test In-Place Densities (nuclear method) of material placed and compacted as a cap for the graphite disposal area of this plant.

This technician was informed that the source of the day for this cap had been changed from Wolfs Pit in Lewiston to Summit Park Mall Lake in Niagara Falls. A value of 114.1 pcf was presented to this technician as a value obtained by Wehran Engineering for Union Carbide. This value was used as a guide until authorization can be obtained to run a new proctor test on this material at Empire Soils Investigations laboratory. This technician tested (and retested) area "P" and drove a shelby tube 11" in depth a station 19+00 35' South (ST-16) and returned this tube to Empire Soils laboratory for undisturbed permeability testing.

∕T Form D		by	Jeff Benson	
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•				
and the second s				



METHOD OF TEST						
STANDARD	METHOD					
ASTM	A					
AASHTO						
MILITARY						
OTHER						

EN	/PI	RE
		M MOISTURE—MAXIMUM DENSITY
		nion C arbide onestoga-Rovers & Associates
DR. BY:	PJA	DATE SAMPLED 5/87 PROJ. NO. BT-87-85
CK'D BY:	CCK	LIESTED BY LB & DHICHBYENG 1-4

FIELD 'N-PLACE DENSITY TEST RE"ORT

SOILS	VIP INVESTIG	TR ATIONS IN	c

8:00 - 200

Jeff Benson

Technician Time: __

Technician: __

0	585 TROY-SCHENECTADY RD., LATHAM, NY 12110 518-78		
	S-5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY	14075	716-649-8110
	105 CORONA AVENUE, GROTON, NY 13073 607-898-5881		
	THE PROPERTY OF THE PROPERTY O	204 225 0	202

Proje	ct:		Carbic				Report No
Client	<u> </u>	Conest	toga-Rov	vers &	Associa	ates	Date:
Contr	actor:	SI	_C	Job NoBT-87-85			
Test No.	Date of Test	Depth or Elevation	1	in-place Moisture (%)	% Compaction	Proctor Code	Location and Remarks
1	5/22	First lift	116.8	4.7	100	L-4	Station 5+00', 10' South
2	5/22	31	96.4	19.1	93.1	L-4	Station 5+50', 40' South
3	5/22	n	98.5	16.6	95.1	<u>L-4</u>	Station 6+00, 10' South
4	5/22	11	101.0	16.1	97 . 5	L-4	Station 6+50', 40' South
5	5/22	16	101.3	16.8	97.8	L-4	Station 7+00, 10' South
6	5/22	11	104.2	18.0	100	L-4	Station 7+50, 40' South
7	5/22	u	100.8	15.4	97.3	L-4	Station 10+00, 10' South
8	5/22	11	102.0	16.0	98.5	L-4	Station 10+50, 40' South
9	5/22	11	102.4	13.2	98.8	L-4	Station 11+50, 15' South
10	5/22	11	104.4	17.2	100	L-4	Retest of test location #2
11	5/22	11	105.3	17.7	100	L-4	Retest of test location #3
12	5/22		104.1	17.7	100	L-4	Retest of test location #4
13	5/22	II	103.8	18.0	100	L-4	Retest of test location #5
Proctor Code	Maxima Density (1	Optimum oisture (%)				Material Type and Source
L-4	4 103.6 21.4		Cla	Clay, trace silt, Summit Park Mall Lake - on-site stockpile			
							
							Respectfully submitted,
Remai	rks:						EMPIRE SOILS INVESTIGATIONS, INC.

FIELD 'N-PLACE DENSITY TEST REPORT



Technician: _

☐ 585 TROY-SCHENECTADY RD., LATHAM, NY 12110 518-783-1555

S-5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY 14075 716-649-8110

☐ 105 CORONA AVENUE, GROTON, NY 13073 607-898-5881

RARITAN CENTER, 300 McGAW DRIVE, EDISON, NJ 08837 201-225-0202

☐ 1164 RIDGE RD. EAST, ROCHESTER, NY 14621 716-342-5320

Proje	ct:	Union C	arbide			·		Report No.	
Clien	0 -				ociates	<u></u>	•	Date:	5/22/87
Cont	ractor:		SLC					Job No	BT-87 - 85
Test No.	Date of Test	Depth or Elevation	In-place Density (pcf)	in-place Moisture (%)	% Compaction	Proctor Code	. L	ocation and Rem	
14	5/22	lst. Lift	105.6	16.5	100	L-4	Retest of test	location #6	
15	5/22	51	105.7	16.8	100	L-4	Retest of test	location #7	
16	5/22	ii	109.1	15.6	100	L-4	Retest of test	location #8	
17	5/22	u	116.2	12.5	100	L-4	Retest of test	location #9	
·									
									•
			-						-
Proctor Code	Maximu Density (1 .	ptimum istura (%)				Material Type and Source		
L-4	103.		1.4	Clay,	trace	sand,	on-site stockpi	le, Summit Pa	rk Mall Lake
		·				· · · · · · · · · · · · · · · · · · ·	Respectfully su	ubmitted,	
Remar	ks:		• • •				EMPIRE SOILS	S INVESTIGATIO	DNS, INC.
						·	-		
Techni	cian Tim		8:00 -		· · · · · · · ·		-		
Tachai	cian:	Je	ff Ben	son			Jef	f Benson	

D. Y SITE OBSERVATION REPORT

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☐ 585 TROY-SCHENECTADY RD., LATHAM, NY 12110 518-783-1555

☐ S-5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY 14075 716-849-8110

☐ 105 CORONA AVENUE, GROTON, NY 13073 607-898-5881

☐ 303 CLEVELAND AVENUE, HIGHLAND PARK, NJ 08904 201-846-5200

☐ 1164 RIDGE RD. EAST, ROCHESTER, NY 14621 716-342-5320

Project: Union Carbide	Location: N. Falls, NY
Client:Conestoga-Rovers & Assoc.	Contractor: SLC
Report No.: DS-9 Project No.: BT-87-85	Date: <u>5/26/87</u>
Weather & Temperature: Clear and warm, 65 to 800	
Arrived at Site: 8:00	Left Site: 4:00

This Empire Soils Investigation Technician was on the above mentioned site to test In-Place Densities (nuclear method) of material placed and compacted as a cap for the graphite disposal area of this plant.

This technician tested areas "L", "M", and "N", and "O". It should be noted that eleven (11) tests were run on area "O" in as much as this area was almost 1.5 acres.

These areas tested on an average from 100% to 95% compaction, the following shelby tubes listed with their respective areas and numbers were returned to the Empire Soils Investigation laboratory for undisturbed permeability testing.

AREA	SHELBY TUBE	LOCATION
L M N O	ST-18 ST-19 ST-20 ST-21 ST-22	Station 3+50', 70' South Station 3+50', 210' South Station 3+50', 340' South Station 3+50', 500' South Station 5+50, 500' South

R/T Form D

FIELI N-PLACE DENSITY TEST RF"ORT

E	IVES	P	VI IO	S NS	INC.

☐ 585 TROY-SCHENECTADY RD., LATHAM, NY 12110 518-783-1555 ☐ S-5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY 14075 ☐ 105 CORONA AVENUE, GROTON, NY 13073 607-898-5881

716-649-8110

☐ RARITAN CENTER, 300 McGAW DRIVE, EDISON, NJ 08837 20 1164 RIDGE RD. EAST, ROCHESTER, NY 14621 716-342-5320 201-225-0202

Project:	Union Carbide	Report No. DT-11
•		Date:5/26/87

BT-87-85 SLC _____ Job No. ____ Contractor: _

-	actor.						
Test No.	Date of Test	Depth c		in-place Moisture (%)	% Compaction	Proctor Code	Location and Remarks
1	5/26	lst. Lift	116.8	11.6	100+	L-5	Station 2+20', 50' South
2	5/26	11	113.3	14.0	98.4	L-5	Station 2+20', 100' South
3	5/26	11	123.8	10.4	100+	L-5	Station 2+20', 120' South
4	5/26	11	125.4	11.5	100+	L-5	Station 3+20', 50' South
5	5/26	11	118.5	11.5	100+	L-5	Station 3+20', 100' South
6	5/26	11	119.5	11.5	100+	L-5	Station 3+20', 120' South
7	5/26	11	119.3	12.2	100+	L - 5	Station 4+50', 50' South
8	5/26	11	109.5	16.9	95.2	L-5	Station 4+50', 100' South
9	5/26	11	117.2	10.6	100+	L-5	Station 4+50', 120' South
10	5/26	11	115.6	12.8	100+	L-5	Station 2+20', 150' South
11	5/26	11	118.4	13.2	100+	L-5	Station 2+20'. 200' South
12	5/26	"	107.2	10.8	93.2	L-5	Station 2+20', 250' South
13	5/26	11	117.4	11.9	100+	L-5	Station 3+20', 150' South
Proctor Code	Maximu Density (Optimum Aoisture (%)	Material Type and Source			
L-5	115.	0	15.7	Clay, Wolfs Pit, Lewiston		Lewiston	

Remarks:		Respectfully submitted, EMPIRE SOILS INVESTIGATIONS, INC.
Technician Time:	8:00 - 4:00	

Jeff Benson

Jeff Benson

Technician:

FIEL! N-PLACE DENSITY TEST RF"ORT



☐ 585 TROY-SCHENECTADY RD., LATHAM, NY 12110

☐ S-5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY 14075 716-649-8110 ☐ 105 CORONA AVENUE, GROTON, NY 13073 607-898-5881

☐ RARITAN CENTER, 300 McGAW DRIVE, EDISON, NJ 08837 21 ☐ 1164 RIDGE RD. EAST, ROCHESTER, NY 14621 716-342-5320 201-225-0202

Project:	Union Carbid ^e	Report N	oDT-11 Page 2
Client	Conestoga-Rovers & Associates	Date:	5/26/87
Contractor:	SLC	 Job No.	BT-87-85

Test No.	Date of Test	Depth o		in-place Moisture {%}	% Compaction	Proctor Code	Location and Remarks	
14	5/26	lst. Lift	122.5	10.9	100+	L - 5	Station 3+20', 200' South	
15	5/26	11	115.5	11.5	100+	L-5	Station 3+20', 250' South	
16	5/26	11	115.3	13.5	100+	L-5	Station 4+50', 150' South	
17	5/26	11	112.7	13.6	98.0	L-5	Station 4+50', 200' South	
18	5/26	11	113.6	13.2	98.7	L-5	Station 4+50', 250' South	
19	5/26	51	112.9	12.8	98.1	L-5	Station 2+00', 300' South	
20	5/26	11	118.8	9.3	100+	L-5	Station 2+00', 330' South .	
21	5/26	11	124.3	9.2	100+	L-5	Station 2+00', 380' South	
22	5/26	11	123.5	7.8	100+	L-5	Station 3+80', 300' South	
23	5/26	11	121.6	8.9	100+	L-5	Station 3+80', 330' South	
24	5/26	11	121.7	8.5	100+	L-5	Station 3+80', 380' South	
25	5/26	11	119.3	8.1	100+	L-5	Station 4+80', 300' South	
26	5/26	15	120.2	10.2	100+	L-5	Station 4+80', 330' South	
Proctor Code	Maximu Bensity (j		Optimum oisture (%)				Material Type and Source	
L-5	115.0)	15.7	Clay	, Wolf F	lf Pit, Lewiston		1
						•		1

		Respectfully submitted,
Remarks:		EMPIRE SOILS INVESTIGATIONS, INC.
Technician Time:	8:00 - 4:00	

Jeff Benson Technician:

FIEL' N-PLACE DENSITY TEST RF"ORT

E V SOILS IN	IPI VESTIGAT	RIE

Technician Time: 8:00 - 4:00

Technician: ____

Jeff Benson

- ☐ 585 TROY-SCHENECTADY RD., LATHAM, NY 12110 518-783-1555
 ☐ S-5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY 14075 716-649-8110
 ☐ 105 CORONA AVENUE, GROTON, NY 13073 607-898-5881
- ☐ RARITAN CENTER, 300 McGAW DRIVE, EDISON, NJ 08837 201-☐ 1164 RIDGE RD. EAST, ROCHESTER, NY 14621 716-342-5320 -

Proje	ct:	Union	Carbi	de	· · · · · · · · · · · · · · · · · · ·			Report N	١٥	D1-11	Page 3
Clien	t	Cones	toga-R	overs a	& Associ	ates	····	Date: _	5/26/87		
Cont	ractor:		SLC					Job No.	BT-8	87-85	
Test No.	Date of Test	Depth or Elevation	in-place Density (pcf)	In-piace Moisture (%)		Proctor Code		ation and	Remarks		
27	5/26	lst. Lift	118,9	10,7	100+	L-5_	니 Station # +50 ', 35	O' South	i		
28	5/26	It	121.2	9.0	100+	L-5	Station 2+80', 40	O¹ South			
29	5/26		122.1	9.6	100+	L-5	Station 2+80¹, 50	O' South			
30	5/26	11	110.8	12.5	96.3	L-5	Station 2+80', 55	O' South			
31	5/26	п	112.2	12.1	97.5	L-5	Station 4+00', 40	O' South			
32	5/26	lt.	108.1	15.3	94.0	L-5	Station 4+00', 50	O' South			•
33	5/26	11	107.7	15.1	93.6	L-5	Station 4+001, 55	O' South			
34	5/26	11	105.8	17.8	92.0	15	Station 5+00', 400	O' South			
35	88	ti	107.9	16.4	93.8	L - 5	Station 5+001, 500	0' South			
36	5/26	11	105.5	15.4	91.7	L-5	Station 5+00', 550	O' South			
37	5/26	11	106.2	17.3	92.3	L - 5	Station 6+00', 400	O' South			
38	5/26	u	106.8	17.0	92.8	L-5	Station 6+00', 550	O' South			
Proctor Code	Maximu Bensity (j	1	ptimum isture (%)	Material Type and Source							
L-5	115.0 15.7 Clay, Wolfs Pit, Lewiston		, Lewiston								
										<u></u>	
							Respectfully sub	mitte d,			
Remar	ks:				·		EMPIRE SOILS II	NVESTIG	ATIONS, IN	C.	

D .Y SITE OBSERVATION REPORT

☐ 1164 RIDGE RD. EAST, ROCHESTER, NY 14621



585 TROY-SCHENECTADY RD., LATHAM, NY 12110 518-783-1555	
S-5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY 14075	716-649-8110
105 CORONA AVENUE, GROTON, NY 13073 607-898-5881	
202 CLEVELAND AVENUE HIGHLAND DARK N.I 08004 201-848-5200	

716-342-5320

Project: Union Carbide	Location:N	N. Falls, NY		
Client:Conestoga-Rovers &				SLC
Report No.: DS-11		BT-87-85	Date: _	5/27/87
Weather & Temperature:	Clear and	d breezy 70	to 850	
Arrived at Site:				4:00

This Empire Soils Investigation technician was on the above mentioned site to test In-Place Densities (nuclear method) of material placed and compacted as a cap for the graphite disposal area of this plant.

Nine (9) In-Place Densities were run in each of the following areas: "A", "C", "D". After testing these areas, one shelby tube was driven in each area to 18" and returned to the Empire Soils laboratory to be tested for undisturbed permeability. The top 9" (second lift) was indicated as the portion of these sample to be tested. Below are listed the aera, shelby tube number and exact location is of sampling.

Area	Shelby Tube #	Location
"A"	ST-23	Station 7+20', 140' South
"C"	ST-24	Station 9+00', 270' South
"D"	ST-25	Station 10+20', 200' South

FIELD 'N-PLACE DENSITY TEST REPORT

EN	IPI VESTIGAT	RE

☐ 585 TROY-SCHENECTADY RD., LATHAM, NY 12110 518-783-1555 ☐ S-5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY 14075 716-649-8110

☐ 105 CORONA AVENUE, GROTON, NY 13073 607-898-5881

RARITAN CENTER, 300 McGAW DRIVE, EDISON, NJ 08837 201-225-0202

☐ 1164 RIDGE RD. EAST, ROCHESTER, NY 14621 716-342-5320

Project:	Union Carbide	Report No	T-13
Client	Conestoga-Rovers & Associates	Date:5/27/8	37

Contractor: _____ Job No. ___BT-87-85

•		
Material Type and Source		
ockpile		

	Respectfully submitted,
Remarks:	EMPIRE SOILS INVESTIGATIONS, INC.

Technician Time: 8:00 - 4:00

Technician:

Jeff Benson

FIELD IN-PLACE DENSITY TEST REPORT

SOILS	/P	RIE TIONS INC.

☐ 585 TROY-SCHENECTADY RD., LATHAM, NY 12110 518-783-1555

716-649-8110

☐ S-5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY 14075 ☐ 105 CORONA AVENUE, GROTON, NY 13073 607-898-5881

☐ RARITAN CENTER, 300 McGAW DRIVE, EDISON, NJ 08837 20 1164 RIDGE RD. EAST, ROCHESTER, NY 14621 716-342-5320 201-225-0202

Project: Union Carbide	Report No. DT-13 Page 2
Client <u>Conestoga-Rovers & Associates</u>	Date:5/27/87
Contractor: SLC	Job No. <u>BT-87-85</u>

Jonura	actor.		310				JUD 140
Test No.	Date of Test	Depth o		in-place Moisture (%)	% Compaction	Proctor Code	Location and Remarks
14 !	5/27	2nd. Lift	107.3	19.9	100	L-4	Station 9+00', 100' South
15 !	5/27	tt	107.1	19.5	100	L-4	Station 9+00', 200' South
16	5/27	11	107.8	16.1	100	L-4	Station 9+00', 300' South
17	5/27	11	107.8	14.8	100	L-4	Station 9+20', 150' South
18	5/27	11	106.4	14.8	100	L-4	Station 9+20', 240' South
19	5/27	11	109.6	14.7	100	L-4	Station 9+60', 50' South
20	5/27	u .	106.0	18.6	100	L-4	Station 9+60', 200' South
21	5/27	it	101.6	22.1	98.1	L-4	Station 9+60', 300' South
22	5/27	11	106.8	16.6	100	L-4	Statin 10+20', 50' South
23	5/27	11	105.1	16.8	100	L-4	Station 10+20', 200' South
24	5/27	11	108.2	14.0	100	L-4	Station 10+20', 350' South
25	5/27	It	107.7	15.3	100	L-4	Station 10+80', 50' South
26	5/27		105.1	15.1	100	L-4	Station 10+80', 200' South
Proctor Code	Maximu Density (Optimum foisture (%)	Material Type and Source			
L-4	1 103.6 21.4		21.4	Clay, trace silt, on-site stockpile, Summit Park MallLake			
~							
Code	-4 103.6 21.4		Cla	y, trac	e sil		

,		Respectfully submitted,
Remarks:		EMPIRE SOILS INVESTIGATIONS, INC.
echnician Time:	8:00 - 4:00	······································
	Jeff Benson	Jeff Benson

SOILS	INVEST	P	R ONS	E INC.
				=

Technician: __

☐ 585 TROY-SCHENECTADY RD., LATHAM, NY 12110 518-783-1555

□ S-5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY 14075 718 □ 105 CORONA AVENUE, GROTON, NY 13073 607-898-5881 □ RARITAN CENTER, 300 McGAW DRIVE, EDISON, NJ 08837 201-225-0202 □ 1164 RIDGE RD, EAST, ROCHESTER, NY 14621 716-342-5320 716-649-8110

Proje	ct:	Union (1164 HIDGE	HU. EAS	11, HOCHESTER, NT 14621	Report No	DT-13 Page 3
 Clien		Conesto	ga-Rov	ers				Date:	5/27/87
				SLC				Job No	BT-87-85
Test No.	Date of Test	Depth or Elevation	in-place Density (pcf)	in-place Moisture (%)	% Compaction	Proctor Code	Lo	ocation and Rema	ırks
27	5/27	2nd. Lift	109.7	15.1	100	L-4	Station 10+80'.	350' South	
			<u>.</u>						
•								. 1 1	
							· · · · · · · · · · · · · · · · · · ·		•
•									
				·					
		- :: :							
Proctor Code	Maximu Density (ptimum sture (%)				Material Type a	ind Source	
L-4	103.		.4	Clay	, trace	Silt	, on-site stockpi	le, Summit Pa	rk Mall Lake
				····					
,			•			· · · · · · · · · · · · · · · · · · ·	Respectfully su	bmitted,	
Remar	ks:						EMPIRE SOILS	INVESTIGATION	NS, INC.
Technic	cian Time	e:	8:00 -	4:00_			.		-
					on		Jeff Be	nson	

D/ Y SITE OBSERVATION REPORT



J	585 TROY-SCHENECTA	ADY RD.,	LATHAM,	NY 12110	518-783-1555
_	C.5167 COLITH DARK A	WENNE	DA DAY	OO13 HAMBII	DO NV 14076

☐ 105 CORONA AVENUE, GROTON, NY 13073 607-898-5881

☐ 303 CLEVELAND AVENUE, HIGHLAND PARK, NJ 08904 201-846-5200

1164 RIDGE RD. EAST, ROCHESTER, NY 14621 716-342-5320

Project:	Jnion Carbide			Location: N.	Falls, NY
Client:	Conestoga-Rover	Contractor: _	SLC		
Report No.: _	DS-12	Project No.:	BT-87-85	Date:	5/28/87
Weather & Te	mperature:	Clear and warm, 70) to 850		
Arrived at Site	e: <u>8:00</u>			Left Site:	3:30

This Empire Soils Investigation Technician was on the above mentiond site to test In-Place Densities (nuclear method) of material placed and compacted as a cap for the graphite disposal area of this plant.

This technician ran nine (9) tests in each of the two following areas: "B", and "K". This technician then drove one shelby tube in each of the areas to 18" and returned these tubes to the Empire Soils laboratory for undisturbed permeability testing (it was indicated on the work order to test top 9", second lift). Below will be found the area, shelby tube number, and exact location of sampling. Also today, authorization to run another proctor test on this material was provided by Don Miller.

Area	Shelby Tube #	Location
"B"	ST-27	Station 7+20', 310' South
"K"	ST-28	Station 5+50', 200' South

R/T Form D

4	Jeff	Benson		
עמ			 	



Technician: __

☐ 585 TROY-SCHENECTADY RD., LATHAM, NY 12110 518-783-1555

☐ S-5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY 14075 716-649-8110 ☐ 105 CORONA AVENUE, GROTON, NY 13073 607-698-5881

☐ RARITAN CENTER, 300 McGAW DRIVE, EDISON, NJ 08837 201-225-0202 ☐ 1164 RIDGE RD. EAST, ROCHESTER, NY 14621 716-342-5320

Project:	Union Carbide	Report No	DT-14	
Client	Conestoga-Rovers & Associates	Date:5/28/87		
Contractor:	SLC	Job No. BT-87-85		

۵٥٠٠٠.			Job No			
Date of Test	Elevation		in-place Moisture (%)	% Compaction	Proctor Code	Location and Remarks
5/28	Zna. Lift	104.6	21.0	100	L-4	Station 6+40', 240' South
5/28	11	104.7	21.0	100	L-4	Station 6+40', 310' South
5/28	н	106.6	19.0	100	L-4	Station 7+00', 240' South
5/28	11	104.2	19.8	100	L-4	Station 7+00', 310' South
5/28	11	104.8	18.3	100	L-4	Station 7+00', 390' South
5/28	11	107.8	19.0	100	L-4	Station 7+50', 340' South
5/28	II .	103.4	20.1	99.8	L-4	Station 8+00, 240' South
5/28	11	104.8	19.6	100	L-4	Station 8+00', 310' South
5/28	11	108.2	18.5	100	L-4	Station 8+00', 390' South
5/28	ii	108.2	16.4	100	L-4	Station 5 +20', 100' South
5/28	П	104.5	19.4	100	L-4	Station 5+20', 250' South
5/28		106.8	19.6	100	L-4	Station 5+20', 350' South
5/28	"	107.3	18.6	100	L-4	Station 5+50', 100' South
			Material Type and Source			
103.6		21.4	Clay, trace silt, on-site stockpile, Summit Park Mall Lake			
*						,
	Date of Test 5/28 5/28 5/28 5/28 5/28 5/28 5/28 5/28 5/28 5/28 5/28 5/28 5/28 5/28 5/28 5/28	Date of Test Depth or Test 2nd. 2nd. Lift 5/28	Date of Test Depth or Elevation Plensity (pcf) Density (pcf) 5/28 " 104.6 5/28 " 104.7 5/28 " 104.6 5/28 " 104.2 5/28 " 104.8 5/28 " 107.8 5/28 " 103.4 5/28 " 104.8 5/28 " 108.2 5/28 " 108.2 5/28 " 104.5 5/28 " 106.8 5/28 " 107.3 Maximum Density (pcf) Optimum Moisture (%)	Date of Test Depth or Elevation Place Density (pcf) In-place Density (pcf) In-place Moisture (%) 5/28 Lift 104.6 21.0 5/28 104.7 21.0 5/28 104.7 21.0 5/28 104.2 19.8 5/28 104.2 19.8 5/28 104.8 18.3 5/28 107.8 19.0 5/28 103.4 20.1 5/28 104.8 19.6 5/28 108.2 18.5 5/28 104.5 19.4 5/28 106.8 19.6 5/28 107.3 18.6	Date of Test Depth or Elevation Place In-place Density (pcf) In-place Moisture (%) % Compaction Compaction 5/28 Lift 104.6 21.0 100 5/28 104.7 21.0 100 5/28 104.7 21.0 100 5/28 100 19.0 100 5/28 104.2 19.8 100 5/28 107.8 19.0 100 5/28 107.8 19.0 100 5/28 103.4 20.1 99.8 5/28 104.8 19.6 100 5/28 108.2 18.5 100 5/28 108.2 16.4 100 5/28 104.5 19.4 100 5/28 106.8 19.6 100 5/28 107.3 18.6 100 5/28 107.3 18.6 100	Date of Test Depth or Elevation Test In-place Ipcfl (pcfl) In-place (pcfl) In-qual (pcfl)

		Respectfully submitted,	-
Remarks:		EMPIRE SOILS INVESTIGATIONS, INC.	
echnician Time:	8:00 - 3:30		-
echnician:	Jeff Benson	Jeff Benson	

EMPIR SOILS INVESTIGATIONS	INC.

- ☐ 585 TROY-SCHENECTADY RD., LATHAM, NY 12110 518-783-1555
- S-5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY 14075 716-649-8110
- ☐ 105 CORONA AVENUE, GROTON, NY 13073 607-898-5881

		Union	Cambi			RD. EAS	ST, ROCHESTER, NY 14621 716-342-5320
			Carbi				Report No. DT-14 Page 2
Clien	t	Conesto	gayRov	ers &	Assoc.	·	Date:5/28/87
Cont	ractor:		S	LC			Job NoBT-87-86
Test No.	Date of Test	Depth or Elevation	in-place	in-place Moisture (%)		Proctor	Location and Remarks
14	5/28	2nd. Lift	105.1	17.4	100	L-4	Station 5+50', 250' South
15	5/28	H	104.2	21.6	100	L-4	Station 5+50', 350' South
16	5/28	11	108.4	17.3	100	L-4	Station 6+00', 100' South
17	5/28	11	110.6	17.2	100	L-4	Station 6+00', 250' South
18	5/28	11	106.6	19.0	100	L-4	Station 6+00', 350' South
							•
Proctor Code	Maximu Density ()ptimum isture (%)				Material Type and Source
L-4	103.	6 2	21.4	Clay,	_trace_	silt,	Summit Park Mall Lake
							`
		•					Respectfully submitted,
Remai	ks:						_ EMPIRE SOILS INVESTIGATIONS, INC.
Techni	cian Tim	اه. {	3:00 -	3:30			
	cian:		Jeff	Benso	n		- Jeff Benson
i ecinili	Ulall		SUBSURFACE	EXPLORAT	ION CONST	RUCTION	QUALITY CONTROL . ENGINEERING SPECIALTY SERVICES

DA Y SITE OBSERVATION REPORT



☐ 585 TROY-SCHENECTADY RD., LATHAM, NY 12110 518-783-1555

☐ S-5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY 14075 716-649-8110

☐ 105 CORONA AVENUE, GROTON, NY 13073 607-898-5881

303 CLEVELAND AVENUE, HIGHLAND PARK, NJ 08904 201-846-5200

☐ 1164 RIDGE RD. EAST, ROCHESTER, NY 14621 716-342-5320

Project: <u>Union Carbide</u>		Location: N. I	alls, NY
Client: <u>Conestoga</u>			
Report No.: DS-13	Project No.: <u>BT-87-85</u>	Date:	5/29/87
Weather & Temperature:	Clear and warm, 75 to 850		
Arrived at Site:	8:00	Left Site:	3:30

This Empire Soils Investigation Technician was on the above mentioned site to test In-Place Densities (nuclear method) of material placed and compacted as a cap for the graphite disposal area of this plant.

This technician ran nine(9) tests in each of the following areas: "L" and "M". In each of these areas, a shelby tube was driven to 18" and returned to the Empire Soils laboratory for undisturbed permeability testing of the top 9" (second lift) of the sample. Below is listed the area, shelby tube number, and the exact location of these tubes.

Area	Shelby Tube #	Location
"["	ST-30	Station 3+50', 70' South
"M"	ST-31	Station 3+50', 210' South

R/T Form D

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SOI	Sin	IVES	P	TIONS	INC.

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□ 585 THOY-SCHENECTADY RD., EXTRAM, NY 1210
□ 5-5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY 14075
□ 105 CORONA AVENUE, GROTON, NY 13073 607-898-5881
□ RARITAN CENTER, 300 MCGAW DRIVE, EDISON, NJ 308-337 201-22

201-225-0202

☐ 1164 RIDGE RD. EAST, ROCHESTER, NY 14621 716-342-5320

Project: Un	ion Carbide	Report NoT-15
Client	Conestoga-Rovers & Associates	Date:5/29/87
Contractor:	SLC	Job NoBT-87-85
	in-place in-place	

Test No.	Date of Test	Depth -	n (pcl)	In-place Moisture (%)	% Compaction	Proctor Code	Location and Remarks
1	5/29	2nd. Lift		24.3	98.5	L-4	Station 2+20', 50' South
2	5/29	11	04.8	21.5	100	L-4	Station 2+20', 100' South
3	5/29	11	96.2	26.2	92.9	L-4	Station 2+20', 120' South
4	5/29	11	106.4	20.1	100	L-4	Station 3+20', 50' South
5	5/29	11	109.5	19.0	100	L-4	Station 3+20', 100' South
6	5/29	14	105.6	19.9	100	L-4	Station 3+20', 120' South
7	5/29	ti	105.9	21.1	100	L-4	Station 4+50', 50' South
8	5/29	11	106.1	20.3	100	L-4	Station 4+50', 100' South
9	5/29	15	104.5	22.3	100	L-4	Station 4+50', 120' South
10	5/29	"	107.2	20.5	20.5 100 L-4 Station 2+20', 150' South		
11	5/29	11	109.0	19.6	100	L-4	Station 2+20', 200' South
12	5/29	11	108.2	19.5	100	L-4	Station 2+20', 250' South
13	5/29	11	107.1	18.3	100	L-4	Station 3+20', 150' South
Proctor Code	Maxim Density		Optimum Moisture (%)	Material Type and Source			
L-4	103.	6	21.4	Clay, trace silt, Summit Park MallLake			
			· · · · · · · · · · · · · · · · · · ·				

		Respectfully submitted,
Remarks:		EMPIRE SOILS INVESTIGATIONS, INC.
Technician Time:	8:00 - 3:30	
Technician:	Jeff Benson	Jeff Benson

SOI	SIN	1P	ATION	SINC.

☐ 585 TROY-SCHENECTADY RD., LATHAM, NY 12110 518-783-1555
☐ S-5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY 14075
☐ 105 CORONA AVENUE, GROTON, NY 13073 607-898-5881
☐ RARITAN CENTER, 300 McGAW DRIVE, EDISON, NJ 08837 201-22:
☐ 1164 RIDGE RD. EAST, ROCHESTER, NY 14621 716-342-5320 716-649-8110 201-225-0202

Proje	ect:	Union Carbide Report No. DT-15 Page 2					
Clien	it		Cone	stoga-	Rovers	& Ass	
Cont	ntractor: SLC					Job NoBT-87-85	
Test No.	Date of Test	Depth or Elevation	In-place Density (pcl)	In-place Moisture (%)	% Compaction	Procter Code	Location and Remarks
14	5/29	2nd. Lift	104.0	18.9	100	L-4	Station 3+20', 200' South
15	5/29	11	106.3	20.3	100	L-4	Station 3+20', 250' South
16	5/29	11	106.0	18.8	100	L-4	Station 4+50', 150' South
17	5/29	и	107.1	20.5	100	L-4	Station 4+50', 200' South
18	5/29	11	106.5	20.5	100	L-4	Station 4+50', 250' South
			·				
		·					•
Proctor	Maximui	m 0	otlmum				
Code	Density (p		sture (%)				Material Type and Source
L-4	103.	6 2	21.4	Clay,	Summit	Park	Mall Lake
							
	·		1			-	
							Respectfully submitted,
Remarks: EMPIRE SOILS INVESTIGATIONS, I					EMPIRE SOILS INVESTIGATIONS, INC.		
	•						
	ian Time	•	00 - 3				
Technic	ian:		Jeff B	enson			Jeff Benson

DA" Y SITE OBSERVATION REPORT



	585 TROY-SCHENECTADY RD., LATHAM, NY 12110 518-783-1555 S-5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY 14075 105 CORONA AVENUE, GROTON, NY 13073 607-898-5881	716-649-8110
ō	303 CLEVELAND AVENUE, HIGHLAND PARK, NJ 08904 201-848-5200	
	1184 RIDGE RD. EAST, ROCHESTER, NY 14621 716-342-5320	

Project: Union Carbide Client: Conestoga-Rovers &	Associates			Falls, NY
Report No.: DS-14		BT-87-85	Date: .	6/1/87
Weather & Temperature:	Clear and warm,	75 to 85 ⁰		
Arrived at Site: 8:00			Left Site:	3:30

This Empire Soils Investigation Technician was on the above mentioned site to test In-Place Densities(nuclear method) of material placed and compacted as a cap for the graphite disposal area of this plant.

This technician ran nine (9) tests in each of the following areas: "N", "I", and "M". This technician then drove one shelby tube in each area to 18" and returned these tubes to the Empire Soils laboratory for undisturbed permeability testing of the top 9" of these samples. The area, shelby tube number, and exact locations of sampling are listed below.

Area	Shelby Tube #	Location
"N"	ST-32	Station 3+50', 340' South
"ງ"	ST-33	Station 1+00', 100' South
"H"	ST-34	Station 1+00', 300 South

Jeff Benson
by ______



- 716-649-8110
- ☐ 585 TROY-SCHENECTADY RD., LATHAM, NY 12110 518-783-1555 ☐ S-5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY 14075 ☐ 105 CORONA AVENUE, GROTON, NY 13073 607-898-5881 ☐ RARITAN CENTER, 300 McGAW DRIVE, EDISON, NJ 08837 201-22 201-225-0202

☐ 1164 RIDGE RD. EAST, ROCHESTER, NY 14621 716-342-5320

Project: Union Carbide						Report No16	
ClientConestaga		-Rover	s & Ass	ociat			
Cont	ractor:		SLC			Job NoBT-87-85	
Test No.	Date of Test	Depth or Elevation	In-place Density (pcl)	in-place Moisture (%)	% Compaction	Proctor Code	Location and Remarks
1	6/1	2nd. Lift	109.4	17.0	100	L-4	Station 2+00', 300' South
2	6/1	ii	108.9	18.6	100	L-4	Station 2+00', 330' South
3	6/1	11	110.8	14.3	100	L-4	Station 2+00', 380' South
4,	6/1	11	107.0	17.4	100	L-4	Station 3+80', 300' South
5	6/1	11	107.5	12.3	100	L-4	Station 3+80', 330' South
6	6/1	11	112.5	17.5	100	L-4	Station 3+80°, 380° South
7	6/1	11	112.3	15.2	100	L-4	Station 4+80', 200' South
8	6/1	11	111.8	15.7	100	L-4	Station 4+80', 330' South
9	6/1	11	110.3	14.8	100	L-4	Station 4+50', 350' South
10	6/1	II	107.0	16.5	100	L-4	Station O+25', 50' South
11	6/1	11	105.5	16.8	100	L-4	Station 0+25', 100' South
12	6/1	11	102.8	14.0	100	L-4	Station O+25', 150' South
13	6/1	H	104.3	13.7	100	L-4	Station 1+00', 50' South
Proctor Code	Maximui Density (p	,	ptimum sture (%)				Material Type and Source
4	-4 103.6 21.4		Clay, trace silt, Summit Park Mall Lake				

•		Respectfully submitted,
Remarks:		EMPIRE SOILS INVESTIGATIONS, INC.
rechnician Time: _	8:00 - 3:30	
Technician:	Jeff Benson	Jeff Renson

SOILS	INVES	PI	RE ONS INC.

\Box	585 TROY-SCHENECTADY	RD., LATHAM, NY 12110	518-783-1555
	585 THOY-SCHENECIAUT	NO., LATHAM, NI 12110	310-700-130

☐ S-5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY 14075
☐ 105 CORONA AVENUE, GROTON, NY 13073 607-898-5881
☐ RARITAN CENTER, 300 McGAW DRIVE, EDISON, NJ 08837 201-22 716-649-8110

201-225-0202

1164 RIDGE RD. EAST.	ROCHESTER,	NY 14621	716-342-5320

Projec	roject: <u>Union Carbide</u> Report No. <u>DT-16 Page 2</u>								
Client	Client <u>Conestoga-Rovers & Associates</u> Date: <u>6/1/87</u>								
Contr	Contractor: SLC Job No. BT-87-85								
Test No.	Date of Test	Depth «	1 .	in-place Moisture (%)	% Compaction	Proctor Code	Location and Remarks		
14	6/1	2nd. Lift	106.8	16.5	100	L-4	Station 1+00', 100' South		
15	6/1	11	107.0	16.5	100	L-4	Station 1+00', 150' South		
16	6/1	14	105.5	19.7	100	L-4	Station 1+50, 50° South		
17	6/1	п	105.3	19.8	100	L-4	Station 1+50', 100' South		
18	6/1	11	105.4	19.5	100	L-4	Station 1+50', 150' South		
19	6/1	11	104.1	15.5	100	L-4	Station 0+25', 200' South		
20	6/1	n	105.3	20.5	100	L-4	Station 0+25', 300' South		
21	6/1	u	104.0	20.9	100	L-4	Station 0+25', 380' South		
22	6/1	11	106.8	17.7	100	L-4	Station 1+00', 200' South		
23	6/1	11	105.7	19.6	100	L-4	Station 1+00' 300' South		
24	6/1	u	110.4	18.2	100	L-4	Station 1+00', 380' South		
25	6/1	11	113.1	17.5	100	L-4	Station 2+00', 200' South		
26	6/1	11	108.5	17.7	100	L-4	Station 2+00', 300' South		
Proctor Code	Maxim Density		Optimum Molsture (%)	Material Type and Source					
L-4	103.6	5	21.4	Clay	, Summi	t Pari	k Mall Lake		

emarks:	EMPIRE SOILS INVESTIGATIONS, INC

8:00 - 3:30 Technician Time: . Jeff Benson

Technician: _

Jeff Benson

Respectfully submitted,



Jeff Benson

Technician: __

☐ 585 TROY-SCHENECTADY RD., LATHAM, NY 12110 518-783-1555 ☐ S-5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY 14075 716-649-8110 ☐ 105 CORONA AVENUE, GROTON, NY 13073 607-898-5881 ☐ RARITAN CENTER, 300 McGAW DRIVE, EDISON, NJ 08837 201-225-0202 ☐ 1164 RIDGE RD. EAST, ROCHESTER, NY 14621 716-342-5320 Report No. DT-16 Page 3 Project: <u>Union Carbide</u> Client ____Conestoga-Rovers & Associates 6/1/87 Date: _____ Job No. <u>BT-87-85</u> SLC Contractor: ____ In-place In-place Density Moisture Proctor Location and Remarks Date of Depth or Test Compaction Code Test Elevation (pcf) [%] No. 2nd. Station 2+00', 380' South Lift | 104.8 16.9 100 27 6/1 Proctor Maximum Optimum Material Type and Source Code Density (pcf) Moisture (%) 21.4 Clay, some silt, Summit Park Mall Lake 103.6 Respectfully submitted, Remarks: _____ EMPIRE SOILS INVESTIGATIONS, INC. Technician Time: _____8:00 - 3:30

P LY SITE OBSERVATION REPORT



- ☐ 585 TROY-SCHENECTADY RD., LATHAM, NY 12110 518-783-1555
- ☐ S-5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY 14075 716-649-8110
- ☐ 105 CORONA AVENUE, GROTON, NY 13073 607-898-5881
- ☐ 303 CLEVELAND AVENUE, HIGHLAND PARK, NJ 08904 201-846-5200
- 1164 RIDGE RD. EAST, ROCHESTER, NY 14621 716-342-5320

Project:Union Carbide		Location: N. Falls, NY
Client:Conestoga-Rovers &		Contractor: SLC
		Date:6/2/87
Weather & Temperature:	Class & Uses 70 to 6	
Arrived at Site: 8:00		Left Site:3:30

This Empire Soils Investigation Technician was on the above mentioned site to test In-Place Densities (nuclear method) of material placed and compacted as a cap for the graphite disposal area of this plant.

This technician ran nine (9) In-Place Density tests in area "I" today and then drove a shelby tube (ST-35) at station 1+00', 480' South to 18". This shelby tube was returned to Empire Soils laboratory for undisturbed permeability testing on the top of this sample (e.g. 2nd. lift).

R/T Form D

EM	PIRE
SOILS INVE	STIGATIONS INC.

Technician Time: 8:00 - 3:30

Technician: ___

Jeff Benson

☐ 585 TROY-SCHENECTADY RD., LATHAM, NY 12110 518-783-1555

☐ S-5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY 14075 ☐ 105 CORONA AVENUE, GROTON, NY 13073 607-898-5881

☐ RARITAN CENTER, 300 McGAW DRIVE, EDISON, NJ 08837 201-225-0202

☐ 1164 RIDGE RD. EAST, ROCHESTER, NY 14621 716-342-5320

Proje	ct:	Unior	ı Carbi	de			Report No	
Clien	t	Cones	stoga-R	overs	& Assoc	<u>iates</u>	Date: 6/2/87	
Conti	actor:		SL	С			Job NoBT-87-85	
Test No.	Date of Test	Depth or Elevation	in-place Density (pcf)	in-place Moisture (%)	% Compaction	Prector Code	Location and Remarks	
1	6/2	2nd. Lift	103.1	22.6	99.5	L-4	Station 0+25', 450' South	
2	6/2	н	102.2	21.6	98.6	L-4	Station 0+25', 500' South	
3	6/2	11	99.4	22.3	95.9	L-4	Station O+25', 550' South	
4	6/2	18	103.3	23.6	100	L-4	Station 1400', 450' South	
5	6/2	н	104.1	22.69	100	L-4	Station 1+00', 500' South	
6	6/2	11	102.9	21.6	99.3	L-4	Station 1+00', 550' South	
7	6/2	11	106.3	19.8	100	L-4	Station 2+00', 450' South	
8	6/2	Ħ	107.9	20.6	100	L-4	Station 2+00', 500' South	
9	6/2	11	109.7	20.1	100	L-4	Station 2 1 90', 550' South	
	-							
Proctor Code	Maximur Density (p		ptimum sture (%)				Material Type and Source	
L-4	103.6	5 21	.4	Clay	y, trace	sil [·]	t, Summit Park Mall Lake	
emark	Respectfully submitted,							
CITICIF	.s				• • • • • • • • • • • • • • • • • • • •		EMPIRE SOILS INVESTIGATIONS, INC.	

DA / SITE OBSERVATION REPORT



00	585 TROY-SCHENECTADY RD., LATHAM, NY 12110 518-783-1555 S-5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY 14075	716-649-8110
	105 CORONA AVENUE, GROTON, NY 13073 607-898-5881	
	303 CLEVELAND AVENUE, HIGHLAND PARK, NJ 08904 201-846-5200	1
	1164 RIDGE RD. EAST, ROCHESTER, NY 14621 716-342-5320	

Project: Union Carbide	Location: N. Falls, NY
Client:Conestoga-Rovers & Associates	_ Contractor: SLC
Report No.: DS-16 Project No.: BT-87-8	Date:6/3/87
Weather & Temperature: Partly sunny and war	m, 70 to 85°
Arrived at Site: 8:00	Left Site:3:30

This Empire Soils Investigation Technician was on the above mentioned site to test In-Place Densities (nuclear method) of material placed and compacted as a cap ofr the graphite disposal area of this plant.

This technician ran 12 In-Place Density tests in areas "E" and 14 In-Place Density tests in area "O"(note: area "O" is 1.5 acres in area requiring extra IPD's , e.g. nine tests per acre per spec.).

This technician then drove one shelby tube for area "E" and two shelby tubes for area "O" to 18" and returned these tubes to Empire Soils laboratory for undisturbed permeability testing of the top 9" of these samples (e.g. second lift). Listed below is the area, shelby tube number and locations for these samples.

Area	Shelby Tube #	Location
"E"	ST-29	Station 7+20', 450' South
"O"	ST-36	Station 3+50', 500' South
"0"	ST-37	Station 5+50', 500' South

A T Form D

Jeff Benson

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SOILS	IP WESTIGAT	RE

	585 TROY-SCH	ENECTADY R	D., LATHAM,	NY 12110	518-783-1555
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☐ S-5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY 14075 716-649-8110 ☐ 105 CORONA AVENUE, GROTON, NY 13073 607-898-5881

☐ RARITAN CENTER, 300 McGAW DRIVE, EDISON, NJ 08837 ☐ 1164 RIDGE RD. EAST, ROCHESTER, NY 14621 716-342-5320

Report No. DT-18 Union Carbide Project: _

Conestoga-Rovers & Associates 6/3/87 Client _ Date: ___

SLC BT-87-85 Contractor: Joh No

Cont	ractor:		JLU				Job No
Test No.	Date of Test	Depth or Elevation	In-place Density (pcl)	In-place Moisture (%)	% Compaction	Proctor Code	Location and Remarks
1	6/3	2nd. Lift	119.1	12.8	100	L-4	Station 6+40', 340' South
2	6/3	11	117.3	10.1	100	L-4	Station 6+40', 400' South
3	6/3	11	114.3	9.1	100	L-4	Station 7+00', 360' South
4	6/3		113.1	9.8	100	L-4	Station 7+00', 410' South
.5	6/3	11	111.7	9.4	100	L-4	Station 7+00', 4≸0' South
6	6/3	11	112.1	13.3	100	L-4	Station 8+00', 400' South
7	6/3	11	106.7	13.5	100	L-4	Station 8+00', 450' South
8	6/3	ti .	105.1	17.9	100	L-4	Station 8+00', 490' South
9	6/3	11	103.5	18.7	99.9	L-4	Station 8+00', 500' South
10	6/3	11	105.3	16.4	100	L-4	Station 6+50', 400' South
11	6/3	"	104.4	17.7	100	L-4	Station 6+50', 450' South
12	6/3	11	104.7	20.6	100	L-4	Station 6+50', 500' South
13	6/3	"	110.7	16.4	100	L-4	Station 2+80', 400' South
Proctor Code	Maximum Density (po	,	timum sture (%)	Material Type and Source			
L-4	103.	6	21.4	Clay, Trace silt, Summit Park Mall Lake			
	· · · · · · · · · · · · · · · · · · ·						

		Respectfully submitted,
Remarks:		 EMPIRE SOILS INVESTIGATIONS, INC.
Technician Time:	8:00 - 3:30	 -

Jeff Benson

Jeff Benson

Technician: __

EMPTRE SOILS INVESTIGATIONS INC.

☐ 585 TROY-SCHENECTADY RD., LATHAM, NY 12110 518-783-1555

☐ S-5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY 14075☐ 105 CORONA AVENUE, GROTON, NY 13073 607-898-5881

☐ RARITAN CENTER, 300 McGAW DRIVE, EDISON, NJ 08837 20 1164 RIDGE RD. EAST, ROCHESTER, NY 14621 716-342-5320 201-225-0202

716-649-8110

Proiect:	Union Carbide	Report No. DT-18 Page 2
<u>-</u>		Date:6/3/87
Contractor:	SLC	Job No. <u>BT-87-85</u>

Contr	actor:	SL	<u>. </u>				JOD NO.		
Test No.	Date of Test	Depth or Elevation		in-place Moisture (%)	% Compaction	Proctor Code	Location and Remarks		
14	6/3	2nd. Lift	110.9	16.7	100	L-4	Station 2+80', 500' South		
15	6/3	п	107.5	15.3	100	L-4	Station 2+80', 550' South		
16	6/3	ıı	106.2	15.4	100	L-4	Station 4+00', 400' South		
17	6/3	11	103.8	20.4	100	L-4	Station 4+00', 500' South		
18	6/3	11	104.0	20.8	100	L-4	Station 4+00', 550' South		
19	6/3	11	104.9	15.9	100	L-4	Station 5+00', 400' South		
20	6/3		104.2	17.8	100	L-4	Station 5+00', 500' South		
21	6/3		116.8	10.6	100	L-4	Station 5+00', 550' South		
22	6/3	11	115.3	11.3	100	L-4	Station 5+50', 400' South		
23	6/3	11	116.1	10.9	100	L-4	Station 5+50', 500' South		
24	6/3	11	112.1	13.5	100	L-4	Station 5+50', 550' South		
25	6/3	11	102.7	17.2	100	L-4	Station 6+00', 400' South		
26	6/3	n	107.3	19.2	100	L-4	Station 6+00', 550' South		
Proctor Code	Maxin Density	1	Optimum Moisture (%)		Material Type and Source				
L-4	 		21.4	Clay, trace silt, Summit Park Mall Lake					
-						~			
				-					
	<u> </u>								

•		Respectfully submitted,
Remarks:		EMPIRE SOILS INVESTIGATIONS, INC.
Technician Time	8:00 - 3:30	
Technician:	Jeff Benson	Jeff Benson

SUBSURFACE EXPLORATION # CONSTRUCTION QUALITY CONTROL # ENGINEERING SPECIALTY SERVICES

D# Y SITE OBSERVATION REPORT



585 TROY-SCHENECTADY RD., LATHAM, NY 12110 518-783-1555	
S-5167 SOUTH PARK AVENUE, P.O. BOX 0913, HAMBURG, NY 14075	716-649-8110
105 CORONA AVENUE, GROTON, NY 13073 607-898-5881	
303 CLEVELAND AVENUE, HIGHLAND PARK, NJ 08904 201-846-5200	

Project: Union Carbide	Location: N. Falls, New York
Client:Conestoga-Rovers & Associates	Contractor: SLC
Report No.: DS-17 Project No.: BT-87-85	Date: 6/4/87
Weather & Temperature: Clear and pleasant, 65 to 750	
Arrived at Site: 8:00	Left Site: 3:00
This Empire Soils Investigation Technician was on the test In-Place Densities (nuclear method) of material cap for the graphite disposal area of this plant. This technician ran nine (9) In-Place Density tests This technician then drove a shelby tube (ST-38) to South. This tube was returned to the Empire Soils I permeability testing of the top 9" (e.g. 2nd. lift) of 10" (e.g. 2nd.	placed and compacted as a in area "P" (North slope). 18" at station 9+00', 35' aboratory for undisturbed
• · · · · · · · · · · · · · · · · · · ·	

R/T Form D

E	INI SI	P	ATION	SINC

8:00 - 3:00

Jeff Benson

Technician Time: _

Technician: _

□ 585 TROY-SCHENECTADY RD., LATHAM, NY 1	2110 518-783-1555	
S-5167 SOUTH PARK AVENUE, P.O. BOX 0913,	HAMBURG, NY 14075	716-649-8110
T 105 CORONA AVENUE, GROTON, NY 13073	607-898-5881	

					105 CORONA	A AVENU	JE, GROTON, NY 13073 607-898-5881 100 McGAW DRIVE, EDISON, NJ 08837 201-225-0202 5T, ROCHESTER, NY 14621 716-342-5320
Proje	ct:	Jnion C	arbide				
Client	l	Conest	oga-Rov	vers &	Associa	ates	Date:6/4/87
Contr	actor:		SLC .	<u> </u>			Job NoBT-87-85
Test No.	Date of Test	Depth or Elevation	in-place Density (pcl)	in-place Moisture (%)	% Compaction	Proctor Code	Location and Remarks
1	6/4	2nd. Lift	107.2	16.7	100	L-4	Station 5+50', 10' South
2	6/4	ti .	103.9	17.7	100	L-4	Station 6+50', 40' South
3	6/4	11	111.2	13.8	100	L-4	Station 7+00', 50' South
4	6/4	H	107.8	16.1	100	L-4	Station 8+50', 30' South
5.	6/4	11	107.2	18.1	100	L-4	Station 9+50', 15' South
6	6/4	п	104.5	17.8	100	L-4	Station 10+00', 20' South
7	6/4	19	108.7	18.6	100	L-4	Station 10+50', 30' South
8	6/4	11	105.0	19.3	100	L-4	Station 11+00', 50' South
9	6/4	н	104.1	21.0	100	Լ-4	Station 11+50', 30' South
	· ·						·
Proctor Code	Maxim Density	- 1	Optimum oisture (%)				Material Type and Source
L-4	103.	6	21.4	Clay, trace silt, Summit Park Mall Lake			
İ	<u> </u>						
				<u> </u>			
							Respectfully submitted,
Remai	ks:				· · · · · · · · · · · · · · · · · · ·		_ EMPIRE SOILS INVESTIGATIONS, INC.

___Jeff_Benson_

APPENDIX F

SHELBY TUBE PERMEABILITY RESULTS

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Union Carbide

CLIENT:

Conestoga-Rovers and Associates

DATE:

May 18, 1987

PROJECT NO:

BT-87-85

REPORT NO:

L-1

REPORT OF MATERIAL TESTING

Material: Three undisturbed (Shelby Tube) samples of the cover material placed

for the above referenced project. Samples were obtained by Empire Soils Investigations, Inc. on April 24, 1987 from locations as noted

below.

Constant Head Triaxial Permeability:

Sample#	Location	Permeability
ST-1	Test pad first lift, East end after two passes with Sheepsfoot roller	6.52×10^{-8} CM/SEC @ 5 PSI. 5.66 x 10^{-8} CM/SEC @ 10 PSI.
ST-2	Test pad first lift, East end after four passes with Sheepsfoot roller	2.05 x 10 ⁻⁸ CM/SEC @ 5 PSI. 1.78 x 10 ⁻⁸ CM/SEC @ 10 PSI.
ST-3	Test pad second lift, East end after two passes with Sheepsfoot roller and one pass with Smooth drum vibratory	2.62 x 10 ⁻⁸ CM/SEC @ 5 PSI. 2.72 x 10 ⁻⁸ CM/SEC @ 10 PSI.

For details regarding these tests, see the attached laboratory permeability test reports.

If you have any further questions, please feel free to contact our office.

Respectfully submitted,

EMPIRE SOILS INVESTIGATIONS, INC.

Charles C. Keipper

May (S)

Laboratory Manager



Union Carbide

CLIENT:

Conestoga-Rovers & Associates

DATE:

May 29, 1987

PROJECT NO:

BT-87-85

REPORT NO:

L-2

REPORT OF MATERIAL TESTING

Material: Nine (9) undisturbed (Shelby Tube) samples of the cover material placed for the above referenced project. Samples were obtained by Empire Soils Investigations, Inc. from locations as noted below.

Constand Head Triaxial Permeability:

Sample#	Location	<u>Permeability</u>
ST-4	Area "A", Station 7+20 140' South	1.35 x 10 ⁻⁸ cm/sec @ 10 psi
ST-5	Area "B", Station 7+20 310' South	$7.52 \times 10^{-9} \text{ cm/sec @ 10 psi}$
ST-6	Area "C", Station 9+00 270' South	1.84 x 10 ⁻⁸ cm/sec @ 10 psi
ST-7	Area "D", Station 10+20 200' South	1.11 x 10 ⁻⁸ cm/sec @ 10 psi
ST-101	Cut off trench, Southwest corner Station 2+60, 570' South	1.95 x 10 ⁻⁸ cm/sec @ 10 psi
ST-8	Area "E", Station 7+20 450' South	1.61 x 10 ⁻⁸ cm/sec @ 10 psi
ST-9	Area "F", Station 11+20 250' South	8.78 x 10 ⁻⁹ cm/sec @ 10 psi
ST-10	Area "G", Station 9+00 500' South	1.37 x 10-8 cm/sec 0 10 psi
ST-11	Area "F", Station 11+20 300' South	1.21 x 10 ⁻⁸ cm/sec @ 10 psi



Union Carbide L-2 May 29, 1987 Page 2

For details regarding these tests, see the attached laboratory permeability test reports.

If you have any further questions, please feel free to contact our office.

Respectfully submitted,

EMPIRE SOILS INVESTIGATIONS, INC.

Charles C. Keipper Laboratory Manager

sll



Union Carbide

CLIENT:

Conestoga-Rovers & Associates

DATE:

May 29, 1987

PROJECT NO:

BT-87-85

REPORT NO:

L-3

REPORT OF MATERIAL TESTING

Material:

Four undisturbed (Shelby Tube) samples of the cover material placed for the above referenced project. Samples were obtained by Empire Soils Investigations, Inc. on May 8th., 12th., and 13th., 1987 from locations as noted below.

Constand Head Triaxial Permeability:

Sample#	Location	<u>Permeability</u>
ST-12	Area "G", Station 9+00 500' South	$9.07 \times 10^{-9} \text{ cm/sec } 0.10 \text{ psi}$
ST-13	Area "H", Station 1+00 300' South	1.49 x 10 ⁻⁸ cm/sec @ 10 psi
ST-14	Area "I", Station 1+00 480' South	7.80 x 10 ⁻⁹ cm/sec @ 10 psi
ST-15	Area "J", Station 1+00 100' South	1.34 x 10^{-8} cm/sec @ 10 psi

For details regarding these tests, see the attached laboratory permeability test reports.

If you have any further questions, please feel free to contact our office.

Respectfully submitted,

EMPIRE SOALS INVESTIGATIONS, INC.

Charles C. Keipper Laboratory Manager



Union Carbide

CLIENT:

Conestoga-Rovers & Associates

DATE:

June 30, 1987

PROJECT NO:

BT-87-85

REPORT NO:

L-5 •

REPORT OF MATERIAL TESTING

Material: Twelve (12) undisturbed (Shelby Tube) samples of the cover material placed for the above referenced project. Samples were obtained by Empire Soils Investigations, Inc. on May 22nd., 26th., 27., and 28th., 1987 from locations as noted below.

Constant Head Triaxial Permeability:

Sample#	Location	Permeability
ST-16	Station 9+00 x 35' South Area "P"	$8.27 \times 10^{-9} \text{ cm/sec } 0 \text{ 10 psi}$
ST-17	Station 5+50 x 200' South Area "K"	2.54×10^{-8} cm/sec @ 10 psi
ST-18	Station 3+50 x 70' South Area "L"	$9.42 \times 10^{-9} \text{ cm/sec } 0 \text{ 10 psi}$
ST-19	Station 3+50 x 210' South Area "M"	1.28 x 10 ⁻⁸ cm/sec @ 10 psi
ST-20	Station 3+50 x 340' South Area "N"	$3.17 \times 10^{-8} \text{ cm/sec @ 10 psi}$
ST-21	Station 3+50 x 500' South Area "O"	7.47 x 10^{-8} cm/sec @ 10 psi
ST-22	Station 5+50 x 500' South Area "O"	1.12 x 10^{-8} cm/sec 0 10 psi
ST-23	Station 7+20 x 140' South Area "A"	$1.15 \times 10^{-8} \text{ cm/sec } 0 \text{ 10 psi}$
ST-24	Station 9+00 x 270' South Area "C"	$8.84 \times 10^{-9} \text{ cm/sec } @ 10 \text{ psi}$



Union Carbide L-5 June 30, 1987 Page 2

Constant Head Permeability (Con't.)

Sample#	Location	<u>Permeability</u>
ST-25	Station 10+20 x 200° South Area "D"	9.72 x 10 ⁻⁹ cm/sec 0 10 psi
ST-27	Station 7+20 x 310' South Area "B"	1.55 x 10 ⁻⁸ cm/sec @ 10 psi
\$1-28	Station 5+50 x 200' South Area "K"	$1.54 \times 10^{-8} \text{ cm/sec } 0 \text{ 10 psi}$

Note: See the attached permeability test reports for details regarding the above test results.

If you have any further questions, please feel free to contact our office.

Respectfully submitted,

EMPIRE SOILS INVESTIGATIONS, INC.

Charles C. Keipper

Manager Testing Services

s11



Union Carbide

CLIENT:

Conestoga-Rovers & Associates

DATE:

July 28, 1987

PROJECT NO:

BT-87-85

REPORT NO:

L-8

REPORT OF MATERIAL TESTING

Material: Three (3) undisturbed (Shelby Tube) samples of the cover material placed for the above referenced project. Samples were obtained by Empire Soils Investigation, Inc. on May 29, 1987 and June 1, 1987 from locations as noted below.

Constant Head Triaxial Permeability:

Sample#	Location	<u>Permeability</u>
ST-30	Station 3+50 x 70' South Area "L"	1.7 x 10^{-8} cm/sec 0 10 psi.
ST-31	Station 3+50 x 210' South Area "N"	1.6×10^{-8} cm/sec 0 10 psi.
ST-32	Station 3+50 x 310' South Area "N"	9.29×10^{-9} cm/sec @ 10 psi.

Please see the attached laboratory data sheet for details of each test.

If you have any further questions, please feel free to contact our office.

Respectfully submitted,

EMPIRE SQILS INVESTIGATIONS, INC.

Charles C. Keipper Laboratory Manager

s11



Union Carbide

CLIENT:

Conestoga-Rovers & Associates

DATE:

June 30, 1987

PROJECT NO:

BT-87-85

REPORT NO:

L-6

REPORT OF MATERIAL TESTING

Material: Three (3) undisturbed (Shelby Tube) samples of the cover material placed for the above referenced project. Samples were obtained

by Empire Soils Investigations, Inc. on June 2, 1987 from locations

as noted below.

Constant Head Triaxial Permeability:

Sample#	Location	<u>Permeability</u>
ST-33	Station 1+00 x 100' South Area "J"	1.00 x 10 ⁻⁸ cm/sec @ 10 psi
ST-34	Station 1+00 x 300' South Area "H"	2.27 x 10 ⁻⁸ cm/sec @ 10 psi
ST-35	Station 1±00 x 480' South Area "I"	6.89 x 10 ⁻⁹ cm/sec @ 10 psi

Note: See the attached permeability test reports for details concerning the above test results.

If you have any further questions, please feel free to contact our office.

Respectfully submitted,

EMPIRE SOILS, INVESTIGATIONS, INC.

Charles C. Keipper

Manager Testing Services

s11



Union Carbide

CLIENT:

Conestoga-Rovers & Associates

DATE:

June 30, 1987

PROJECT NO:

BT-87-85

REPORT NO:

L-7

REPORT OF MATERIAL TESTING

Material: Four (4) undisturbed (Shelby tube) samples of the cover material placed for the above referenced project. Samples were obtained by Empire Soils Investigations, Inc. on June 3 and June 4, 1987. from locations as noted below.

Constant Head Triaxial Permeability:

Sample#	Location	<u>Permeability</u>
ST-29	Station 7+20 x 450' South Area "E"	3.23 x 10 ⁻⁸ cm/sec 0 10 psi
ST-36	Station 3+50 x 500' South Area "O"	1.62 x 10 ⁻⁸ cm/sec @ 10 psi
ST-37	Station 5+50 x 500' South Area "O"	1.12 x 10 ⁻⁸ cm/sec @ 10 psi
ST-38	Station 9+00 x 35° South Area "P"	$1.05 \times 10^{-8} \text{ cm/sec } 0 \text{ 10 psi}$

Note: See the attached permeability test reports for details concerning these tests.

If you have any further questions, please feel free to contact our office.

Respectfully submitted,

EMPIRE SOILS INVESTIGATIONS, INC.

Charles C. Keipper

Manager Testing Services

TEST DATA:	SAMPLE DATA:
Specimen Height (cm): 14.58	Sample Identification: ST-]
Specimen Diameter (cm): 7.23	lst. lift, East end, test pad
Dry Unit Weight (pcf): 107.7	Visual Description: Red-brown SILT
Moisture Content Before Test (%): 18.3	and CLAY, little gravel to pockets of
Moisture Content After Test (%): 20.1	Remarks: tan silt
Cell Confining Pressure (psi): 95	
Test Pressure (psi): 85 90	_ Maximum Dry Density
Back Pressure (psi): 80 80	(ASTM D) (pcf):
Differential Head (psi): 5 10	Optimum Moisture Content (%):
Flow Rate $(\Delta V/t)$ (cm ³ /sec) O 6.45x10 ⁻⁵ Δ 1.12x10	-4 Percent Compaction: Constant Head Triaxial
Permeability (cm/sec): $0.52 \times 10^{-8} \Delta 5.66 \times 10^{-8}$	-8 Permeameter Type:
	- t (sec)
0 50,000	100,000
	△V/t RELATIONSRIP
VV (cm ³)	
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10-8	PERMEABILITY
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PERMEABILLTY	
<u>a</u> .6	
HYDRAULIC GR	WADIENT - Ah/L (cm/cm)
_	

PERMEABILITY TEST REPORT,

Union Carbide Conestoga-Rovers and Assoc.

TEST DATA:		SAMPLE DATA:	
Specimen Height (cm):	0.41	Sample Identizicatio	n: ST-2
Specimen Diameter (cm): 7	.23	_lst_Lift, East_en	d, test pad
Dry Unit Weight (pcf): 1	09.5		Red-brown SILT and
Moisture Content Before Te		CLAY, trace fine s	and and gravel
Moisture Content After Te	_	Remarks:	
Cell Confining Pressure (p			
Test Pressure (psi):	85 90	Maximum Dry Density	
Back Pressure (psi):	0 80	(ASTM D) (pcf):
Differential Head (psi): 5	10	Optimum Moisture Con	tent (%):
Flow Rate $(\Delta V/t)$ (cm ³ /sec) 0 2.	85x10-5' <u>\</u> 4.93x10 ⁻⁵	Percent Compaction:	
Permeability (cm/sec): 02.		Permeameter Type: Co	nstant Head Triaxial
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	HYDRAULIC GRAD	DIENT - Δh/L (cm/cm)	
	PE	RMEABILITY TEST RE	PORT

Union Carbide Conestoga-Rovers and Associates

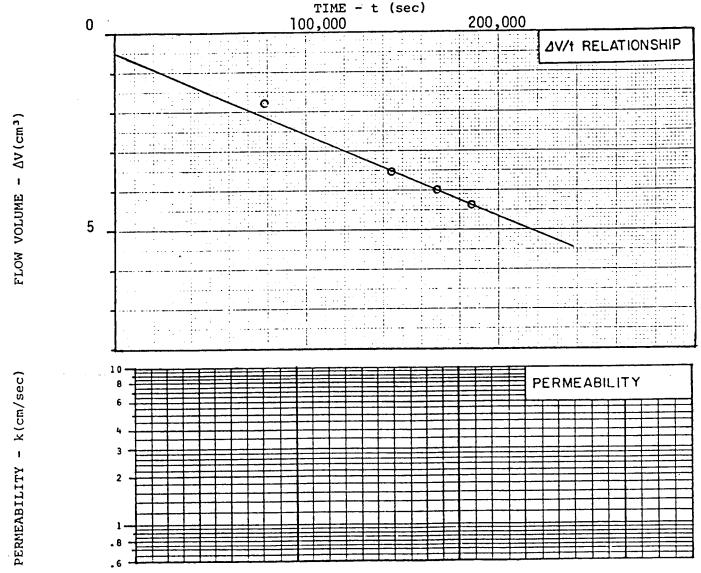
TEST DATA:	SAMPLE DATA:	
Specimen Height (cm): 7.36	Sample Identification: ST-3	
Specimen Diameter (cm): 7.14	Second lift, East end test pit	
Dry Unit Weight (pcf): 109.0	Visual Description: Red-brown SILT	
Moisture Content Before Test (%): 19.0	and CLAY, trace fine sand and gravel	
Moisture Content After Test (%): 20.8	Remarks:	
Cell Confining Pressure (psi): 95		
Test Pressure (psi): 85 90	Maximum Dry Density	
Back Pressure (psi): 80 80	(ASTM D) (pcf):	
Differential Head (psi): 5 10 Optimum Moisture Content (%):		
Flow Rate $(\Delta V/t)$ (cm ³ /sec) $O(5.00 \times 10^{-5} \Delta)$ $O(1.04 \times 10^{-4})$	Percent Compaction:	
Permeability (cm/sec): 02.62×10^{-8} $\Delta 2.72 \times 10^{-8}$	8 _{Permeameter Type: Constant Head Triaxial}	
	t (sec)	
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HYDRAULIC GRA	DIENT - \Dientle h/L (cm/cm)	



PERMEABILITY TEST REPORT

Union Carbide Conestoga- Revers and Associates

TEST DATA:	SAMPLE DATA:	
Specimen Height (cm): 9.14	Sample Identification: ST-4	
Specimen Diameter (cm): 7.17	Area A	
Dry Unit Weight (pcf): 113.6	Visual Description: Stiff red-brown	
Moisture Content Before Test (%): 17.3	Silt and Clay, trace gravel	
Moisture Content After Test (%): 19.2	Remarks:	
Cell Confining Pressure (psi): 95	Station 7+20, 140' South	
Test Pressure (psi): 90	Maximum Dry Density	
Back Pressure (psi): 80	(ASTM D) (pcf):	
Differential Head (psi): 10	Optimum Moisture Content (%):	
Flow Rate $(\Delta V/t)$ (cm ³ /sec)O 4.20x10 ⁻⁵ Δ	Percent Compaction:	
Permeability (cm/sec): 0 1.35x10-8/	Permeameter Type: Constant Head Triaxial	
TIME	- t (sec)	
0 100,000	200,000	



HYDRAULIC GRADIENT - △h/L (cm/cm)



PERMEABILITY TEST REPORT

Union Carbide Conestoga-Rovers and Associates

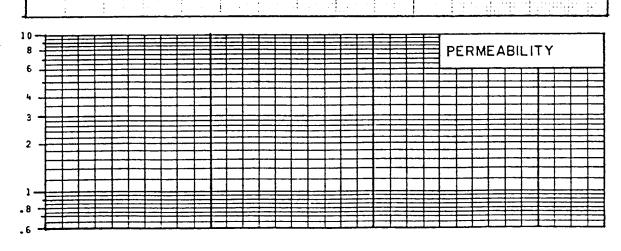
TEST DATA:	SAMPLE DATA:
Specimen Height (cm): 9.46	Sample Identification: ST_5
Specimen Diameter (cm): 7.24	Area B
Dry Unit Weight (pcf): 111.6	Visual Description: Stiff red-brown
Moisture Content Before Test (%): 18,5	Silt and Clay, trace gravel
Moisture Content After Test (%): 20.7	Remarks:
Cell Confining Pressure (psi): 95	Station 7+20, 310' South
Test Pressure (psi): 90	Maximum Dry Density
Back Pressure (psi): 80	(ASTM D) (pcf):
Differential Head (psi): 10	Optimum Moisture Content (%):
Flow Rate $(\Delta V/t)(cm^3/sec) = \frac{2.30 \times 10^{-5}\Delta}{2.30 \times 10^{-5}\Delta}$	Percent Compaction:
Permeability (cm/sec): 07.52x10-9 \(\Delta \)	Permeameter Type: Constant Head Triaxial
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HYDRAULIC GRADIENT - Δh/L (cm/cm)



Union Carbide Conestoga-Rovers & Associates

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rest data:			SAMPLE DATA		
Specimen Height (cm): 9.47		Sample Identification: ST-6		
Specimen Diameter	(cm): 7.19		Area C		
Dry Unit Weight (• • • •		Visual Description: Stiff red-brown		
		20.4	Silt and Clay, trace gravel		
		22.3	Remarks:		
Cell Confining Pr		95	Station 9+00, 270' South		
Test Pressure (ps			Maximum Dry Density		
-			(ASTM D) (pcf):		
Back Pressure (ps					
Differential Head			Optimum Moisture Content (%):		
	n³/sec)Ο <u>5.55x10⁻⁵</u> Δ_		Percent Compaction:		
Permeability (cm/	sec): Ο <u>1.84x10⁻⁸</u> Δ_		Permeameter Type: Constant Head Triaxia		
			t (sec)		
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HYDRAULIC GRADIENT - Δ h/L (cm/cm)



PERMEABILITY - k(cm/sec)

PERMEABILITY TEST REPORT

Union Carbide Conestoga-Rovers & Associates

	- 		
TEST DATA: SAMPLE DATA:			
Specimen Height (cm): 9.50 Sample Identification: ST-	7		
Specimen Diameter (cm): 7.17 Area D			
Dry Unit Weight (pcf): 106.8 Visual Description: Red-br	own SILT and		
Moisture Content Before Test (%): 22.1 CLAY, trace gravel	·		
Moisture Content After Test (%): 22.1 Remarks:			
Cell Confining Pressure (psi): 95 Station 10+20, 200° Sou	ith		
Test Pressure (psi): 90 Maximum Dry Density			
Back Pressure (psi): 80 (ASTM D) (pcf):			
Differential Head (psi): 10 - Optimum Moisture Content ((%):		
Flow Rate $(\Delta V/t)$ (cm ³ /sec) 0 3.30x10 ⁻⁵ Δ Percent Compaction:			
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HYDRAULIC GRADIENT - Δh/L (cm/cm)			
PERMEABILITY TEST REPORT			
EMPIRE Union Carbide	Union Carbide Conestoga-Rovers & Associates		

CCK DATE: 5/29/87

PROJ.NO.

BT-87-85

CK'D.

DR BY : D/G

TEST DATA:	
Specimen Height (cm): 8.50 Sample Identification: ST-8	
Specimen Diameter (cm): 7.19 Area E	
Dry Unit Weight (pcf): 125.2 Visual Description: Red-brown Si	it and
Moisture Content Before Test (%): 12.0 Clay, trace gravel, changing to	Silt,
Moisture Content Before Test (%): 12.0 Clay, trace graver, changing to Some clay, little fine sand & g	rave:
Cell Confining Pressure (psi): 95 Station 7+20, 450' South	
Test Pressure (psi): 90 Maximum Dry Density	
Back Pressure (psi): 80 (ASTM D) (pcf):	
Differential Head (psi): 10 Optimum Moisture Content (%):	
Flow Rate $(\Delta V/t)(cm^3/sec)O\frac{5.40x10^{-5}}{\Delta}$ Percent Compaction:	
Permeability (cm/sec): O 1.61x10 ⁻⁸ \(\Delta \) Permeameter Type: Constant Head T	riaxial
TIME - t (sec)	
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HYDRAULIC GRADIENT - Δh/L (cm/cm)	
PERMEABILITY TEST REPORT	

Union Carbide

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DR HY: DJG

Conestoga-Rovers & Associates

PROJ. NO. BT-87-85

DATE:5/29/87

TEST DATA:		SAMPLE DATA		
Specimen Height (cm): 9		Sample Identif	icatio	n:ST-9
Specimen Diameter (cm): 7	.25	Area F	····	
Dry Unit Weight (pcf): 1	05.8	Visual Descrip	tion:_	Red-brown Silt and
Moisture Content Before Te	st (%): 22.5	Clay, trace	gravel	
Moisture Content After Te	st (%): 21.7	Remarks: Stat	ion 11	+20, 250' South
Cell Confining Pressure (p	si): <u>95</u>			
Test Pressure (psi): _9	0	Maximum Dry De	nsity	
Back Pressure (psi): 8	0	(ASTM D)	(pcf)):
Differential Head (psi): 1	0	Optimum Moistu	re Cont	tent (%):
Flow Rate($\Delta V/t$)(cm ³ /sec)0 2	.68x10 ⁻⁵ Δ	Percent Compac	tion:_	
Permeability (cm/sec): 08.		Permeameter Ty	pe Cons	tant HeadTriaxial
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	HYDRAULIC GRA	DIENT - Ah/L (cr	n/cm)	
	PE	ERMEABILITY TO	EST RE	EPORT
EMPIRE		Union Carbide		

DATE: 5/29/87

PROJ.NO. BT-87-85

DRBY: A CK'D. CCK

TEST DATA:			SAMPLE DATA:
	ht (cm): 9.48	8	Sample Identification: ST-10
Specimen Diame	7 0		Area G
-	ht (pcf): 106	.6	Visual Description: Red-brown SILT and
	ent Before Test (%):_		CLAY, trace gravel
	ent After Test (%):_		Remarks:
	g Pressure (psi):	^-	Station 9+00, 500' South
Test Pressure			Maximum Dry Density
			(ASTM D) (pcf):
Back Pressure	(ps1).		Optimum Moisture Content (%):
	Head (psi): 10	٨	Percent Compaction:
	t)(cm ³ /sec)0_4.19x10_3	Δ Λ	Permeameter Type: Constant Head Triaxial
Permeability	(cm/sec): 01.37x10 ⁻⁸		Telmeametel Types oonstant near
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PERMEABILITY TEST REPORT

Conestoga-Rovers & Associates

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Union Carbide

CCK DATE: 5/29/87

DRIN' DIE CK'O.

TEST DATA:		SAMPLE DATA:
Specimen Height (cm):	9,48	Sample Identification: ST-11
Specimen Diameter (cm):		Area F
Dry Unit Weight (pcf):	108.2	Visual Description: Red-brown SILT and
Moisture Content Before Tes		CLAY, trace gravel
Moisture Content After Tes		Remarks:
Cell Confining Pressure (ps		Station 11+20, 300' South
	90	Maximum Dry Density
Back Pressure (psi):	80	(ASTM D) (pcf):
Differential Head (psi):	10	Optimum Moisture Content (%):
Flow Rate $(\Delta V/t)(cm^3/sec)0$ 3	_	Percent Compaction:
Permeability (cm/sec): 01.		Permeameter Type: Constant Head Triaxial
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	ı P	ERMEABILITY TEST REPORT

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Union Carbide Conestoga-Rovers & Associates

PROJ.NO.

BT-87-85

SAMPLE DATA: Specimen Height (cm): 9,47 Specimen Diameter (cm): 7.21 Dry Unit Weight (pcf): 110.6 Woisture Content Refore Test (%): 19.8 Moisture Content After Test (%): 20.5 Test Pressure (psi): 90 Back Pressure (psi): 60 Coll Confining Pressure (psi): 10 Priow Rate (AV/t) (cm/sec): 0 9,07x10 6 Permeability (cm/sec): 0 9,07x10 6 Time - t (sec) 100,000 200,000 AVI RELATIONSHIP PERMEABILITY PERMEABILITY HYDRAULIC GRADIENT - Ah/L (cm/cm) PERMEABILITY TEST REPORT Union Carbide Conestoga-Rovers & Associates) 			
Specimen Reight (cm): 7.21 Specimen Diameter (cm): 7.22 Dry Unit Weight (pcf): 110.6 Moisture Content Before Test (*): 19.8 Moisture Content After Test (*): 20.5 Test Pressure (psi): 95 Test Pressure (psi): 60 CASTM D) (pcf): Differential Mead (psi): 10 Flow Rate(AV/t)(cm/sec): 0.2.75x10-5 A Permeability (cm/sec): 0.9.07x10 A TIME - t (sec) 100,000 TIME - t (sec) 200,000 AVI RELATIONSHIP HYDRAULIC GRADIENT - Ab/L (cn/cm) PERMEABILITY PERMEABILITY TEST REPORT Union Carbide	TEST DATA:		•	
Dry Unit Weight (pcf): 110.6 Moisture Content Before Test (*): 19.8 Moisture Content After Test (*): 20.5 Moisture Content After Test (*): 29.5 Test Pressure (psi): 90 Back Pressure (psi): 10 Plow Rate (\(\Delta V \) (\text{Lord Not occasional pockets} \) Permeability (cm/sec) 0 2.75x10-5 \(\Delta \) Permeability (cm/sec) 0 9.07x10 \(\Delta \) Time - t (sec) 200,000 100,000 - t (sec) 200,000 100,000 - t (sec) 200,000 Marimum Dry Density Permeameter Type: Constant Head Triaxial Permeameter Type: Constant Head	Specimen He:	ight (cm): 9.47		Sample Identification:
Moisture Content Before Test (%): 19.8 Moisture Content After Test (%): 20.5 Cell Confining Pressure (psi): 95 Back Pressure (psi): 90 Back Pressure (psi): 10 Differential Head (psi): 10 Permeability (cm/sec): 0 9.07x10 TIME - t (sec) 100,000 TIME - t (sec) 200,000 AWY! RELATIONSHIP PERMEABILITY HYDRAULIC GRADIENT - \(\Delta \)/L (cm/cm) PERMEABILITY PERMEABILITY PERMEABILITY TEST REPORT Union Carbide	Specimen Dia	ameter (cm).		
Moisture Content After Test (%): 19.8 20.5 Remarks: of tan silt	Dry Unit We:	ight (pcf): 110.0	5	-
Moisture Content After Test (%): 20.5 Remarks: 0f tan site	Moisture Co	ntent Before Test (9	19.8	
Cell Confining Pressure (psi): 95 Station 9400, 500° South	Moisture Co	ntent After Test (9	s): 20.5	Remarks: of tan silt
Rack Pressure (psi): 80				Station 9+00, 500' South
Differential Head (psi): 10		00		_ Maximum Dry Density
Permeability (cm/sec): 0 9.07x10 Δ Permeameter Type: Constant Head Triaxial O	Back Pressu	re (psi):80		(ASTM D) (pcf):
Percent Compaction: Permeability (cm/sec): 0 9.07x10	Differentia	1 Head (psi): 10		Optimum Moisture Content (%):
Permeability (cm/sec): 0 9.07x10 \(\Delta \) Permeameter Type: Units Call the add it it is a constant. The add it is a constant in the add it is a constant				Percent Compaction:
TIME - t (sec) 200,000 JAVI RELATIONSHIP PERMEABILITY HYDRAULIC GRADIENT - \(\Delta h / L \) (cm/cm) PERMEABILITY TEST REPORT Union Carbide				Permeameter Type: Constant Head Triaxi
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PERMEABILITY TEST REPORT Union Carbide	13d	.6		
EMPIRE Union Carbide			HYDRAULIC G	RADIENT - Ah/L (cm/cm)
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DRBY: OHA CK'D.

CCK DATE: 5/29/87

PROJ.NO.

BT-87-85

					
TEST DATA:			SAMPLE DATA:	<u>:</u>	
Specimen	Height (cm):		Sample Ider	ntificatio	n:ST-13
Specimen	Diameter (cm):	7.19		Area H	
Dry Unit	Weight (pcf):	121.8	Visual Desc	ription:_	Red-brown & tan SIL
Moisture	Content Before	Test (%): 14.0	some clav w	ith pocket	s of tank silt and fi
Moisture	Content After	Test (%): 14.9	Remarks: So	and, trace	gravel
Cell Conf	ining Pressure	(psi): 95			300' South
Test Pres	sure (psi):	90	Maximum Dry		
Back Pres	sure (psi):	80	(ASTM D) (pcf):
	ial Head (psi)				tent (%):
	(ΔV/t)(cm³/sec)		Percent Com		
	ity (cm/sec):	- ∆	_	- -	nstant Head Triaxial
					
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		HYDRAULIC GRA	ADIENT - Ah/L	(cm/cm)	
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DR EY: NG

5/29/87

DATE:

BT-87-85

PROJ.NO.

				-	SAMPLE DATA:
TEST D		· · · · · · 9 ·	14	·	Sample Identification: ST-14
Specia	men Heig	ht (cm): 9.	28		Area I
Specia	men Diam	eter (cm): 7.	16. 2		Visual Description: Red-brown Silt and
		ht (pcf): 10		2 3	Clay, trace gravel
Moist	ure Cont	ent Before Tes	· (8):_2	2 9	Remarks:
		ent After Tes			Station 1+00, 480' South
		g Pressure (ps		<u> </u>	Maximum Dry Density
	Pressure		30		(ASTM D) (pcf):
	Pressure	: (psi/.			Optimum Moisture Content (%):
		Head (psi):		w.	Percent Compaction:
Flow	Rate(∆V/	/t)(cm³/sec)0_2.5	ουχίυ ^ο Δ		Permeameter Type: Constant Head Triaxial
Perme	ability	(cm/sec): 0 7.8	30x10 ⁻³		Permeameter Type:
			5	TIME 50,000	- t (sec)
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ec)	-	8			PERMEABILITY
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HYDRAULIC GRADIENT - Δh/L (cm/cm)					
	PERMEABILITY TEST REPORT			PERMEABILITY TEST REPORT	
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CK,D

DR BY: DJC

DATE: 5/29/87

TEST DATA:			s	SAMPLE DATA:
	leight (cm):	9.11		Sample Identification: ST-15
	iameter (cm):			Area J
Dry Unit W	eight (pcf):	108.0		Visual Description: Red-brown Silt and
ì		Test (%): 2].2		clay, with pockets of tan silt, tr. gr
Moisture C	ontent After	Test (%): 21.3		Remarks:
Cell Confi	ning Pressure	(psi):95		Station 1+00, 100' South
Test Press	ure (psi):	90	1	Maximum Dry Density
Back Press	ure (psi):	80		(ASTM D) (pcf):
Differenti	al Head (psi):_	10		Optimum Moisture Content (%):
	$\Delta V/t)(cm^3/sec)O_{-}$:	Percent Compaction:
Permeabili	ty (cm/sec):0]	.34x10 ⁻⁸ Δ	1	Permeameter Type: Constant Head Triaxia
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<u> </u>		HYDRAULIC		ENT - Δh/L (cm/cm)
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TEST DATA:	SAMPLE DATA:		
Specimen Height (cm): 10.40	Sample Identification: ST-16		
Specimen Diameter (cm): 7.24	Station 9+00, 35° South - Area P		
Dry Unit Weight (pcf): 105.4	Visual Description: Brown SILT and red-		
Moisture Content Before Test (%): 22.4	brown mottled Silt and Clay, trace		
Moisture Content After Test (%): 24.0	Remarks: gravel, stiff		
Cell Confining Pressure (psi): 95			
Test Pressure (psi): 90	_ Maximum Dry Density		
Back Pressure (psi): 80	(ASTM D) (pcf):		
Differential Head (psi): 10	Optimum Moisture Content (%):		
Flow Rate $(\Delta V/t)(cm^3/sec) = \frac{2.30 \times 10^{-5}}{0.00 \times 10^{-5}} \Delta$	Percent Compaction:		
Permeability (cm/sec): $0.8.27 \times 10^{-9} \Delta$	Permeameter Type: Constant Head Triaxial		
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	Conestoga-Rovers & Associates REPORT #L-5		

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TEST DATA:	Commence of the Property of th
Specimen Height (cm): 8.23	SAMPLE DATA:
Specimen Diameter (cm): 7.21	Sample Identification: ST-17
Dry Unit Weight (pcf): 112.6	Station 5+50, 200' South, Area K
Moisture Content Before Test (%): 17.0	Visual Description: Red-brown and brown
Moisture Content After Test (1): 19.4	Silt and Clay, trace gravel
Cell Confining Pressure (psi): 95	Remarks:
Test Pressure (psi): 90	
	Maximum Dry Density
	(ASTM D) (pcf):
Differential Head (psi): 10	Optimum Moisture Content (%):
Flow Rate $(\Delta V/t)(cm^3/sec)O(8.87x10^{-5}\Delta)$	Percent Compaction:
Permeability (cm/sec): $0.2.54 \times 10^{-8} \Delta$	Permeameter Type: Constant Head Triaxia
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HYDRAULIC GRADII	ENT - \Delta h/L (cm/cm)
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COIN	estoga-Rovers & Associates

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BT-87-85

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TEST DATA:	SAMPLE DATA:	
Specimen Height (cm):	9.80 Sample Identification: ST-18	
Specimen Diameter (cm):	7.26 Station 3+50 x 70 South, Area L	
Ory Unit Weight (pcf):		Clay
Moisture Content Before T		
Moisture Content After T		
Cell Confining Pressure (AP	
Test Pressure (psi):	90Maximum Dry Density	
Back Pressure (psi):	80 (ASTM D) (pcf):	
Differential Head (psi):	10 Optimum Moisture Content (%):	
Flow Rate($\Delta V/t$)(cm ³ /sec)0	.80x10-5 \(\Delta \) Percent Compaction: Constant Head T	riaxia
Permeability (cm/sec): 0		
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SOILS INVESTIGATIONS INC	Union Carbide Conestoga-Rovers & Associates	-

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DATE: 7/7/87

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TEST DATA:	SAMPLE DATA:			
Specimen Height (cm):	Sample Identification: ST-19			
Specimen Diameter (cm):	Station 3+50 x 210' South, Area M			
Dry Unit Weight (pcf):	14.9	Visual Description: Brown SILT and Clay		
Moisture Content Before Te	st (%): 16.5	trace gravel		
Moisture Content After Te		Remarks:		
Cell Confining Pressure (p		wengt vs:		
· · · · · · · · · · · · · · · · · · ·	90	Manie		
	80	Maximum Dry Density		
Differential Head (psi):		(ASTM D) (pcf):		
Flow Rate (ΔV/t)(cm³/sec) 0 4.		_ Optimum Moisture Content (%):		
Permeability (cm/sec): 0 1.		Percent Compaction:		
- crimeability (cm/sec): 0 1.	20Χ10 Δ	Permeameter Type: Constant Head Triaxia		
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SOILS INVESTIGATIONS INC		Union Carbide		
		Conestoga-Rovers & Associates		
	1 67			
O.F.	DA: DDC CK.D CK	DATE: 7/7/87 PROJ.NO. BT-87-85		

Permeability (cm/sec): 0 3.17x10 ⁻⁸ Δ Permeameter Type: Constant Head Triaxia TIME - t (sec) 50,000 20//1 RELATIONSHIP 10 10 10 10 10 10 10 10 10 1	TEST DATA: Specimen Height (cm): Specimen Diameter (cm): Dry Unit Weight (pcf): Moisture Content Before Test Moisture Content After Test Cell Confining Pressure (pst Test Pressure (psi): Back Pressure (psi): Differential Head (psi): Flow Rate (ΔV/t)(cm³/sec) O 9.	9.14 7.19 113.1 st (*): 15.9 st (*): 19.4 si): 95 90 80 10	SAMPLE DATA: Sample Identification: ST-20 Station 3+50 x 340° South, Area N Visual Description: Red-brown SILT and Clay and brown sitt, trace gravel Remarks: Maximum Dry Density (ASTM D) (pcf): 4 Optimum Moisture Content (%): Percent Compaction:
0 50,000 100,000 AVY RELATIONSHIP 10 PERMEABILITY 2 PERMEABILITY	Permeability (cm/sec): 0.3 .	17x10 ⁻⁸ Δ	Permeameter Type: Constant Head Triax
PERMEABILITY - K(cm/sec) FLOW VOLUME - AV(cm ³)	0		100,000
DERMEABILITY - K(cm/sec	FLOW VOLUME -		
	R (cm/sec)	HYDRAULIC GRA	

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DATE: 7/7/87

TEST DATE			SAMPLE DATA:			
1	n Height (cm):		Sample Identificat	ion:ST-21		
	Diameter (cm):		<u>Station 3+50 x 500</u>	South Area O		
	Weight (pcf):		Visual Description	Brown & Red-brown		
		Test (%): 16.4		ce gravel and pocket		
		Test (%): 19.8	Remarks: of brown			
	fining Pressure	(psi): <u>95</u>	,			
,	essure (psi):	90	Maximum Dry Density			
1 :	ssure (psi):		_ (ASTM D) (pc			
	tial Head (psi)		Optimum Moisture Co			
<u> </u>	Flow Rate $(\Delta V/t)(cm^3/sec)O_{2.78x10^4}\Delta$ Percent Compaction:					
Permeabi	Permeability (cm/sec): O7.47x10 ⁻⁸ Δ Permeameter Type Lonstant Head Triaxial					
TIME - t (sec)						
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			IENT - Δh/L (cm/cm)			
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SOILS INVE	STIGATIONS INC		Union Carbide			
			Conestoga-Rovers & A	ssociates		

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DATE:7/7/87

Specimen Height (cm): 10.78 Specimen Diametér (cm): 7.24 Station 5+50 x 500¹ South, Area () Pry Unit Weight (pcf): 105.4 Moisture Content Before Test (x): 22.1 Moisture Content After Test (x): 25.9 Cell Confining Pressure (psi): 95 Test Pressure (psi): 90 Back Pressure (psi): 10 Optimum Moisture Content (x): Percent Compaction: Permeability (cm/sec): 03.00x10⁻⁵ Δ. Permeability (cm/sec): 01.12x10⁻ð Δ TIME - t (sec) 200,000 100,000 100,	TEST DATA:	SAMPLE DATA:
Visual Description:Brown & red-brown & table to the first (%): 22.1 Moisture Content Before Test (%): 25.9 Maximum Content After Test (%): 25.9 Maximum Dry Density	Specimen Height (cm):	10.78 Sample Identification: ST-22
Moisture Content Before Test (1): 22.1 Moisture Content After Test (1): 25.9 Call Confining Pressure (psi): 95 Test Pressure (psi): 80 (ASTN D) (pcf): Differential Read (psi): 10 Coptimum Moisture Content (1): Permeability (cm/sec): 0.1.12x10 ⁻⁸ Δ Permeability (cm/sec): 0.1.12x10 ⁻⁸ Δ TIME - t (sec) 100,000	Specimen Diameter (cm):	7.24 Station 5+50 x 500' South, Area ()
Moisture Content After Test (*): 25.9 Remarks:		David Lagran
Test Pressure (psi): 90	Moisture Content Before Te	est (%): 22.1 & tan Silt and Clay, trace fine grave
Test Pressure (psi): 90	Moisture Content After Te	est (%): 25.9 Remarks:
Back Pressure (psi): 80	Cell Confining Pressure (osi): 95
Differential Head (psi): 10	Test Pressure (psi):	90 Maximum Dry Density
Permeability (cm/sec): 0 1.12x10 ⁻⁸ Δ Permeameter Type: Constant Head Triaxial	Back Pressure (psi):	80 (ASTM D) (pcf):
Permeability (cm/sec): 0 1.12x10 ⁻⁸ \(\triangle \) TIME - t (sec) 200,000 AV/t RELATIONSHIP FEMPIRE PERMEABILITY PERMEABILITY PERMEABILITY PERMEABILITY PERMEABILITY PERMEABILITY TEST REPORT Union Carbide		
100,000 200,000 AV/1 RELATIONSHIP AV/1 RELATIONSHIP FERMEABILITY PERMEABILITY PERMEABILITY PERMEABILITY PERMEABILITY TEST REPORT Union Carbide	Flow Rate $(\Delta V/t)(cm^3/sec)O$ 3.	,00x10 ⁻⁵ Δ· Percent Compaction:
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EMPIRE Union Carbide		HYDRAULIC GRADIENT - ∆h/L (cm/cm)
		PERMEABILITY TEST REPORT
	EMPIRE SOILS INVESTIGATIONS INC.	

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DATE: 7/7/87

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TEST DATA:		-	CAMPA	
Specimen Height (cm):	9.13		SAMPLE DATA:	67
Specimen Diameter (cm):			Sample Identific	cation: ST-23 140' South, Area "A"
Dry Unit Weight (pcf):				
Moisture Content Before		24.9	-	ion: Red-brown & brown &
Moisture Content After				ff Silt and Clay
Cell Confining Pressure		95	Remarks:	:
Test Pressure (psi):	90			
Back Pressure (psi):	80		Maximum Dry Dens	-
Differential Head (psi)			(ASTM D)	
Flow Rate (\Delta V/t)(cm3/sec)(Optimum Moisture	
Permeability (cm/sec): C			Percent Compacti	
			rermeameter Type	: Constant Head Triaxial
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SOILS INVESTIGATIONS INC			ion Carbide	
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TEST DATA:	SAMPLE DATA:				
Specimen Height (cm): 8.52	Sample Identification: ST-24				
Specimen Diameter (cm): 7.24	Station 9+00 x 270' South, Area "C"				
Dry Unit Weight (pcf): 105.7	Visual Description: Brown, red & grey				
Moisture Content Before Test (1): 22.2	mottled Silt and Clay				
Moisture Content After Test (%): 23.8	Remarks:				
Cell Confining Pressure (psi):					
Test Pressure (psi): 90	Maximum Dry Density				
Back Pressure (psi): 80	(ASTM D) (pcf):				
Differential Head (psi): 10	Optimum Moisture Content (%):				
Flow Rate $(\Delta V/t)$ (cm ³ /sec) 0.00×10^{-5} Δ	Percent Compaction:				
Permeability (cm/sec): O 8.84x10 ⁻⁹ \(\Delta \) Permeameter Type: Constant Head Triaxia					
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HYDRAULIC	GRADIENT - ∆h/L (cm/cm)				
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	onstant Head Triaxial				
SOILS INVESTIGATIONS INC	onestoga-Rovers & Associates				

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TEST DATA;	SAMPLE DATA:				
Specimen Height (cm):	Sample Identification: ST-25	. 			
Specimen Diameter (cm):	7.23 Station 10+20 x 200' South, Are	ea "D"			
Dry Unit Weight (pcf):	103.2 Visual Description: Brown & red-				
Moisture Content Before	Test (%): 23.8 mottled Silt and Clay, trace gr				
Moisture Content After	Test (%): 25.1 Remarks:	avei			
Cell Confining Pressure					
	90 Maximum Dry Density				
D1	on the second se				
Differential Head (psi):	(noin b) (pcr):				
Flow Rate($\Delta V/t$)(cm³/sec)O	2 20 70 E	Optimum Moisture Content (%):			
Permeability (cm/sec):0	o 0	Tudaydal			
	Permeameter Type: Constant Head Tria				
0	TIME - t (sec) 100,000 200,000	1			
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SOILS INVESTIGATIONS INC	Union Carbide Conestoga-Rovers & Associates	-			

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7/7/87

PROJ.NO. BT-87-85

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TEST DATA:	SAMPLE DA	
Specimen Height (cm):	8.49 Sample Id	dentification: ST-27
Specimen Diameter (cm);_	7.21 Station	7+20% 310' South, Area B
Dry Unit Weight (pcf):	103.3 Visual D	escription: Brown, red & tankmottle
Moisture Content Before		clay, trace gravel
Moisture Content After	est (%): 25.7 Remarks:	
Cell Confining Pressure		
Test Pressure (psi):		Dry Density
Back Pressure (psi):) (pcf):
Differential Head (psi):		Moisture Content (%):
Flow Rate ($\Delta V/t$) (cm ³ /sec) O		Compaction:
Permeability (cm/sec):0	$55x10^{-8}$ Δ Permeame	ter Type: Constant Head Triaxial
reimeability (cm/sec/. o		
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	SAMPLE DATA:
Specimen Height (cm): 8.48	Sample Identification: ST-28
Specimen Diameter (cm): 7.21	Station 5+50x200' South, Area "K"
Dry Unit Weight (pcf): 104.2	Visual Description: Brown & grey mottled
Moisture Content Before Test (%): 21.9	Silt and Clay
Moisture Content After Test (%): 25.1	Remarks:
Cell Confining Pressure (psi): 95	
Test Pressure (psi): 90	Maximum Dry Density
Back Pressure (psi): 80	(ASTM D) (pcf):
Differential Head (psi): 10	Optimum Moisture Content (%):
Flow Rate $(\Delta V/t)$ (cm ³ /sec) $O(5.20 \times 10^{-5})$ Δ	Percent Compaction:
Permeability (cm/sec): $01.54 \times 10^{-8} \Delta$	Permeameter Type: Constant Head Triaxial
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DATE: 7/7/87

•TEST DATA:		SAMPLE DATA:
Specimen Height (cm):	14.13	Sample Identification: ST-29
Specimen Diameter (cm):	7.29	Station 7+20 x 450' South, Area "E"
Dry Unit Weight (pcf):_	102.3	Visual Description: Red & brown & grey
Moisture Content Before	Test (%): 16.1	mottled Silt and Clay, hard and dry
Moisture Content After		Remarks:
Cell Confining Pressure		
Test Pressure (psi):	90	Maximum Dry Density
Back Pressure (psi):	03	(ASTM D) (pcf):
Differential Head (psi)		Optimum Moisture Content (%):
Flow Rate(ΔV/t)(cm³/sec)($\Delta = \frac{6.70 \times 10^{-5}}{10^{-5}} \Delta$	Percent Compaction:
Permeability (cm/sec): (Permeameter Type: Constant Head Triaxial
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•	HYDRAULIC GR	ADIENT - Ah/L (cm/cm)
	Р	ERMEABILITY TEST REPORT
EMPIRE		Union Carbide

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PROJ.NO. BT-87-85

DATE: 6/30/87

FALLING HEAD FLEXIBLE WALL PERMEABILITY

Sample Local Station Uffset from Baselin	ا ت	on Lift	Field in-place densii Dry Unit Moisture Weight Content lbs/cu.ft. % of dry Weight Optimum	Field in-place densit by Unit Moisture Weight Content bs/cu.ft. % of dry Weight Optimum	Perc Compa	Shelby tube Specimen Height Cm.	Shelby tubo Specimen Diameter Cm.	sults Shelby tube Shelby tube Specimen Specimen Confining Test Tail Iction Height Diameter (Triaxial Cell) (head) (back) cm. cm. Pressure Pressure Gradient mum	Permeabi Test) (head) Pressure psi	Tail (back) Pressure	Gradient	Coeffiecient of Permeability k (cm/sec)
Area	Area "L" 21	2nd	113.6	18.9	i	11.2	7.11	83.0	80.0	70.0	62.8	62.8 1.7 x 10 ⁻⁸
Area "M"		2nd	123.5	14.6	:	12.0	7.11	83.0	80.0	70.0	58.6	1.6 x 10 ⁻⁸
Area "N"		2nd	110.0	19.7	i	11.5	7.11	83.0	80.0	70.0	61.2	9 20 X 10-9

TEST DATA	SAMPLE DATA:	
Specimen Height (cm):	1001 Cauth	Area ".]"
Specimen Diameter (cm):		
Dry Unit Weight (pcf):		
Moisture Content Before T	_	
Moisture Content After T		
Cell Confining Pressure (osi):95	
Test Pressure (psi):	90 Maximum Dry Density	
Back Pressure (psi):	80 (ASTM D) (pcf):	
Differential Head (psi):_		•
Flow Rate $(\Delta V/t)(cm^3/sec)0$.40x10 ⁻⁵ A Percent Compaction:	- J. Tudavial
Permeability (cm/sec):0	.00x10-8 \Delta Permeameter Type: Constant He	ad Iriaxiai
	TIME - t (sec)	•
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	ΔV/t RE	LATIONSHIP
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	HYDRAULIC GRADIENT - Ah/L (cm/cm)	
	PERMEABILITY TEST REPORT	
SOILS INVESTIGATIONS INC	Union Carbide Conestoga-Rovers & Associates	3

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	ا مغرا سد	REST DATA	:						
		Specimen	- Hei	.ght (cm):_	0 10		SAMPLE DATA:		
	1.5	Specimen	Dia	meter (cm):	7.23		_ Sample Identif		
		•		ght (pcf):					South, Area "H"
	;			tent Before			_ Visual Descrip	tion: Re	ed-brown & brown
				tent After			mottled Silt	and Clay	, trace gravel
	,			ng Pressure			Remarks:		
		Test Pres			90		-		
1		Back Pres					Maximum Dry De	_	
				Head (psi)	80		(ASTM D)		
				/t)(cm³/sec)C			Optimum Moistur		nt (%):
				(cm/sec): C			Percent Compact	ion:	
\vdash				(Cm/ Sec) : C	2.2/310	Δ	Permeameter Typ	e: Cons	tant Head Triaxia
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		T'A #7	~~				MEABILITY TEST	· · · · · · · · · · · · · · · · · · ·	T -
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TEST DATA:	•	SAMPLE DATA:	
Specimen Height (cm):	10.42	Sample Identification: +ST-35	
Specimen Diameter (cm):	7.21	Station 1+00 x 480' South, Area	drev.
Dry Unit Weight (pcf):		Visual Description: Red, brown &	grey,
Moisture Content Before Tes		mottled Silt and Clay	
Moisture Content After Tes	st (%): 24.3	Remarks:	
Cell Confining Pressure (ps	i):95		_
Test Pressure (psi): 90)	Maximum Dry Density	
Back Pressure (psi): 80)	(ASTM D) (pcf):	
Differential Head (psi): 1	0	Optimum Moisture Content (%):	
Flow Rate (\Delta V/t)(cm3/sec)O 1.	90x10 ⁻⁵ Δ	Percent Compaction:	Tuinvia
Permeability (cm/sec): 0 6		Permeameter Type: Constant Head	
	TIME -	· t (sec)	
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TEST DATA:		_		
Specimen Height (cm):	10.20		SAMPLE DATA:	
Specimen Diameter (cm)	. 7.25			cation: ST-36
Dry Unit Weight (pcf):	101.2			500' South, Area "0"
Moisture Content Befor	101.3		_ Visual Descript	ion: Red & grey mottled
Moisture Content After	e lest (%):	24.7	Silt and Clay	, tr. gravel
Cell Confining Pressure	· lest (%):	26.3	Remarks:	
Test Pressure (psi):				
Back Pressure (psi):	90		_ Maximum Dry Den:	
Differential Head (psi)	80	 -	(ASTM D)	
Flow Rate ($\Delta V/t$)(cm ³ /sec)	·— 10——		_ Optimum Moisture	
Permeability (cm/sec):	1.62x10 ⁻⁸	Δ	Percent Compacti	
(Cm/sec):		Δ	Permeameter Type	: Constant Head Triaxia
0.	•	TIME -	t (sec)	
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	SAMPLE DATA:
TEST DATA:	
Specimen Height (cm):	THE TOOL COURT AND HOW
Specimen Diameter (cm):	
Dry Unit Weight (pcf):	and the state of t
Moisture Content Before Test Moisture Content After Test	
Cell Confining Pressure (psi	
Test Pressure (psi):	
	(ASTM D) (pcf):
Differential Head (psi):	
Flow Rate ($\Delta V/t$)(cm³/sec)0 3.53	Percent Compaction:
Permeability (cm/sec): 0 1.12	
*EIMEGDITIC] (CM) 3CG) . 4 1410	
0	TIME - t (sec) 100,000 200,000
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	HYDRAULIC GRADIENT - Ah/L (cm/cm)
	PERMEABILITY TEST REPORT

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-		TEST DATA:							
Ī		Specimen H	Height (cm):	9.14		Sample Identification: ST-38			
	•		iameter (cm):			Station	dentificat: 9+00 v 25	South Area "P"	
1	<i>'</i> ,		leight (pcf):						
			Content Before					Brown & tan & red	
1			ontent After			Silt an			
ľ	٠.		ning Pressure			Remarks:			
	•			90					
	•	Back Press		80			Ory Density		
			al Head (psi):	10		•) (pc		
1			ΔV/t)(cm³/sec)O		, ——		Optimum Moisture Content (%): Percent Compaction:		
			ty (cm/sec): O						
r							er Type:	Constant Head Triaxia	
		•	0		TIME 100,000	- t (sec)	200,00	n	
							200,00		
								△V/t RELATIONSHIP	
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	EMPIRE SOILS INVESTIGATIONS INC			PE	RMEABILIT'	Y TEST RE	PORT		
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	Conestoga-Rovers & Associates			ciates					
				ON BY: DG	ck'b. Ck	DATE: 6/30	0/87	рясы.но. BT-87-85	

		
TEST DATA:	•	Sample DATA: Sample Identification: ST-101
Specimen Height (cm):	10.78	Dampie Identitional
Specimen Diameter (cm):	7.02	Cut-off area
Dry Unit Weight (pcf):	110.3	Visual Description: Brown & Tan & red-
Moisture Content Before Tes	t (%): 19.0	brown Silt, some clay, trace gravel
Moisture Content After Tes	t (%): 19.9	Remarks:
Cell Confining Pressure (ps.		Station 2+60, 570' South
Test Pressure (psi): 90		_ Maximum Dry Density
Back Pressure (psi): 80	<u> </u>	(ASTM D) (pcf):
Differential Head (psi): 10	<u> </u>	Optimum Moisture Content (%):
Flow Rate $(\Delta V/t)(cm^3/sec)0$ 4.		Percent Compaction:
Permeability (cm/sec): 0 1.	95x10 ⁻⁸ 6	Permeameter Type: Constant Head Triaxial
		- t (sec)
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