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CARBON PRODUCTS DIVISION
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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
nmd

Enclosure

CC: Mr. A.C. Ogg

UNION CARBIDE CORPORATION
CARBON PRODUCTS DIVISION

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

September 1987
Ref. No. 1851

CONESTOGA-ROVERS & ASSOCIATES

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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 guidelines.

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 Site. 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).

The movement of waste was conducted in 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 1×10^{-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.

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.

Although drums are known to have been buried 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) Topsoil

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

	1st Lift		2nd Lift	
	Compaction	Permeability	% Compaction	Permeability
Area	(%)	(x 10^{-8} cm/s)	(%)	(x 10^{-8} cm/s)
A	98.0	1.35	99.6	1.15
B	97.7	0.75	100.0	1.55
C	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
H	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
M	98.9	1.28	100.0	1.60
N	99.8	3.17	100.0	0.93
O	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. To 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

Station	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	17
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.

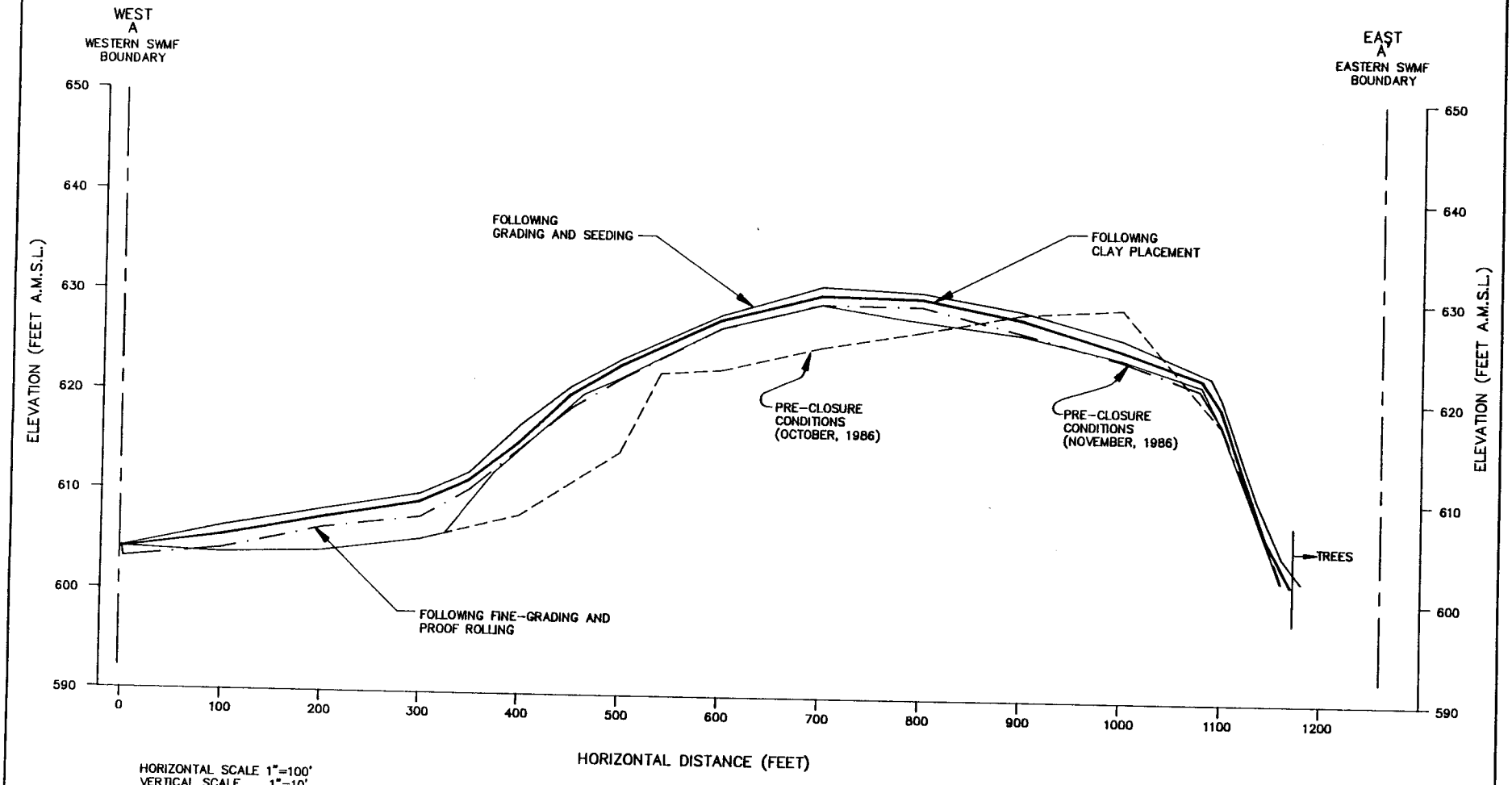


figure 1

WEST–EAST CROSS–SECTION A–A'

Union Carbide Corporation

CRA

1851–28/08/87–5–D–0

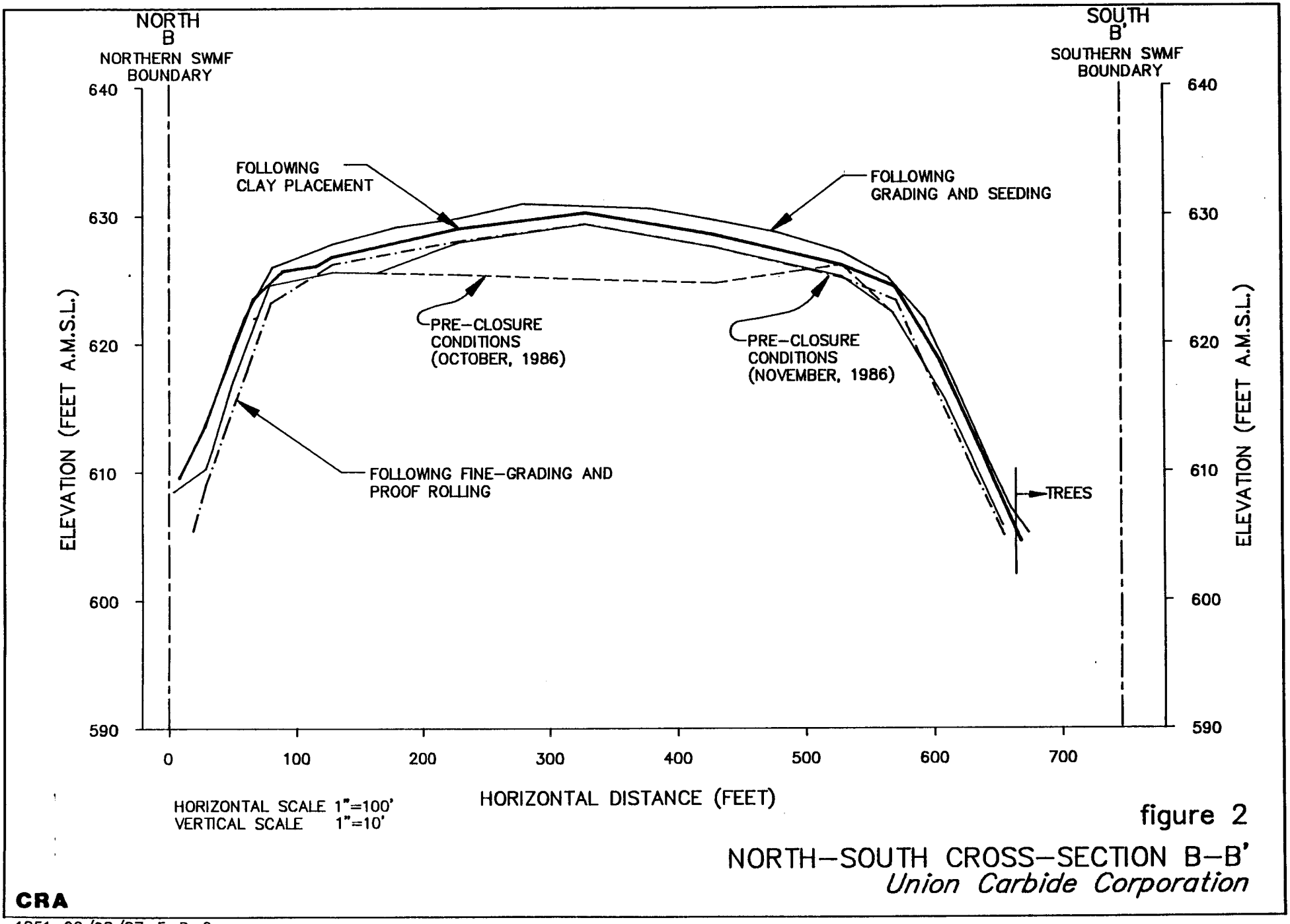


figure 2

NORTH–SOUTH CROSS–SECTION B–B'

Union Carbide Corporation

CRA

1851–28/08/87–5–D–0

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

Sample Location	Sample Number	Sample Depth (ft.)	Atterburg Limits			% Moisture	% Passing #200 Sieve	% Clay	Permeability
			Liquid	Plastic	Plasticity				
Sample 1	1	5 - 20	40	19	21	27.7	88		
Sample 2	2A	5 - 20	40	21	19	20.4	92		
	2B	20	42	21	21	22.6	91		
Sample 3	3	5 - 20	40	20	20	23.0	90		
Test Pit 1	4A	5 - 20	36	18	18	24.6	90		
	4B	20	36	20	16	25.4	90		
Test Pit 2	5	5 - 20	40	20	20	21.8	90		
Test Pit 3	6A	5 - 20	41	20	21	21.7	90		
	6B	20	38	20	18	15.4	91		

STAGE I SAMPLING - COMPOSITE SAMPLES

*Sample 1, 2, 3	Composite 1,2A,2B,3	5 - 20					89	61	7.14×10^{-9} cm/sec @ 5 PSI 6.55×10^{-9} cm/sec @ 10 PSI
**Test Pits 1,2,3	Composite 4A,4B,5,6A,6B	5 - 20					90	63.5	6.27×10^{-9} cm/sec @ 5 PSI 6.27×10^{-9} cm/sec @ 10 PSI

* Composite G
** Composite A

UNION CARBIDE CORPORATION - NIAGARA FALLS, NEW YORK

STAGE II SAMPLING - INDIVIDUAL SAMPLES

Sample Location	Sample Number	Sample Depth (ft.)	Atterburg Limits Liquid	Plastic	Plasticity	% Moisture	% Passing #200 Sieve	% Clay	Permeability
Test Pit A	A2	2				17.6	94	48.8	
	A6	6				19.2	88	55.8	
	A10	10				16.7	87	49.8	
	A14	14				25.8	92	69.2	
	A19	19				26.3	90	63.7	
Test Pit B	B2	2				19.7	85	47.2	
	B6	6				20.0	87	47.0	
	B10	10				25.2	93	67.1	
	B14	14				25.9	89	61.0	
	B19	19				26.9	89	60.6	
Test Pit C	C2	2				13.2	84	47.0	
	C6	6				18.9	92	69.0	
	C10	10				19.2	92	64.5	
	C14	14				25.1	92	68.7	
	C19	19				25.9	89	60.1	
Test Pit D	D2	2				16.4	83	46.5	
	D6	6				19.3	89	62.9	
	D10	10				22.5	92	67.8	
	D14	14				23.3	90	63.0	
	D19	19				23.6	89	60.5	
Test Pit E	E2	2				16.2	86	51.0	
	E6	6				20.5	88	57.8	
	E10	10				22.6	89	61.0	
	E14	14				26.2	93	68.0	
	E19	19				26.0	89	57.9	

UNION CARBIDE CORPORATION - NIAGARA FALLS, NEW YORK

STAGE II SAMPLING - INDIVIDUAL SAMPLES - Continued

Sample Location	Sample Number	Sample Depth (ft.)	Atterburg Limits Liquid	Plastic	Plasticity	% Moisture	% Passing #200 Sieve	% Clay	Permeability
Test Pit F	F1	1				16.9	88	51.0	
	F4	4				18.7	80	48.5	
	F7	7				19.9	91	67.2	
	F10	10				22.8	91	67.9	
	F13	13				23.5	92	65.1	
	F16	16				24.3	92	67.0	
	F19	19				24.5	92	65.8	
Test Pit G	G2	2				16.9	83	51.1	
	G6	6				17.3	80	43.0	
	G10	10				20.5	91	65.3	
	G14	14				22.6	90	64.0	
	G19	19				23.6	88	59.0	

STAGE II SAMPLING - COMPOSITE SAMPLES*

B Composite	2 - 19	34	21	13	22.5	84.3	48.5	8.16×10^{-9} cm/sec @ 10 PSI
C Composite	2 - 19	39	22	17	22.2	90.2	64.0	7.00×10^{-9} cm/sec @ 10 PSI
D Composite	2 - 19	37	20	17	22.7	89.6	61.0	2.66×10^{-9} cm/sec @ 10 PSI?
E Composite	2 - 19	38	20	18	19.6	90.3	58.5	8.66×10^{-9} cm/sec @ 10 PSI
F Composite	1 - 19	39	21	18	20.1	89.8	61.3	7.37×10^{-9} cm/sec @ 10 PSI

STAGE II SAMPLING - STOCKPILE, INDIVIDUAL AND COMPOSITE

Stockpile 1				22.1	87.0	58.9	
Stockpile 2				20.6	88.0	58.5	
Stockpile 3				17.8	89.0	50.0	
Stockpile Composite	38	21	17	19.0	90.3	59.1	7.79×10^{-9} cm/sec @ 10 PSI

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

APPENDIX B

ANALYSIS OF GEOTECHNICAL DATA

UNION CARBIDE CORPORATION P.O. BOX 887, NIAGARA FALLS, NY 14302
CARBON PRODUCTS DIVISION

February 2, 1987

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,
Michael A. Balent

Chief Plant Engineer

M.A. Balent, P.E.
nmd
Attach.

CC: Messrs. G.A. Hamm
A.C. Ogg
H.T. Prosser

CRA
Consulting Engineers

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.

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
° 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.

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.

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	All samples fall into the CL classification
Soil should contain more than 50 percent by weight passing a #200 sieve	All samples had 80 percent or more passing the #200 sieve
Soil should have more than 25 percent clay	44 samples analyzed for this parameter had 43 percent or more of clay
The liquid limit should be 30 percent or greater	For 14 samples analyzed for Atterberg limits, the liquid limit was 34 percent or greater
The plasticity index should be 15 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).
Compacted soil permeability of $1x10^{-7}$ cm/sec or less	All permeabilities determined during testing were on the order of magnitude of 10^{-9} cm/sec.

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.

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.

Conclusions:

Based on a review of geotechnical properties, NYSDEC guidelines, 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 purposes. Union Carbide will provide results as required for in-place testing during the construction phase of the project.

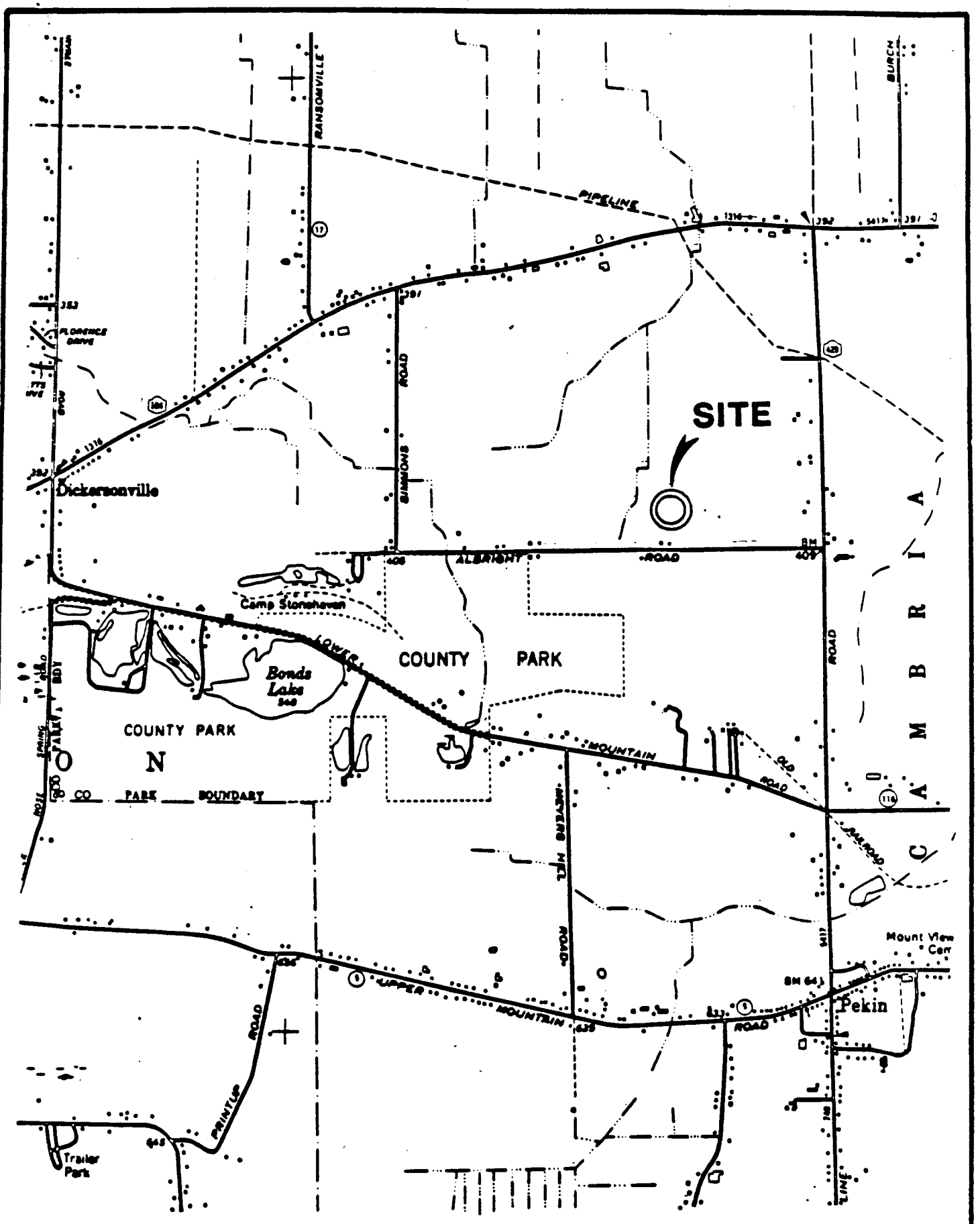
We hope this material is helpful to you, Mike. If we can be of further assistance, please do not hesitate to call.

Yours very truly,

CONESTOGA-ROVERS & ASSOCIATES

Douglas J. Oscar

DJO:jd
Enclosures
cc: J. Kay



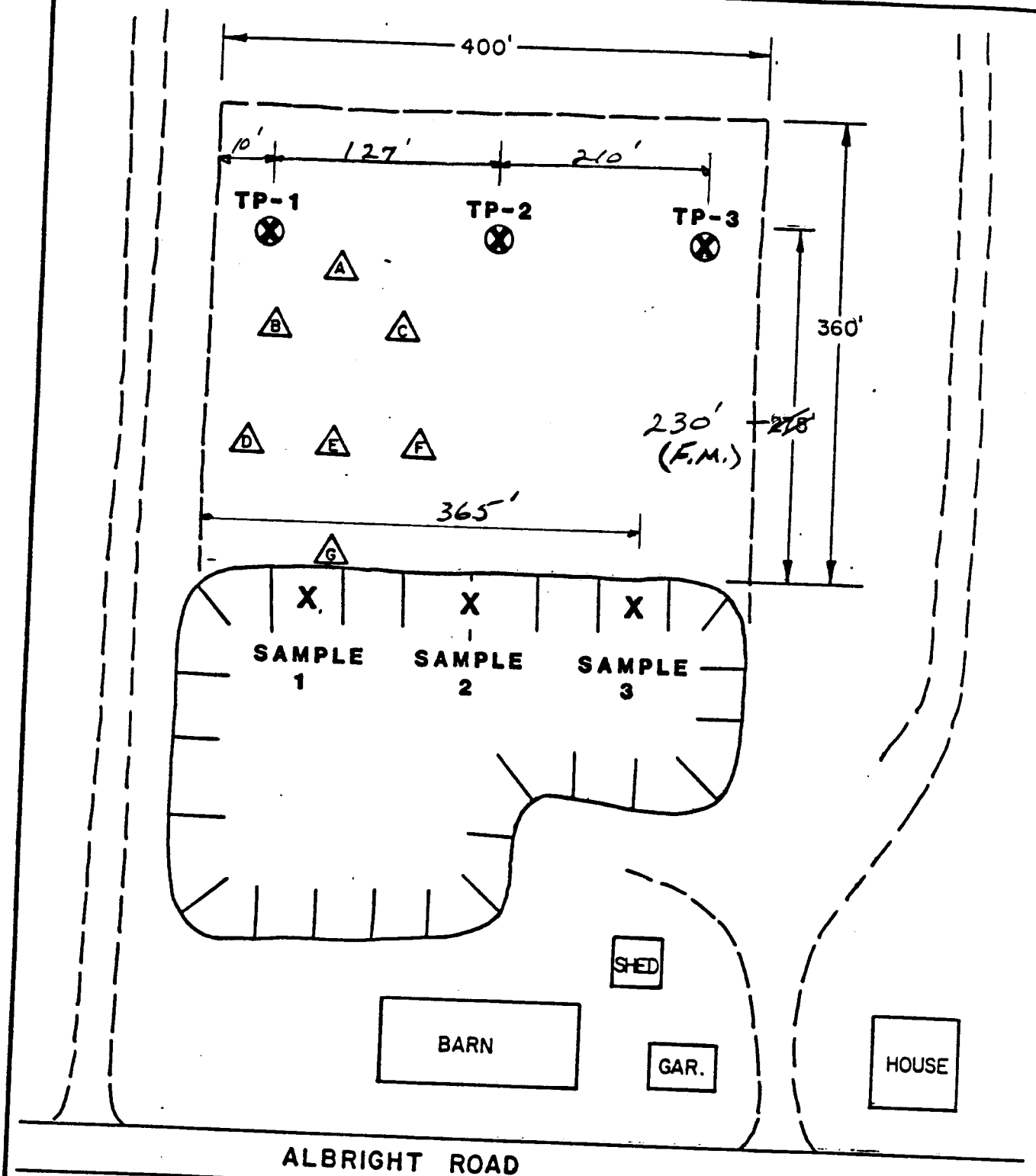
NYSDOT PLANIMETRIC 7.5 MINUTE
RANSOMVILLE QUAD

VICINITY MAP
PLESS TRUCKING SITE NO. 2

FIGURE 1

4-2049

4 NORTH



NOTE: SEE FIG. 3 FOR LOCATION OF TEST PITS A THROUGH G.

LEGEND

X - SAMPLE LOCATION STAGE I

⊗ TEST PIT STAGE I

△ TEST PIT STAGE II (A THROUGH G)

DWG. NO. A-2179

URS URS Company, Inc. CONSULTING ENGINEERS NEW YORK NEW JERSEY

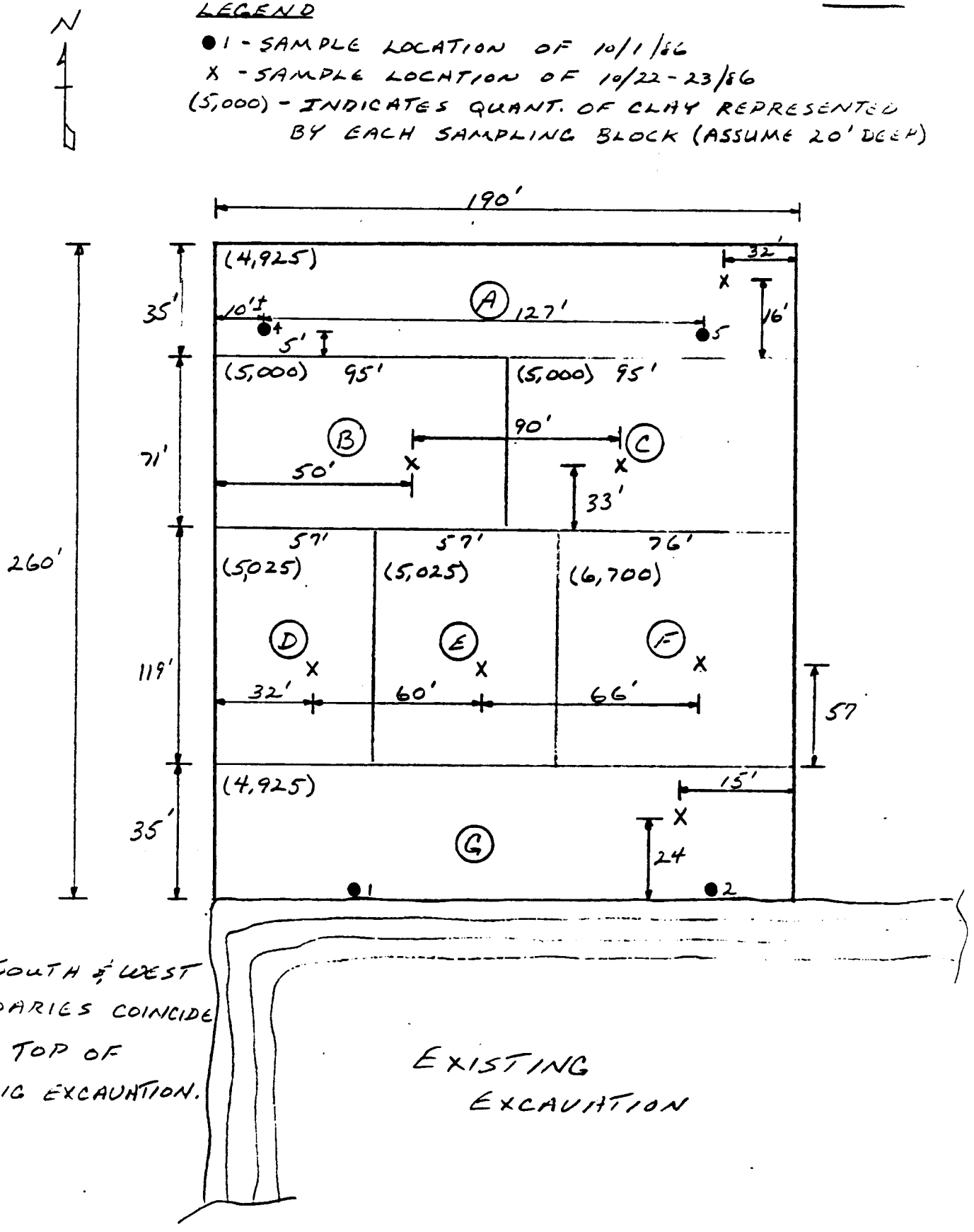
SOIL SAMPLING SITE NO. 3 PLESS TRUCKING

FIGURE 2

UCC - ALBRIGHT RD
SITE - SAMPLE PLAN

10/21/86 - Rev C

N.T.S.



CRA
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

Reference No. 1851

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

1. Only clay excavated from intervals between 1-8 feet be used as cap material if it meets design criteria;

2. 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;

3. 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 per

Steve Crossman, C.E.T.

SC:jd
cc: D. Miller

APPENDIX D

SAND TESTING RESULTS

1851

URS

AN INTERNATIONAL PROFESSIONAL SERVICES ORGANIZATION

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

March 27, 1987

Rec'd CRA
MAR 31 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:

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 COMPANY, INC.

Vern Singh, P.E.
Project Manager

Enc.

VS/bc
3/27/87L
35113

TABLE 1

GEOTECHNICAL LABORATORY TEST DATA SURVEY - DRAINAGE MATERIAL

Sample	USCS	Max. Dry Density (ASTM D-698)	Optimum Moisture Content	Permeability (cm/sec)	% Passing #200 Sieve	Cu*	Cc**
1	SP	101.6 pcf	13.6%	2.23×10^{-3} @ 0.073 psi 2.12×10^{-3} @ 0.122 psi	3.6	2.42	1.15
2	SW	116.0 pcf	7.0%	2.15×10^{-2} @ 0.02 psi 2.38×10^{-2} @ 0.05 psi	5.4	10.0	1.51
3	SW	110.0 pcf	9.2%	1.69×10^{-2} @ 0.034 psi 1.41×10^{-2} @ 0.057 psi	2.5	6.06	1.27
4	SP	106.6 pcf	5.5%	2.78×10^{-2} @ 0.014 psi 2.68×10^{-2} @ 0.032 psi	0.9	3.21	0.90

Note: SW - < 5% passing #200 sieve, Cu > 4, and 1 < Cc < 3
SP - < 5% passing #200 sieve

* Cu - Uniformity Coefficient, D_{60}/D_{10}

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

USCS - Unified Soil Classification System

EMPIRE
SOILS INVESTIGATIONS INC

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	Mechanical Analysis
UC-GG-870108-3	Maximum Density-Optimum Moisture
UC-GG-870108-4	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

sll

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

EMPIRE
SOILS INVESTIGATIONS INC

UNION CARBIDE TEST DATA SUMMARY

TABLE #1

Mechanical Analysis - ASTM D-422.

Sieve Size	Percent Finer			
	Sample #1	Sample #2	Sample #3	Sample #4
1"	100			
1/2"	98.5			
3/8"	98.4	100		100
#4	97.1	99.4	100	99.9
#8	95.8	78.5	87.1	81.4
#16	93.7	43.0	61.4	39.2
#50	68.2	14.5	17.0	3.1
#100	17.1	8.9	7.1	1.3
#200	3.6	5.4	2.5	0.9

TABLE #2

Maximum Density - Optimum Moisture - ASTM D-698

Sample #1 - 101.6 pcf @ 13.6% moisture.
Sample #2 - 116.0 pcf @ 7.0% moisture.
Sample #3 - 111.0 pcf @ 9.2% moisture.
Sample #4 - 106.6 pcf @ 5.5% moisture.

TABLE #3

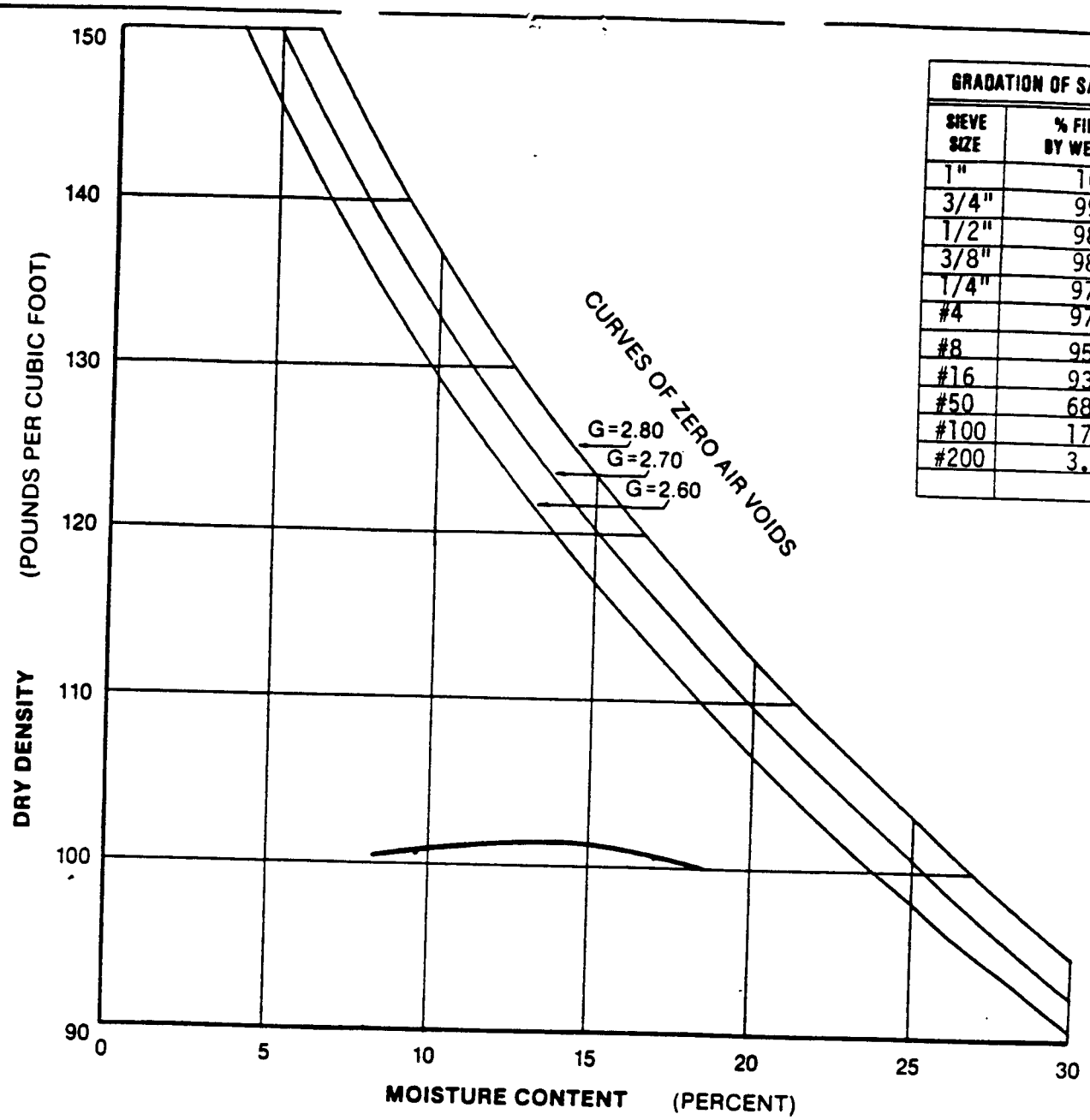
Constant Head Permeability:

Sample #1 - 2.23×10^{-3} CM/SEC @ .073 PSI.
2.12×10^{-3} CM/SEC @ .122 PSI.

Sample #2 - 2.15×10^{-2} CM/SEC @ .02 PSI.
2.38×10^{-2} CM/SEC @ .05 PSI.

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

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



GRADATION OF SAMPLE	
SIEVE SIZE	% FINER BY WEIGHT
1"	100.0
3/4"	99.5
1/2"	98.5
3/8"	98.4
1/4"	97.6
#4	97.1
#8	95.8
#16	93.7
#50	68.2
#100	17.1
#200	3.6

SAMPLE DESCRIPTION

Sample # UC-NE870108-1

Material Sand

Color Lt. Brown Source Unknown

Sampled By Client At Unknown

TEST RESULTS

Maximum Dry Density 101.6 pcf

Optimum Water Content 13.6 %

METHOD OF TEST	
STANDARD	METHOD
ASTM D698	A
AASHTO	
MILITARY	
OTHER	

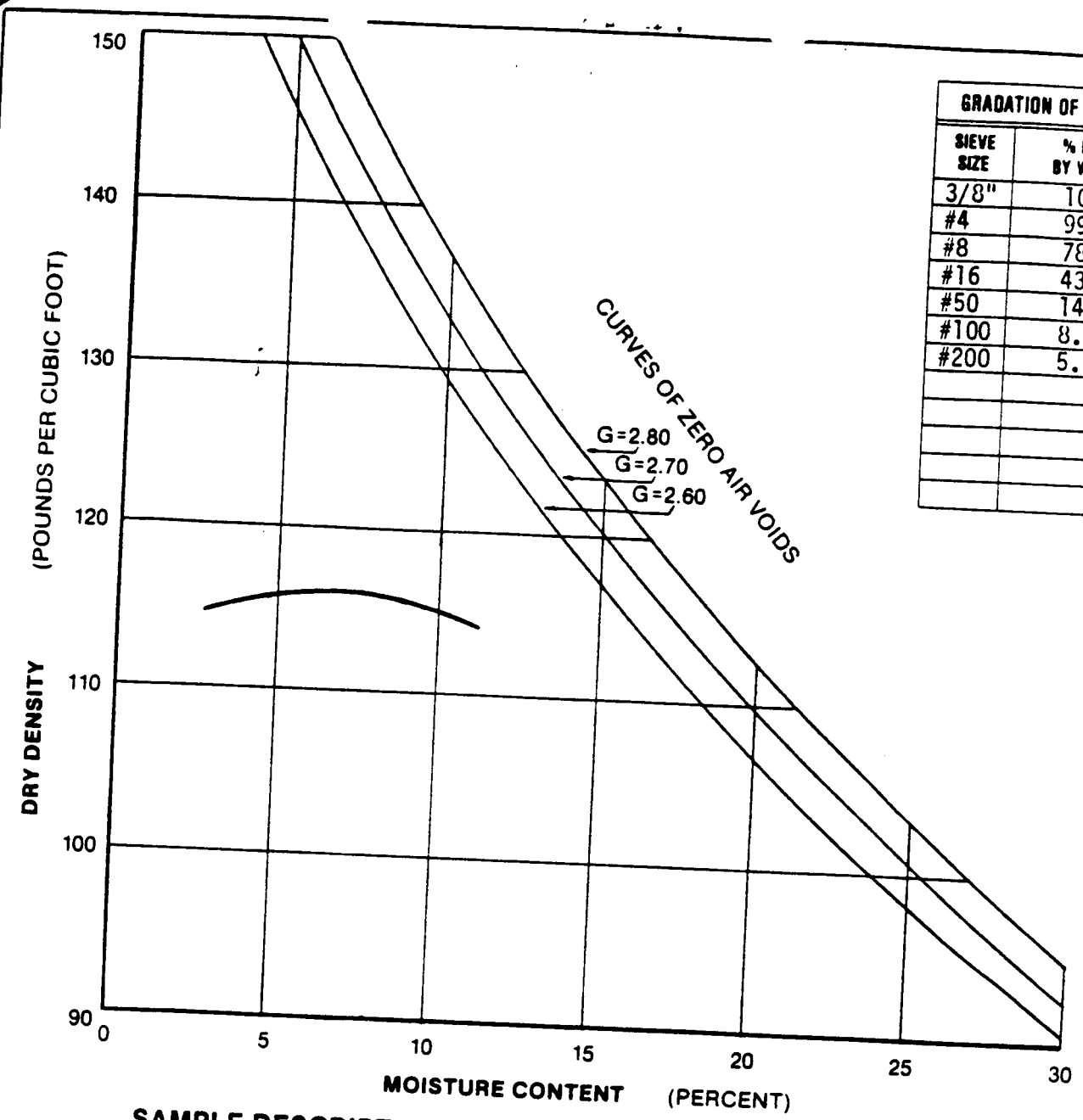
EMPIRE SOILS INVESTIGATIONS INC.

OPTIMUM MOISTURE—MAXIMUM DENSITY

Union Carbide
URS Company, Inc.

DR. BY: PJA	DATE SAMPLED: 1/8/87	PROJ. NO. BT-86-6	
CK'D. BY: CCK	TESTED BY: JK	CURVE NO. L-11A	

R/T Form E



GRADATION OF SAMPLE	
SIEVE SIZE	% FINER BY WEIGHT
3/8"	100.0
#4	99.4
#8	78.5
#16	43.0
#50	14.5
#100	8.9
#200	5.4

SAMPLE DESCRIPTION

Sample # UC-NS-870108-2

Material Sand

Color Gry.-brn. Source Unknown

Sampled By Client At Unknown

TEST RESULTS

Maximum Dry Density 116.0 pcf

Optimum Water Content 7.0 %

METHOD OF TEST	
STANDARD	METHOD
ASTM D698	A
AASHTO	
MILITARY	
OTHER	

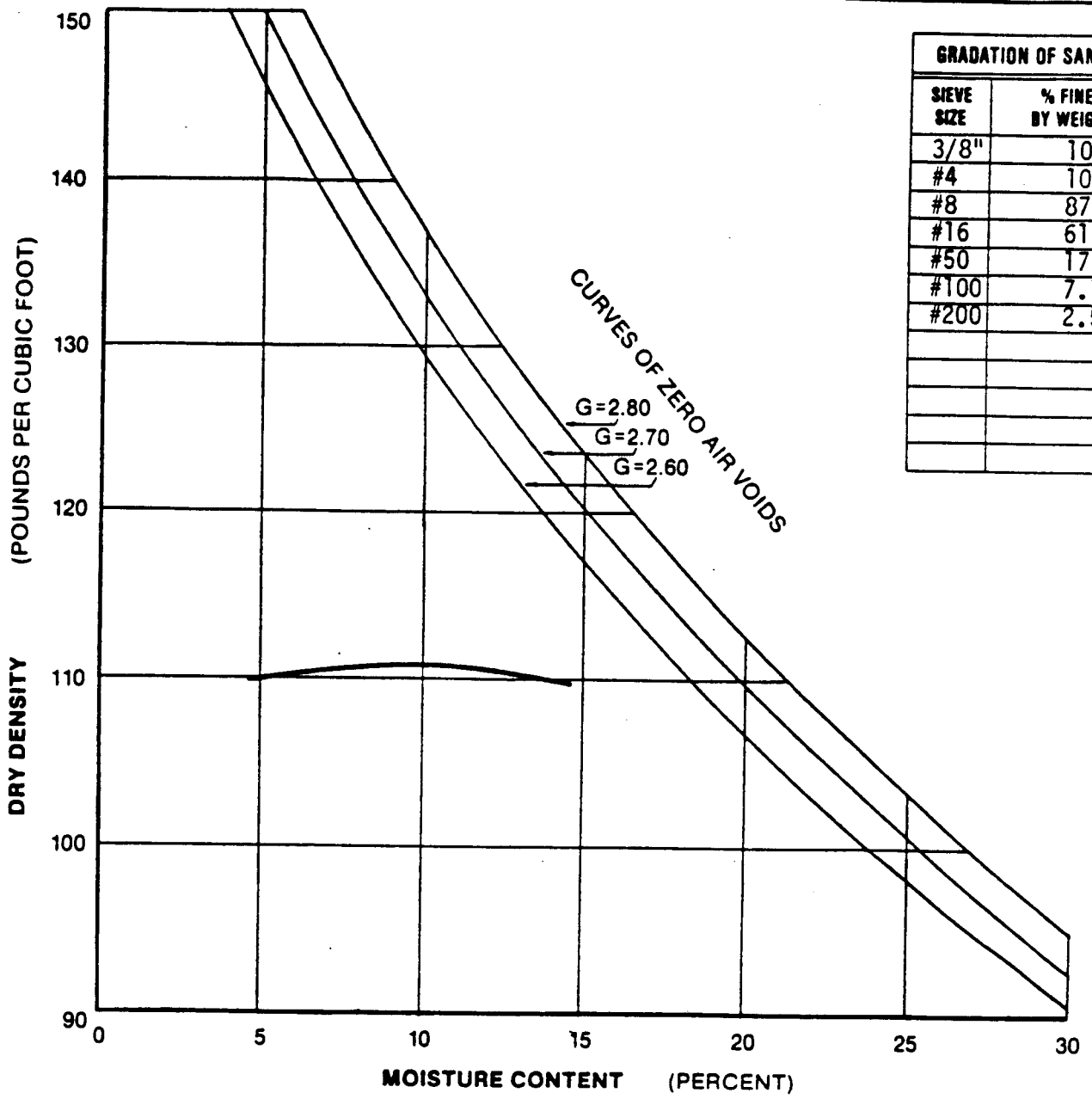
EMPIRE SOILS INVESTIGATIONS INC

OPTIMUM MOISTURE—MAXIMUM DENSITY

Union Carbide
URS Company

DR. BY PJA	DATE SAMPLED 1/8/87	PROJ. NO BT-86-6
CK'D BY CCK	TESTED BY: JK	CURVE NO. L-11B

R/T Form E



GRADATION OF SAMPLE	
SIEVE SIZE	% FINER BY WEIGHT
3/8"	100.0
#4	100.0
#8	87.1
#16	61.4
#50	17.0
#100	7.1
#200	2.5

SAMPLE DESCRIPTION

Sample # UC-GG-870108-3

Material Sand

Color Brown Source Unknown

Sampled By Client At Unknown

TEST RESULTS

Maximum Dry Density 111.0 pcf

Optimum Water Content 9.2 %

METHOD OF TEST	
STANDARD	METHOD
ASTM D698	A
AASHTO	
MILITARY	
OTHER	

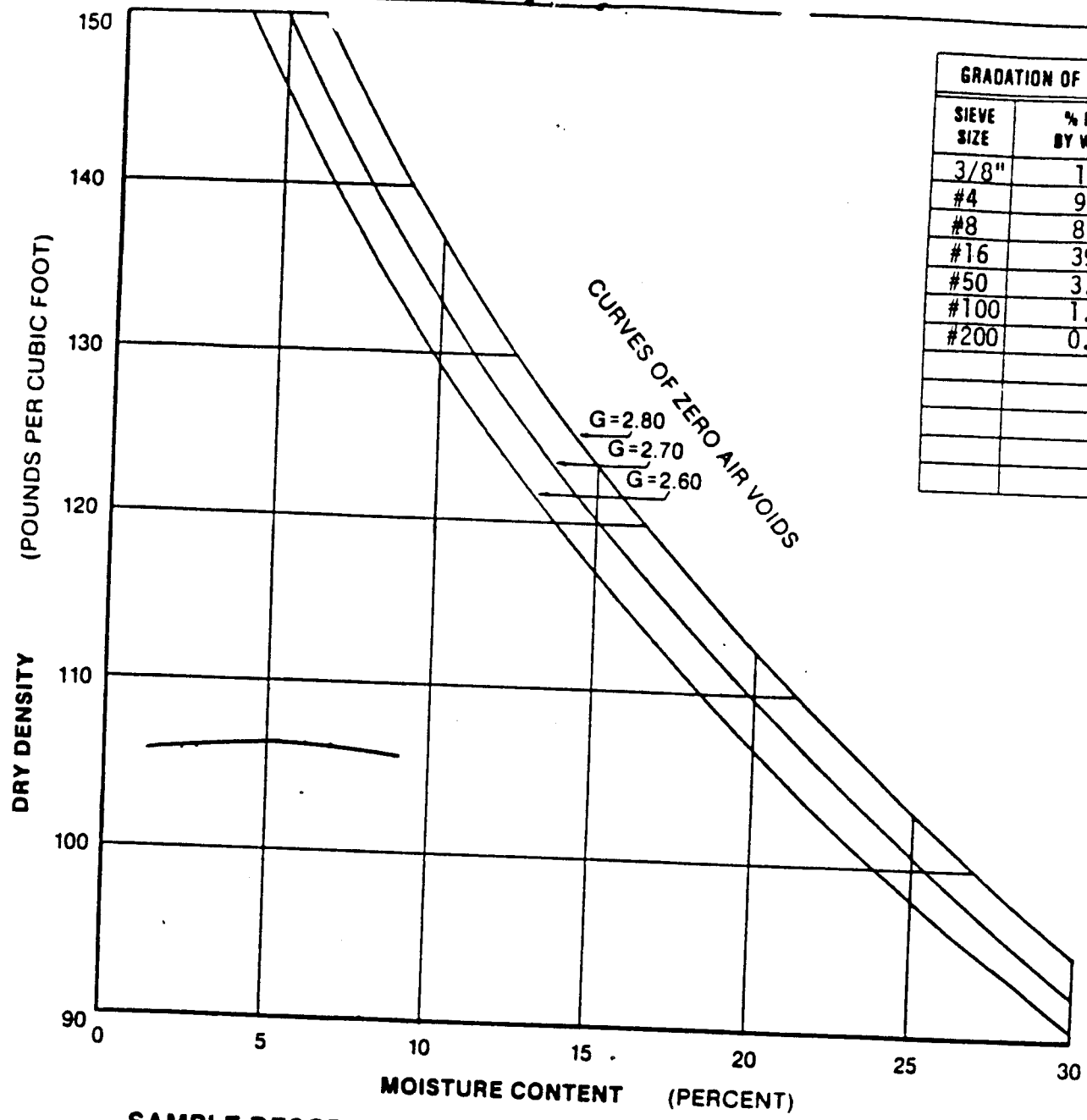
EMPIRE SOILS INVESTIGATIONS INC

OPTIMUM MOISTURE—MAXIMUM DENSITY

Union Carbide
URS Company, Inc.

DR. BY: PJA | DATE SAMPLED: 1/8/87 | PROJ. NO. BT-86-6

CK'D. BY: CCK | TESTED BY: JK | CURVE NO.



GRADATION OF SAMPLE	
SIEVE SIZE	% FINER BY WEIGHT
3/8"	100.0
#4	99.9
#8	81.4
#16	39.2
#50	3.1
#100	1.3
#200	0.9

SAMPLE DESCRIPTION

Sample # UC-GG-870108-4

Material Sand

Color Brown Source Unknown

Sampled By Client At Unknown

TEST RESULTS

Maximum Dry Density 106.6 pcf

Optimum Water Content 5.5 %

METHOD OF TEST	
STANDARD	METHOD
ASTM D698	A
AASHTO	
MILITARY	
OTHER	

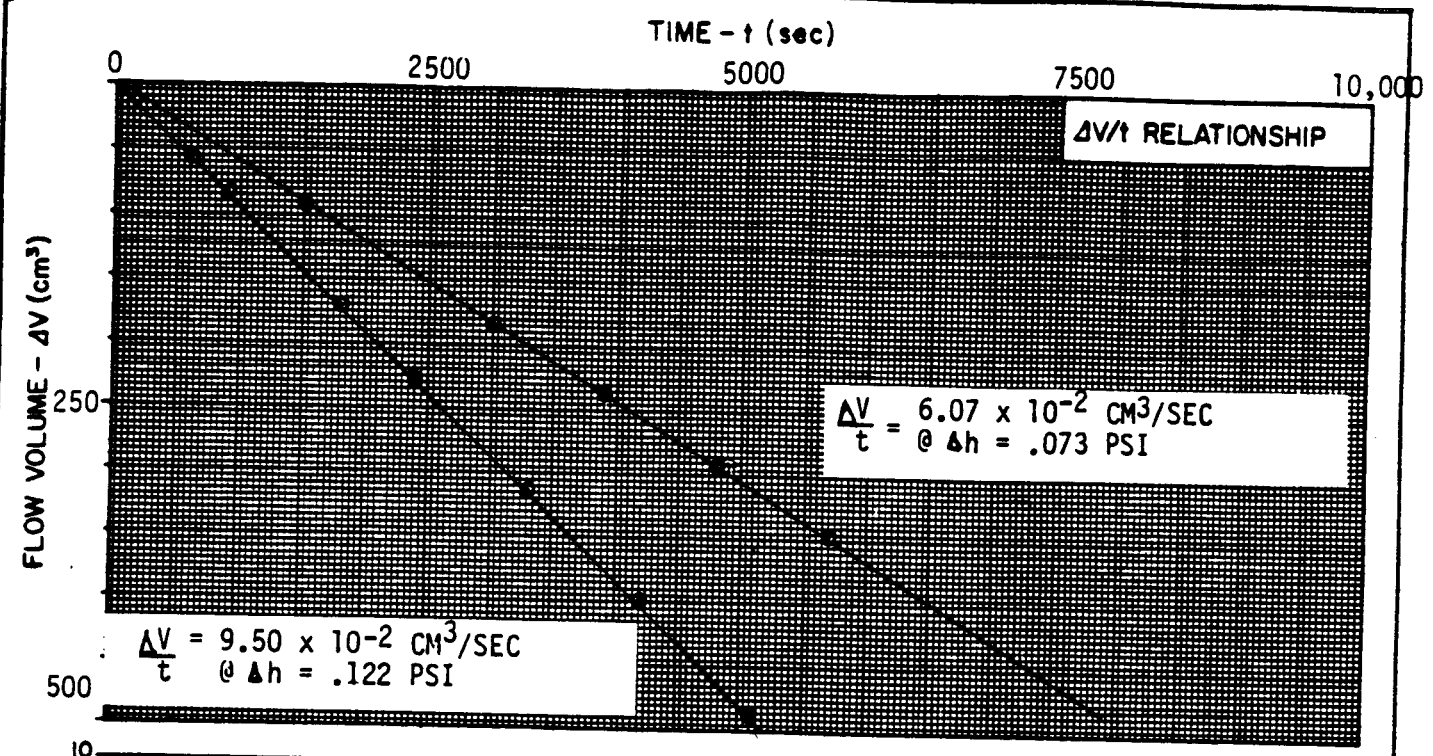
EMPIRE SOILS INVESTIGATIONS INC

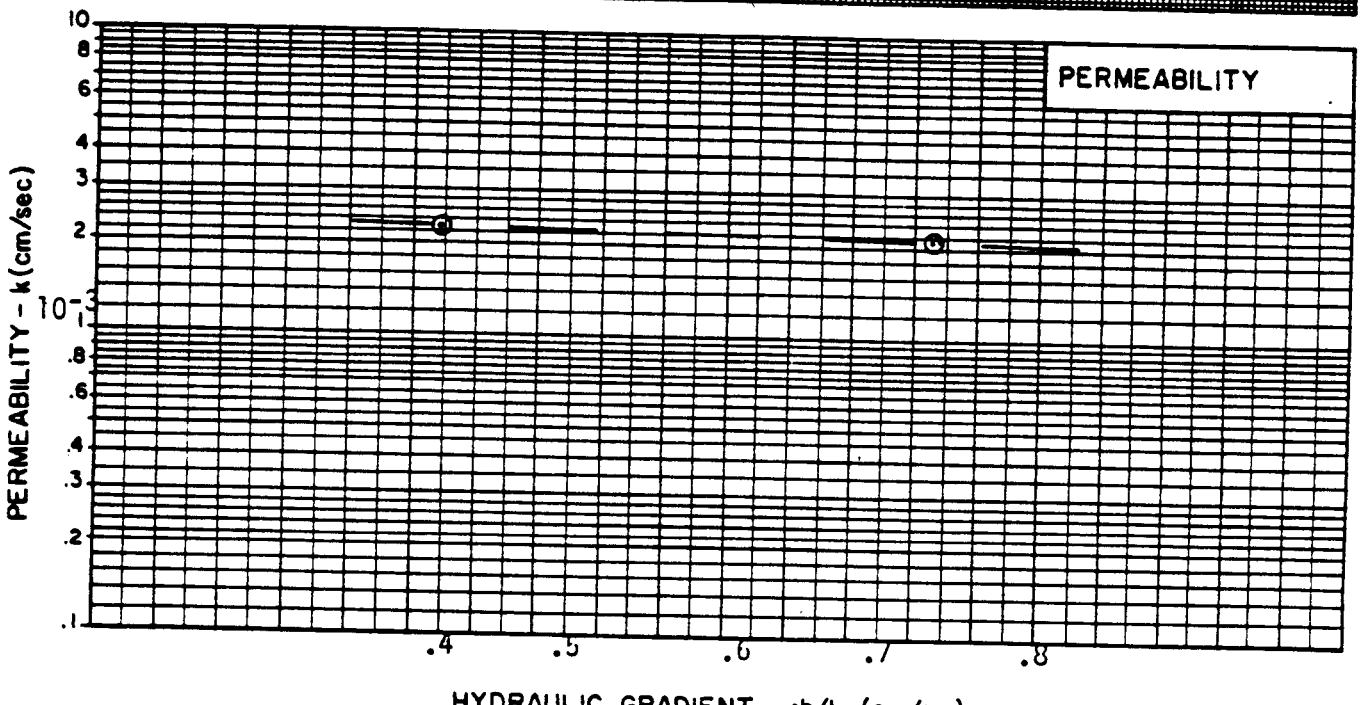
OPTIMUM MOISTURE—MAXIMUM DENSITY

Union Carbide
URS Company, Inc.

DR BY PJA	DATE SAMPLED 1/8/87	PROJ NO BT-86-6
CK'D BY CCK	TESTED BY JK	CURVE NO L-11D

R:T Form E





TEST DATA:

TYPE OF PERMEAMETER	Constant Head Rigid Wall	
SPECIMEN HEIGHT (cm)	11.65	
SPECIMEN DIAMETER (cm)	10.16	
DRY UNIT WEIGHT (pcf)	95.2	
MOISTURE CONTENT BEFORE TEST (%)	15.9	
MOISTURE CONTENT AFTER TEST (%)	20.0	
MAXIMUM DRY DENSITY (ASTM D 698) (pcf)	101.6	
OPTIMUM MOISTURE CONTENT (%)	13.6	
CELL CONFINING PRESSURE (psi)		
TEST PRESSURE (psi)		
BACK PRESSURE (psi)		
DIFFERENTIAL HEAD (psi)	.073	.122
PERMEABILITY (cm/sec)	2.23 x 10-3	2.12 x 10-3

SAMPLE IDENTIFICATION:
Sample No. UC-NE-870108-1

VISUAL DESCRIPTION:
Light Brown Fine Sand

EMPIRE SOILS INVESTIGATIONS, INC.

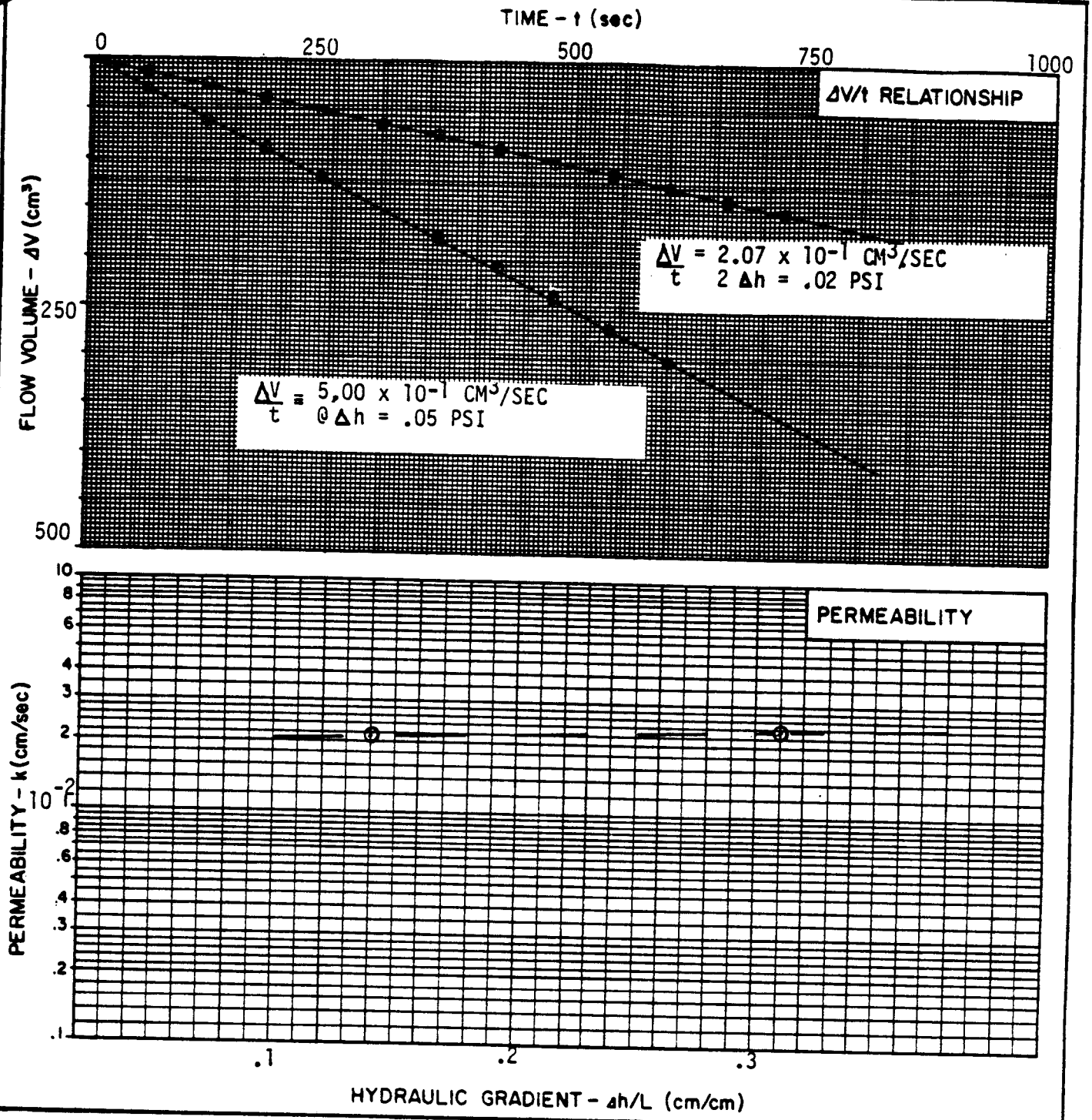
PERMEABILITY TEST REPORT

Union Carbide
URS Company, Inc.

L-11E

DATE: 2/24/87

PROJ. NO.: BT-86-6



TEST DATA:

TYPE OF PERMEAMETER	Constant Head Rigid Wall	
SPECIMEN HEIGHT (cm)	11.65	
SPECIMEN DIAMETER (cm)	10.16	
DRY UNIT WEIGHT (pcf)	110.4	
MOISTURE CONTENT BEFORE TEST (%)	11.6	
MOISTURE CONTENT AFTER TEST (%)	15.0	
MAXIMUM DRY DENSITY (ASTM D 698) (pcf)	116.0	
OPTIMUM MOISTURE CONTENT (%)	7.0	
CELL CONFINING PRESSURE (psi)		
TEST PRESSURE (psi)		
BACK PRESSURE (psi)		
DIFFERENTIAL HEAD (psi)	.02	.05
PERMEABILITY (cm/sec)	2.15 x 10-2	2.38 x 10-2

SAMPLE IDENTIFICATION:
Sample No. UC-NS-870108-2

VISUAL DESCRIPTION:
Grey-Brown Sand

EMPIRE SOILS INVESTIGATIONS, INC.

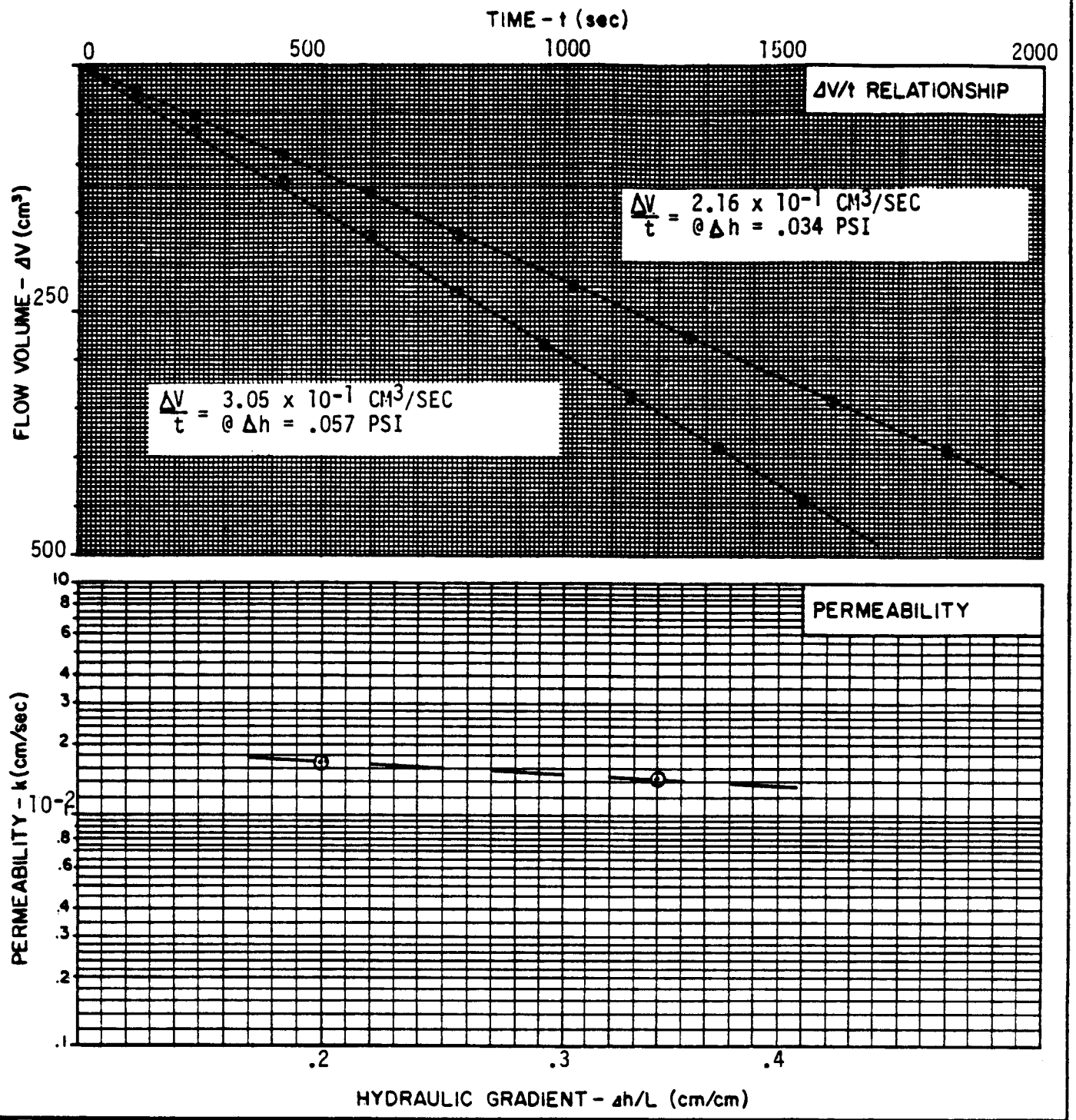
PERMEABILITY TEST REPORT

Union Carbide
URS Company, Inc.

L-11F

DATE: 2/24/87

PROJ. NO.: BT-86-6



TEST DATA:

TYPE OF PERMEAMETER	Constant Head Rigid Wall	
SPECIMEN HEIGHT (cm)	11.65	
SPECIMEN DIAMETER (cm)	10.16	
DRY UNIT WEIGHT (pcf)	104.9	
MOISTURE CONTENT BEFORE TEST (%)	14.2	
MOISTURE CONTENT AFTER TEST (%)	16.3	
MAXIMUM DRY DENSITY (ASTM D 698) (pcf)	111.0	
OPTIMUM MOISTURE CONTENT (%)	9.2	
CELL CONFINING PRESSURE (psi)		
TEST PRESSURE (psi)		
BACK PRESSURE (psi)		
DIFFERENTIAL HEAD (psi)	.034	.057
PERMEABILITY (cm/sec)	1.69 x 10-2	1.41 x 10-2

SAMPLE IDENTIFICATION:
Sample No. UC-GG-870108-3

VISUAL DESCRIPTION:
Brown Sand

EMPIRE SOILS INVESTIGATIONS, INC.

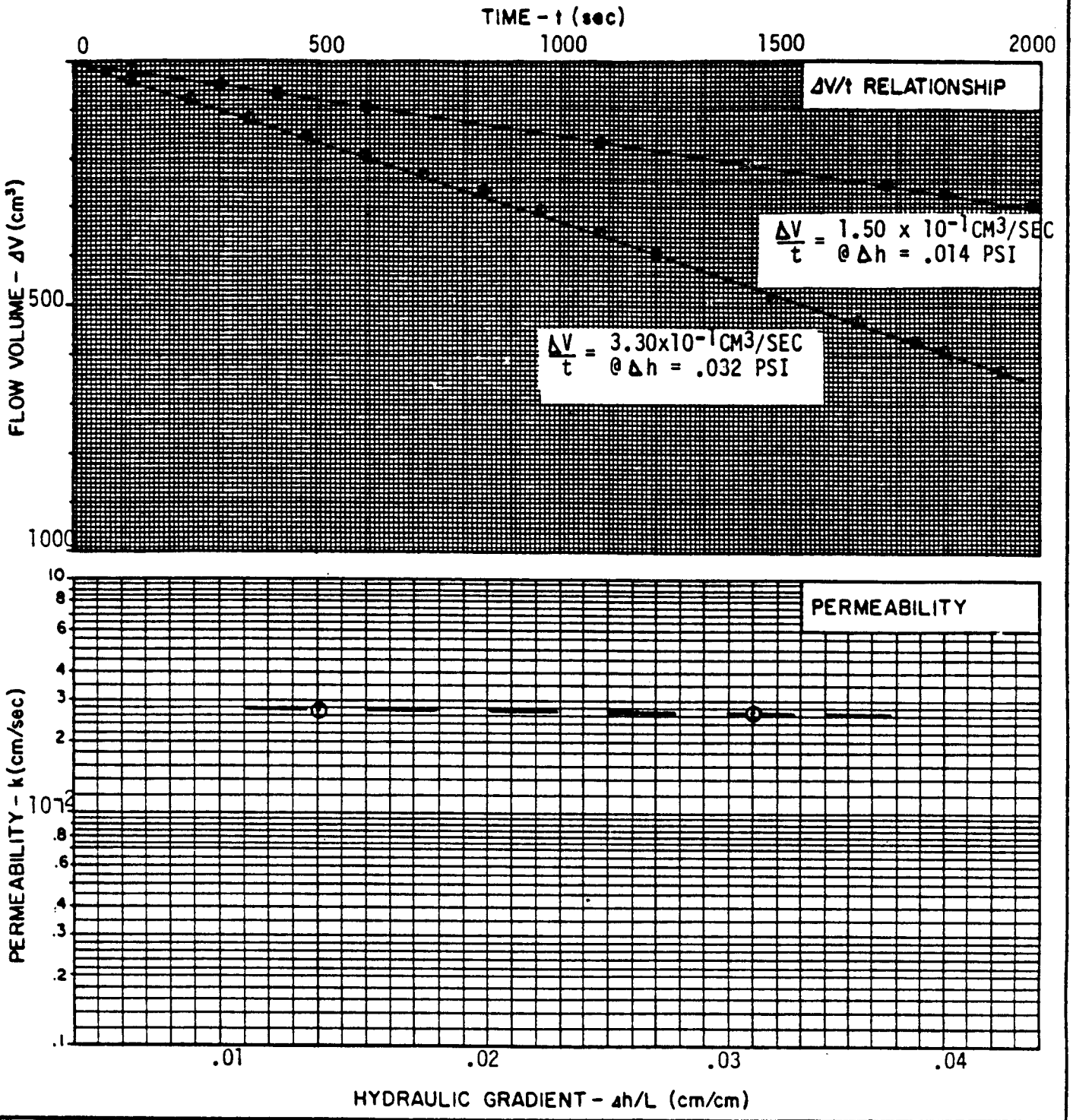
PERMEABILITY TEST REPORT

Union Carbide
URS Company, Inc.

L-11G

DATE: 2/24/87

PROJ. NO.: BT-86-6



TEST DATA:

TYPE OF PERMEAMETER	Constant Head Rigid Wall	
SPECIMEN HEIGHT (cm)	11.65	
SPECIMEN DIAMETER (cm)	10.16	
DRY UNIT WEIGHT (pcf)	103.2	
MOISTURE CONTENT BEFORE TEST (%)	13.3	
MOISTURE CONTENT AFTER TEST (%)	17.3	
MAXIMUM DRY DENSITY (ASTM D 698) (pcf)	111.0	
OPTIMUM MOISTURE CONTENT (%)	9.2	
CELL CONFINING PRESSURE (psi)		
TEST PRESSURE (psi)		
BACK PRESSURE (psi)		
DIFFERENTIAL HEAD (psi)	.014	.032
PERMEABILITY (cm/sec)	2.78x10-2	2.68 x 10-2

SAMPLE IDENTIFICATION:
Sample No. UC-GG-870108-4

VISUAL DESCRIPTION:
Brown Sand

EMPIRE SOILS INVESTIGATIONS, INC.

PERMEABILITY TEST REPORT

Union Carbide
URS Company, Inc.

L-11H

DATE: 2/24/87 | PROJ. NO: BT-86-6

APPENDIX E

IN-PLACE MOISTURE DENSITY TEST RESULTS

D' .Y SITE OBSERVATION REPORT

EMPIRE 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
- 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-1 Project No.: BT-87-85 Date: 4/24/87

Weather & Temperature: Overcast and cool, 35 to 45°

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.

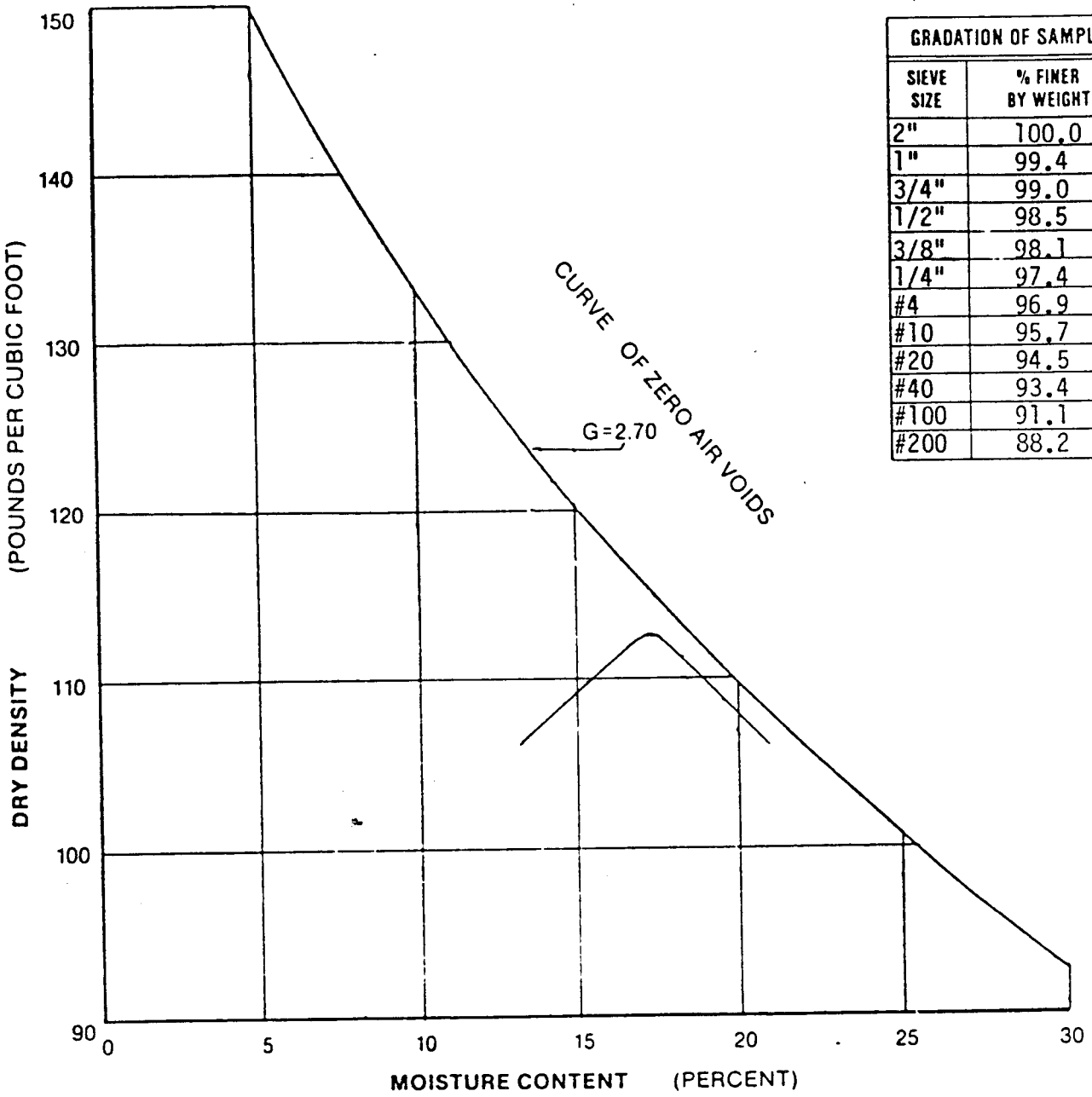
The contractor then placed another 9" lift and compacted it as above (making 1 pass with the sheepsfoot roller(see In-Place Density test 17 to 20) and then made the second pass with the sheepsfoot roller followed by 2 passes with a smooth drummed roller after which this technician obtained shelby tube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

R/T Form D

by Jeff Benson



GRADATION OF SAMPLE	
SIEVE SIZE	% FINER BY WEIGHT
2"	100.0
1"	99.4
3/4"	99.0
1/2"	98.5
3/8"	98.1
1/4"	97.4
#4	96.9
#10	95.7
#20	94.5
#40	93.4
#100	91.1
#200	88.2

SAMPLE DESCRIPTION

Material Silty Clay, trace sand, tr. gravel

Color Brown Source Wolff Fram

Sampled By ESI At Albright Road, Lewiston, N.Y.

TEST RESULTS

Maximum Dry Density 112.6 pcf

Optimum Water Content 17.3 %

METHOD OF TEST	
STANDARD	METHOD
ASTM	B
AASHTO	
MILITARY	
OTHER	

EMPIRE SOILS INVESTIGATIONS INC.

OPTIMUM MOISTURE—MAXIMUM DENSITY

Union Carbide
Conestoga-Rovers and Associates

DR. BY:	PJA	DATE SAMPLED	4/24/87	PROJ NO.	BT-87-85
CK'D BY	CCK	TESTED BY	BM & JB	CURVE NO.	L-1A

FIELD IN-PLACE DENSITY TEST REPORT

EMPIRE 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
- 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-1

Client Conestoga-Rovers & Associates Date: 4/24/87

Contractor: SLC Job No. BT-87-85

Test No.	Date of Test	Depth or Elevation	In-place Density (pcf)	In-place Moisture (%)	% Compaction	Proctor Code	Location and Remarks Test pad for landfill cap
1	4/24	1st. layer	94.7	17.4	84.1	L-1	1st. layer, 1st. pass, South 1/2, West end
2	4/24	"	99.6	15.5	88.5	L-1	1st. layer, 1st. pass, North 1/2, West end
3	4/24	"	106.6	17.5	94.7	L-1	1st. layer, 1st pass, North 1/2, East end
4	4/24	"	96.5	15.4	85.7	L-1	1st. layer, 1st. pass, South 1/2, East end
5	4/24	"	103.9	14.4	92.3	L-1	1st. layer, 2nd. pass, South 1/2, West end
6	4/24	"	104.5	15.8	92.8	L-1	1st. layer, 2nd. pass, South 1/2, West end
7	4/24	"	107.7	17.1	95.6	L-1	1st. layer, 2nd. pass, North 1/2, East end
8	4/24	"	105.5	16.9	93.7	L-1	1st. layer, 2nd. pass, South 1/2 East end
9	4/24	"	102.4	16.7	90.9	L-1	1st. layer, 3rd. pass, South 1/2 West end
10	4/24	"	105.9	16.7	94.9	L-1	1st. layer, 3rd. pass, North 1/2, West end
11	4/24	"	110.9	16.4	98.5	L-1	1st. layer, 3rd. pass, North 1/2, East end
12	4/24	"	105.9	17.6	94.9	L-1	1st. layer, 3rd. pass, South 1/2, East end
13	4/24	"	105.4	17.0	93.6	L-1	1st. layer, 4th. pass, South, 1/2, West end

Proctor Code	Maximum Density (pcf)	Optimum Moisture (%)	Material Type and Source
L-1	112.6	17.3	Silty CLAY, trace sand and gravel, Wolfes Pit, Lewiston, N.Y.

Respectfully submitted,

Remarks: _____

EMPIRE SOILS INVESTIGATIONS, INC.

Technician Time: 8:30 - 2:30

Technician: Jeff Benson

Jeff Benson

FIELD IN-PLACE DENSITY TEST REPORT

EMPIRE 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
- 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-1 Page 2

Client Conestoga-Rovers & Associates Date: 4/24/87

Contractor: SLC Job No. BT-87-85

Test No.	Date of Test	Depth or Elevation	In-place Density (pcf)	In-place Moisture (%)	% Compaction	Proctor Code	Location and Remarks
14	4/24	1st. layer	104.8	17.9	93.1	L-1	1st. Layer, 4th. pass, North 1/2, West end
15	4/24	"	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, South 1/2, West end
18	4/24	"	101.4	15.6	90.1	L-1	1st. layer, 1st. pass, North 1/2, East end
19	4/24	"	101.4	15.6	90.1	L-1	1st. layer, 1st. pass, North 1/2, East end
20	4/24	"	97.9	19.8	86.9	L-1	1st. layer, 1st. pass, South 1/2, East end
21	4/24	"	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 Drummed
22	4/24	"	108.8	18.0	96.6	L-1	

Proctor Code	Maximum Density (pcf)	Optimum Moisture (%)	Material Type and Source
L-1	112.6	17.3	Silty Clay, trace sand and gravel

Respectfully submitted,

Remarks:

EMPIRE SOILS INVESTIGATIONS, INC.

Technician Time: 8:30 - 2:30

Technician: Jeff Benson Jeff Benson

D. / SITE OBSERVATION REPOF

EMPIRE
SOILS INVESTIGATIONS INC.

- 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 607-898-5881
- 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-87-85 Date: 5/1/87

Weather & Temperature: Clear and breezy, 55 to 65°

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.

by Jeff Benson

FIELD -PLACE DENSITY TEST RE ORT

EMPIRE 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
- 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-2

Client: Conestoga-Rovers & Associates — Date: 5/1/87

Contractor: SLC — Job No. BT-87-85

Test No.	Date of Test	Depth or Elevation	In-place Density (pcf)	In-place Moisture (%)	% Compaction	Proctor Code	Location and Remarks Area "A" (Tests 1-9) Area "3" (Tests 10-18)
1	5/1	1st. Lift	118.3	11.5	100+	L-5	Station 6+40', 100' South
2	5/1	"	108.0	11.5	93.9	L-5	Station 6 + 40', 140' South
3	5/1	"	114.8	12.7	99.8	L-5	Station 6+40', 200' South
4	5/1	"	110.1	14.0	95.7	L-5	Station 7+00, 100' South
5	5/1	"	114.1	13.3	99.2	L-5	Station 7+00, 140' South
6	5/1	"	113.5	12.0	98.7	L-5	Station 7+00, 200' South
7	5/1	"	113.3	13.4	98.5	L-5	Station 8+00, 100' South
8	5/1	"	112.7	14.3	98.0	L-5	Station 8+00, 140' South
9	5/1	"	112.7	11.2	98.0	L-5	Station 8+00, 200' South
10	5/1	"	111.2	12.7	96.7	L-5	Station 6+40, 240' South
11	5/1	"	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	"	110.5	12.9	96.1	L-5	Station 7+00, 310' South

Proctor Code	Maximum Density (pcf)	Optimum Moisture (%)	Material Type and Source
L-5	115.0	15.7	Clay, Wolfs Pit (Lewiston, New York)

Respectfully submitted,

EMPIRE SOILS INVESTIGATIONS, INC.

Remarks:

Technician Time: 8:00 - 3:30

Technician: Jeff Benson

Jeff Benson

FIELD IN-PLACE DENSITY TEST REPORT

EMPIRE 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
- 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-2 Page 2

Client: Conestoga-Rovers & Associates — Date: 5/1/87

Contractor: SLC — Job No. BT-87-85

Test No.	Date of Test	Depth or Elevation	In-place Density (pcf)	In-place Moisture (%)	% Compaction	Proctor Code	Location and Remarks
14	5/1	1st. Lift	108.5	15.2	95.3	L-5	Station 7+00', 390' South
15	5/1	"	113.1	12.9	98.3	L-5	Station 7+50', 340' South
16	5/1	"	115.9	12.1	100+	L-5	Station 8+00', 240' South
17	5/1	"	113.3	12.5	98.5	L-5	Station 8+00', 310' South
18	5/1	"	113.3	13.4	98.5	L-5	Station 8+00', 390' South
19	5/1	"	109.1	13.8	94.9	L-5	Station 8+60', 100' South
20	5/1	"	110.3	15.2	95.9	L-5	Station 8+60', 200' South
21	5/1	"	110.0	14.2	95.7	L-5	Station 8+60', 270' South
22	5/1	"	106.7	14.8	92.8	L-5	Station 8+60', 350' South
23	5/1	"	110.2	14.1	95.8	L-5	Station 9+00', 100' South
24	5/1	"	112.9	13.9	98.2	L-5	Station 9+00, 200' South
25	5/1	"	110.7	15.0	96.3	L-5	Station 9+00', 300' South
26	5/1	"	102.9	16.6	89.5	L-5	Station 9+20', 150' South

Proctor Code	Maximum Density (pcf)	Optimum Moisture (%)	Material Type and Source
L-5	115.0	15.7	Clay, Wolfs Pit, Lewiston, New York

Respectfully submitted,

Remarks: _____

EMPIRE SOILS INVESTIGATIONS, INC.

Technician Time: 8:00 - 3:30

Technician: Jeff Benson

Jeff Benson

FIELD IN-PLACE DENSITY TEST REPORT

EMPIRE 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
- 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-2 Page 3

Client Conestoga-Rovers & Associates — Date: 5/01/87

Contractor: SLC — Job No. BT-87-85

Test No.	Date of Test	Depth or Elevation	In-place Density (pcf)	In-place Moisture (%)	% Compaction	Proctor Code	Location and Remarks
27	5/1	1st. Lift	109.5	17.7	95.2	L-5	Station 9+20', 240' South

Proctor Code	Maximum Density (pcf)	Optimum Moisture (%)	Material Type and Source
L-5	115.0	15.7	Clay, Wolfs Pit, Lewiston, NY

Respectfully submitted,

EMPIRE SOILS INVESTIGATIONS, INC.

Remarks:

Technician Time: 8:00 - 3:30

Technician: Jeff Benson

Jeff Benson

D Y SITE OBSERVATION REPOI

EMPIRE 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
- 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-2 Project No.: BT-87-85 Date: 5/4/87

Weather & Temperature: Clear and pleasant, 45 to 60°

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

by Jeff Benson

FIELD ·PLACE DENSITY TEST RE··RT

EMPIRE 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
- 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-3

Client: Conestoga-Rovers & Associates — Date: 5/4/87

Contractor: SLC — Job No. BT-87-85

Test No.	Date of Test	Depth or Elevation	In-place Density (pcf)	In-place Moisture (%)	% Compaction	Proctor Code	Location and Remarks Area "D"
1	5/4	1st. Lift	105.1	16.2	91.2	L-5	Station 9+60', 50' South
2	5/4	"	113.5	14.0	98.7	L-5	Station 9+60', 200' South
3	5/4	"	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	"	109.8	17.0	95.5	L-5	Station 10+20', 200' South
6	5/4	"	107.4	17.1	93.4	L-5	Station 10+20', 350' South
7	5/4	"	107.8	19.1	93.7	L-5	Station 10+80, 50' South
8	5/4	"	101.5	21.8	88.2	L-5	Station 10+80', 200' South
9	5/4	"	105.8	18.4	92.0	L-5	Station 10+80', 350' South

Proctor Code	Maximum Density (pcf)	Optimum Moisture (%)	Material Type and Source
L-5	115.0	15.7	Clay, Wolfs Pit, Lewiston, NY

Respectfully submitted,

EMPIRE SOILS INVESTIGATIONS, INC.

Remarks:

Technician Time: 8:00 - 12:00

Technician: Jeff Benson

Jeff Benson

D/ SITE OBSERVATION REPOR

EMPIRE
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
- 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-3 Project No.: BT-87-85 Date: 5/5/87

Weather & Temperature: Clear and pleasant, 50 to 60°

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

by Jeff Benson

FIELD -PLACE DENSITY TEST REPORT

EMPIRE 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
- 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-4

Client Conestoga-Rovers & Associates Date: 5/5/87

Contractor: SLC Job No. BT-87-85

Test No.	Date of Test	Depth or Elevation	In-place Density (pcf)	In-place Moisture (%)	% Compaction	Proctor Code	Location and Remarks
1	5/5	1st. Lift	112.5	14.0	97.8	L-5	Station 6+40', 340' South
2	5/5	"	110.9	10.8	96.4	L-5	Station 6+40', 400' South
3	5/5	"	107.4	20.4	93.4	L-5	Station 7+00, 360' South
4	5/5	"	109.1	11.7	94.9	L-5	Station 7+00, 410' South
5	5/5	"	116.1	13.0	100+	L-5	Station 7+00, 460' South
6	5/5	"	110.3	11.9	95.9	L-5	Station 8+00, 400' South
7	5/5	"	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	"	109.7	14.9	95.4	L-5	Station 8+00, 500' South
10	5/5	"	100.7	24.4	87.6	L-5	Station 10+80', 160' South
11	5/5	"	102.5	22.2	89.1	L-5	Station 10+80', 200' South
12	5/5	See Remarks					Station 10+80', 460' South
13	5/5	1st. Lift	103.1	23.0	89.7	L-5	Station 11+20', 160' South

Proctor Code	Maximum Density (pcf)	Optimum Moisture (%)	Material Type and Source
L-5	115.0	15.7	Clay: Wolfs Pit, Lewiston

Respectfully submitted,

Remarks: This test will be taken tomorrow

EMPIRE SOILS INVESTIGATIONS, INC.

5/6/87. Today % moisture excessive on material here with #10, #11, #13 to be retested

Technician Time: 8:00 - 1:00

Technician: Jeff Benson Jeff Benson

FIELD -PLACE DENSITY TEST REPORT

EMPIRE 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
☐ 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-4 Page 2

Client Conestoga-Rovers & Associates — Date: 5/5/87

Contractor: SLC — Job No. BT-87-85

Test No.	Date of Test	Depth or Elevation	In-place Density (pcf)	In-place Moisture (%)	% Compaction	Proctor Code	Location and Remarks
14	5/5	1st. Lift	102.9	20.7	89.5	L-5	Station 11+20', 200' South
15	5/5	See Remarks					Station 11+20', 465' South
16	5/5	1st. Lift	103.3	22.4	89.8	L-5	Station 11+60', 160' South
17	5/5	"	100.7	21.0	87.6	L-5	Station 11+60', 200' South
18	5/5	See Remarks					Station 11+60', 465' South

Proctor Code	Maximum Density (pcf)	Optimum Moisture (%)	Material Type and Source
L-5	115.0	15.7	Clay, Wolfs Pit, Lewiston

Respectfully submitted,

EMPIRE SOILS INVESTIGATIONS, INC.

Remarks: These tests will be taken tomorrow 5/6/87. Today % moisture excessive on material here.

Technician Time: 8:00 - 1:00

Technician: Jeff Benson

Jeff Benson

D. / SITE OBSERVATION REPOR

EMPIRE 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
- 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-4 Project No.: BT-87-85 Date: 5/6/87

Weather & Temperature: Clear and pleasant, 45 to 60

Arrived at Site: 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 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.

R/T Form D

by Jeff Benson

FIELD IN-PLACE DENSITY TEST REPORT

EMPIRE 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
- 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-5

Client Conestoga-Rovers & Associates — Date: 5/6/87

Contractor: SLC — Job No. BT-87-85

Test No.	Date of Test	Depth or Elevation	In-place Density (pcf)	In-place Moisture (%)	% Compaction	Proctor Code	Location and Remarks Area "F"(1 thru 9) Area "G" (10 thru 18)
1	5/6	1st. Lift	108.9	17.2	94.7	L-5	Station 10+80', 160' South
2	5/6	"	108.3	19.3	94.1	L-5	Station 10+80', 200' South
3	5/6	"	103.6	20.5	90.1	L-5	Station 10+80', 465' South
4	5/6	"	108.7	17.4	94.5	L-5	Station 11+20, 160' South
5	5/6	"	113.9	13.9	99.0	L-5	Station 11+20, 200' South
6	5/6	"	105.2	16.7	94.5	L-5	Station 11+20, 465' South
7	5/6	"	102.9	23.7	89.5	L-5	Station 11+60, 160' South
8	5/6	"	107.4	18.7	93.4	L-5	Station 11+60, 200' South
9	5/6	"	108.9	17.2	94.7	L-5	Station 11+60, 465' South
10	5/6	"	112.7	14.6	98.0	L-5	Station 8+50', 400' South
11	5/6	"	108.9	14.4	94.7	L-5	Station 8+50', 600' South
12	5/6	"	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	Maximum Density (pcf)	Optimum Moisture (%)	Material Type and Source
L-5	115.0	15.7	Clay, Wolfs Pit, Lewiston

Respectfully submitted,

EMPIRE SOILS INVESTIGATIONS, INC.

Remarks:

Technician Time: 8:00 - 2:00

Technician: Jeff Benson

Jeff Benson

FIELD IN-PLACE DENSITY TEST REPORT

EMPIRE 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
- 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-5 Page 2

Client Conestoga-Rovers & Associates — Date: 5/6/87

Contractor: SLC — Job No. BT-87-85

Test No.	Date of Test	Depth or Elevation	In-place Density (pcf)	In-place Moisture (%)	% Compaction	Proctor Code	Location and Remarks
14	5/6	1st. Lift	108.9	15.4	94.7	L-5	Station 9+50', 500' South
15	5/6	"	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	"	106.2	20.0	92.5	L-5	Station 10+60', 480' South

Proctor Code	Maximum Density (pcf)	Optimum Moisture (%)	Material Type and Source
L-5	115.0	15.7	Clay, Wolfs Pit, Lewiston

Respectfully submitted,

EMPIRE SOILS INVESTIGATIONS, INC.

Remarks: _____

Technician Time: Jeff Benson

Technician: _____ Jeff Benson

D/ ' SITE OBSERVATION REPOR'

EMPIRE 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
- 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 Date: 5/7/87

Weather & Temperature: Clear and cool, 45 to 55°

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 returend 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

by Jeff Benson

FIELD IN-PLACE DENSITY TEST REPORT

EMPIRE 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
- 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-6

Client Conestoga-Rovers & Associates

Date: 5/7/87

Contractor: SLC

Job No. BT-87-85

Test No.	Date of Test	Depth or Elevation	In-place Density (pcf)	In-place Moisture (%)	% Compaction	Proctor Code	Location and Remarks Area "F" IPD 1-9, Supplement to area "E" IPD 10-12
1	5/7	2nd. Lift	107.5	17.1	93.5	L-5	Station 10+80', 160' South
2	5/7	"	109.3	17.6	95.0	L-5	Sation 10+80', 200' South
3	5/7	"	108.2	19.6	94.1	L-5	Station 10+80', 465' South
4	5/7	"	102.6	20.6	89.2	L-5	Station 11+20', 160' South
5	5/7	"	101.9	26.0	88.6	L-5	Station 11+20', 200' South
6	5/7	"	106.0	22.8	92.2	L-5	Station 11+20', 465' South
7	5/7	"	105.3	20.6	91.6	L-5	Station 11+60', 160' South
8	5/7	"	109.1	20.5	94.9	L-5	Station 11+60', 200' South
9	5/7	"	101.0	25.5	87.9	L-5	Station 11+60', 465' South
10	5/7	1st. Lift	106.2	17.9	92.3	L-5	Station 6+50', 400' South
11	5/7	"	110.1	15.6	95.7	L-5	Station 6+50', 450' South
12	5/7	"	105.8	20.0	92.0	L-5	Station 6+50', 500' South

Proctor Code	Maximum Density (pcf)	Optimum Moisture (%)	Material Type and Source
L-5	115.0	15.7	Clay, Wolfs Pit, Lewiston

Respectfully submitted,

EMPIRE SOILS INVESTIGATIONS, INC.

Remarks: Three additional tests(10-12) are supplemental to area "E" tested 5/5/87

Technician Time: 8:00 - 11:15

Technician: Jeff Benson

Jeff Benson

D/ ' SITE OBSERVATION REPOR'

EMPIRE 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
- 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-6 Project No.: BT-87-85 Date: 5/8/87

Weather & Temperature: Clear and pleasant, 60 to 65°

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 1st. lift, bottom 9", was already tested.

B.T Form D

by Jeff Benson

FIELD -PLACE DENSITY TEST REPORT

EMPIRE 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
- 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-7

Client Conestoga-Rovers & Associates

Date: 5/8/87

Contractor: SLC

Job No. BT-87-85

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	"	114.0	13.4	99.1	L-5	Station 8+50', 600' South
3	5/8	"	108.5	16.7	94.3	L-5	Station 8+50', 650' South
4	5/8	"	110.9	15.6	96.4	L-5	Station 9+50', 360' South
5	5/8	"	114.4	13.3	99.5	L-5	Station 9+50', 500' South
6	5/8	"	108.2	16.1	99.1	L-5	Station 9+50', 600' South
7	5/8	"	107.0	18.4	93.0	L-5	Station 9+50', 620' South
8	5/8	"	113.3	13.9	98.5	L-5	Station 10+40', 440' South
9	5/8	"	111.6	13.6	97.0	L-5	Station 10+60', 480' South

Proctor Code	Maximum Density (pcf)	Optimum Moisture (%)	Material Type and Source
L-5	115.0	15.7	Clay, Wolfs Pit, Lewiston

Respectfully submitted,

EMPIRE SOILS INVESTIGATIONS, INC.

Remarks:

Technician Time: 2:30 - 4:00

Technician: Jeff Benson

Jeff Benson

D/ ' SITE OBSERVATION REPOR'

EMPIRE
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
- 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-7 Project No.: BT-87-85 Date: 5/11/87

Weather & Temperature: Clear & breezy, 60 to 75°

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 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 the Empire Soils laboratory for undisturbed permeability testing.

R/T Form D

by Jeff Benson

FIELD IN-PLACE DENSITY TEST REPORT

EMPIRE 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
- 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-8

Client: Conestoga-Rovers & Associates — Date: 5/11/87

Contractor: SLC — Job No. BT-87-85

Test No.	Date of Test	Depth or Elevation	In-place Density (pcf)	In-place Moisture (%)	% Compaction	Proctor Code	Location and Remarks Area "H"
1	5/11	1st. Lift	116.8	8.5	100+	L-5	Station 0+25', 200' South
2	5/11	"	106.9	17.4	93.0	L-5	Station 0+25', 300' South
3	5/11	"	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	"	108.9	15.4	94.7	L-5	Station 1+00', 300' South
6	5/11	"	111.6	16.2	97.0	L-5	Station 1+00', 380' South
7	5/11	"	116.7	15.4	100+	L-5	Station 2+00', 200' South
8	5/11	"	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	Maximum Density (pcf)	Optimum Moisture (%)	Material Type and Source
L-5	115.0	15.7	Clay, Wolfs Pit, Lewiston

Respectfully submitted,

EMPIRE SOILS INVESTIGATIONS, INC.

Remarks: Proctor L-5 obtained from ESI report to URS Eng. per Wolfs Pit clay

Technician Time: 12:30 - 4:00

Technician: Jeff Benson

Jeff Benson

DA SITE OBSERVATION REPORT

EMPIRE 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
☐ 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-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 11" 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

by Jeff Benson

FIELD IN-PLACE DENSITY TEST REPORT

EMPIRE SOILS INVESTIGATIONS INC.

- 585 TROY-SCHENECTADY RD., LATHAM, NY 12110 518-783-1555
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- 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-9

Client: Conestoga-Rovers & Associates — Date: 5/12/87

Contractor: SLC — Job No. BT-87-85

Test No.	Date of Test	Depth or Elevation	In-place Density (pcf)	In-place Moisture (%)	% Compaction	Proctor Code	Location and Remarks
1	5/12	1st. Lift	109.1	17.3	94.9	L-5	Station 0+25', 450' South
2	5/12	"	105.2	15.6	94.1	L-5	Station 0+25', 500' South
3	5/12	"	112.9	13.0	98.2	L-5	Station 0+25', 550' South
4	5/12	"	105.4	17.8	91.7	L-5	Station 1+00', 450' South
5	5/12	"	112.2	14.3	97.6	L-5	Station 1+00, 500' South
6	5/12	"	109.7	14.0	95.4	L-5	Station 1+00', 550' South
7	5/12	"	107.6	18.9	93.6	L-5	Station 2+00', 450' South
8	5/12	"	110.4	15.9	96.0	L-5	Station 2+00', 500' South
9	5/12	"	104.5	21.1	90.9	L-5	Station 2+00', 550' South
10	5/12	"	102.7	19.3	89.3	L-5	Station 0+25', 50' South
11	5/12	"	106.6	19.4	92.7	L-5	Station 0+25', 100' South
12	5/12	"	114.1	12.7	99.2	L-5	Station 0+25', 150' South
13	5/12	"	106.0	18.2	92.2	L-5	Station 1+00', 50' South

Proctor Code	Maximum Density (pcf)	Optimum Moisture (%)	Material Type and Source
L-5	115.0	15.7	Clay, Wolfs Pit, Lewiston

Respectfully submitted,

EMPIRE SOILS INVESTIGATIONS, INC.

Remarks:

Technician Time: 8:00 - 3:30

Technician: Jeff Benson

Jeff Benson

FIELD IN-PLACE DENSITY TEST REPORT

EMPIRE SOILS INVESTIGATIONS INC.

- 585 TROY-SCHENECTADY RD., LATHAM, NY 12110 518-783-1555
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Project: Union Carbide — Report No. DT-9 Page 2

Client: Conestoga-Rovers & Assoc. — Date: 5/12/87

Contractor: SLC — Job No. BT-87-85

Test No.	Date of Test	Depth or Elevation	In-place Density (pcf)	In-place Moisture (%)	% Compaction	Proctor Code	Location and Remarks
14	5/12	1st. Lift	112.2	15.2	97.6	L-5	Station 1+00', 100' South
15	5/12	"	111.3	15.9	96.8	L-5	Station 1+00', 150' South
16	5/12	"	109.0	16.7	94.8	L-5	Station 1+50', 50' South
17	5/12	"	114.2	13.2	99.3	L-5	Station 1+50', 100' South
18	5/12	"	114.4	14.4	99.5	L-5	Station 1+50', 150' South
19	5/12	"	108.2	15.5	94.1	L-5	Station 5+20', 100' South
20	5/12	"	112.1	13.8	97.5	L-5	Station 5+20', 250' South
21	5/12	"	112.7	7.8	98.0	L-5	Station 5+20', 350' South
22	5/12	"	105.7	21.1	91.9	L-5	Station 5+50', 100' South
23	5/12	"	105.5	17.8	91.7	L-5	Station 5+50', 250' South
24	5/12	"	117.8	11.2	100+	L-5	Station 5+50, 350' South
25	5/12	"	111.0	17.4	96.6	L-5	Station 6+00', 100' South
26	5/12	"	117.0	14.2	100+	L-5	Station 6+00', 250' South

Proctor Code	Maximum Density (pcf)	Optimum Moisture (%)	Material Type and Source
L-5	115.0	15.7	Clay, Wolfs Pit, Lewiston

Respectfully submitted,

Remarks: _____

EMPIRE SOILS INVESTIGATIONS, INC.

Technician Time: 8:00 - 3:30

Technician: Jeff Benson — Jeff Benson

FIELD [illegible]-PLACE DENSITY TEST REPORT

EMPIRE SOILS INVESTIGATIONS INC.

- 585 TROY-SCHENECTADY RD., LATHAM, NY 12110 518-783-1555
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Project: Union Carbide

Report No. DT-9 Page 3

Client Conestoga-Rovers & Associates

Date: 5/12/87

Contractor: SLC

Job No. BT-87-85

Test No.	Date of Test	Depth or Elevation	In-place Density (pcf)	In-place Moisture (%)	% Compaction	Proctor Code	Location and Remarks
27	5/12	1st. Lift	119.6	9.3	100+	L-5	Station 6+00, 350' South

Proctor Code	Maximum Density (pcf)	Optimum Moisture (%)	Material Type and Source
L-5	115.0	15.7	Clay, Wolfs Pit, Lewiston

Respectfully submitted,

EMPIRE SOILS INVESTIGATIONS, INC.

Remarks:

Technician Time: 8:00 - 3:30

Technician: Jeff Benson

Jeff Benson

FIELD [illegible] PLACE DENSITY TEST REPORT

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

Project: Union Carbide — Report No. DT-10

Client Conestoga-Rovers & Assoc. — Date: 5/21/87

Contractor: SLC — Job No. BT-87-85

Test No.	Date of Test	Depth or Elevation	In-place Density (pcf)	In-place Moisture (%)	% Compaction	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	"	96.8	21.9	84.2	L-5	200' W. of station 11+100 and 100' North
3	5/21	"	101.3	22.2	88.0	L-5	200' W. of station 11+1-0 and 150' North
4	5/21	"	103.1	22.5	89.6	L-5	200' W. of station 11+100 and 200' North
5	5/21	"	101.9	20.4	88.6	L-5	100' W. of station 11+100 and 50' North
6	5/21	"	97.4	21.6	84.7	L-5	100' W. of station 11+100 and 100' North
7	5/21	"	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

Proctor Code	Maximum Density (pcf)	Optimum Moisture (%)	Material Type and Source
L-5	115.0	15.7	Clay, Wolf Pit

Remarks: Material was wet, could not achieve reg. compaction

Technician Time: 8:00 - 1:30

Technician: Peter Romano, Jr.

Respectfully submitted,

EMPIRE SOILS INVESTIGATIONS, INC.

Peter Romano Jr.

D/ ` Y SITE OBSERVATION REPORT

EMPIRE SOILS INVESTIGATIONS INC.

- 585 TROY-SCHENECTADY RD., LATHAM, NY 12110 518-783-1555
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- 1164 RIDGE RD. EAST, ROCHESTER, NY 14621 716-342-5320

Project: Union Carbide Location: N. Fall, NY

Client: Conestoga-Rovers & Associates Contractor: SLC

Report No.: DS-10 Project No.: BT-87-85 Date: 5/22/87

Weather & Temperature: Clear and cool, 65 to 70°

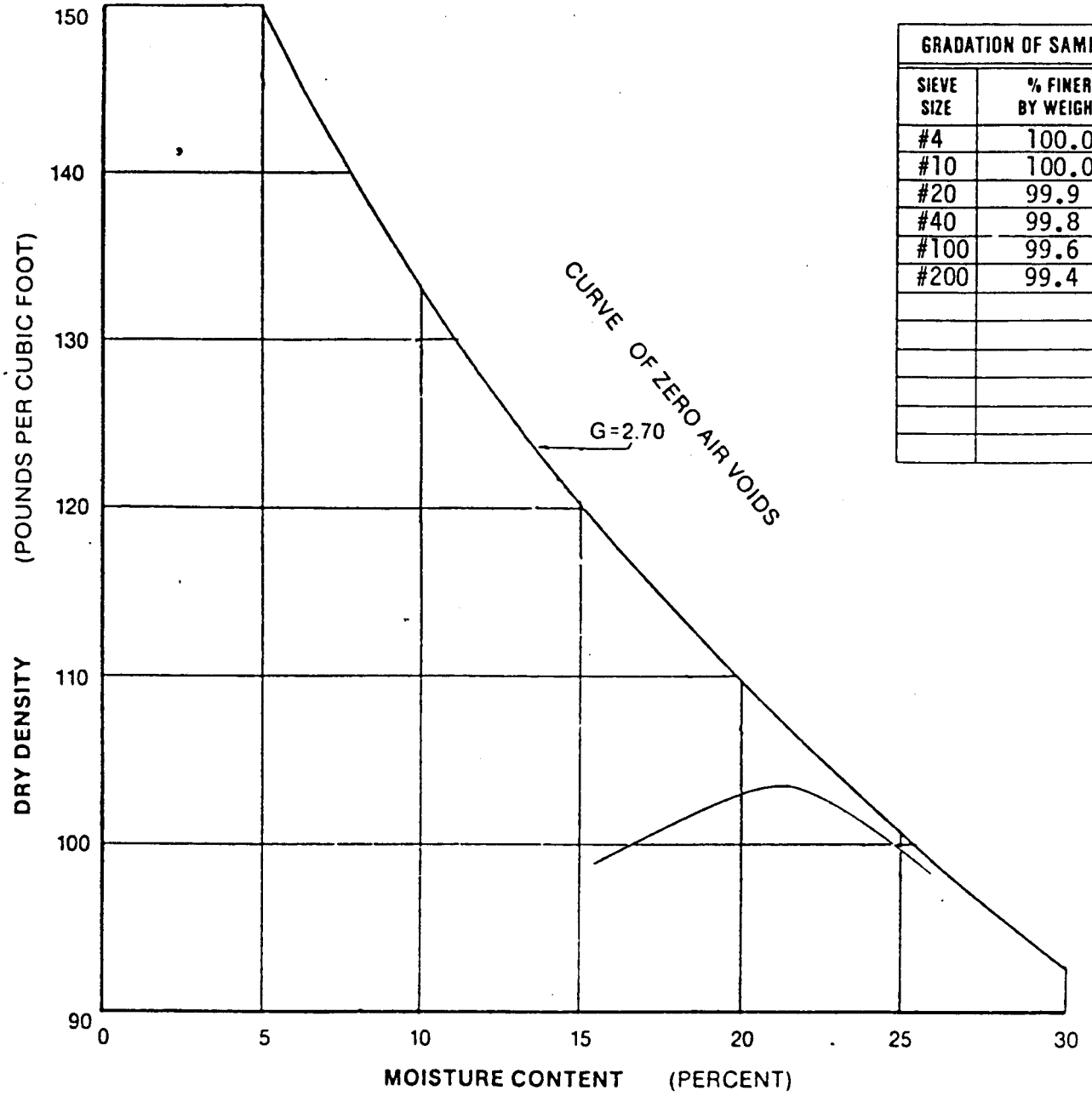
Arrived at Site: 8:00 Left Site: 2:00

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.

R.T Form D

by Jeff Benson



GRADATION OF SAMPLE	
SIEVE SIZE	% FINER BY WEIGHT
#4	100.0
#10	100.0
#20	99.9
#40	99.8
#100	99.6
#200	99.4

SAMPLE DESCRIPTION

Material Clay, trace silt

Color Gry-brn. Source Summit Park Mall Lake

Sampled By ESI At On-site stockpile

TEST RESULTS

Maximum Dry Density 103.6 pcf

Optimum Water Content 21.4 %

METHOD OF TEST	
STANDARD	METHOD
ASTM D698	A
AASHTO	
MILITARY	
OTHER	

EMPIRE SOILS INVESTIGATIONS INC.

OPTIMUM MOISTURE—MAXIMUM DENSITY

Union Carbide
Conestoga-Rovers & Associates

DR. BY: PJA	DATE SAMPLED 5/87	PROJ. NO. BT-87-85	
CK'D. BY: CCK	TESTED BY: LB & DH	CURVE NO. L-4	

FIELD IN-PLACE DENSITY TEST REPORT

EMPIRE SOILS INVESTIGATIONS INC

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

Project: Union Carbide — Report No. DT-12

Client: Conestoga-Rovers & Associates — Date: 5/22/87

Contractor: SLC — Job No. BT-87-85

Test No.	Date of Test	Depth or Elevation	In-place Density (pcf)	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	"	96.4	19.1	93.1	L-4	Station 5+50', 40' South
3	5/22	"	98.5	16.6	95.1	L-4	Station 6+00, 10' South
4	5/22	"	101.0	16.1	97.5	L-4	Station 6+50', 40' South
5	5/22	"	101.3	16.8	97.8	L-4	Station 7+00, 10' South
6	5/22	"	104.2	18.0	100	L-4	Station 7+50, 40' South
7	5/22	"	100.8	15.4	97.3	L-4	Station 10+00, 10' South
8	5/22	"	102.0	16.0	98.5	L-4	Station 10+50, 40' South
9	5/22	"	102.4	13.2	98.8	L-4	Station 11+50, 15' South
10	5/22	"	104.4	17.2	100	L-4	Retest of test location #2
11	5/22	"	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	"	103.8	18.0	100	L-4	Retest of test location #5

Proctor Code	Maximum Density (pcf)	Optimum Moisture (%)	Material Type and Source
L-4	103.6	21.4	Clay, trace silt, Summit Park Mall Lake - on-site stockpile

Respectfully submitted,

EMPIRE SOILS INVESTIGATIONS, INC.

Remarks:

Technician Time: 8:00 - 2:00

Technician: Jeff Benson

Jeff Benson

FIELD IN-PLACE DENSITY TEST REPORT

EMPIRE SOILS INVESTIGATIONS INC.

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

Project: Union Carbide — Report No. DT-12 Page 2

Client Conestoga-Rovers & Associates — Date: 5/22/87

Contractor: SLC — Job No. BT-87-85

Test No.	Date of Test	Depth or Elevation	In-place Density (pcf)	In-place Moisture (%)	% Compaction	Proctor Code	Location and Remarks
14	5/22	1st. Lift	105.6	16.5	100	L-4	Retest of test location #6
15	5/22	"	105.7	16.8	100	L-4	Retest of test location #7
16	5/22	"	109.1	15.6	100	L-4	Retest of test location #8
17	5/22	"	116.2	12.5	100	L-4	Retest of test location #9

Proctor Code	Maximum Density (pcf)	Optimum Moisture (%)	Material Type and Source
L-4	103.6	21.4	Clay, trace sand, on-site stockpile, Summit Park Mall Lake

Respectfully submitted,

Remarks: _____

EMPIRE SOILS INVESTIGATIONS, INC.

Technician Time: 8:00 - 2:00

Technician: Jeff Benson — Jeff Benson

DAILY SITE OBSERVATION REPORT

EMPIRE 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
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- 303 CLEVELAND AVENUE, HIGHLAND PARK, NJ 08904 201-846-5200
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Project: Union Carbide Location: N. Falls, NY

Client: Conestoga-Rovers & Assoc. Contractor: SLC

Report No.: DS-9 Project No.: BT-87-85 Date: 5/26/87

Weather & Temperature: Clear and warm, 65 to 80°

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

R/T Form D

by Jeff Benson

FIELI N-PLACE DENSITY TEST RF^ORT

EMPIRE SOILS INVESTIGATIONS INC.

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

Project: Union Carbide Report No. DT-11

Client Conestoga-Rovers & Assoc. Date: 5/26/87

Contractor: SLC Job No. BT-87-85

Test No.	Date of Test	Depth or Elevation	In-place Density (pcf)	In-place Moisture (%)	% Compaction	Proctor Code	Location and Remarks
1	5/26	1st. Lift	116.8	11.6	100+	L-5	Station 2+20', 50' South
2	5/26	"	113.3	14.0	98.4	L-5	Station 2+20', 100' South
3	5/26	"	123.8	10.4	100+	L-5	Station 2+20', 120' South
4	5/26	"	125.4	11.5	100+	L-5	Station 3+20', 50' South
5	5/26	"	118.5	11.5	100+	L-5	Station 3+20', 100' South
6	5/26	"	119.5	11.5	100+	L-5	Station 3+20', 120' South
7	5/26	"	119.3	12.2	100+	L-5	Station 4+50', 50' South
8	5/26	"	109.5	16.9	95.2	L-5	Station 4+50', 100' South
9	5/26	"	117.2	10.6	100+	L-5	Station 4+50', 120' South
10	5/26	"	115.6	12.8	100+	L-5	Station 2+20', 150' South
11	5/26	"	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	"	117.4	11.9	100+	L-5	Station 3+20', 150' South

Proctor Code	Maximum Density (pcf)	Optimum Moisture (%)	Material Type and Source
L-5	115.0	15.7	Clay, Wolfs Pit, Lewiston

Respectfully submitted,

Remarks:

EMPIRE SOILS INVESTIGATIONS, INC.

Technician Time: 8:00 - 4:00

Technician: Jeff Benson

Jeff Benson

FIEL' N-PLACE DENSITY TEST RF'ORT

EMPIRE SOILS INVESTIGATIONS INC.

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Project: Union Carbide — Report No. DT-11 Page 2

Client Conestoga-Rovers & Associates — Date: 5/26/87

Contractor: SLC — Job No. BT-87-85

Test No.	Date of Test	Depth or Elevation	In-place Density (pcf)	In-place Moisture (%)	% Compaction	Proctor Code	Location and Remarks
14	5/26	1st. Lift	122.5	10.9	100+	L-5	Station 3+20', 200' South
15	5/26	"	115.5	11.5	100+	L-5	Station 3+20', 250' South
16	5/26	"	115.3	13.5	100+	L-5	Station 4+50', 150' South
17	5/26	"	112.7	13.6	98.0	L-5	Station 4+50', 200' South
18	5/26	"	113.6	13.2	98.7	L-5	Station 4+50', 250' South
19	5/26	"	112.9	12.8	98.1	L-5	Station 2+00', 300' South
20	5/26	"	118.8	9.3	100+	L-5	Station 2+00', 330' South
21	5/26	"	124.3	9.2	100+	L-5	Station 2+00', 380' South
22	5/26	"	123.5	7.8	100+	L-5	Station 3+80', 300' South
23	5/26	"	121.6	8.9	100+	L-5	Station 3+80', 330' South
24	5/26	"	121.7	8.5	100+	L-5	Station 3+80', 380' South
25	5/26	"	119.3	8.1	100+	L-5	Station 4+80', 300' South
26	5/26	"	120.2	10.2	100+	L-5	Station 4+80', 330' South

Proctor Code	Maximum Density (pcf)	Optimum Moisture (%)	Material Type and Source
L-5	115.0	15.7	Clay, Wolf Pit, Lewiston

Respectfully submitted,

Remarks: _____

EMPIRE SOILS INVESTIGATIONS, INC.

Technician Time: 8:00 - 4:00

Technician: Jeff Benson — Jeff Benson

FIEL' 'N-PLACE DENSITY TEST RF'ORT

EMPIRE SOILS INVESTIGATIONS INC.

- 585 TROY-SCHENECTADY RD., LATHAM, NY 12110 518-783-1555
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Project: Union Carbide

Report No. DT-11 Page 3

Client Conestoga-Rovers & Associates

Date: 5/26/87

Contractor: SLC

Job No. BT-87-85

Test No.	Date of Test	Depth or Elevation	In-place Density (pcf)	In-place Moisture (%)	% Compaction	Proctor Code	Location and Remarks
27	5/26	1st. Lift	118.9	10.7	100+	L-5	Station 4+50', 350' South
28	5/26	"	121.2	9.0	100+	L-5	Station 2+80', 400' South
29	5/26	"	122.1	9.6	100+	L-5	Station 2+80', 500' South
30	5/26	"	110.8	12.5	96.3	L-5	Station 2+80', 550' South
31	5/26	"	112.2	12.1	97.5	L-5	Station 4+00', 400' South
32	5/26	"	108.1	15.3	94.0	L-5	Station 4+00', 500' South
33	5/26	"	107.7	15.1	93.6	L-5	Station 4+00', 550' South
34	5/26	"	105.8	17.8	92.0	L-5	Station 5+00', 400' South
35	"	"	107.9	16.4	93.8	L-5	Station 5+00', 500' South
36	5/26	"	105.5	15.4	91.7	L-5	Station 5+00', 550' South
37	5/26	"	106.2	17.3	92.3	L-5	Station 6+00', 400' South
38	5/26	"	106.8	17.0	92.8	L-5	Station 6+00', 550' South

Proctor Code	Maximum Density (pcf)	Optimum Moisture (%)	Material Type and Source
L-5	115.0	15.7	Clay, Wolfs Pit, Lewiston

Respectfully submitted,

Remarks:

EMPIRE SOILS INVESTIGATIONS, INC.

Technician Time: 8:00 - 4:00

Technician: Jeff Benson

Jeff Benson

1351

D[illegible]Y SITE OBSERVATION REPORT

EMPIRE 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
- 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-11 Project No.: BT-87-85 Date: 5/27/87

Weather & Temperature: Clear and breezy 70 to 85°

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.

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

R/T Form D

by Jeff Benson

FIELD IN-PLACE DENSITY TEST REPORT

EMPIRE 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
- 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-13

Client Conestoga-Rovers & Associates Date: 5/27/87

Contractor: SLC Job No. BT-87-85

Test No.	Date of Test	Depth or Elevation	In-place Density (pcf)	In-place Moisture (%)	% Compaction	Proctor Code	Location and Remarks
1	5/27	2nd. Lift	119.6	11.4	100	L-4	Station 6+40', 100' South
2	5/27	"	118.4	11.1	100	L-4	Station 6+40', 140' South
3	5/27	"	120.6	10.9	100	L-4	Station 6+40', ~~140~~ 130' South
4	5/27	"	118.7	11.1	100	L-4	Station 7+00', 100' South
5	5/27	"	111.9	18.3	100	L-4	Station 7+00', 140' South
6	5/27	"	112.0	18.1	100	L-4	Station 7+00', 200' South
7	5/27	"	104.4	19.9	100	L-4	Station 8+00', 100' South
8	5/27	"	99.8	19.1	96.3	L-4	Station 8+00', 140' South
9	5/27	"	103.9	20.0	100	L-4	Station 8+00', 200' South
10	5/27	"	105.9	20.8	100	L-4	Station 8+60', 100' South
11	5/27	"	101.5	21.6	98.0	L-4	Station 8+60', 200' South
12	5/27	"	99.3	18.4	95.8	L-4	Station 8+60', 270' South
13	5/27	"	104.4	17.9	100	L-4	Station 8+60', 350' South

Proctor Code	Maximum Density (pcf)	Optimum Moisture (%)	Material Type and Source
L-4	103.6	21.4	Clay, trace silt, Summit Park Mall Lake, on-site stockpile

Respectfully submitted,

Remarks:

EMPIRE SOILS INVESTIGATIONS, INC.

Technician Time: 8:00 - 4:00

Technician: Jeff Benson

Jeff Benson

FIELD IN-PLACE DENSITY TEST REPORT

EMPIRE 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
- 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-13 Page 2

Client Conestoga-Rovers & Associates Date: 5/27/87

Contractor: SLC Job No. BT-87-85

Test No.	Date of Test	Depth or Elevation	In-place Density (pcf)	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	"	107.1	19.5	100	L-4	Station 9+00', 200' South
16	5/27	"	107.8	16.1	100	L-4	Station 9+00', 300' South
17	5/27	"	107.8	14.8	100	L-4	Station 9+20', 150' South
18	5/27	"	106.4	14.8	100	L-4	Station 9+20', 240' South
19	5/27	"	109.6	14.7	100	L-4	Station 9+60', 50' South
20	5/27	"	106.0	18.6	100	L-4	Station 9+60', 200' South
21	5/27	"	101.6	22.1	98.1	L-4	Station 9+60', 300' South
22	5/27	"	106.8	16.6	100	L-4	Statin 10+20', 50' South
23	5/27	"	105.1	16.8	100	L-4	Station 10+20', 200' South
24	5/27	"	108.2	14.0	100	L-4	Station 10+20', 350' South
25	5/27	"	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	Maximum Density (pcf)	Optimum Moisture (%)	Material Type and Source
L-4	103.6	21.4	Clay, trace silt, on-site stockpile, Summit Park Mall Lake

Respectfully submitted,.

Remarks:

EMPIRE SOILS INVESTIGATIONS, INC.

Technician Time: 8:00 - 4:00

Technician: Jeff Benson Jeff Benson

FIELD IN-PLACE DENSITY TEST REPORT

EMPIRE 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
- 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-13 Page 3

Client Conestoga-Rovers — Date: 5/27/87

Contractor: SLC — Job No. BT-87-85

Test No.	Date of Test	Depth or Elevation	In-place Density (pcf)	In-place Moisture (%)	% Compaction	Proctor Code	Location and Remarks
27	5/27	2nd. Lift	109.7	15.1	100	L-4	Station 10+80', 350' South

Proctor Code	Maximum Density (pcf)	Optimum Moisture (%)	Material Type and Source
L-4	103.6	12.4	Clay, trace Silt, on-site stockpile, Summit Park Mall Lake

Respectfully submitted,

Remarks: _____

EMPIRE SOILS INVESTIGATIONS, INC.

Technician Time: 8:00 - 4:00

Technician: Jeff Benson — Jeff Benson

DAILY SITE OBSERVATION REPORT

EMPIRE 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
- 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-12 Project No.: BT-87-85 Date: 5/28/87

Weather & Temperature: Clear and warm, 70 to 85°

Arrived at Site: 8:00 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

by Jeff Benson

FIELD IN-PLACE DENSITY TEST REPORT

EMPIRE 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
- 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

Test No.	Date of Test	Depth or Elevation	In-place Density (pcf)	In-place Moisture (%)	% Compaction	Proctor Code	Location and Remarks
1	5/28	2nd. Lift	104.6	21.0	100	L-4	Station 6+40', 240' South
2	5/28	"	104.7	21.0	100	L-4	Station 6+40', 310' South
3	5/28	"	106.6	19.0	100	L-4	Station 7+00', 240' South
4	5/28	"	104.2	19.8	100	L-4	Station 7+00', 310' South
5	5/28	"	104.8	18.3	100	L-4	Station 7+00', 390' South
6	5/28	"	107.8	19.0	100	L-4	Station 7+50', 340' South
7	5/28	"	103.4	20.1	99.8	L-4	Station 8+00, 240' South
8	5/28	"	104.8	19.6	100	L-4	Station 8+00', 310' South
9	5/28	"	108.2	18.5	100	L-4	Station 8+00', 390' South
10	5/28	"	108.2	16.4	100	L-4	Station 5 +20', 100' South
11	5/28	"	104.5	19.4	100	L-4	Station 5+20', 250' South
12	5/28	"	106.8	19.6	100	L-4	Station 5+20', 350' South
13	5/28	"	107.3	18.6	100	L-4	Station 5+50', 100' South

Proctor Code	Maximum Density (pcf)	Optimum Moisture (%)	Material Type and Source
L-4	103.6	21.4	Clay, trace silt, on-site stockpile, Summit Park Mall Lake

Respectfully submitted,

Remarks: _____

EMPIRE SOILS INVESTIGATIONS, INC.

Technician Time: 8:00 - 3:30

Technician: Jeff Benson — Jeff Benson

FIELD IN-PLACE DENSITY TEST REPORT

EMPIRE 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
- 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 Page 2

Client Conestoga-Rovers & Assoc. — Date: 5/28/87

Contractor: SLC — Job No. BT-87-86

Test No.	Date of Test	Depth or Elevation	In-place Density (pcf)	In-place Moisture (%)	% Compaction	Proctor Code	Location and Remarks
14	5/28	2nd. Lift	105.1	17.4	100	L-4	Station 5+50', 250' South
15	5/28	"	104.2	21.6	100	L-4	Station 5+50', 350' South
16	5/28	"	108.4	17.3	100	L-4	Station 6+00', 100' South
17	5/28	"	110.6	17.2	100	L-4	Station 6+00', 250' South
18	5/28	"	106.6	19.0	100	L-4	Station 6+00', 350' South

Proctor Code	Maximum Density (pcf)	Optimum Moisture (%)	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

Technician: Jeff Benson — Jeff Benson

DA Y SITE OBSERVATION REPORT

EMPIRE 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
- 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-13 Project No.: BT-87-85 Date: 5/29/87

Weather & Temperature: Clear and warm, 75 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 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
"L"	ST-30	Station 3+50', 70' South
"M"	ST-31	Station 3+50', 210' South

R/T Form D

by Jeff Benson

FIELD IN-PLACE DENSITY TEST REPORT

EMPIRE 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
☐ 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-15

Client: Conestoga-Rovers & Associates — Date: 5/29/87

Contractor: SLC — Job No. BT-87-85

Test No.	Date of Test	Depth or Elevation	In-place Density (pcf)	In-place Moisture (%)	% Compaction	Proctor Code	Location and Remarks
1	5/29	2nd. Lift	102.0	24.3	98.5	L-4	Station 2+20', 50' South
2	5/29	"	04.8	21.5	100	L-4	Station 2+20', 100' South
3	5/29	"	96.2	26.2	92.9	L-4	Station 2+20', 120' South
4	5/29	"	106.4	20.1	100	L-4	Station 3+20', 50' South
5	5/29	"	109.5	19.0	100	L-4	Station 3+20', 100' South
6	5/29	"	105.6	19.9	100	L-4	Station 3+20', 120' South
7	5/29	"	105.9	21.1	100	L-4	Station 4+50', 50' South
8	5/29	"	106.1	20.3	100	L-4	Station 4+50', 100' South
9	5/29	"	104.5	22.3	100	L-4	Station 4+50', 120' South
10	5/29	"	107.2	20.5	100	L-4	Station 2+20', 150' South
11	5/29	"	109.0	19.6	100	L-4	Station 2+20', 200' South
12	5/29	"	108.2	19.5	100	L-4	Station 2+20', 250' South
13	5/29	"	107.1	18.3	100	L-4	Station 3+20', 150' South

Proctor Code	Maximum Density (pcf)	Optimum Moisture (%)	Material Type and Source
L-4	103.6	21.4	Clay, trace silt, Summit Park MallLake

Respectfully submitted,

EMPIRE SOILS INVESTIGATIONS, INC.

Remarks: _____

Technician Time: 8:00 - 3:30

Technician: Jeff Benson

Jeff Benson

FIELD IN-PLACE DENSITY TEST REPORT

EMPIRE 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
☐ 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-15 Page 2

Client Conestoga-Rovers & Assoc. — Date: 5/29/87

Contractor: SLC — Job No. BT-87-85

Test No.	Date of Test	Depth or Elevation	In-place Density (pcf)	In-place Moisture (%)	% Compaction	Proctor Code	Location and Remarks
14	5/29	2nd. Lift	104.0	18.9	100	L-4	Station 3+20', 200' South
15	5/29	"	106.3	20.3	100	L-4	Station 3+20', 250' South
16	5/29	"	106.0	18.8	100	L-4	Station 4+50', 150' South
17	5/29	"	107.1	20.5	100	L-4	Station 4+50', 200' South
18	5/29	"	106.5	20.5	100	L-4	Station 4+50', 250' South

Proctor Code	Maximum Density (pcf)	Optimum Moisture (%)	Material Type and Source
L-4	103.6	21.4	Clay, Summit Park Mall Lake

Respectfully submitted,

Remarks: _____

EMPIRE SOILS INVESTIGATIONS, INC.

Technician Time: 8:00 - 3:30

Technician: Jeff Benson — Jeff Benson

DA'' Y SITE OBSERVATION REPORT

EMPIRE 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
- 303 CLEVELAND AVENUE, HIGHLAND PARK, NJ 08904 201-846-5200
- 1184 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-14 Project No.: BT-87-85 Date: 6/1/87

Weather & Temperature: Clear and warm, 75 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 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
"J"	ST-33	Station 1+00', 100' South
"H"	ST-34	Station 1+00', 300 South

R.T Form D

by Jeff Benson

FIELD IN-PLACE DENSITY TEST REPORT

EMPIRE 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
- 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-16

Client: Conestoga-Rovers & Associates — Date: 6/1/87

Contractor: SLC — Job No. BT-87-85

Test No.	Date of Test	Depth or Elevation	In-place Density (pcf)	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	"	108.9	18.6	100	L-4	Station 2+00', 330' South
3	6/1	"	110.8	14.3	100	L-4	Station 2+00', 380' South
4	6/1	"	107.0	17.4	100	L-4	Station 3+80', 300' South
5	6/1	"	107.5	12.3	100	L-4	Station 3+80', 330' South
6	6/1	"	112.5	17.5	100	L-4	Station 3+80', 380' South
7	6/1	"	112.3	15.2	100	L-4	Station 4+80', 200' South
8	6/1	"	111.8	15.7	100	L-4	Station 4+80', 330' South
9	6/1	"	110.3	14.8	100	L-4	Station 4+50', 350' South
10	6/1	"	107.0	16.5	100	L-4	Station 0+25', 50' South
11	6/1	"	105.5	16.8	100	L-4	Station 0+25', 100' South
12	6/1	"	102.8	14.0	100	L-4	Station 0+25', 150' South
13	6/1	"	104.3	13.7	100	L-4	Station 1+00', 50' South

Proctor Code	Maximum Density (pcf)	Optimum Moisture (%)	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

Technician: Jeff Benson — Jeff Benson

FIELD IN-PLACE DENSITY TEST REPORT

EMPIRE 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
- 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-16 Page 2

Client Conestoga-Rovers & Associates — Date: 6/1/87

Contractor: SLC — Job No. BT-87-85

Test No.	Date of Test	Depth or Elevation	In-place Density (pcf)	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	"	107.0	16.5	100	L-4	Station 1+00', 150' South
16	6/1	"	105.5	19.7	100	L-4	Station 1+50, 50' South
17	6/1	"	105.3	19.8	100	L-4	Station 1+50', 100' South
18	6/1	"	105.4	19.5	100	L-4	Station 1+50', 150' South
19	6/1	"	104.1	15.5	100	L-4	Station 0+25', 200' South
20	6/1	"	105.3	20.5	100	L-4	Station 0+25', 300' South
21	6/1	"	104.0	20.9	100	L-4	Station 0+25', 380' South
22	6/1	"	106.8	17.7	100	L-4	Station 1+00', 200' South
23	6/1	"	105.7	19.6	100	L-4	Station 1+00' 300' South
24	6/1	"	110.4	18.2	100	L-4	Station 1+00', 380' South
25	6/1	"	113.1	17.5	100	L-4	Station 2+00', 200' South
26	6/1	"	108.5	17.7	100	L-4	Station 2+00', 300' South

Proctor Code	Maximum Density (pcf)	Optimum Moisture (%)	Material Type and Source
L-4	103.6	21.4	Clay, Summit Park Mall Lake

Respectfully submitted,

EMPIRE SOILS INVESTIGATIONS, INC.

Remarks:

Technician Time: 8:00 - 3:30

Technician: Jeff Benson

Jeff Benson

FIELD IN-PLACE DENSITY TEST REPORT

EMPIRE 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
- 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-16 Page 3

Client Conestoga-Rovers & Associates — Date: 6/1/87

Contractor: SLC — Job No. BT-87-85

Test No.	Date of Test	Depth or Elevation	In-place Density (pcf)	In-place Moisture (%)	% Compaction	Proctor Code	Location and Remarks
27	6/1	2nd. Lift	104.8	16.9	100	L-4	Station 2+00', 380' South

Proctor Code	Maximum Density (pcf)	Optimum Moisture (%)	Material Type and Source
L-4	103.6	21.4	Clay, some silt, Summit Park Mall Lake

Respectfully submitted,

Remarks: _____

EMPIRE SOILS INVESTIGATIONS, INC.

Technician Time: 8:00 - 3:30

Technician: Jeff Benson — Jeff Benson

D LY SITE OBSERVATION REPOR

EMPIRE
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
- 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-15 Project No.: BT-87-85 Date: 6/2/87

Weather & Temperature: Clear & Warm, 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 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

by Jeff Benson

FIELD IN-PLACE DENSITY TEST REPORT

EMPIRE 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
- 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-17

Client Conestoga-Rovers & Associates Date: 6/2/87

Contractor: SLC Job No. BT-87-85

Test No.	Date of Test	Depth or Elevation	In-place Density (pcf)	In-place Moisture (%)	% Compaction	Proctor 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	"	102.2	21.6	98.6	L-4	Station 0+25', 500' South
3	6/2	"	99.4	22.3	95.9	L-4	Station 0+25', 550' South
4	6/2	"	103.3	23.6	100	L-4	Station 1+00', 450' South
5	6/2	"	104.1	22.69	100	L-4	Station 1+00', 500' South
6	6/2	"	102.9	21.6	99.3	L-4	Station 1+00', 550' South
7	6/2	"	106.3	19.8	100	L-4	Station 2+00', 450' South
8	6/2	"	107.9	20.6	100	L-4	Station 2+00', 500' South
9	6/2	"	109.7	20.1	100	L-4	Station 2+00', 550' South

Proctor Code	Maximum Density (pcf)	Optimum Moisture (%)	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

Technician: Jeff Benson

Jeff Benson

DA / SITE OBSERVATION REPORT

EMPIRE SOILS INVESTIGATIONS 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
- 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-16 Project No.: BT-87-85 Date: 6/3/87

Weather & Temperature: Partly sunny and warm, 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
"O"	ST-37	Station 5+50', 500' South

R T Form D

by Jeff Benson

FIELD IN-PLACE DENSITY TEST REPORT

EMPIRE 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
- 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-18

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

Contractor: SLC — Job No. BT-87-85

Test No.	Date of Test	Depth or Elevation	In-place Density (pcf)	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	"	117.3	10.1	100	L-4	Station 6+40', 400' South
3	6/3	"	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	"	111.7	9.4	100	L-4	Station 7+00', 470' South
6	6/3	"	112.1	13.3	100	L-4	Station 8+00', 400' South
7	6/3	"	106.7	13.5	100	L-4	Station 8+00', 450' South
8	6/3	"	105.1	17.9	100	L-4	Station 8+00', 490' South
9	6/3	"	103.5	18.7	99.9	L-4	Station 8+00', 500' South
10	6/3	"	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	"	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 (pcf)	Optimum Moisture (%)	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

Technician: Jeff Benson

Jeff Benson

FIELD IN-PLACE DENSITY TEST REPORT

EMPIRE 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
☐ 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-18 Page 2

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

Contractor: SLC — Job No. BT-87-85

Test No.	Date of Test	Depth or Elevation	In-place Density (pcf)	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	"	107.5	15.3	100	L-4	Station 2+80', 550' South
16	6/3	"	106.2	15.4	100	L-4	Station 4+00', 400' South
17	6/3	"	103.8	20.4	100	L-4	Station 4+00', 500' South
18	6/3	"	104.0	20.8	100	L-4	Station 4+00', 550' South
19	6/3	"	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	"	115.3	11.3	100	L-4	Station 5+50', 400' South
23	6/3	"	116.1	10.9	100	L-4	Station 5+50', 500' South
24	6/3	"	112.1	13.5	100	L-4	Station 5+50', 550' South
25	6/3	"	102.7	17.2	100	L-4	Station 6+00', 400' South
26	6/3	"	107.3	19.2	100	L-4	Station 6+00', 550' South

Proctor Code	Maximum Density (pcf)	Optimum Moisture (%)	Material Type and Source
L-4	103.6	21.4	Clay, trace silt, Summit Park Mall Lake

Respectfully submitted,

EMPIRE SOILS INVESTIGATIONS, INC.

Remarks:

Technician Time: 8:00 - 3:30

Technician: Jeff Benson

Jeff Benson

DAILY SITE OBSERVATION REPORT

EMPIRE 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
- 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, 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 75°

Arrived at Site: 8:00 Left Site: 3:00

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 ran nine (9) In-Place Density tests in area "P" (North slope). This technician then drove a shelby tube (ST-38) to 18" at station 9+00', 35' South. This tube was returned to the Empire Soils laboratory for undisturbed permeability testing of the top 9" (e.g. 2nd. lift) of the sample.

R/T Form D

by Jeff Benson

FIELD IN-PLACE DENSITY TEST REPORT

EMPIRE 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
- 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-19

Client: Conestoga-Rovers & Associates Date: 6/4/87

Contractor: SLC Job No. BT-87-85

Test No.	Date of Test	Depth or Elevation	In-place Density (pcf)	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	"	103.9	17.7	100	L-4	Station 6+50', 40' South
3	6/4	"	111.2	13.8	100	L-4	Station 7+00', 50' South
4	6/4	"	107.8	16.1	100	L-4	Station 8+50', 30' South
5	6/4	"	107.2	18.1	100	L-4	Station 9+50', 15' South
6	6/4	"	104.5	17.8	100	L-4	Station 10+00', 20' South
7	6/4	"	108.7	18.6	100	L-4	Station 10+50', 30' South
8	6/4	"	105.0	19.3	100	L-4	Station 11+00', 50' South
9	6/4	"	104.1	21.0	100	L-4	Station 11+50', 30' South

Proctor Code	Maximum Density (pcf)	Optimum Moisture (%)	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 - 3:00

Technician: Jeff Benson Jeff Benson

APPENDIX F

SHELBY TUBE PERMEABILITY RESULTS

EMPIRE
SOILS INVESTIGATIONS INC.

PROJECT: 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. 5.66×10^{-8} CM/SEC @ 10 PSI.
ST-2	Test pad first lift, East end after four passes with Sheepsfoot roller	2.05×10^{-8} CM/SEC @ 5 PSI. 1.78×10^{-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	2.62×10^{-8} CM/SEC @ 5 PSI. 2.72×10^{-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
Laboratory Manager

sll

EMPIRE
SOILS INVESTIGATIONS INC.

PROJECT: 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	Permeability
ST-4	Area "A", Station 7+20 140' South	1.35×10^{-8} cm/sec @ 10 psi
ST-5	Area "B", Station 7+20 310' South	7.52×10^{-9} cm/sec @ 10 psi
ST-6	Area "C", Station 9+00 270' South	1.84×10^{-8} cm/sec @ 10 psi
ST-7	Area "D", Station 10+20 200' South	1.11×10^{-8} cm/sec @ 10 psi
ST-101	Cut off trench, Southwest corner Station 2+60, 570' South	1.95×10^{-8} cm/sec @ 10 psi
ST-8	Area "E", Station 7+20 450' South	1.61×10^{-8} cm/sec @ 10 psi
ST-9	Area "F", Station 11+20 250' South	8.78×10^{-9} cm/sec @ 10 psi
ST-10	Area "G", Station 9+00 500' South	1.37×10^{-8} cm/sec @ 10 psi
ST-11	Area "F", Station 11+20 300' South	1.21×10^{-8} cm/sec @ 10 psi

EMPIRE
SOILS INVESTIGATIONS INC.

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

Charles C. Keipper
Laboratory Manager

sll

EMPIRE
SOILS INVESTIGATIONS INC.

PROJECT: 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	Permeability
ST-12	Area "G", Station 9+00 500' South	9.07×10^{-9} cm/sec @ 10 psi
ST-13	Area "H", Station 1+00 300' South	1.49×10^{-8} cm/sec @ 10 psi
ST-14	Area "I", Station 1+00 480' South	7.80×10^{-9} cm/sec @ 10 psi
ST-15	Area "J", Station 1+00 100' South	1.34×10^{-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

Charles C. Keipper
Laboratory Manager

sll

EMPIRE
SOILS INVESTIGATIONS INC.

PROJECT: 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"	8.27×10^{-9} cm/sec @ 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"	9.42×10^{-9} cm/sec @ 10 psi
ST-19	Station 3+50 x 210' South Area "M"	1.28×10^{-8} cm/sec @ 10 psi
ST-20	Station 3+50 x 340' South Area "N"	3.17×10^{-8} cm/sec @ 10 psi
ST-21	Station 3+50 x 500' South Area "O"	7.47×10^{-8} cm/sec @ 10 psi
ST-22	Station 5+50 x 500' South Area "O"	1.12×10^{-8} cm/sec @ 10 psi
ST-23	Station 7+20 x 140' South Area "A"	1.15×10^{-8} cm/sec @ 10 psi
ST-24	Station 9+00 x 270' South Area "C"	8.84×10^{-9} cm/sec @ 10 psi

Constant Head Permeability (Con't.)

Sample#	Location	Permeability
ST-25	Station 10+20 x 200' South Area "D"	9.72×10^{-9} cm/sec @ 10 psi
ST-27	Station 7+20 x 310' South Area "B"	1.55×10^{-8} cm/sec @ 10 psi
ST-28	Station 5+50 x 200' South Area "K"	1.54×10^{-8} cm/sec @ 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

Charles C. Keipper
Manager Testing Services

sll

EMPIRE
SOILS INVESTIGATIONS INC.

PROJECT: 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	Permeability
ST-30	Station 3+50 x 70' South Area "L"	1.7×10^{-8} cm/sec @ 10 psi.
ST-31	Station 3+50 x 210' South Area "M"	1.6×10^{-8} cm/sec @ 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 SOILS INVESTIGATIONS, INC.

Charles C. Keipper

Charles C. Keipper
Laboratory Manager

sll

EMPIRE
SOILS INVESTIGATIONS INC.

PROJECT: 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	Permeability
ST-33	Station 1+00 x 100' South Area "J"	1.00×10^{-8} cm/sec @ 10 psi
ST-34	Station 1+00 x 300' South Area "H"	2.27×10^{-8} cm/sec @ 10 psi
ST-35	Station 1+00 x 480' South Area "I"	6.89×10^{-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

Charles C. Keipper
Manager Testing Services

sll

EMPIRE
SOILS INVESTIGATIONS INC.

PROJECT: 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	Permeability
ST-29	Station 7+20 x 450' South Area "E"	3.23×10^{-8} cm/sec @ 10 psi
ST-36	Station 3+50 x 500' South Area "O"	1.62×10^{-8} cm/sec @ 10 psi
ST-37	Station 5+50 x 500' South Area "O"	1.12×10^{-8} cm/sec @ 10 psi
ST-38	Station 9+00 x 35' South Area "P"	1.05×10^{-8} cm/sec @ 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

Charles C. Keipper
Manager Testing Services

sll

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

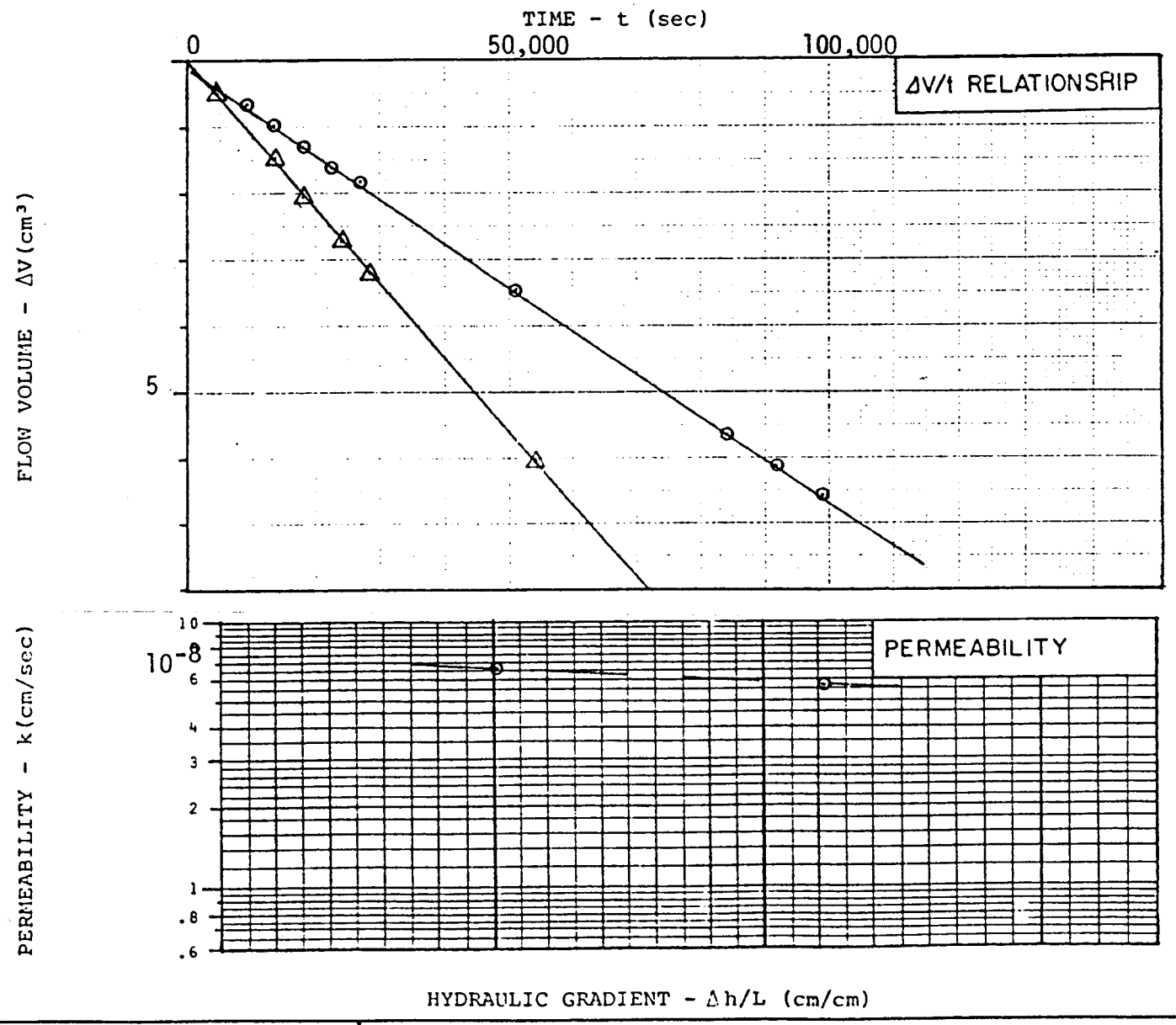
TEST DATA:

Specimen Height (cm): 14.58
Specimen Diameter (cm): 7.23
Dry Unit Weight (pcf): 107.7
Moisture Content Before Test (%): 18.3
Moisture Content After Test (%): 20.1
Cell Confining Pressure (psi): 95
Test Pressure (psi): 85 90
Back Pressure (psi): 80 80
Differential Head (psi): 5 10
Flow Rate (ΔV/t)(cm³/sec) O 6.45×10^{-5} Δ 1.12×10^{-4}
Permeability (cm/sec): O 6.52×10^{-8} Δ 5.66×10^{-8}

SAMPLE DATA:

Sample Identification: ST-1
1st. lift, East end, test pad
Visual Description: Red-brown SILT and CLAY, little gravel to pockets of tan silt
Remarks:

Maximum Dry Density (ASTM D ____) (pcf):
Optimum Moisture Content (%):
Percent Compaction: Constant Head Triaxial
Permeameter Type:



EMPIRE SOILS INVESTIGATIONS INC.

PERMEABILITY TEST REPORT

Union Carbide
Conestoga-Rovers and Assoc.

TEST DATA:

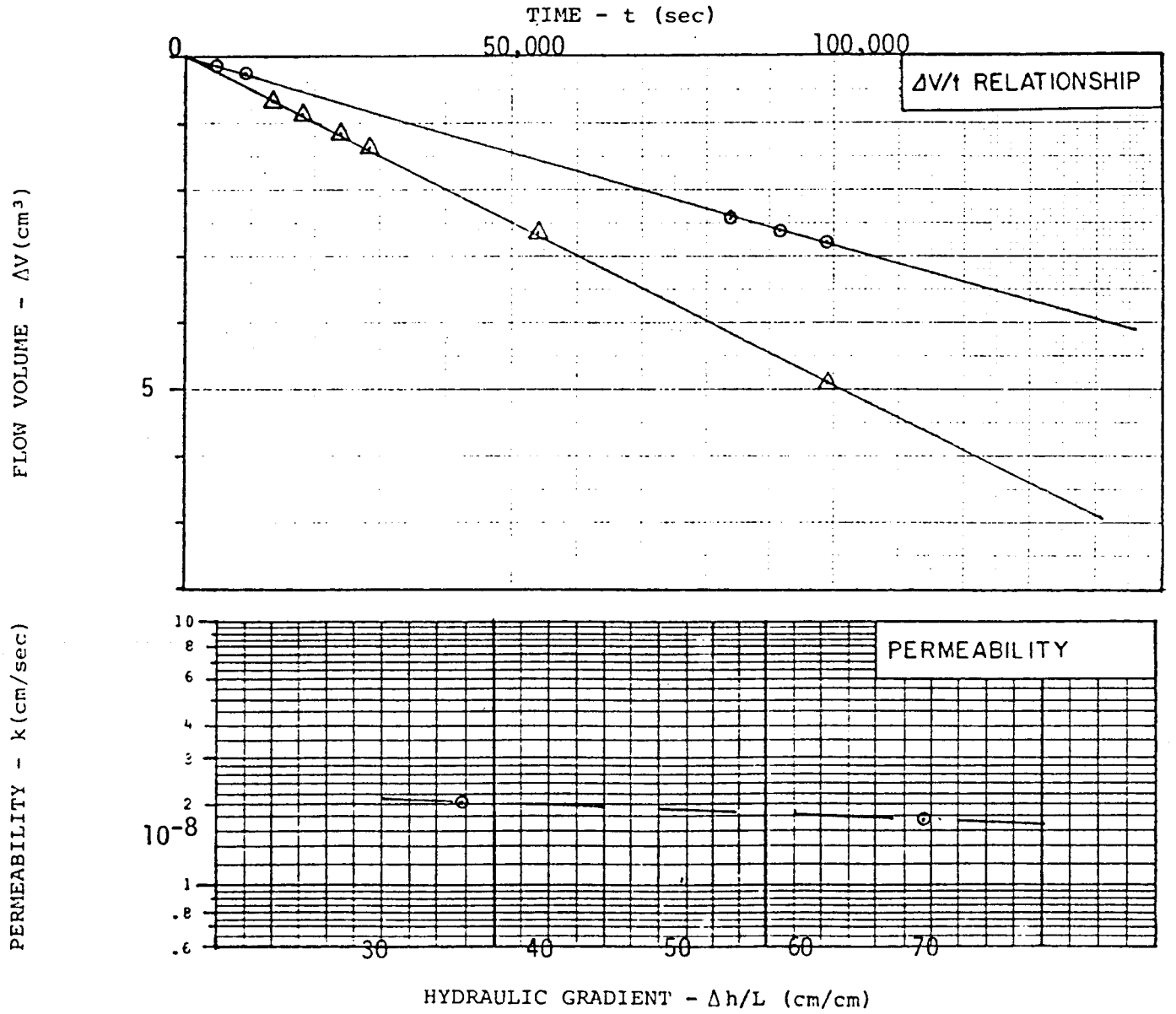
Specimen Height (cm): 10.41
Specimen Diameter (cm): 7.23
Dry Unit Weight (pcf): 109.5
Moisture Content Before Test (%): 19.3
Moisture Content After Test (%): 20.1
Cell Confining Pressure (psi): 95

Test Pressure (psi):	85	90
Back Pressure (psi):	80	80
Differential Head (psi):	5	10
Flow Rate (ΔV/t) (cm³/sec)	O 2.85x10^{-5}	Δ 4.93x10^{-5}
Permeability (cm/sec):	O 2.05x10^{-8}	Δ 1.78x10^{-8}

SAMPLE DATA:

Sample Identification: ST-2
1st. Lift, East end, test pad
Visual Description: Red-brown SILT and CLAY, trace fine sand and gravel
Remarks:

Maximum Dry Density (ASTM D ____) (pcf): ____
Optimum Moisture Content (%): ____
Percent Compaction: ____
Permeameter Type: Constant Head Triaxial



EMPIRE SOILS INVESTIGATIONS INC.

PERMEABILITY TEST REPORT

Union Carbide
Conestoga-Rovers and Associates

TEST DATA:

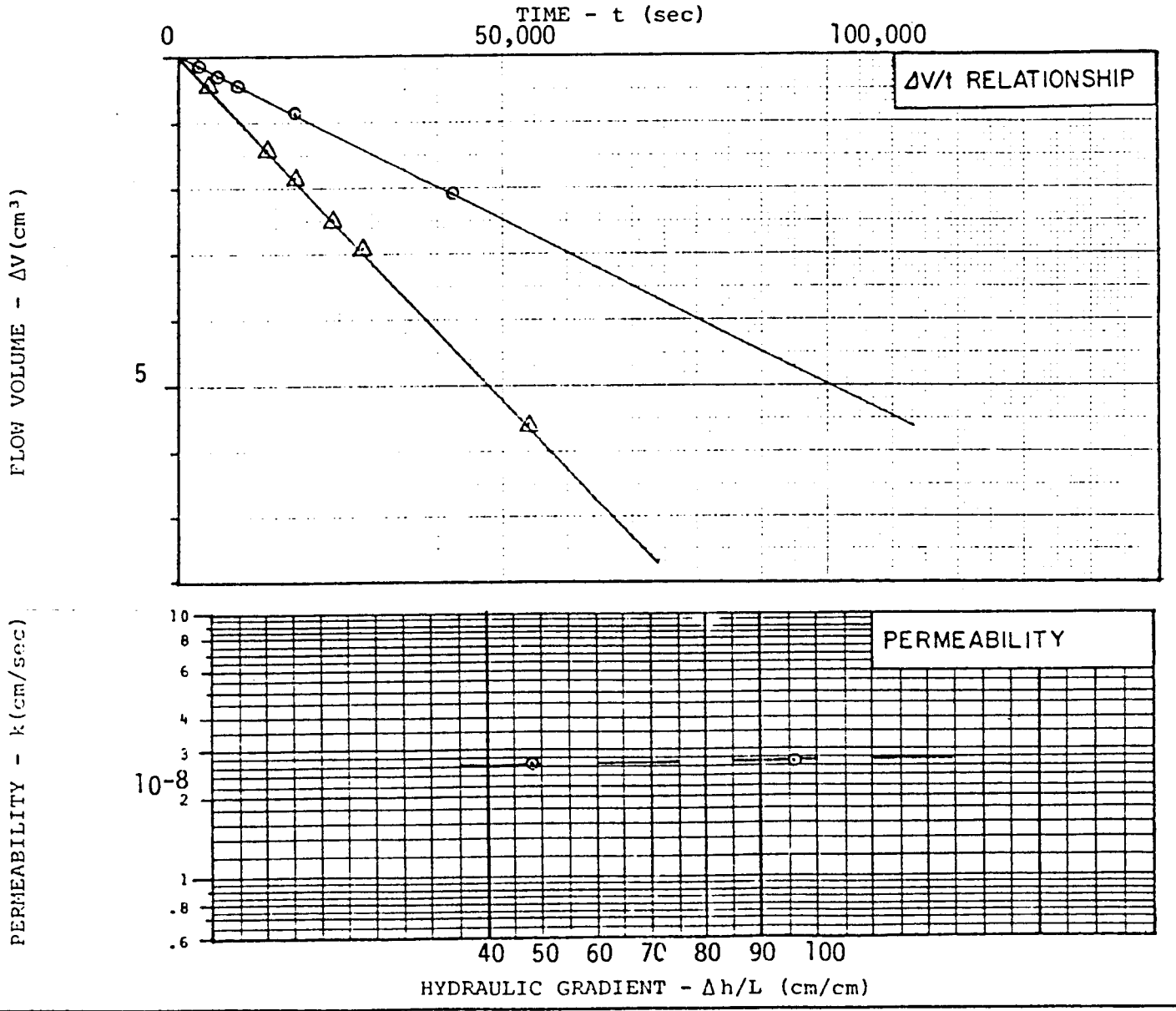
Specimen Height (cm): 7.36
Specimen Diameter (cm): 7.14
Dry Unit Weight (pcf): 109.0
Moisture Content Before Test (%): 19.0
Moisture Content After Test (%): 20.8
Cell Confining Pressure (psi): 95

	O	Δ
Test Pressure (psi):	85	90
Back Pressure (psi):	80	80
Differential Head (psi):	5	10
Flow Rate (ΔV/t) (cm³/sec)	5.00×10^{-5}	1.04×10^{-4}
Permeability (cm/sec):	2.62×10^{-8}	2.72×10^{-8}

SAMPLE DATA:

Sample Identification: ST-3
Second lift, East end test pit
Visual Description: Red-brown SILT and CLAY, trace fine sand and gravel
Remarks:

Maximum Dry Density (ASTM D ____) (pcf): ____
Optimum Moisture Content (%): ____
Percent Compaction: ____
Permeameter Type: Constant Head Triaxial



EMPIRE SOILS INVESTIGATIONS INC.

PERMEABILITY TEST REPORT

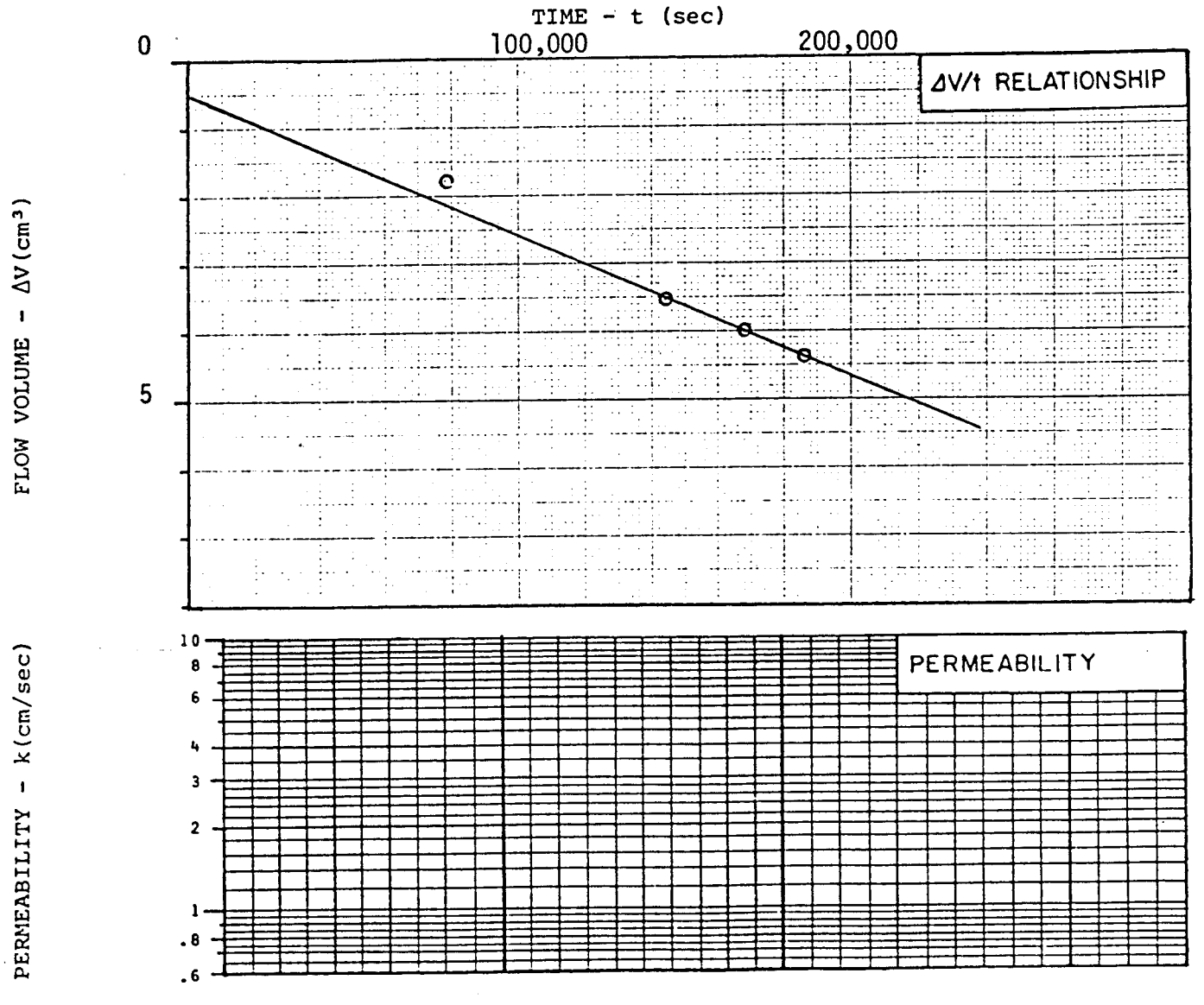
Union Carbide
Conestoga- Rovers and Associates

TEST DATA:

Specimen Height (cm): 9.14
Specimen Diameter (cm): 7.17
Dry Unit Weight (pcf): 113.6
Moisture Content Before Test (%): 17.3
Moisture Content After Test (%): 19.2
Cell Confining Pressure (psi): 95
Test Pressure (psi): 90
Back Pressure (psi): 80
Differential Head (psi): 10
Flow Rate ($\Delta V/t$) (cm^3/sec) O 4.20×10^{-5} Δ
Permeability (cm/sec): O 1.35×10^{-8} Δ

SAMPLE DATA:

Sample Identification: ST-4
Area A
Visual Description: Stiff red-brown
Silt and Clay, trace gravel
Remarks:
Station 7+20, 140' South
Maximum Dry Density
(ASTM D ____) (pcf):
Optimum Moisture Content (%):
Percent Compaction:
Permeameter Type: Constant Head Triaxial



EMPIRE SOILS INVESTIGATIONS INC

PERMEABILITY TEST REPORT

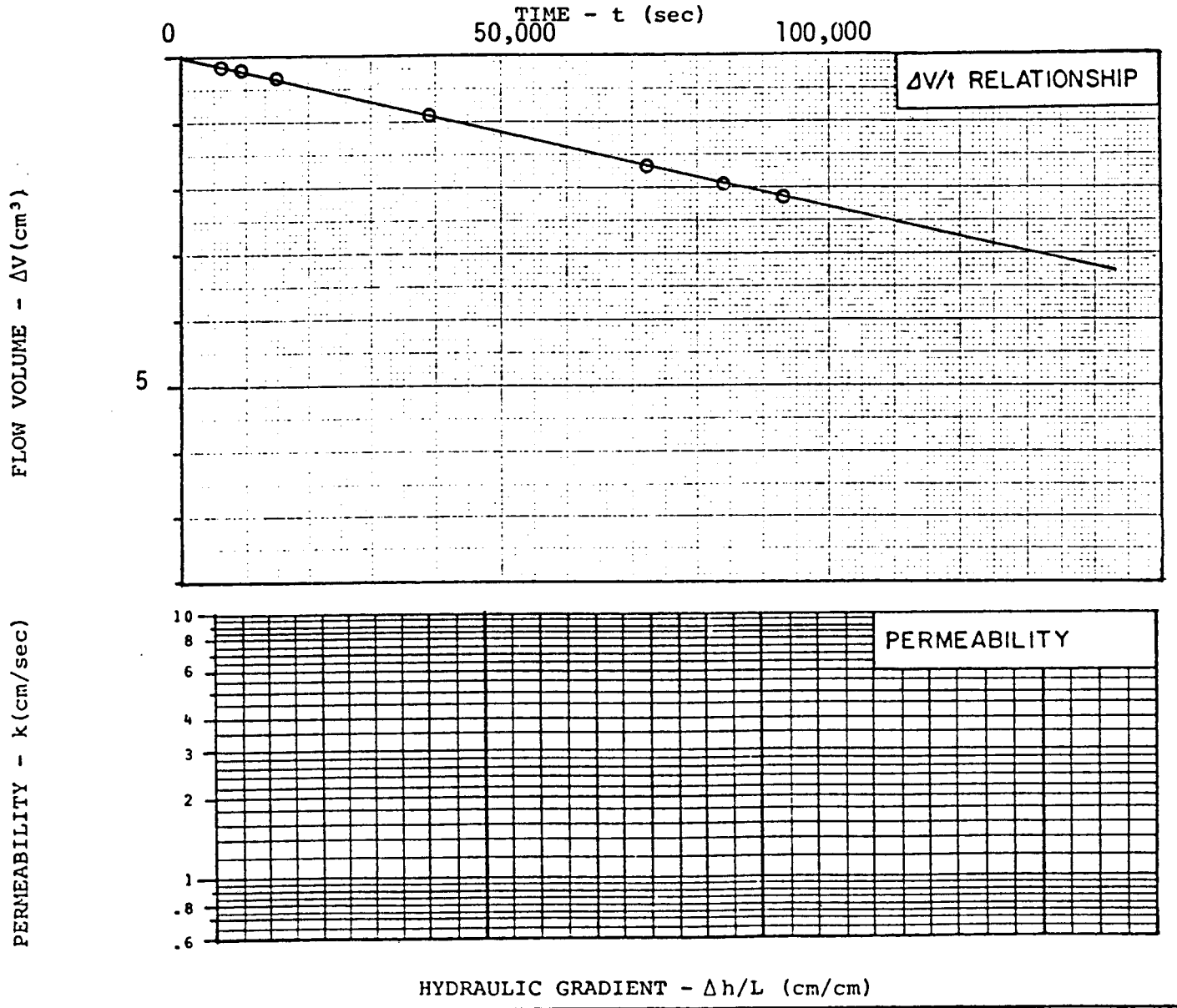
Union Carbide
Conestoga-Rovers and Associates

TEST DATA:

Specimen Height (cm): 9.46
Specimen Diameter (cm): 7.24
Dry Unit Weight (pcf): 111.6
Moisture Content Before Test (%): 18.5
Moisture Content After Test (%): 20.7
Cell Confining Pressure (psi): 95
Test Pressure (psi): 90
Back Pressure (psi): 80
Differential Head (psi): 10
Flow Rate ($\Delta V/t$) (cm^3/sec) O 2.30×10^{-5} Δ
Permeability (cm/sec): O 7.52×10^{-9} Δ

SAMPLE DATA:

Sample Identification: ST-5
Area B
Visual Description: Stiff red-brown
Silt and Clay, trace gravel
Remarks:
Station 7+20, 310' South
Maximum Dry Density
(ASTM D ____) (pcf):
Optimum Moisture Content (%):
Percent Compaction:
Permeameter Type: Constant Head Triaxial



EMPIRE SOILS INVESTIGATIONS INC

PERMEABILITY TEST REPORT

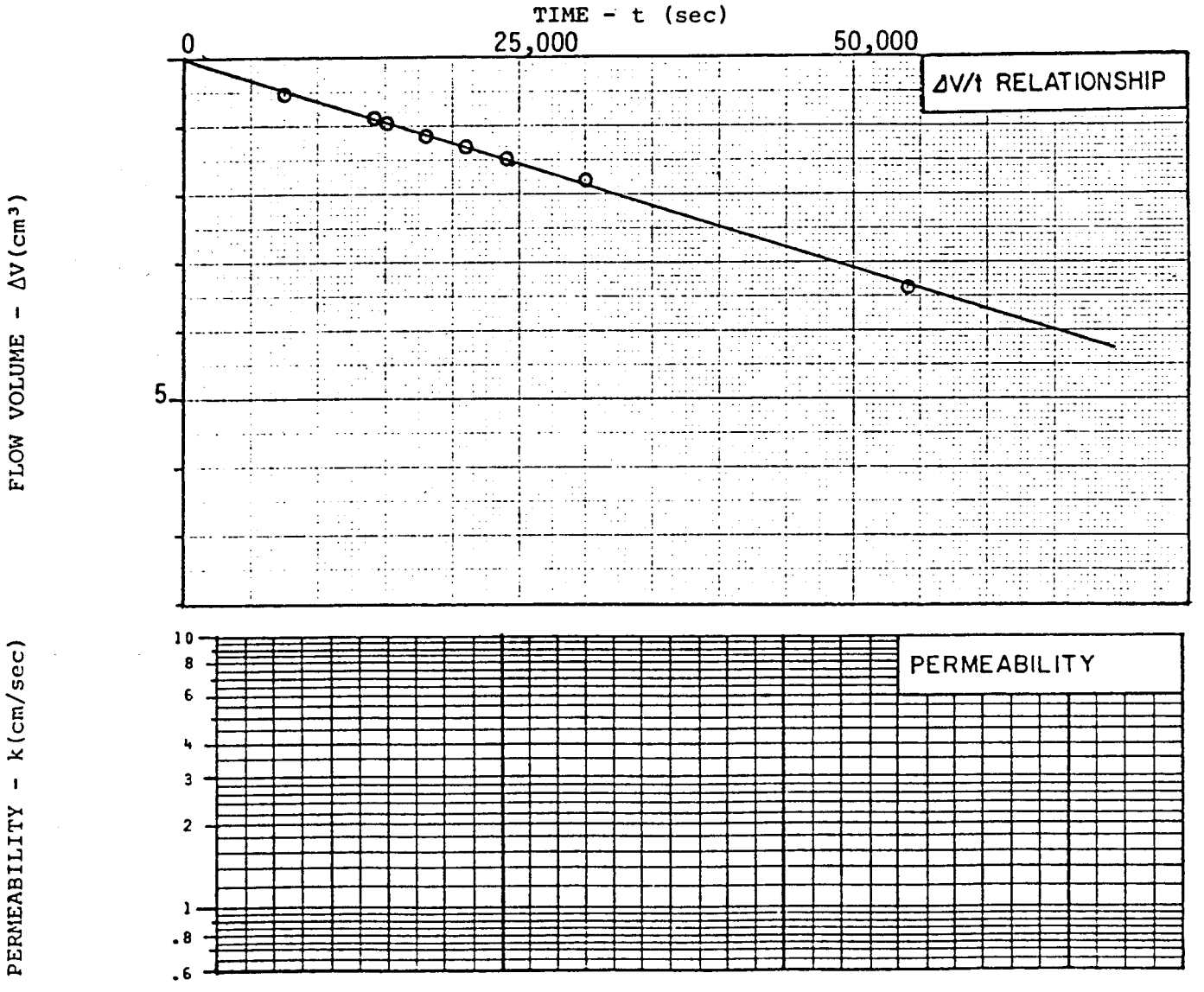
Union Carbide
Conestoga-Rovers & Associates

TEST DATA:

Specimen Height (cm): 9.47
Specimen Diameter (cm): 7.19
Dry Unit Weight (pcf): 107.7
Moisture Content Before Test (%): 20.4
Moisture Content After Test (%): 22.3
Cell Confining Pressure (psi): 95
Test Pressure (psi): 90
Back Pressure (psi): 80
Differential Head (psi): 10
Flow Rate ($\Delta V/t$) (cm^3/sec) O 5.55×10^{-5} Δ
Permeability (cm/sec): O 1.84×10^{-8} Δ

SAMPLE DATA

Sample Identification: ST-6
Area C
Visual Description: Stiff red-brown
Silt and Clay, trace gravel
Remarks:
Station 9+00, 270' South
Maximum Dry Density
(ASTM D ____) (pcf):
Optimum Moisture Content (%):
Percent Compaction:
Permeameter Type: Constant Head Triaxial



EMPIRE SOILS INVESTIGATIONS INC

PERMEABILITY TEST REPORT

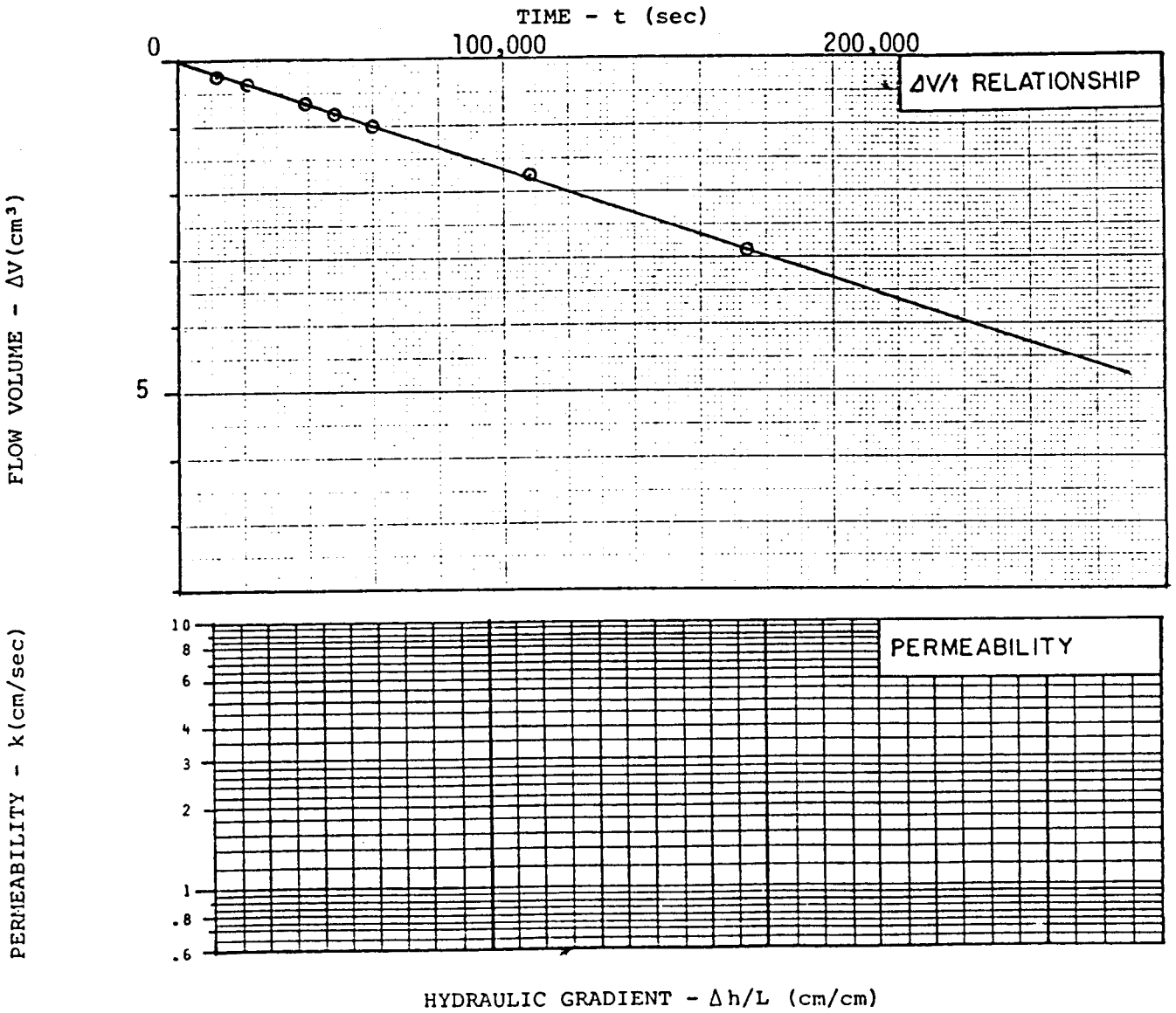
Union Carbide
Conestoga-Rovers & Associates

TEST DATA:

Specimen Height (cm): 9.50
Specimen Diameter (cm): 7.17
Dry Unit Weight (pcf): 106.8
Moisture Content Before Test (%): 22.1
Moisture Content After Test (%): 22.1
Cell Confining Pressure (psi): 95
Test Pressure (psi): 90
Back Pressure (psi): 80
Differential Head (psi): 10
Flow Rate ($\Delta V/t$) (cm^3/sec) O 3.30×10^{-5} Δ
Permeability (cm/sec): O 1.11×10^{-8} Δ

SAMPLE DATA:

Sample Identification: ST-7
Area D
Visual Description: Red-brown SILT and CLAY, trace gravel
Remarks: Station 10+20, 200' South
Maximum Dry Density (ASTM D ____) (pcf): ____
Optimum Moisture Content (%): ____
Percent Compaction: ____
Permeameter Type: Constant Head Triaxial



EMPIRE SOILS INVESTIGATIONS INC.

PERMEABILITY TEST REPORT

Union Carbide
Conestoga-Rovers & Associates

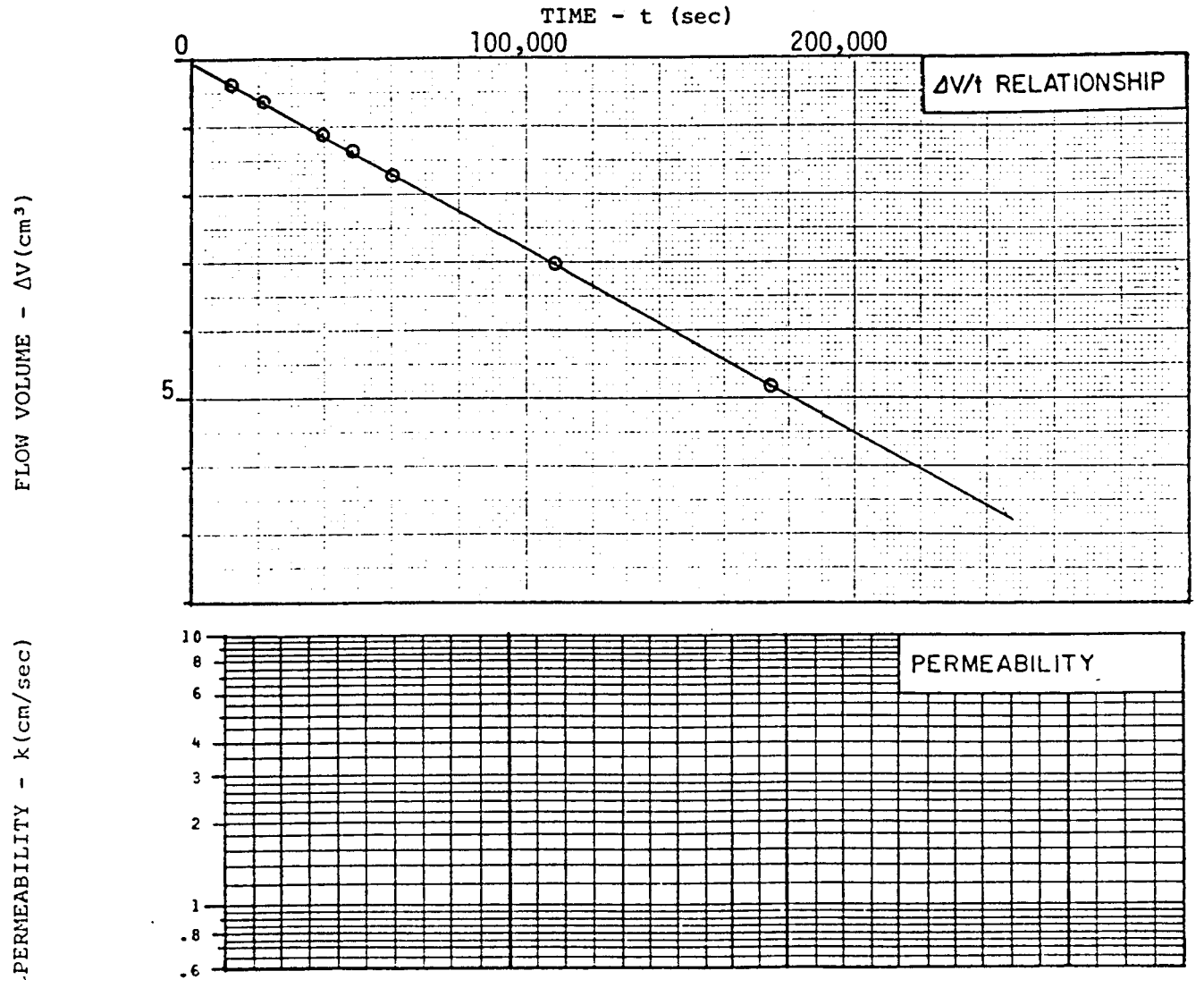
DR BY: DJG	CK'D CCK	DATE: 5/29/87	PROJ.NO. BT-87-85

TEST DATA:

Specimen Height (cm): 8.50
Specimen Diameter (cm): 7.19
Dry Unit Weight (pcf): 125.2
Moisture Content Before Test (%): 12.0
Moisture Content After Test (%): 12.7
Cell Confining Pressure (psi): 95
Test Pressure (psi): 90
Back Pressure (psi): 80
Differential Head (psi): 10
Flow Rate ($\Delta V/t$) (cm^3/sec) O 5.40×10^{-5} Δ
Permeability (cm/sec): O 1.61×10^{-8} Δ

SAMPLE DATA:

Sample Identification: ST-8
Area E
Visual Description: Red-brown Silt and Clay, trace gravel, changing to Silt, some clay, little fine sand & gravel
Remarks: Station 7+20, 450' South
Maximum Dry Density (ASTM D ____) (pcf):
Optimum Moisture Content (%):
Percent Compaction:
Permeameter Type: Constant Head Triaxial



EMPIRE SOILS INVESTIGATIONS INC

PERMEABILITY TEST REPORT

Union Carbide
Conestoga-Rovers & Associates

DR BY: DJG	CK'D. CCK	DATE: 5/29/87	PROJ. NO. BT-87-85

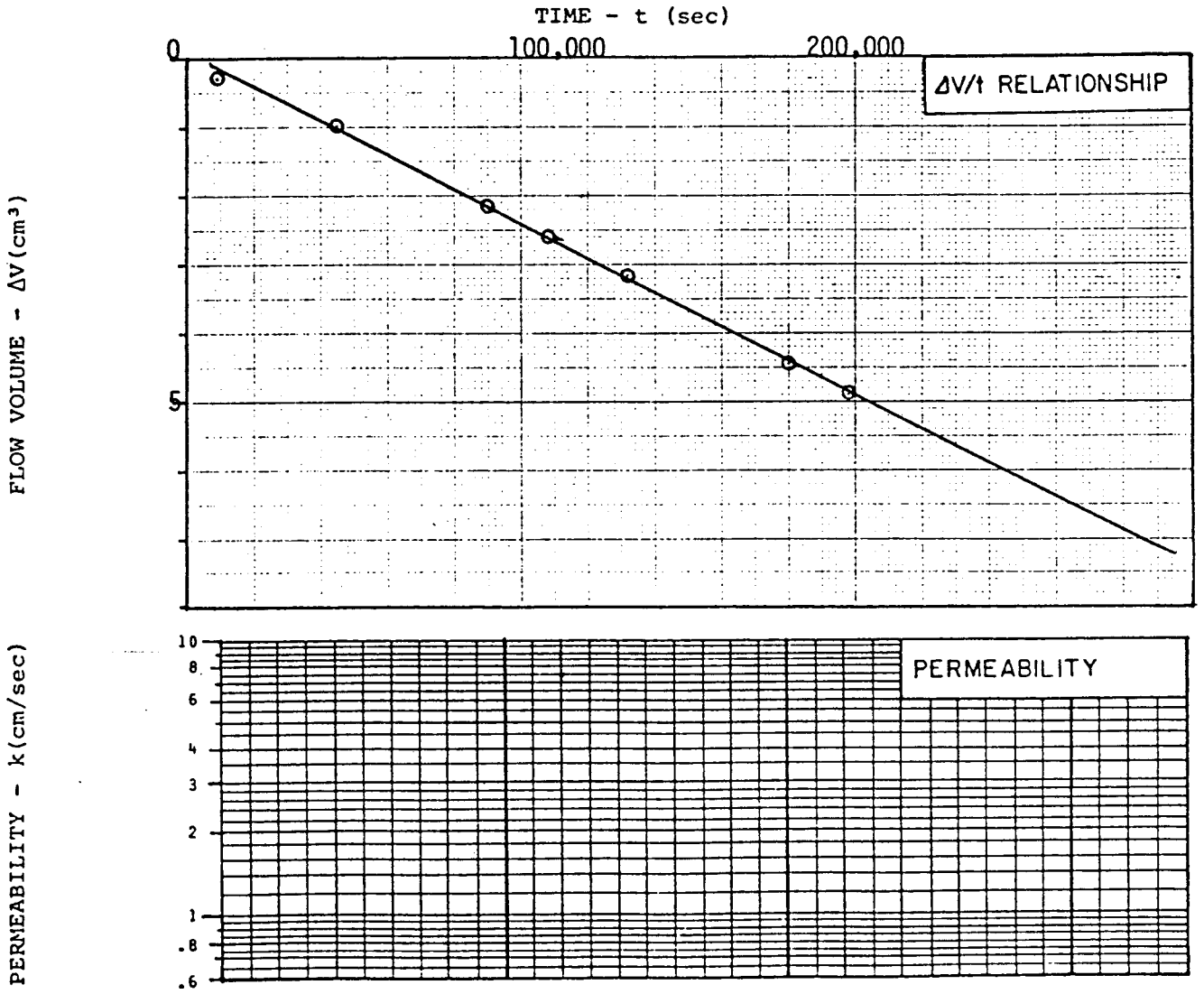
TEST DATA:

Specimen Height (cm): 9.50
Specimen Diameter (cm): 7.25
Dry Unit Weight (pcf): 105.8
Moisture Content Before Test (%): 22.5
Moisture Content After Test (%): 21.7
Cell Confining Pressure (psi): 95
Test Pressure (psi): 90
Back Pressure (psi): 80
Differential Head (psi): 10
Flow Rate ($\Delta V/t$) (cm^3/sec) O 2.68×10^{-5} Δ
Permeability (cm/sec): O 8.78×10^{-9} Δ

SAMPLE DATA

Sample Identification: ST-9
Area F
Visual Description: Red-brown Silt and Clay, trace gravel
Remarks: Station 11+20, 250' South

Maximum Dry Density (ASTM D ____) (pcf):
Optimum Moisture Content (%):
Percent Compaction:
Permeameter Type: Constant Head Triaxial



EMPIRE SOILS INVESTIGATIONS INC.

PERMEABILITY TEST REPORT

Union Carbide
Conestoga-Rovers & Associates

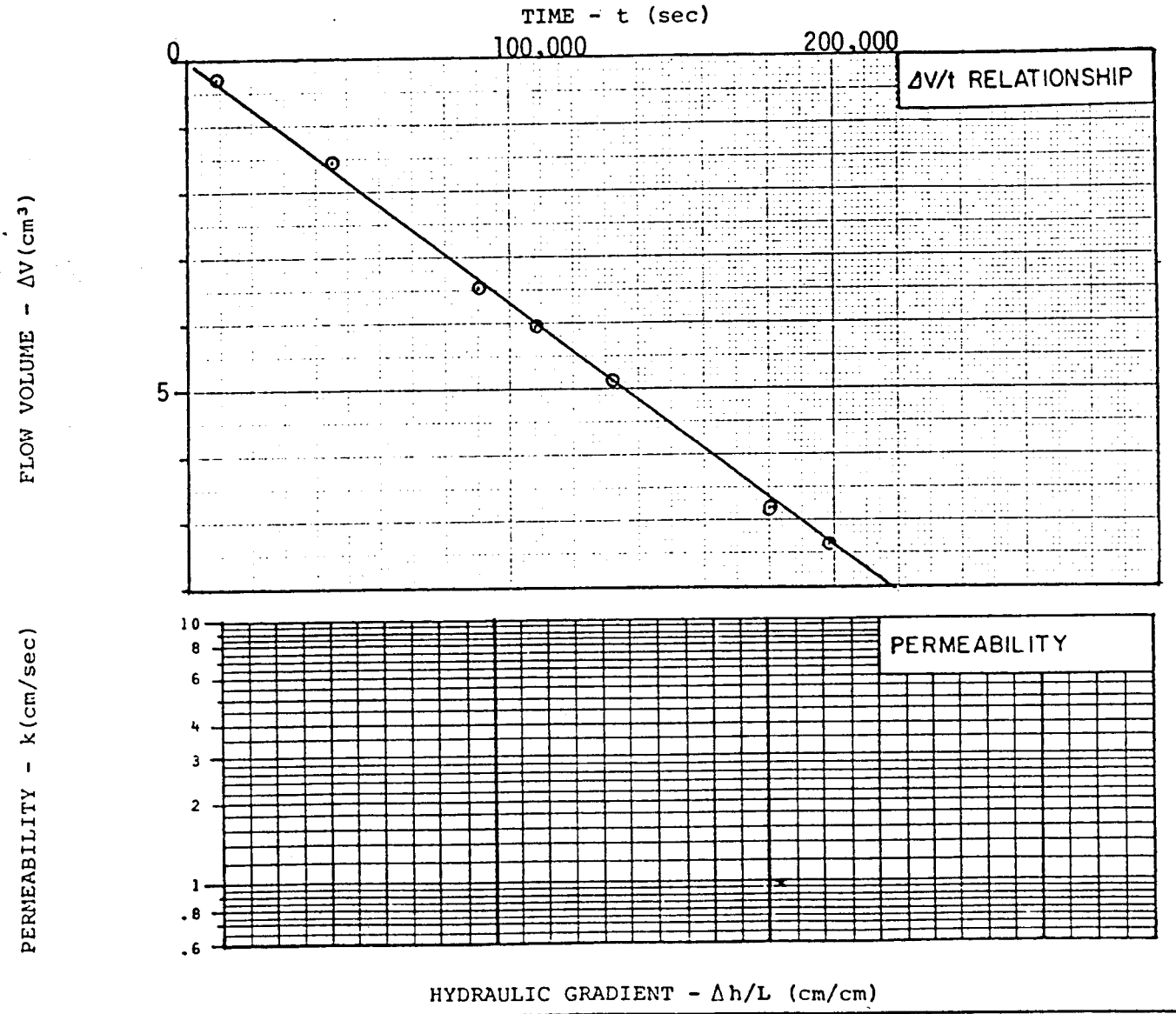
DR BY:	CK'D. CCK	DATE: 5/29/87	PROJ.NO. BT-87-85

TEST DATA:

Specimen Height (cm): 9.48
Specimen Diameter (cm): 7.25
Dry Unit Weight (pcf): 106.6
Moisture Content Before Test (%): 22.5
Moisture Content After Test (%): 22.1
Cell Confining Pressure (psi): 95
Test Pressure (psi): 90
Back Pressure (psi): 80
Differential Head (psi): 10
Flow Rate ($\Delta V/t$) (cm^3/sec) O 4.19×10^{-5} Δ
Permeability (cm/sec): O 1.37×10^{-8} Δ

SAMPLE DATA:

Sample Identification: ST-10
Area G
Visual Description: Red-brown SILT and CLAY, trace gravel
Remarks:
Station 9+00, 500' South
Maximum Dry Density (ASTM D ____) (pcf):
Optimum Moisture Content (%):
Percent Compaction:
Permeameter Type: Constant Head Triaxial



EMPIRE SOILS INVESTIGATIONS INC.

PERMEABILITY TEST REPORT

Union Carbide
Conestoga-Rovers & Associates

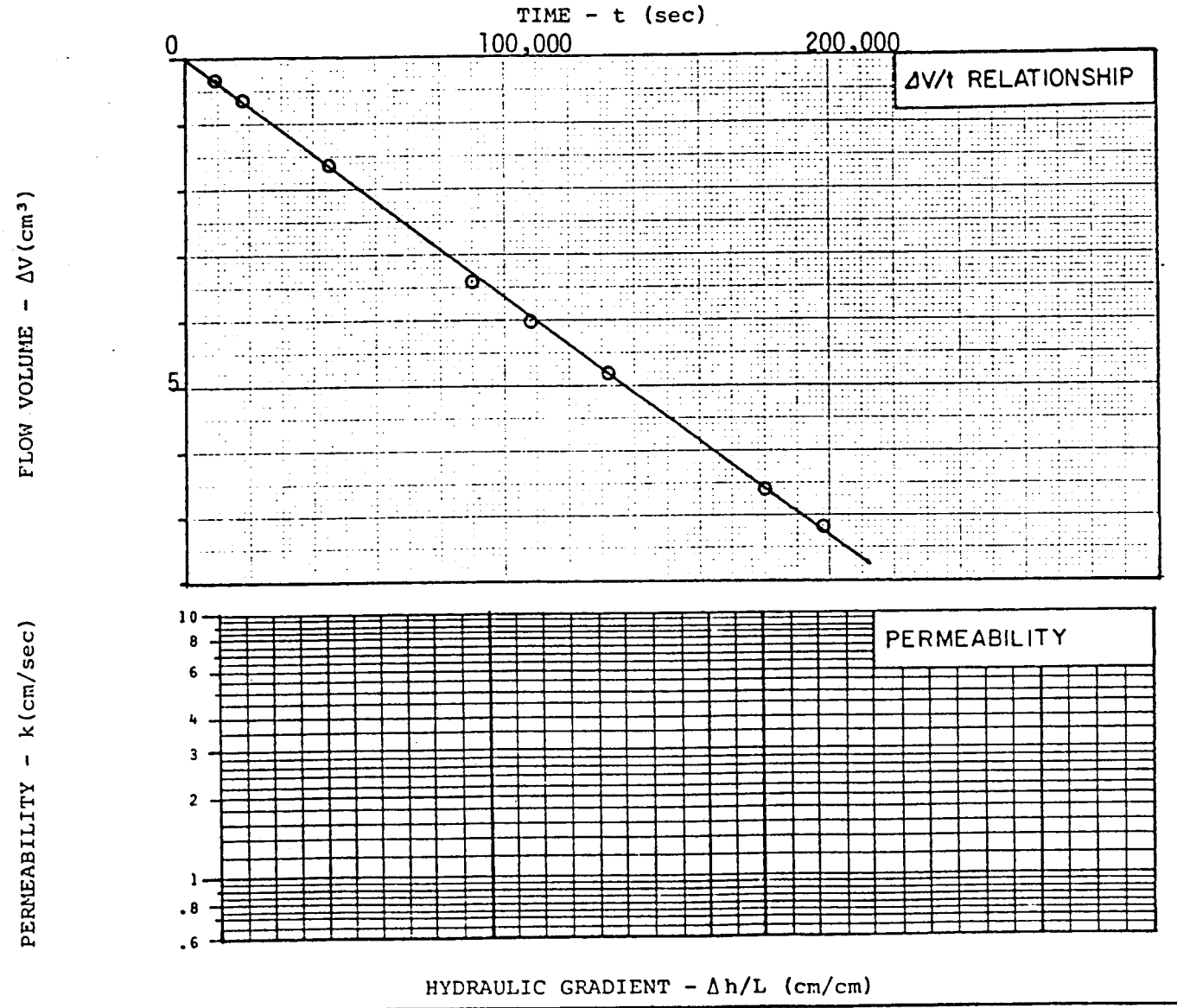
DR BY:	CK'D. CCK	DATE: 5/29/87	PROJ. NO. BT-87-85

TEST DATA:

Specimen Height (cm): 9.48
Specimen Diameter (cm): 7.27
Dry Unit Weight (pcf): 108.2
Moisture Content Before Test (%): 19.0
Moisture Content After Test (%): 20.1
Cell Confining Pressure (psi): 95
Test Pressure (psi): 90
Back Pressure (psi): 80
Differential Head (psi): 10
Flow Rate (ΔV/t) (cm³/sec) O 3.74×10^{-5} Δ
Permeability (cm/sec): O 1.21×10^{-8} Δ

SAMPLE DATA:

Sample Identification: ST-11
Area F
Visual Description: Red-brown SILT and CLAY, trace gravel
Remarks:
Station 11+20, 300' South
Maximum Dry Density (ASTM D ____) (pcf):
Optimum Moisture Content (%):
Percent Compaction:
Permeameter Type: Constant Head Triaxial



EMPIRE SOILS INVESTIGATIONS INC.

PERMEABILITY TEST REPORT

Union Carbide
Conestoga-Rovers & Associates

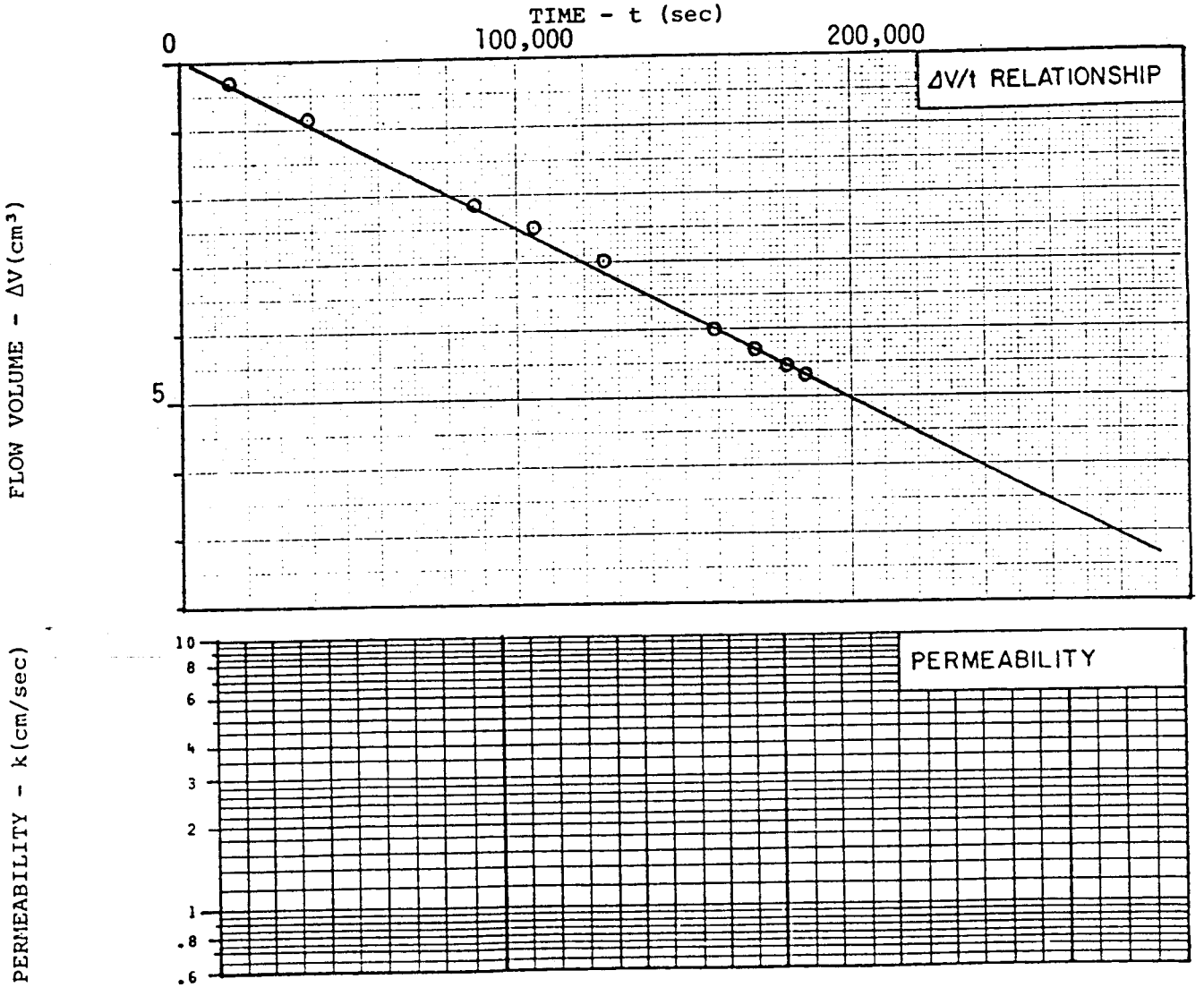
DR BY:	CK'D CCK	DATE 5/29/87	PROJ.NO. BT-87-85

TEST DATA:

Specimen Height (cm): 9.47
Specimen Diameter (cm): 7.21
Dry Unit Weight (pcf): 110.6
Moisture Content Before Test (%): 19.8
Moisture Content After Test (%): 20.5
Cell Confining Pressure (psi): 95
Test Pressure (psi): 90
Back Pressure (psi): 80
Differential Head (psi): 10
Flow Rate (ΔV/t)(cm³/sec) O 2.75x10⁻⁵ Δ
Permeability (cm/sec): O 9.07x10⁻⁹ Δ

SAMPLE DATA:

Sample Identification: ST-12
Area G
Visual Description: Stiff red-brown Silt and Clay, with occasional pockets of tan silt
Remarks: Station 9+00, 500' South
Maximum Dry Density (ASTM D ____) (pcf): ____
Optimum Moisture Content (%): ____
Percent Compaction: ____
Permeameter Type: Constant Head Triaxial



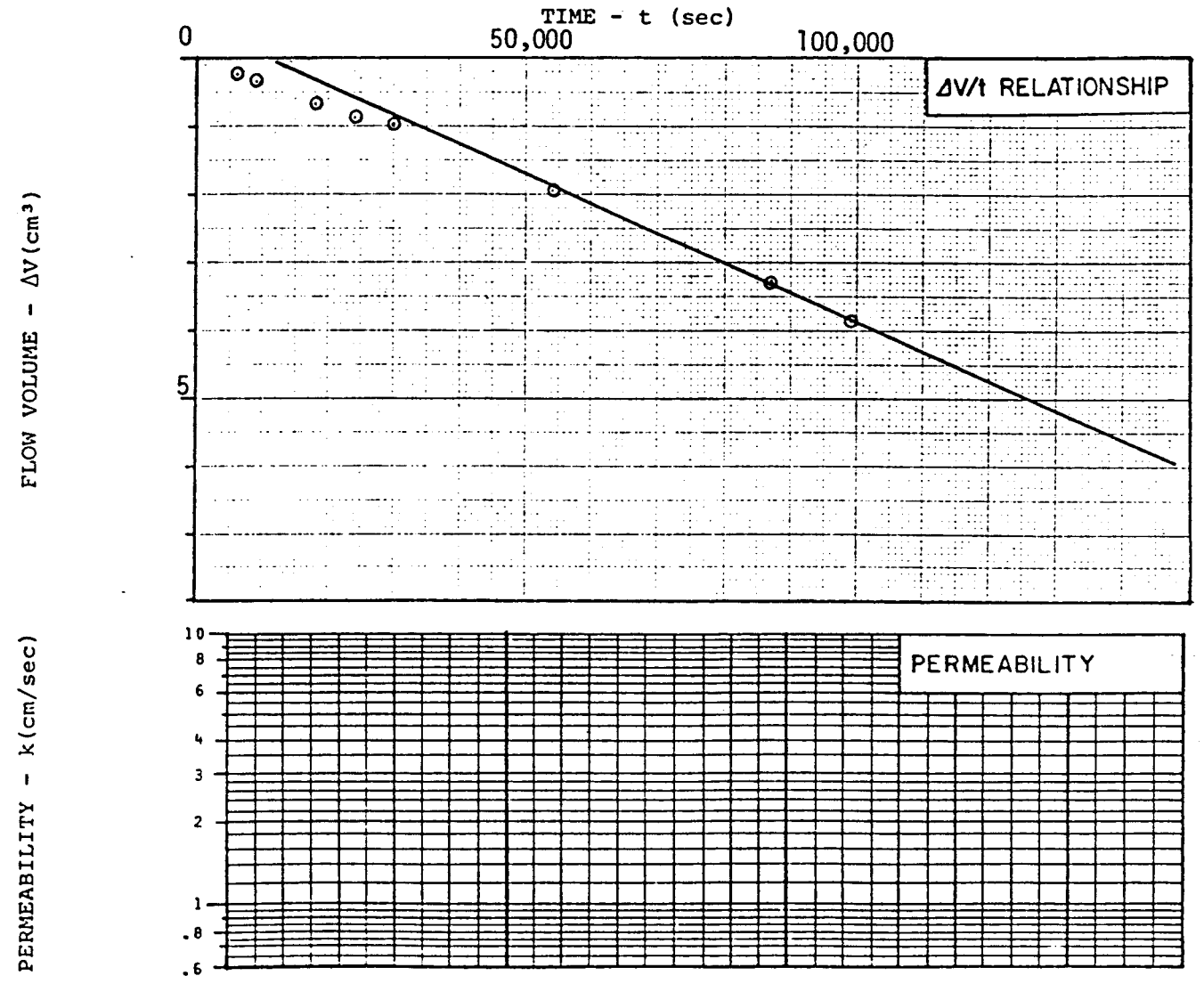
EMPIRE SOILS INVESTIGATIONS INC.

PERMEABILITY TEST REPORT

Union Carbide
Conestoga-Rovers & Associates

DR BY:	CK'D CCK	DATE: 5/29/87	PROJ.NO. BT-87-85

TEST DATA:		SAMPLE DATA:	
Specimen Height (cm):	10.38	Sample Identification:	ST-13
Specimen Diameter (cm):	7.19		Area H
Dry Unit Weight (pcf):	121.8	Visual Description:	Red-brown & tan SILT some clay with pockets of tank silt and fine sand, trace gravel
Moisture Content Before Test (%):	14.0		
Moisture Content After Test (%):	14.9	Remarks:	Station 1+00, 300' South
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	4.10×10^{-5} Δ	Percent Compaction:	
Permeability (cm/sec): O	1.49×10^{-8} Δ	Permeameter Type:	Constant Head Triaxial



EMPIRE SOILS INVESTIGATIONS INC.

PERMEABILITY TEST REPORT

Union Carbide
Conestoga-Rovers & Associates

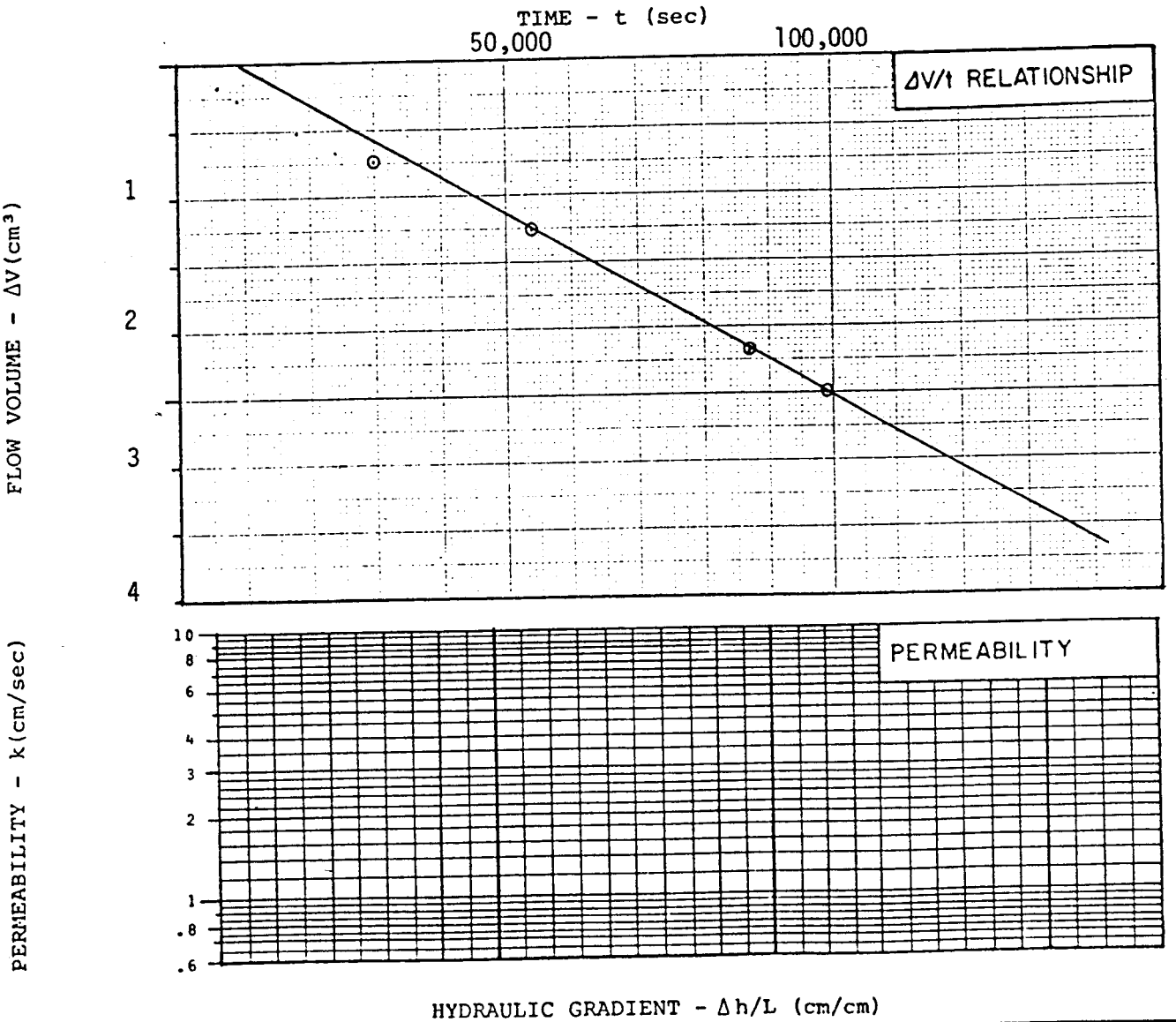
DRWN: NG	CK'D. CCK	DATE: 5/29/87	PROJ.NO. BT-87-85

TEST DATA:

Specimen Height (cm): 9.14
Specimen Diameter (cm): 7.28
Dry Unit Weight (pcf): 106.2
Moisture Content Before Test (%): 22.3
Moisture Content After Test (%): 22.9
Cell Confining Pressure (psi): 95
Test Pressure (psi): 90
Back Pressure (psi): 80
Differential Head (psi): 10
Flow Rate ($\Delta V/t$) (cm^3/sec) O 2.50×10^{-5} Δ
Permeability (cm/sec): O 7.80×10^{-9} Δ

SAMPLE DATA:

Sample Identification: ST-14
Area I
Visual Description: Red-brown Silt and Clay, trace gravel
Remarks: Station 1+00, 480' South
Maximum Dry Density (ASTM D ____) (pcf):
Optimum Moisture Content (%):
Percent Compaction:
Permeameter Type: Constant Head Triaxial



EMPIRE SOILS INVESTIGATIONS INC.

PERMEABILITY TEST REPORT

Union Carbide
Conestoga-Rovers & Associates

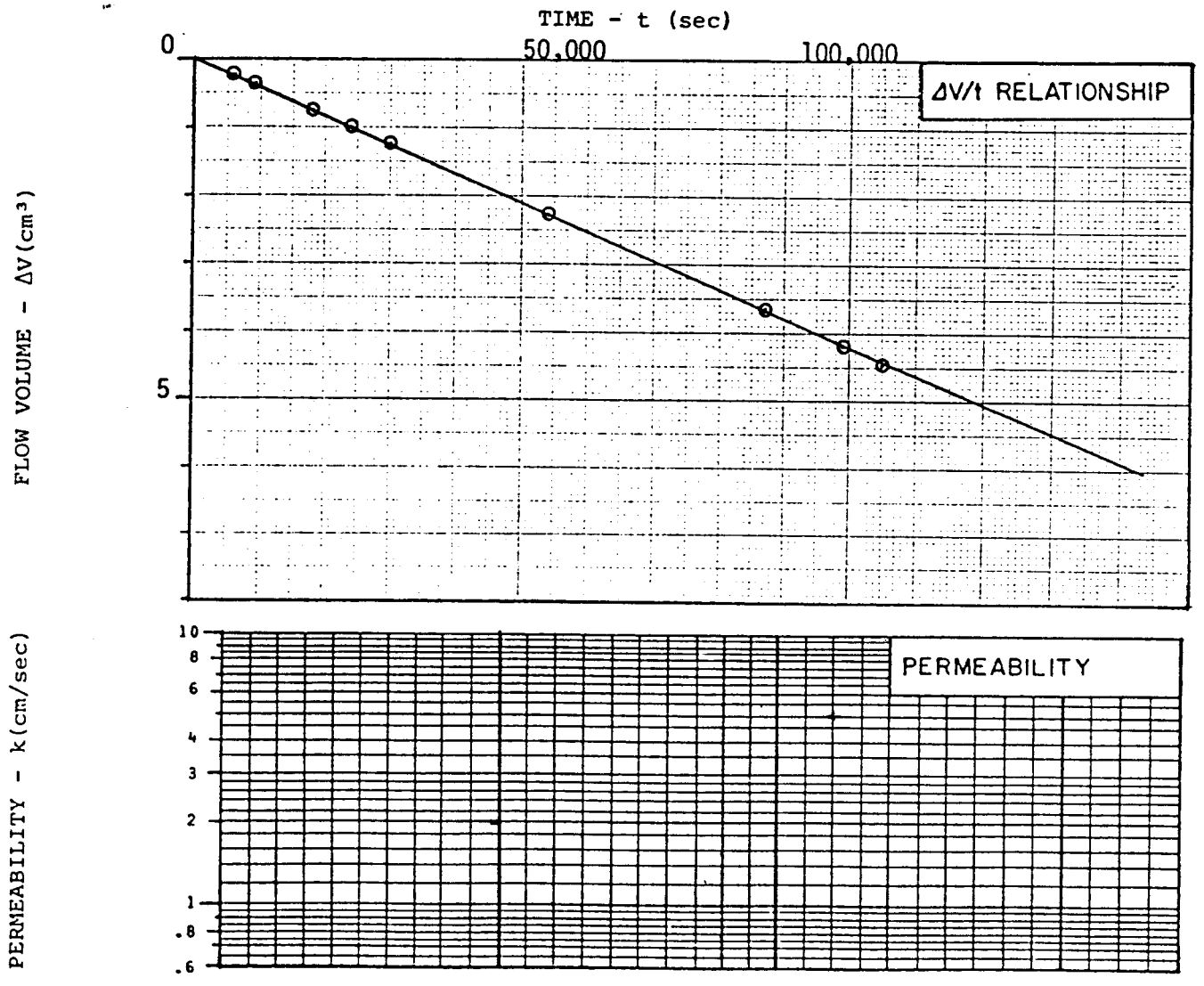
DR BY: DJG	CK'D CCK	DATE: 5/29/87	PROJ.NO. BT-87-85

TEST DATA:

Specimen Height (cm): 9.11
Specimen Diameter (cm): 7.24
Dry Unit Weight (pcf): 108.0
Moisture Content Before Test (%): 21.2
Moisture Content After Test (%): 21.3
Cell Confining Pressure (psi): 95
Test Pressure (psi): 90
Back Pressure (psi): 80
Differential Head (psi): 10
Flow Rate ($\Delta V/t$) (cm^3/sec) O 4.25×10^{-5} Δ
Permeability (cm/sec): O 1.34×10^{-8} Δ

SAMPLE DATA:

Sample Identification: ST-15
Area J
Visual Description: Red-brown Silt and clay, with pockets of tan silt, tr. grave
Remarks:
Station 1+00, 100' South
Maximum Dry Density (ASTM D ____) (pcf):
Optimum Moisture Content (%):
Percent Compaction:
Permeameter Type: Constant Head Triaxial



EMPIRE SOILS INVESTIGATIONS INC

PERMEABILITY TEST REPORT

Union Carbide
Conestoga-Rovers & Associates

DR BY:	CK'D.	DATE	PROJ. NO.
[illegible]	CCK	5/29/87	BT-87-85

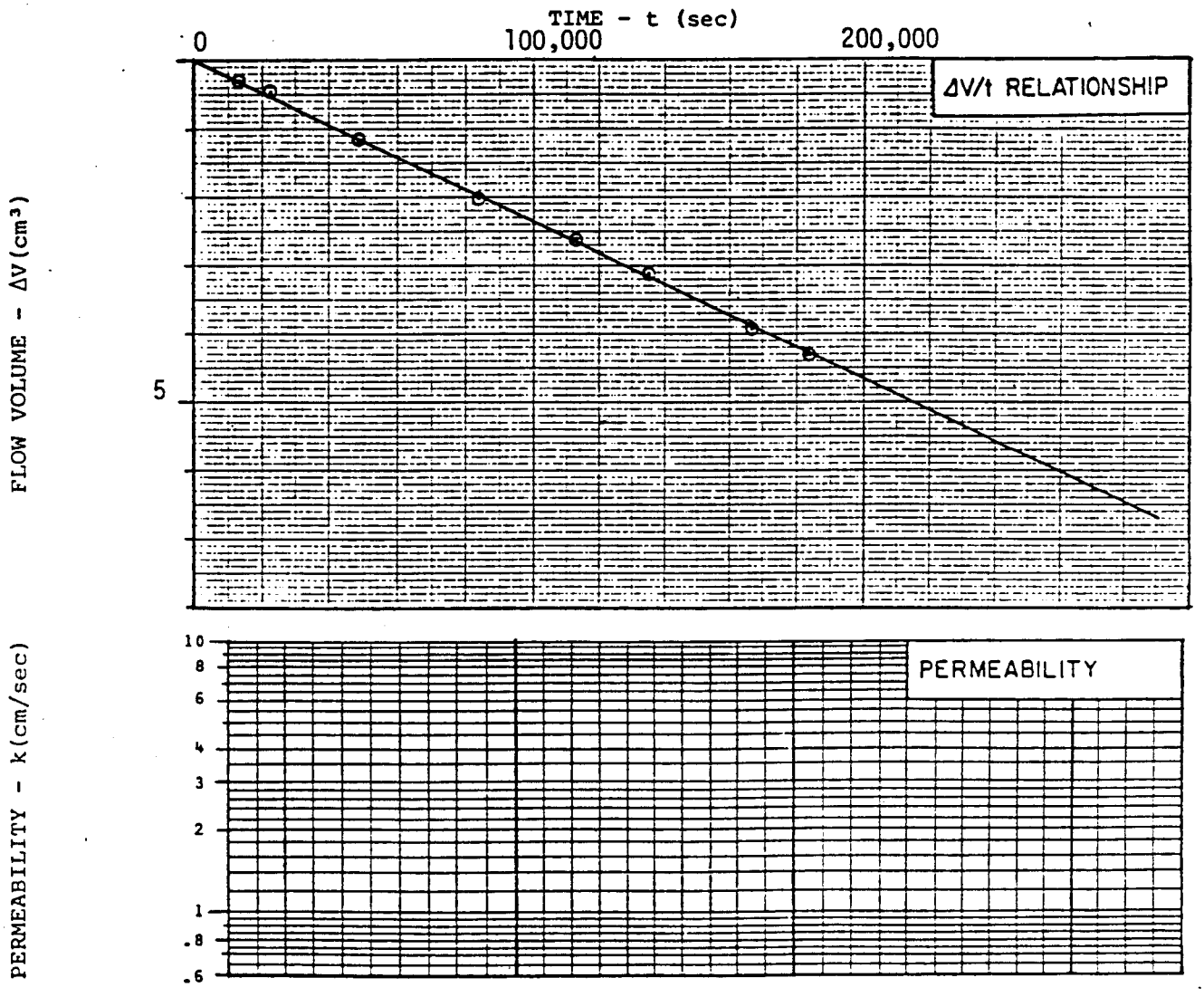
TEST DATA:

Specimen Height (cm): 10.40
Specimen Diameter (cm): 7.24
Dry Unit Weight (pcf): 105.4
Moisture Content Before Test (%): 22.4
Moisture Content After Test (%): 24.0
Cell Confining Pressure (psi): 95
Test Pressure (psi): 90
Back Pressure (psi): 80
Differential Head (psi): 10
Flow Rate ($\Delta V/t$) (cm^3/sec) O 2.30×10^{-5} Δ
Permeability (cm/sec): O 8.27×10^{-9} Δ

SAMPLE DATA:

Sample Identification: ST-16
Station 9+00, 35' South - Area P
Visual Description: Brown SILT and red-brown mottled Silt and Clay, trace gravel, stiff
Remarks:

Maximum Dry Density (ASTM D ____) (pcf):
Optimum Moisture Content (%):
Percent Compaction:
Permeameter Type: Constant Head Triaxial



EMPIRE SOILS INVESTIGATIONS INC

PERMEABILITY TEST REPORT

Union Carbide
Conestoga-Rovers & Associates
REPORT #L-5

DR BY: DJC	CK'D. CK	DATE: 7/7/87	PROJ. NO. BT-87-85

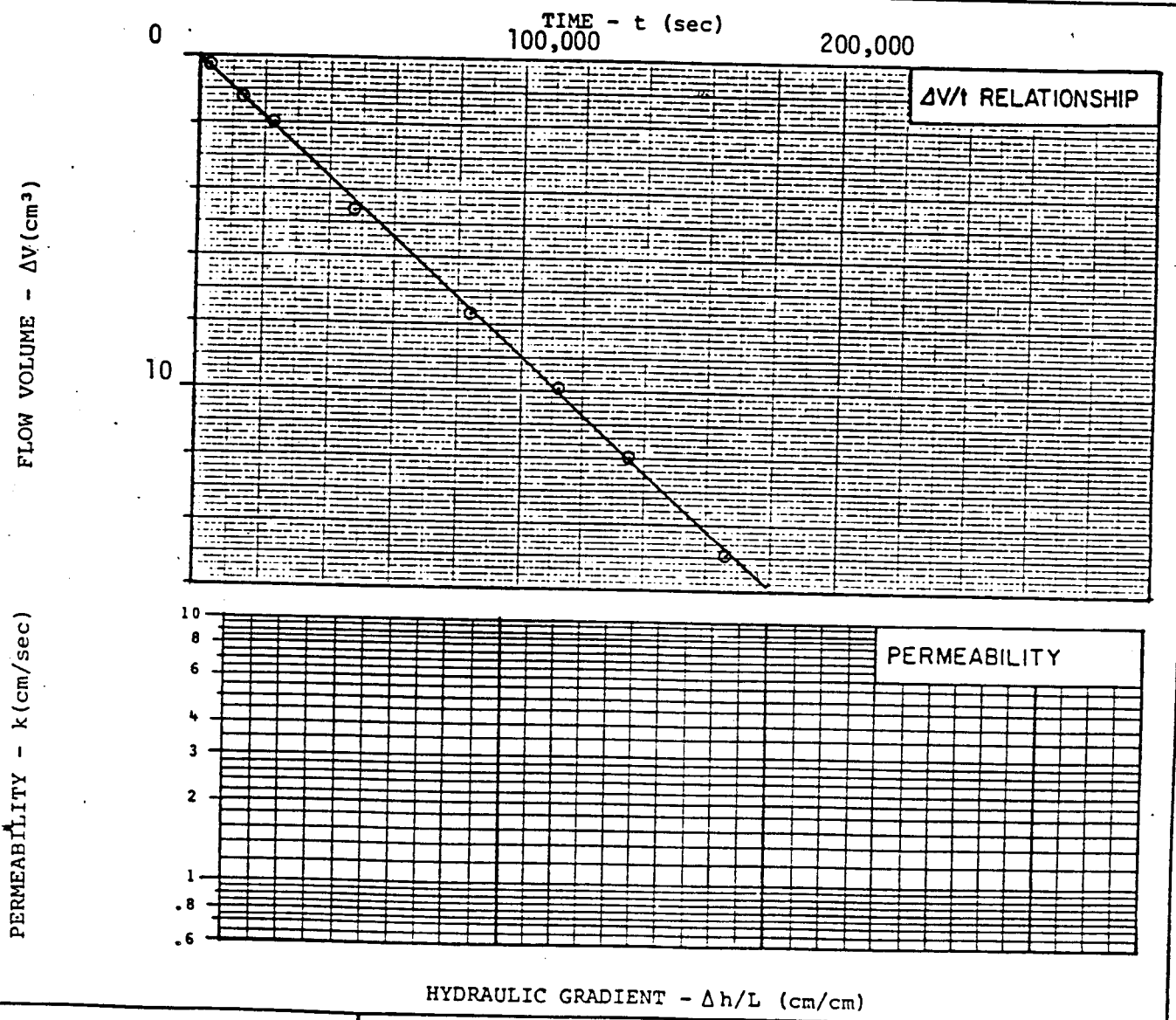
TEST DATA:

Specimen Height (cm): 8.23
Specimen Diameter (cm): 7.21
Dry Unit Weight (pcf): 112.6
Moisture Content Before Test (%): 17.0
Moisture Content After Test (%): 19.4
Cell Confining Pressure (psi): 95
Test Pressure (psi): 90
Back Pressure (psi): 80
Differential Head (psi): 10
Flow Rate ($\Delta V/t$) (cm^3/sec) O 8.87×10^{-5} Δ
Permeability (cm/sec): O 2.54×10^{-8} Δ

SAMPLE DATA:

Sample Identification: ST-17
Station 5+50, 200' South, Area K
Visual Description: Red-brown and brown Silt and Clay, trace gravel
Remarks:

Maximum Dry Density (ASTM D ____) (pcf):
Optimum Moisture Content (%):
Percent Compaction:
Permeameter Type: Constant Head Triaxial



EMPIRE SOILS INVESTIGATIONS INC

PERMEABILITY TEST REPORT

Union Carbide
Conestoga-Rovers & Associates

L-5

DR BY: DJG	CK'D. CCK	DATE: 7/7/87	PROJ.NO. BT-87-85

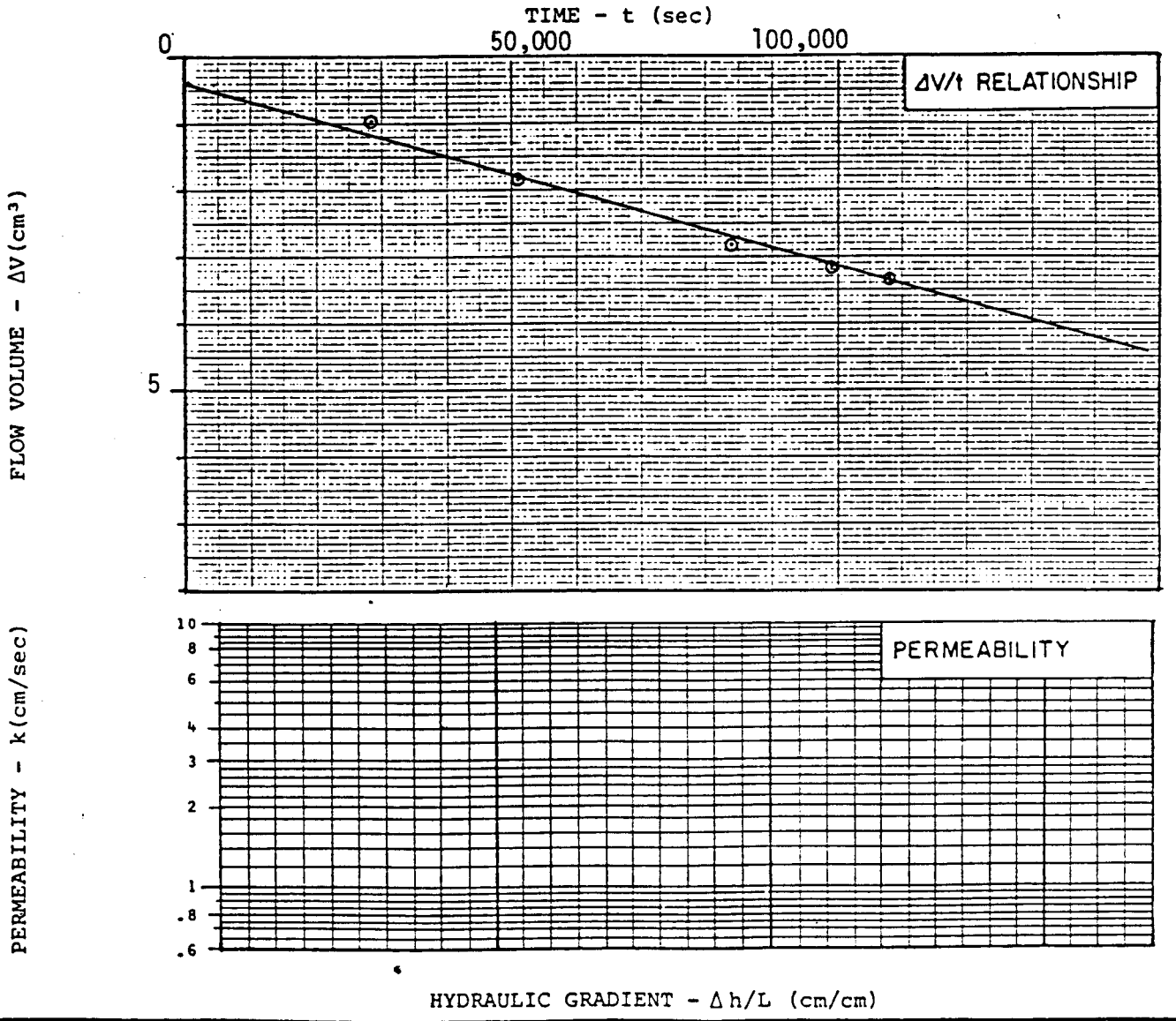
TEST DATA:

Specimen Height (cm): 9.80
Specimen Diameter (cm): 7.26
Dry Unit Weight (pcf): 117.4
Moisture Content Before Test (%): 16.6
Moisture Content After Test (%): 17.9
Cell Confining Pressure (psi): 95
Test Pressure (psi): 90
Back Pressure (psi): 80
Differential Head (psi): 10
Flow Rate ($\Delta V/t$) (cm^3/sec) O 2.80×10^{-5} Δ
Permeability (cm/sec): O 9.42×10^{-9} Δ

SAMPLE DATA:

Sample Identification: ST-18
Station 3+50 x 70' South, Area L
Visual Description: Brown SILT and Clay in occasional pockets of fine sand and silt
Remarks: trace f-c gravel, stiff

*Maximum Dry Density (ASTM D ____) (pcf):
Optimum Moisture Content (%):
Percent Compaction: Constant Head Triaxial
Permeameter Type:



EMPIRE SOILS INVESTIGATIONS INC

PERMEABILITY TEST REPORT

Union Carbide
Conestoga-Rovers & Associates

L-5

DR BY: DJC	CK'D. CK	DATE: 7/7/87	PROJ.NO. BT-87-85

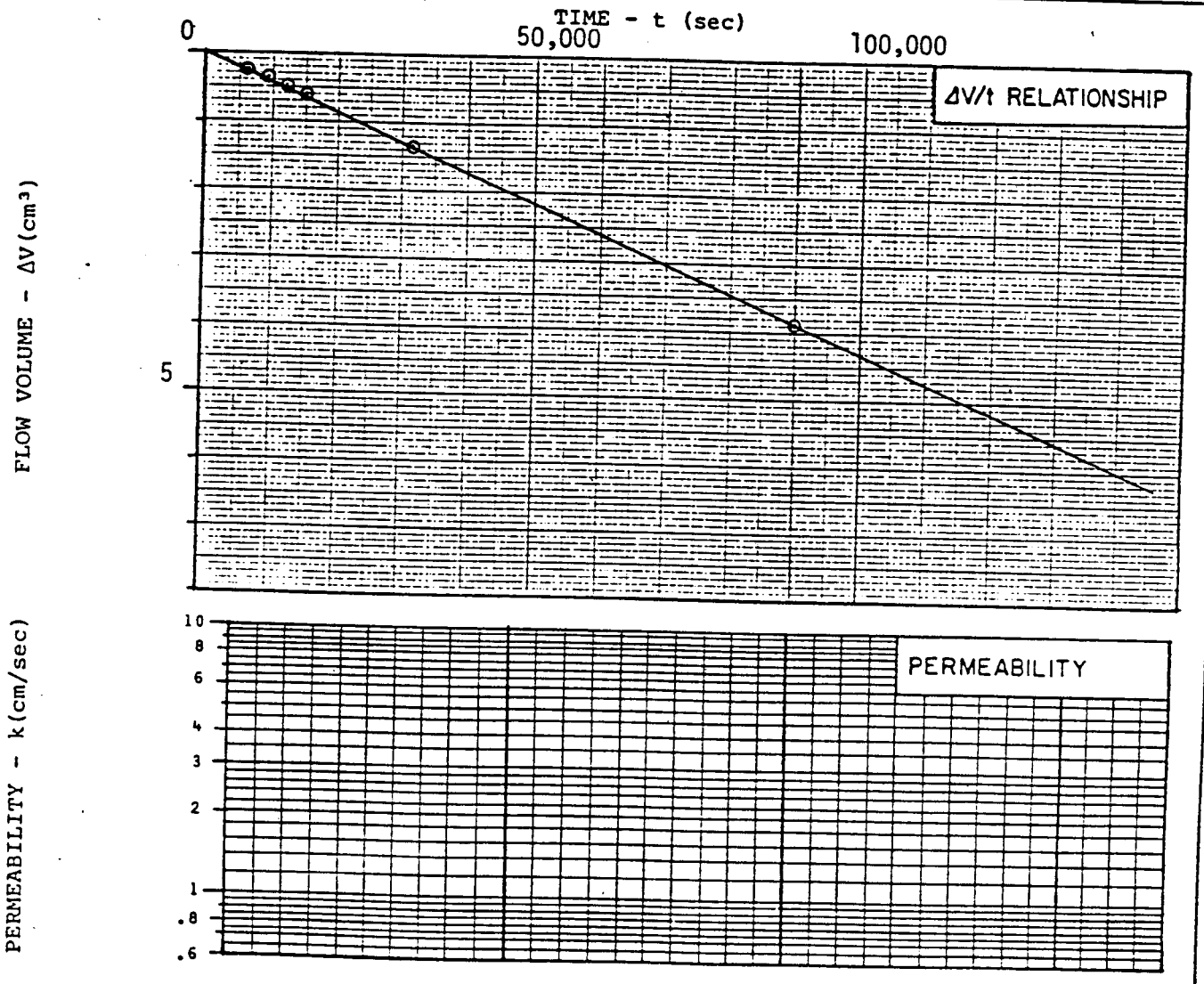
TEST DATA:

Specimen Height (cm): 8.51
Specimen Diameter (cm): 7.20
Dry Unit Weight (pcf): 114.9
Moisture Content Before Test (%): 16.5
Moisture Content After Test (%): 19.4
Cell Confining Pressure (psi): 95
Test Pressure (psi): 90
Back Pressure (psi): 80
Differential Head (psi): 10
Flow Rate ($\Delta V/t$) (cm^3/sec) O 4.30×10^{-5} Δ
Permeability (cm/sec): O 1.28×10^{-8} Δ

SAMPLE DATA:

Sample Identification: ST-19
Station 3+50 x 210' South, Area M
Visual Description: Brown SILT and Clay, trace gravel
Remarks:

Maximum Dry Density (ASTM D ____) (pcf):
Optimum Moisture Content (%):
Percent Compaction:
Permeameter Type: Constant Head Triaxial



EMPIRE SOILS INVESTIGATIONS INC

PERMEABILITY TEST REPORT

Union Carbide
Conestoga-Rovers & Associates

DR BY: DJG	CK'D. CK	DATE: 7/7/87	PROJ.NO. BT-87-85

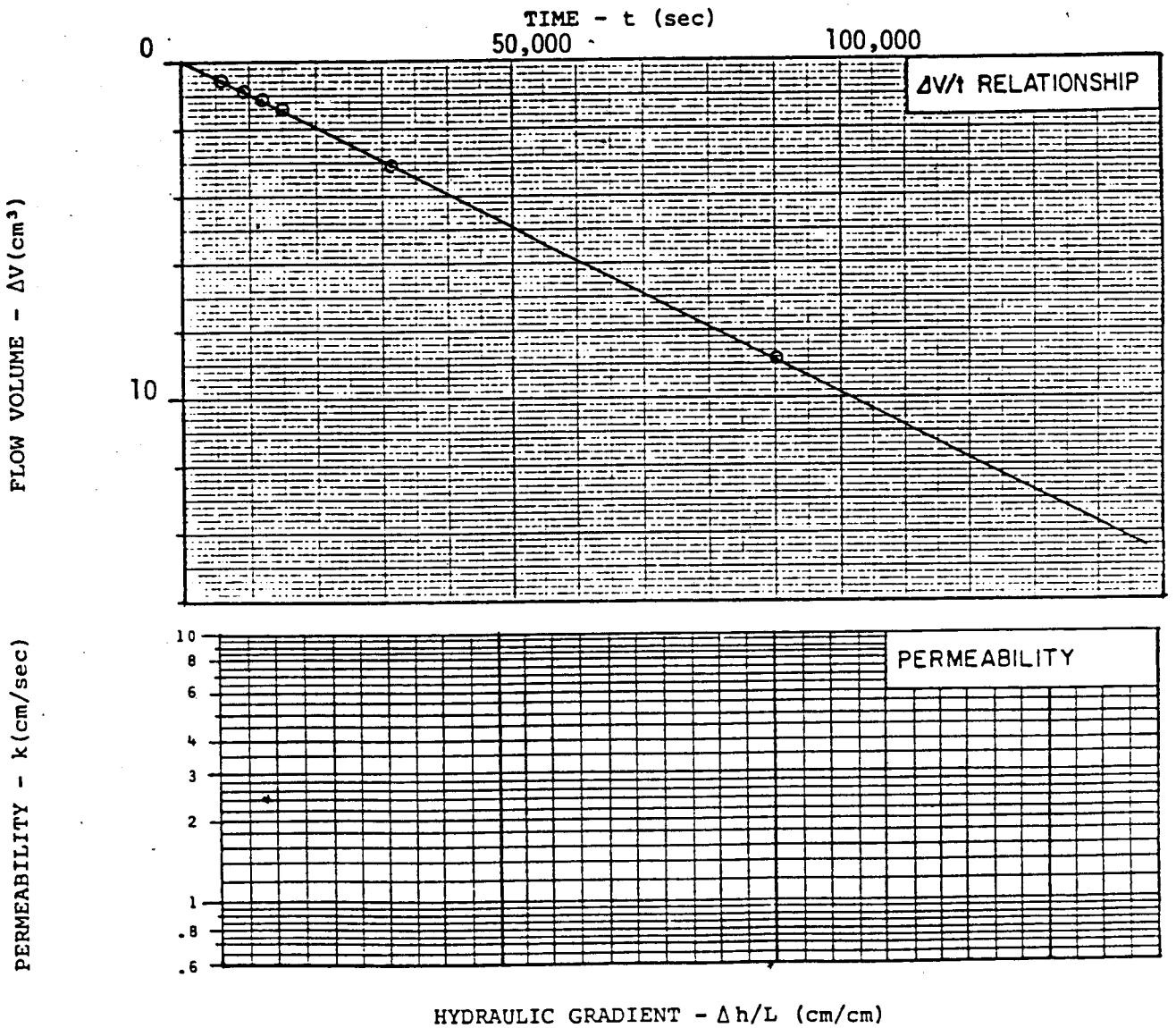
TEST DATA:

Specimen Height (cm): 9.14
Specimen Diameter (cm): 7.19
Dry Unit Weight (pcf): 113.1
Moisture Content Before Test (%): 15.9
Moisture Content After Test (%): 19.4
Cell Confining Pressure (psi): 95
Test Pressure (psi): 90
Back Pressure (psi): 80
Differential Head (psi): 10
Flow Rate (ΔV/t) (cm³/sec) O 9.9×10^{-5} Δ
Permeability (cm/sec): O 3.17×10^{-8} Δ

SAMPLE DATA:

Sample Identification: ST-20
Station 3+50 x 340' South, Area N
Visual Description: Red-brown SILT and Clay and brown silt, trace gravel
Remarks:

Maximum Dry Density (ASTM D ____) (pcf):
Optimum Moisture Content (%):
Percent Compaction:
Permeameter Type: Constant Head Triaxial



EMPIRE SOILS INVESTIGATIONS INC

PERMEABILITY TEST REPORT

Union Carbide
Conestoga-Rovers & Associates
L-5

DR BY: DJC	CK'D. CK	DATE: 7/7/87	PROJ.NO. BT-87-85

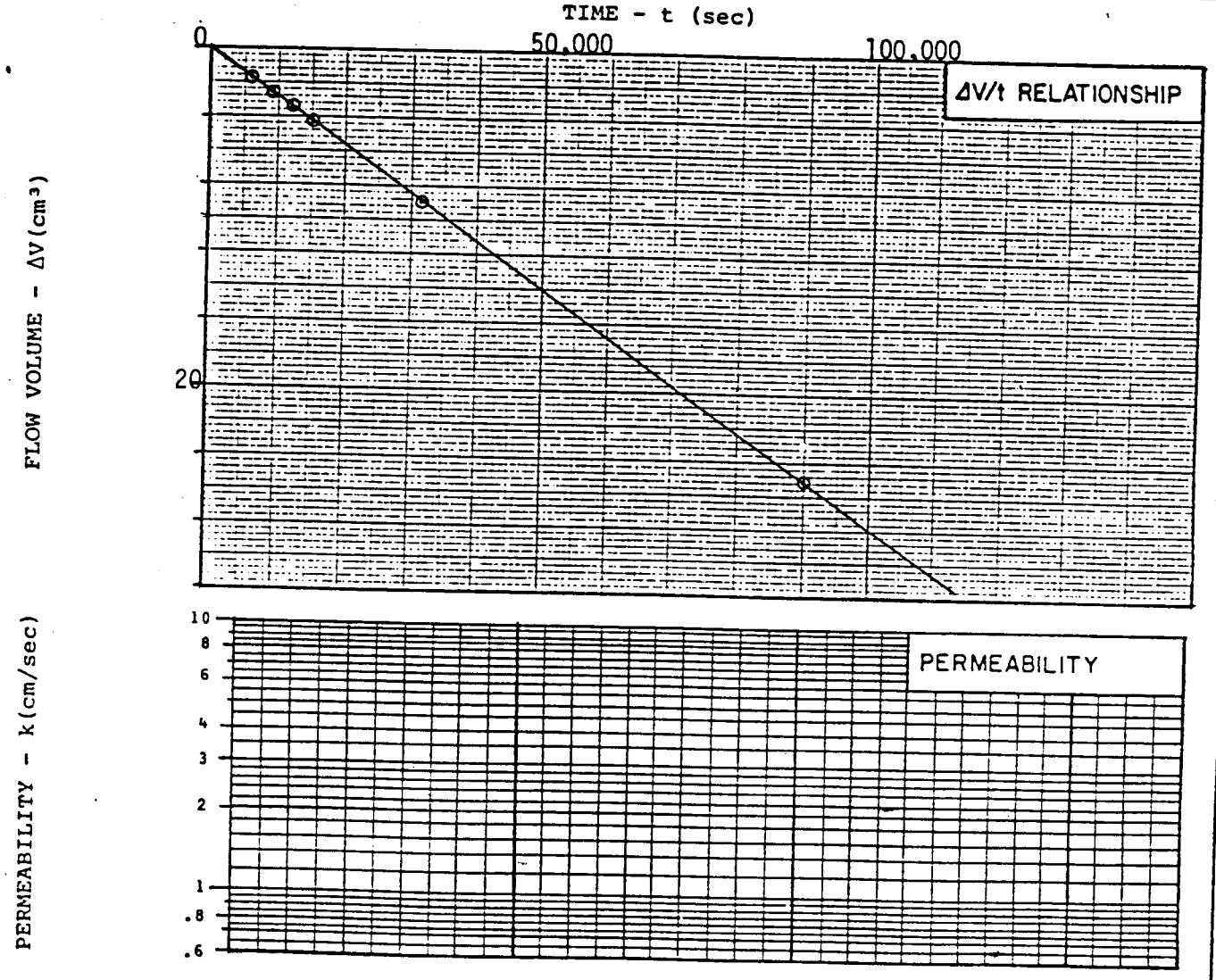
TEST DATA:

Specimen Height (cm): 7.65
Specimen Diameter (cm): 7.18
Dry Unit Weight (pcf): 105.9
Moisture Content Before Test (%): 16.4
Moisture Content After Test (%): 19.8
Cell Confining Pressure (psi): 95
Test Pressure (psi): 90
Back Pressure (psi): 80
Differential Head (psi): 10
Flow Rate ($\Delta V/t$) (cm^3/sec) O 2.78×10^{-4} Δ
Permeability (cm/sec): O 7.47×10^{-8} Δ

SAMPLE DATA:

Sample Identification: ST-21
Station 3+50 x 500' South, Area O
Visual Description: Brown & Red-brown silt and clay, trace gravel and pockets of brown silt
Remarks:

Maximum Dry Density (ASTM D ____) (pcf):
Optimum Moisture Content (%):
Percent Compaction:
Permeameter Type: Constant Head Triaxial



EMPIRE SOILS INVESTIGATIONS INC

PERMEABILITY TEST REPORT

Union Carbide
Conestoga-Rovers & Associates

DR BY: DJG	CK'D CK	DATE 7/7/87	PROJ. NO. BT-87-85

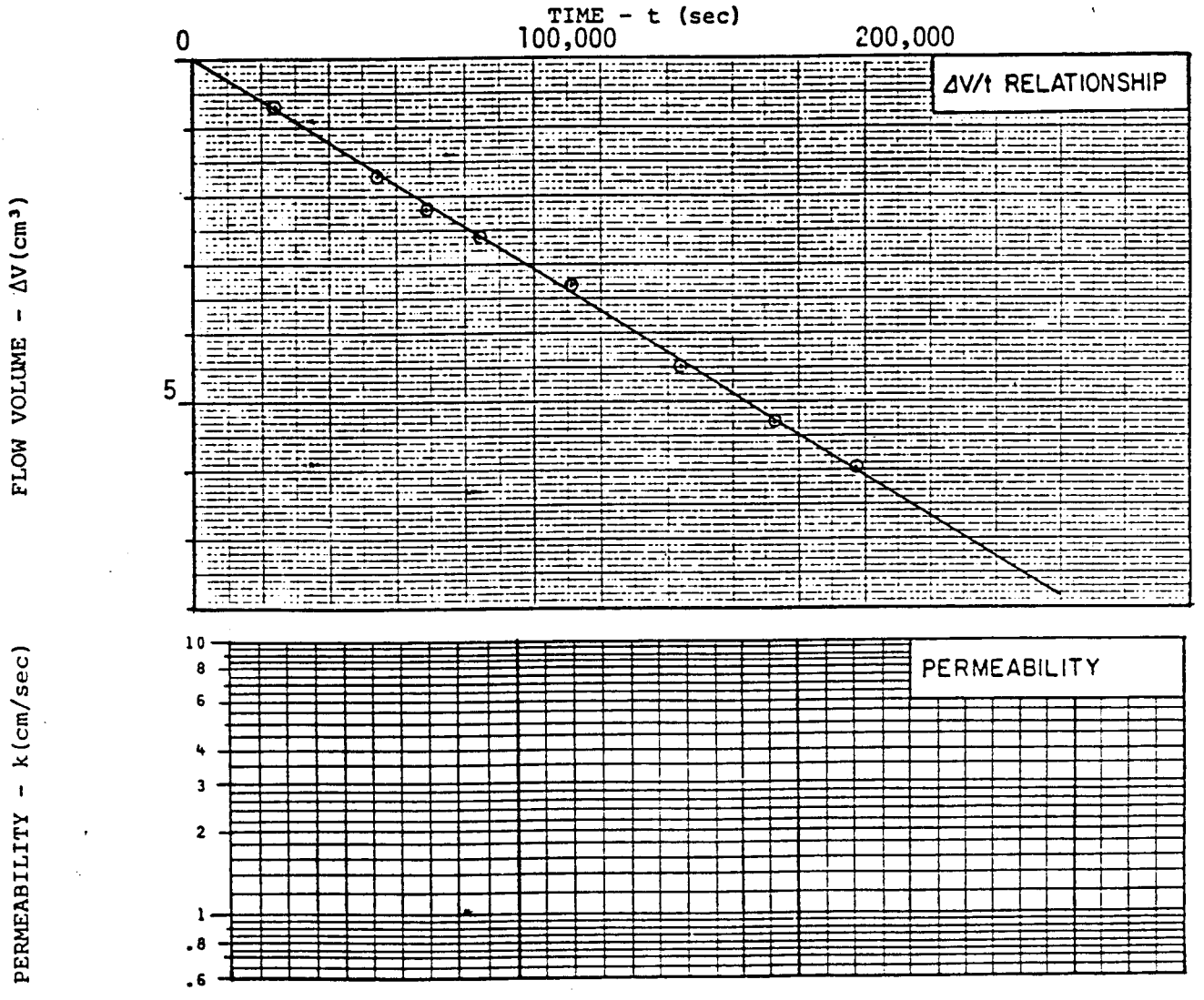
TEST DATA:

Specimen Height (cm): 10.78
Specimen Diameter (cm): 7.24
Dry Unit Weight (pcf): 105.4
Moisture Content Before Test (%): 22.1
Moisture Content After Test (%): 25.9
Cell Confining Pressure (psi): 95
Test Pressure (psi): 90
Back Pressure (psi): 80
Differential Head (psi): 10
Flow Rate (ΔV/t) (cm³/sec) O 3.00×10^{-5} Δ
Permeability (cm/sec): O 1.12×10^{-8} Δ

SAMPLE DATA:

Sample Identification: ST-22
Station 5+50 x 500' South, Area 0
Visual Description: Brown & red-brown & tan Silt and Clay, trace fine gravel
Remarks:

Maximum Dry Density (ASTM D ____) (pcf):
Optimum Moisture Content (%):
Percent Compaction:
Permeameter Type: Constant Head Triaxial



EMPIRE SOILS INVESTIGATIONS INC

PERMEABILITY TEST REPORT

Union Carbide
Conestoga-Rovers & Associates

L-5

DR BY: DJG	CK'D. CK	DATE: 7/7/87	PROJ. NO. BT-87-85

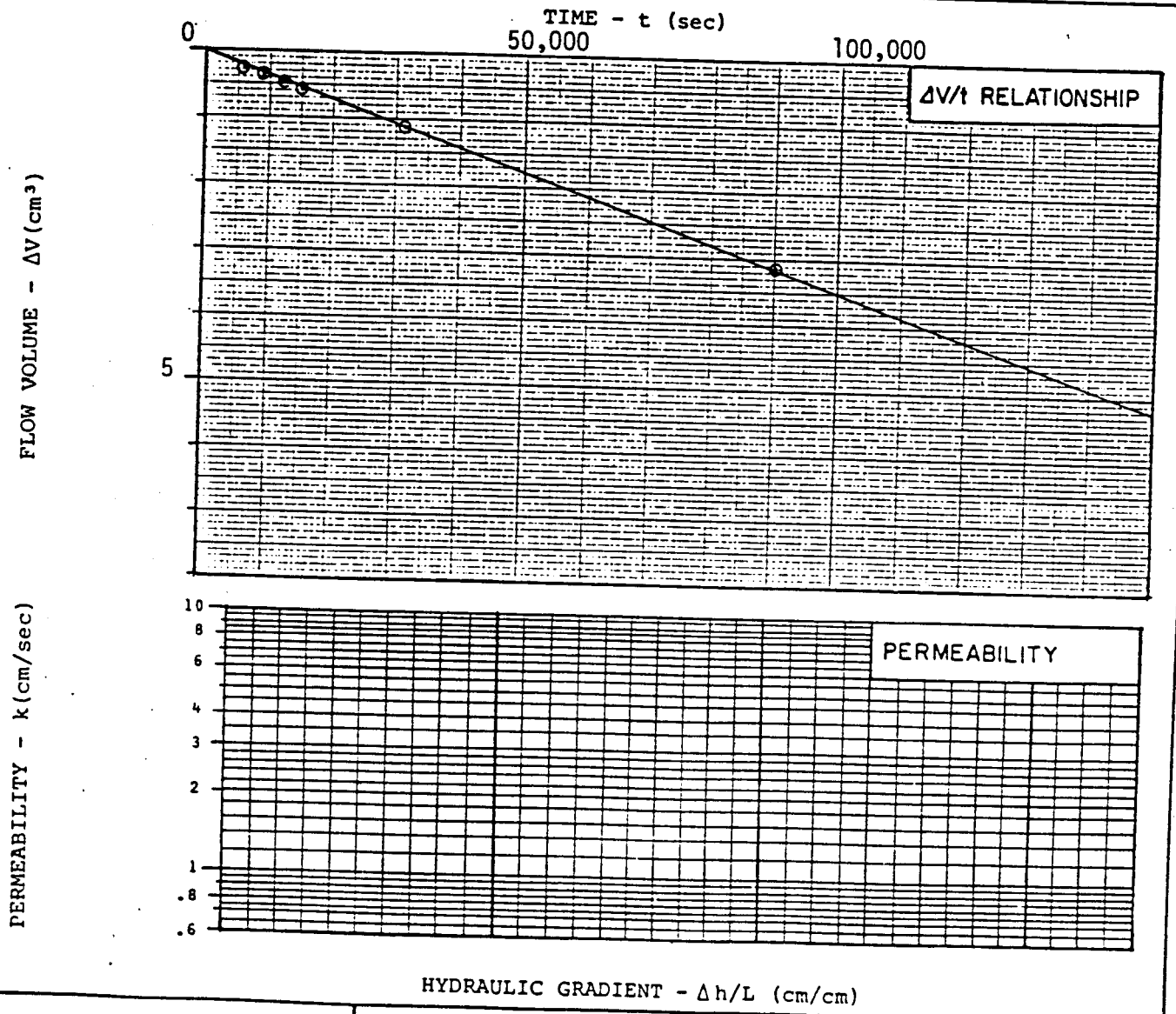
TEST DATA:

Specimen Height (cm): 9.13
Specimen Diameter (cm): 7.19
Dry Unit Weight (pcf): 102.2
Moisture Content Before Test (%): 24.9
Moisture Content After Test (%): 26.9
Cell Confining Pressure (psi): 95
Test Pressure (psi): 90
Back Pressure (psi): 80
Differential Head (psi): 10
Flow Rate ($\Delta V/t$) (cm^3/sec) O 3.60×10^{-5} Δ
Permeability (cm/sec): O 1.15×10^{-8} Δ

SAMPLE DATA:

Sample Identification: ST-23
Station 7+20 x 140' South, Area "A"
Visual Description: Red-brown & brown & tan mottled stiff Silt and Clay
Remarks:

Maximum Dry Density (ASTM D ____) (pcf):
Optimum Moisture Content (%):
Percent Compaction:
Permeameter Type: Constant Head Triaxial



EMPIRE SOILS INVESTIGATIONS INC

PERMEABILITY TEST REPORT

Union Carbide
Conestoga-Rovers & Associates

L-5

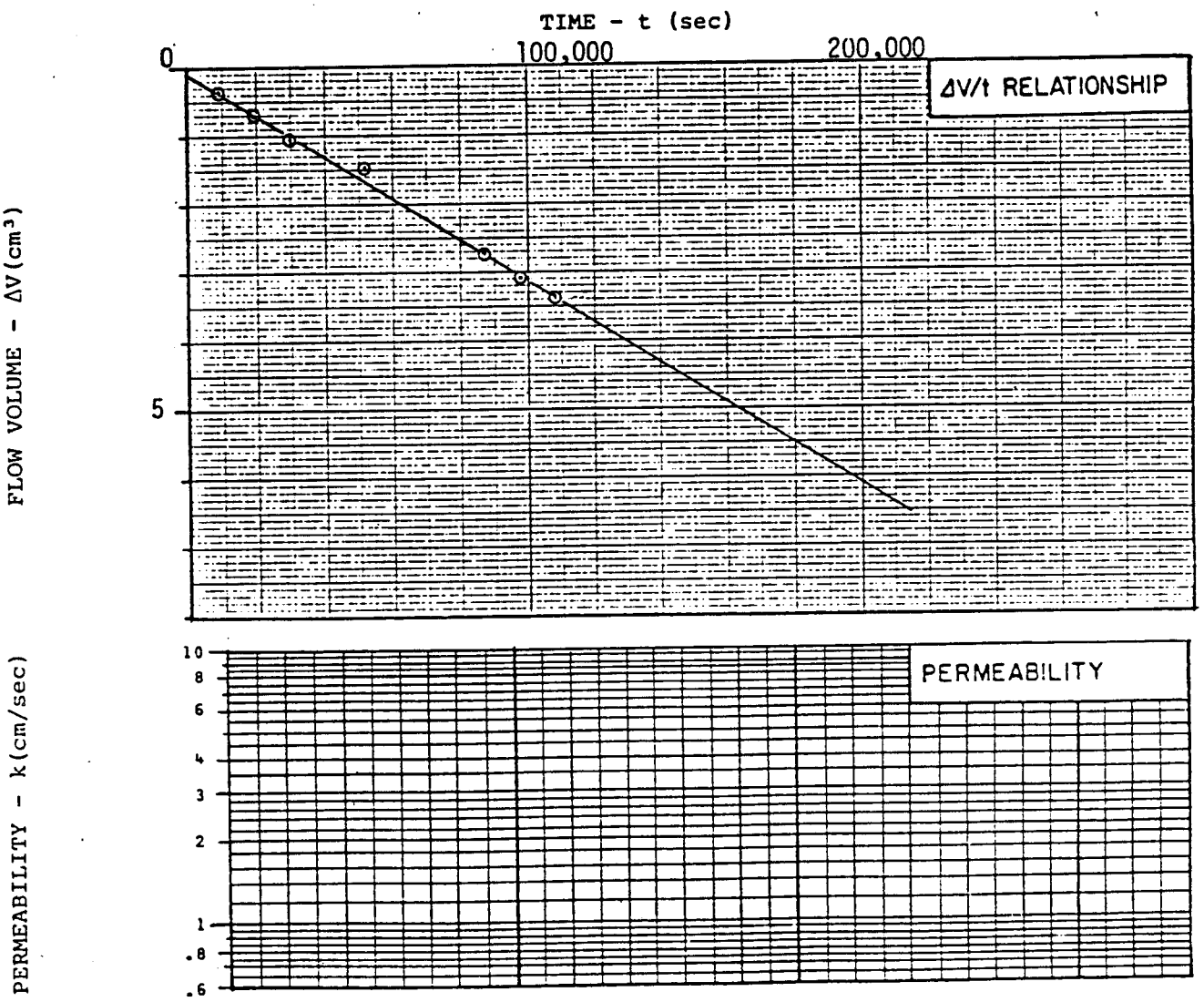
DR BY: DJG	CK'D. CCK	DATE: 7/7/87	PROJ.NO. BT-87-85

TEST DATA:

Specimen Height (cm): 8.52
Specimen Diameter (cm): 7.24
Dry Unit Weight (pcf): 105.7
Moisture Content Before Test (%): 22.2
Moisture Content After Test (%): 23.8
Cell Confining Pressure (psi): 95
Test Pressure (psi): 90
Back Pressure (psi): 80
Differential Head (psi): 10
Flow Rate ($\Delta V/t$) (cm^3/sec) O 3.00×10^{-5} Δ
Permeability (cm/sec): O 8.84×10^{-9} Δ

SAMPLE DATA:

Sample Identification: ST-24
Station ~~9~~+00 x 270' South, Area "C"
Visual Description: Brown, red & grey mottled Silt and Clay
Remarks:
Maximum Dry Density (ASTM D ____) (pcf):
Optimum Moisture Content (%):
Percent Compaction:
Permeameter Type: Constant Head Triaxial



EMPIRE SOILS INVESTIGATIONS INC

PERMEABILITY TEST REPORT

Constant Head Triaxial
Conestoga-Rovers & Associates

L-5

DR BY: re	CK'D CK	DATE: 7/7/87	PROJ.NO. BT-87-85

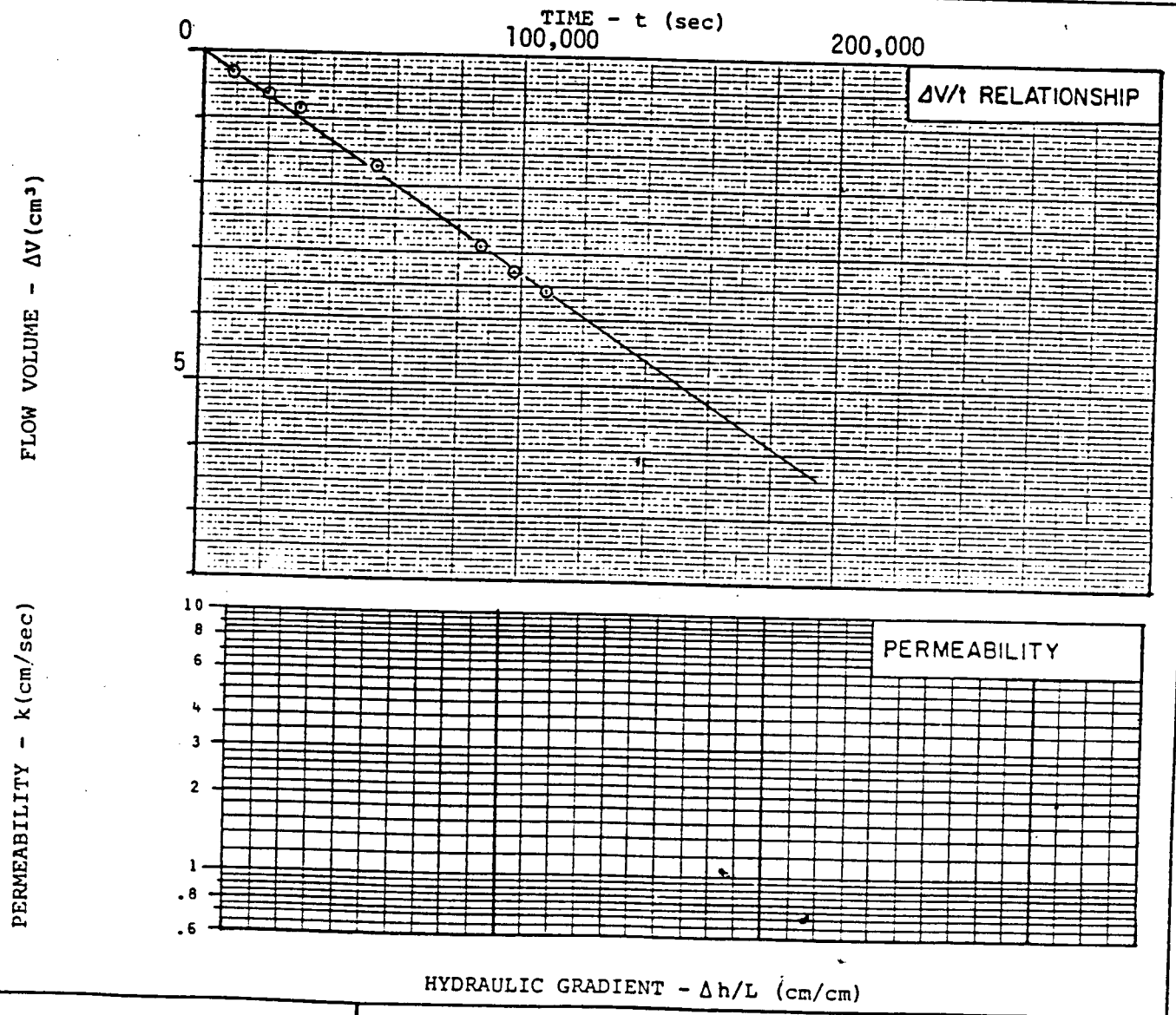
TEST DATA:

Specimen Height (cm): 8.51
Specimen Diameter (cm): 7.23
Dry Unit Weight (pcf): 103.2
Moisture Content Before Test (%): 23.8
Moisture Content After Test (%): 25.1
Cell Confining Pressure (psi): 95
Test Pressure (psi): 90
Back Pressure (psi): 80
Differential Head (psi): 10
Flow Rate ($\Delta V/t$) (cm^3/sec) O 3.30×10^{-5} Δ
Permeability (cm/sec): O 9.72×10^{-9} Δ

SAMPLE DATA:

Sample Identification: ST-25
Station 10+20 x 200' South, Area "D"
Visual Description: Brown & red-brown mottled Silt and Clay, trace gravel
Remarks:

Maximum Dry Density (ASTM D ____) (pcf):
Optimum Moisture Content (%):
Percent Compaction:
Permeameter Type: Constant Head Triaxial



EMPIRE SOILS INVESTIGATIONS INC

PERMEABILITY TEST REPORT

Union Carbide
Conestoga-Rovers & Associates

L-5

DR BY:	CK'D. CK	DATE: 7/7/87	PROJ. NO. BT-87-85

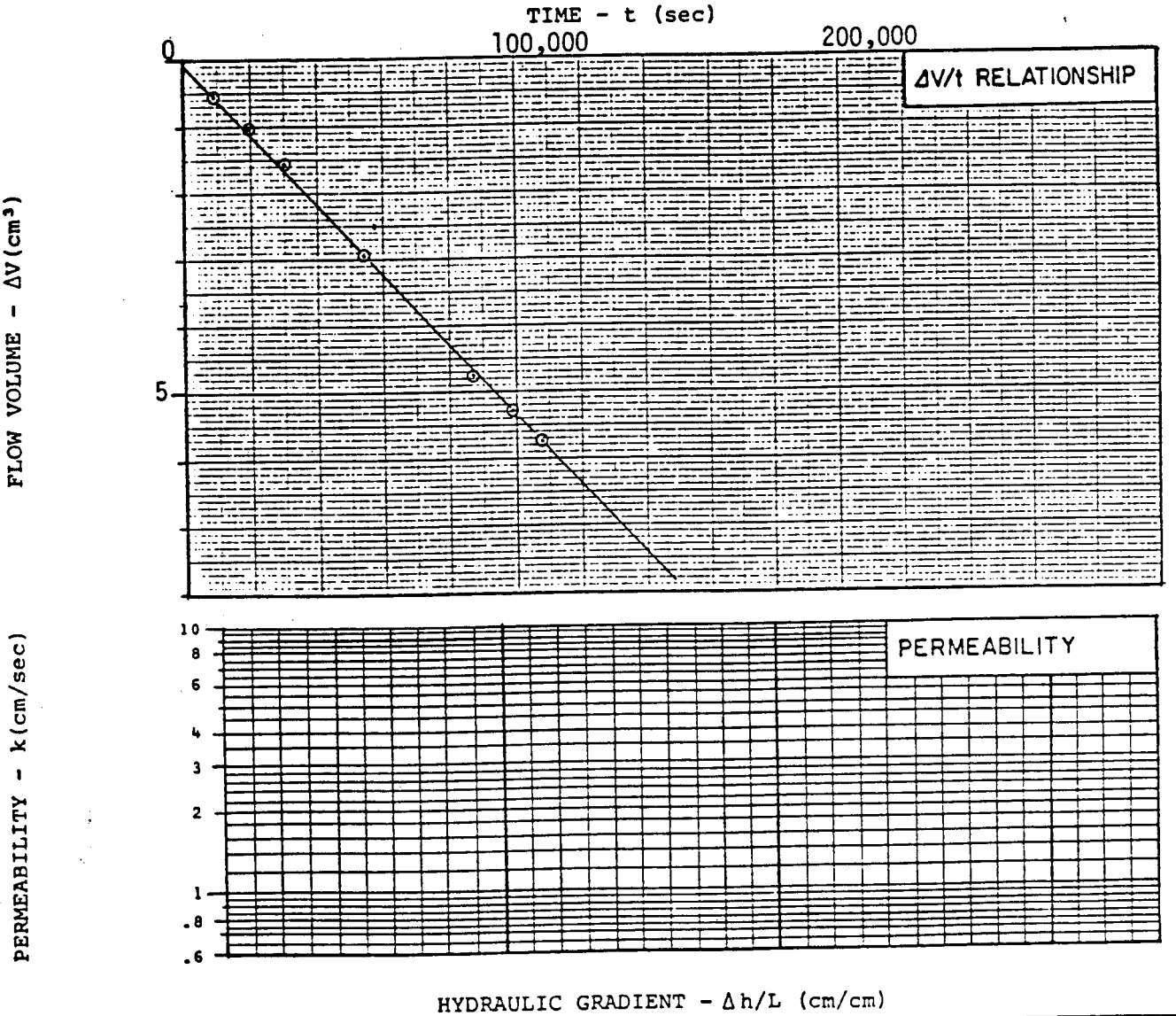
TEST DATA:

Specimen Height (cm): 8.49
Specimen Diameter (cm): 7.21
Dry Unit Weight (pcf): 103.3
Moisture Content Before Test (%): 23.2
Moisture Content After Test (%): 25.7
Cell Confining Pressure (psi): 95
Test Pressure (psi): 90
Back Pressure (psi): 80
Differential Head (psi): 10
Flow Rate (ΔV/t) (cm³/sec) O 5.23×10^{-5} Δ
Permeability (cm/sec): O 1.55×10^{-8} Δ

SAMPLE DATA:

Sample Identification: ST-27
Station 7+20x 310' South, Area B
Visual Description: Brown, red & tan mottled silt and clay, trace gravel
Remarks:

Maximum Dry Density
(ASTM D ____) (pcf):
Optimum Moisture Content (%):
Percent Compaction:
Permeameter Type: Constant Head Triaxial



EMPIRE SOILS INVESTIGATIONS INC

PERMEABILITY TEST REPORT

Union Carbide
Conestoga-Rovers & Associates

DR BY: re	CK'D CK	DATE: 7/7/87	PROJ.NO. BT-87-85

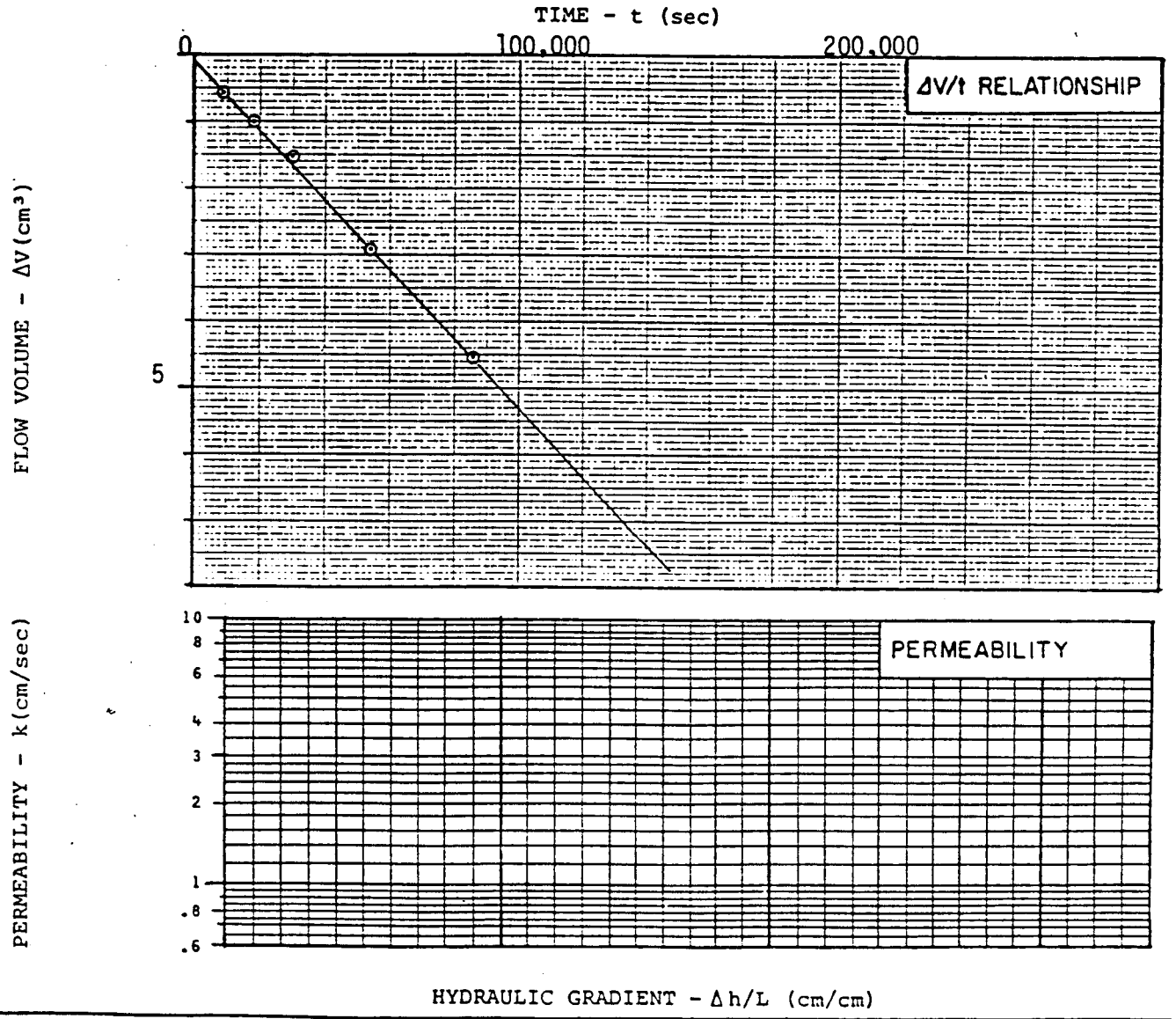
TEST DATA:

Specimen Height (cm): 8.48
Specimen Diameter (cm): 7.21
Dry Unit Weight (pcf): 104.2
Moisture Content Before Test (%): 21.9
Moisture Content After Test (%): 25.1
Cell Confining Pressure (psi): 95
Test Pressure (psi): 90
Back Pressure (psi): 80
Differential Head (psi): 10
Flow Rate (ΔV/t) (cm³/sec) O 5.20×10^{-5} Δ
Permeability (cm/sec): O 1.54×10^{-8} Δ

SAMPLE DATA:

Sample Identification: ST-28
Station 5+50x200' South, Area "K"
Visual Description: Brown & grey mottled Silt and Clay
Remarks:

Maximum Dry Density (ASTM D ____) (pcf):
Optimum Moisture Content (%):
Percent Compaction:
Permeameter Type: Constant Head Triaxial



EMPIRE SOILS INVESTIGATIONS INC

PERMEABILITY TEST REPORT

Union Carbide
Conestoga-Rovers & Associates

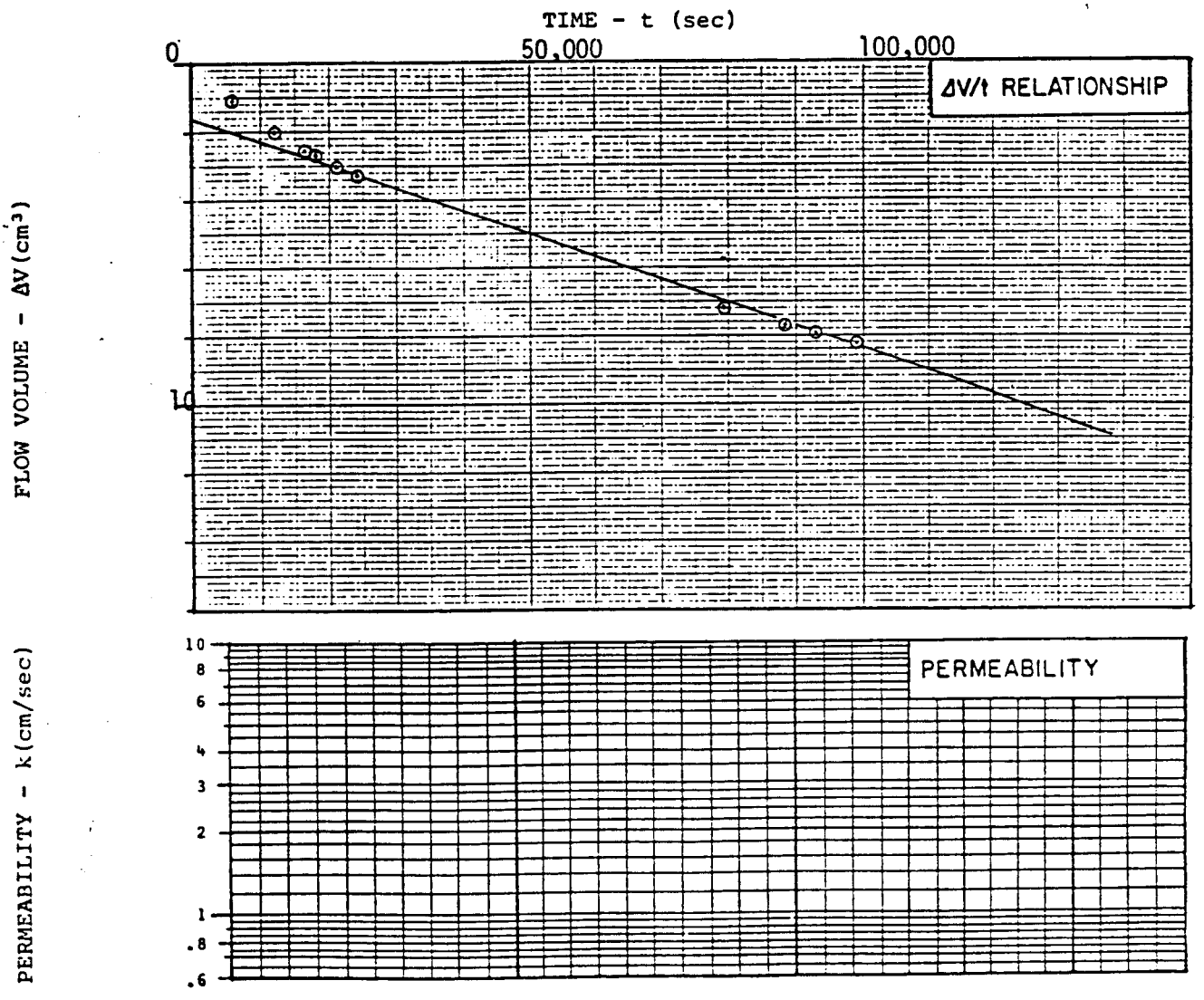
DR BY: rl	CK'D. CK	DATE: 7/7/87	PROJ. NO. BT-87-85

TEST DATA:

Specimen Height (cm): 14.13
Specimen Diameter (cm): 7.29
Dry Unit Weight (pcf): 102.3
Moisture Content Before Test (%): 16.1
Moisture Content After Test (%): 22.9
Cell Confining Pressure (psi): 95
Test Pressure (psi): 90
Back Pressure (psi): 80
Differential Head (psi): 10
Flow Rate ($\Delta V/t$) (cm^3/sec) O 6.70×10^{-5} Δ
Permeability (cm/sec): O 3.23×10^{-8} Δ

SAMPLE DATA:

Sample Identification: ST-29
Station 7+20 x 450' South, Area "E"
Visual Description: Red & brown & grey mottled Silt and Clay, hard and dry
Remarks:
Maximum Dry Density (ASTM D ____) (pcf):
Optimum Moisture Content (%):
Percent Compaction:
Permeameter Type: Constant Head Triaxial



EMPIRE SOILS INVESTIGATIONS INC

PERMEABILITY TEST REPORT

Union Carbide
Conestoga-Rovers & Associates

DR BY:	CK'D. CK	DATE: 6/30/87	PROJ. NO. BT-87-85

FALLING HEAD FLEXIBLE WALL PERMEABILITY

Sample No.	Sample Location			Field in-place density results			Shelby tube Specimen Height cm.	Shelby tube Specimen Diameter cm.	Permeability results				
	Station	Offset from Baseline	Lift	Dry Unit Weight lbs/cu.ft.	Moisture Content % of dry Weight Optimum	Percent Compaction Maximum			Confining (Triaxial Cell) Pressure psi	Test (head) Pressure psi	Tail (back) Pressure psi	Gradient	Coeffiecient of Permeability k (cm/sec)
ST-30	Area "L"		2nd	113.6	18.9	--	11.2	7.11	83.0	80.0	70.0	62.8	1.7×10^{-8}
ST-31	Area "M"		2nd	123.5	14.6	--	12.0	7.11	83.0	80.0	70.0	58.6	1.6×10^{-8}
ST-32	Area "N"		2nd	110.0	19.7	--	11.5	7.11	83.0	80.0	70.0	61.2	9.29×10^{-9}

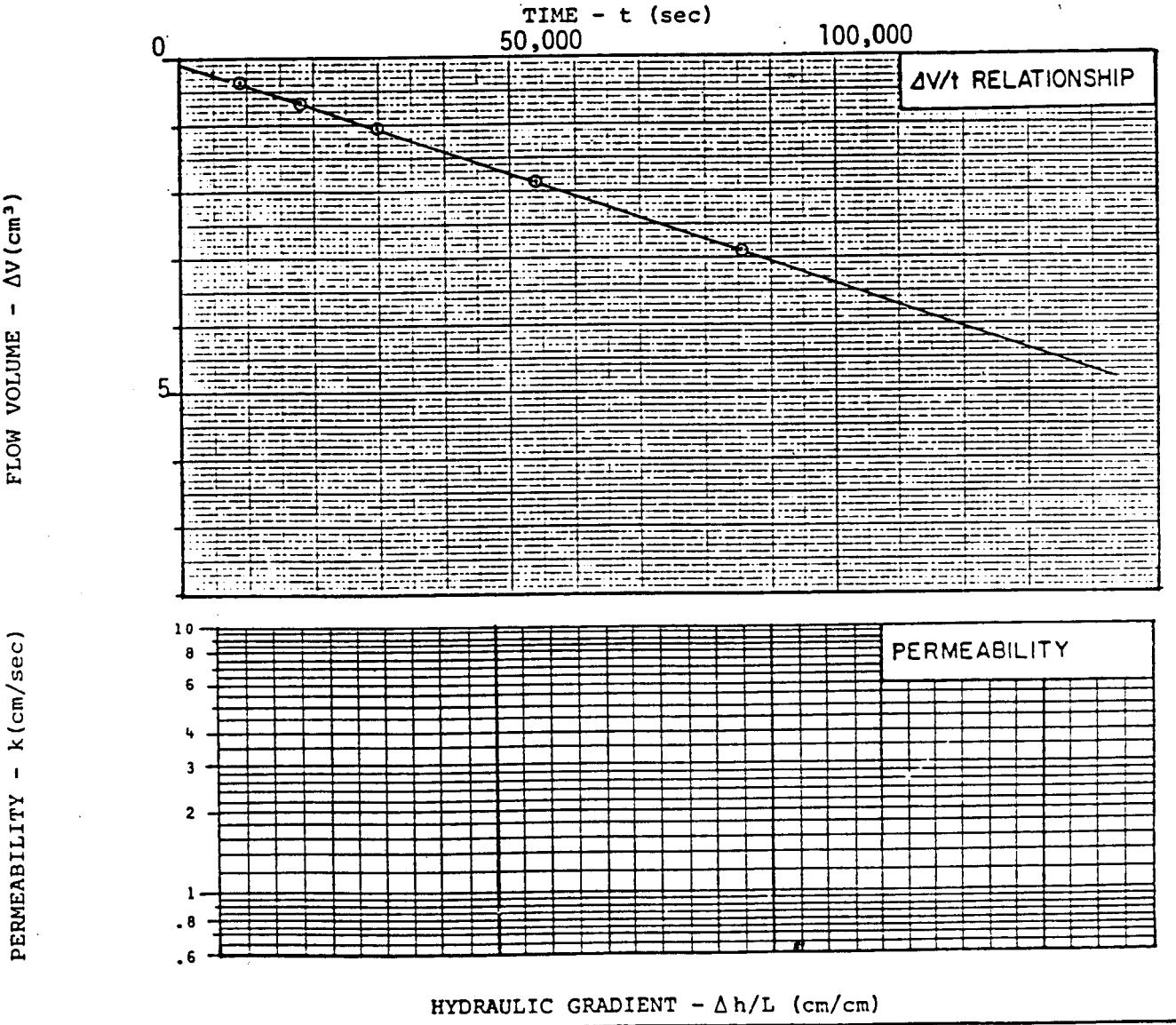
TEST DATA

Specimen Height (cm): 8.49
Specimen Diameter (cm): 7.23
Dry Unit Weight (pcf): 108.0
Moisture Content Before Test (%): 19.8
Moisture Content After Test (%): 23.4
Cell Confining Pressure (psi): 95
Test Pressure (psi): 90
Back Pressure (psi): 80
Differential Head (psi): 10
Flow Rate ($\Delta V/t$) (cm^3/sec) O 3.40×10^{-5} Δ
Permeability (cm/sec): O 1.00×10^{-8} Δ

SAMPLE DATA:

Sample Identification: ST-33
Station 1+00 x 100' South, Area "J"
Visual Description: Red-brown & grey & tan mottled Silt and Clay
Remarks:

Maximum Dry Density (ASTM D ____) (pcf):
Optimum Moisture Content (%):
Percent Compaction:
Permeameter Type: Constant Head Triaxial



EMPIRE SOILS INVESTIGATIONS INC

PERMEABILITY TEST REPORT

Union Carbide
Conestoga-Rovers & Associates

DR BY	CK'D.	DATE	PROJ. NO.
re	CK	6/30/87	BT-87-85

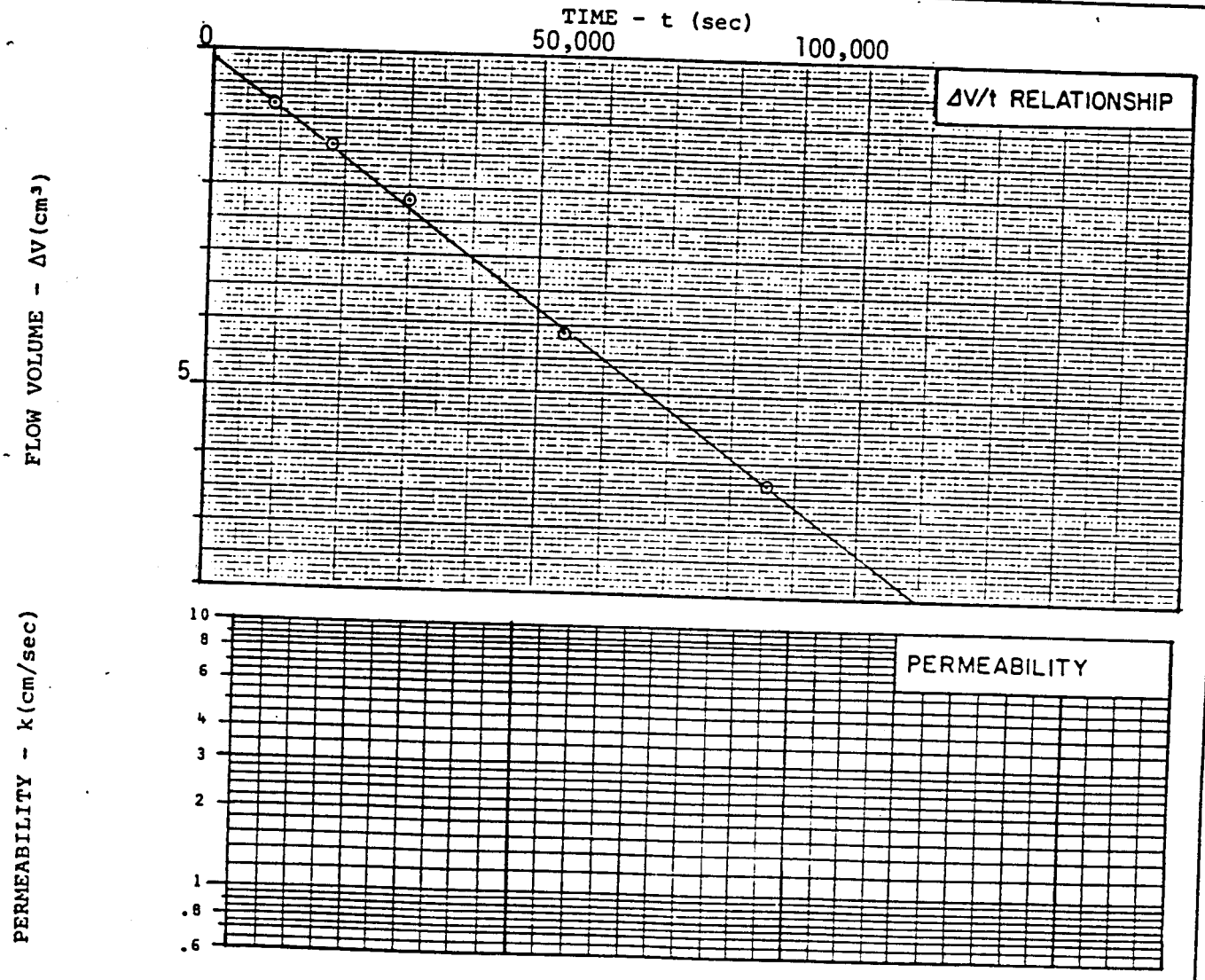
TEST DATA:

Specimen Height (cm): 9.10
Specimen Diameter (cm): 7.23
Dry Unit Weight (pcf): 104.8
Moisture Content Before Test (%): 20.5
Moisture Content After Test (%): 25.2
Cell Confining Pressure (psi): 95
Test Pressure (psi): 90
Back Pressure (psi): 80
Differential Head (psi): 10
Flow Rate (ΔV/t) (cm³/sec) O 7.20×10^{-5} Δ
Permeability (cm/sec): O 2.27×10^{-8} Δ

SAMPLE DATA:

Sample Identification: ST-34
Station 1+00 x 300' South, Area "H"
Visual Description: Red-brown & brown mottled Silt and Clay, trace gravel
Remarks:

Maximum Dry Density (ASTM D ____) (pcf):
Optimum Moisture Content (%):
Percent Compaction:
Permeameter Type: Constant Head Triaxial



EMPIRE SOILS INVESTIGATIONS INC

PERMEABILITY TEST REPORT

Union Carbide
Conestoga-Rovers & Associates
L-5

DR BY: re	CK'D. CK	DATE: 6/30/87	PROJ. NO. BT-87-85

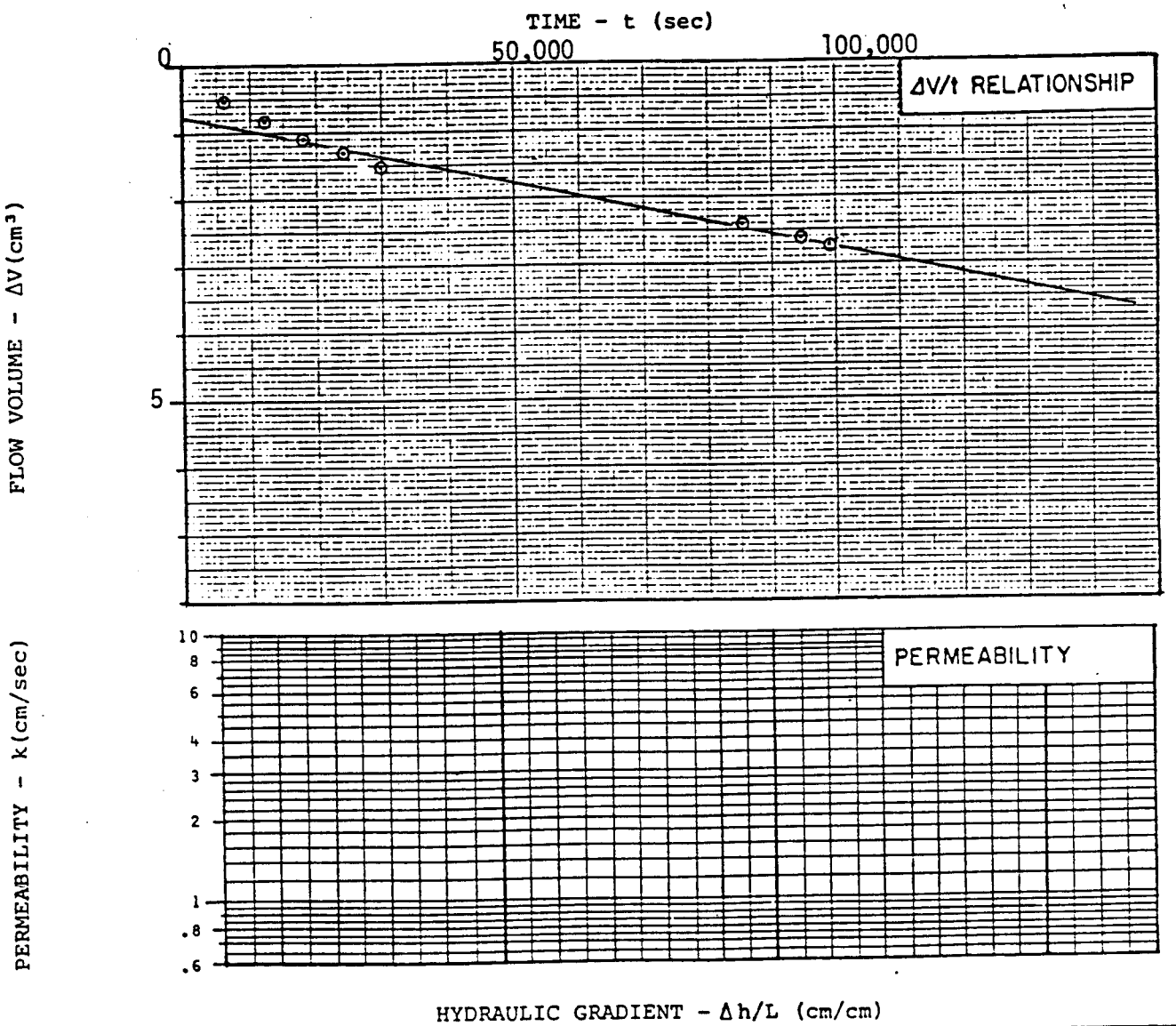
TEST DATA:

Specimen Height (cm): 10.42
Specimen Diameter (cm): 7.21
Dry Unit Weight (pcf): 104.5
Moisture Content Before Test (%): 23.1
Moisture Content After Test (%): 24.3
Cell Confining Pressure (psi): 95
Test Pressure (psi): 90
Back Pressure (psi): 80
Differential Head (psi): 10
Flow Rate (ΔV/t) (cm³/sec) O 1.90x10⁻⁵ Δ
Permeability (cm/sec): O 6.89x10-9 Δ

SAMPLE DATA:

Sample Identification: ST-35
Station 1+00 x 480' South, Area "I"
Visual Description: Red, brown & grey mottled Silt and Clay
Remarks:

Maximum Dry Density (ASTM D ____) (pcf):
Optimum Moisture Content (%):
Percent Compaction:
Permeameter Type: Constant Head Triaxial



EMPIRE SOILS INVESTIGATIONS INC

PERMEABILITY TEST REPORT

Union Carbide
Conestoga-Rovers & Associates
L-5

DR BY: re	CK'D. CCK	DATE: 6/30/87	PROJ.NO. BT-87-85

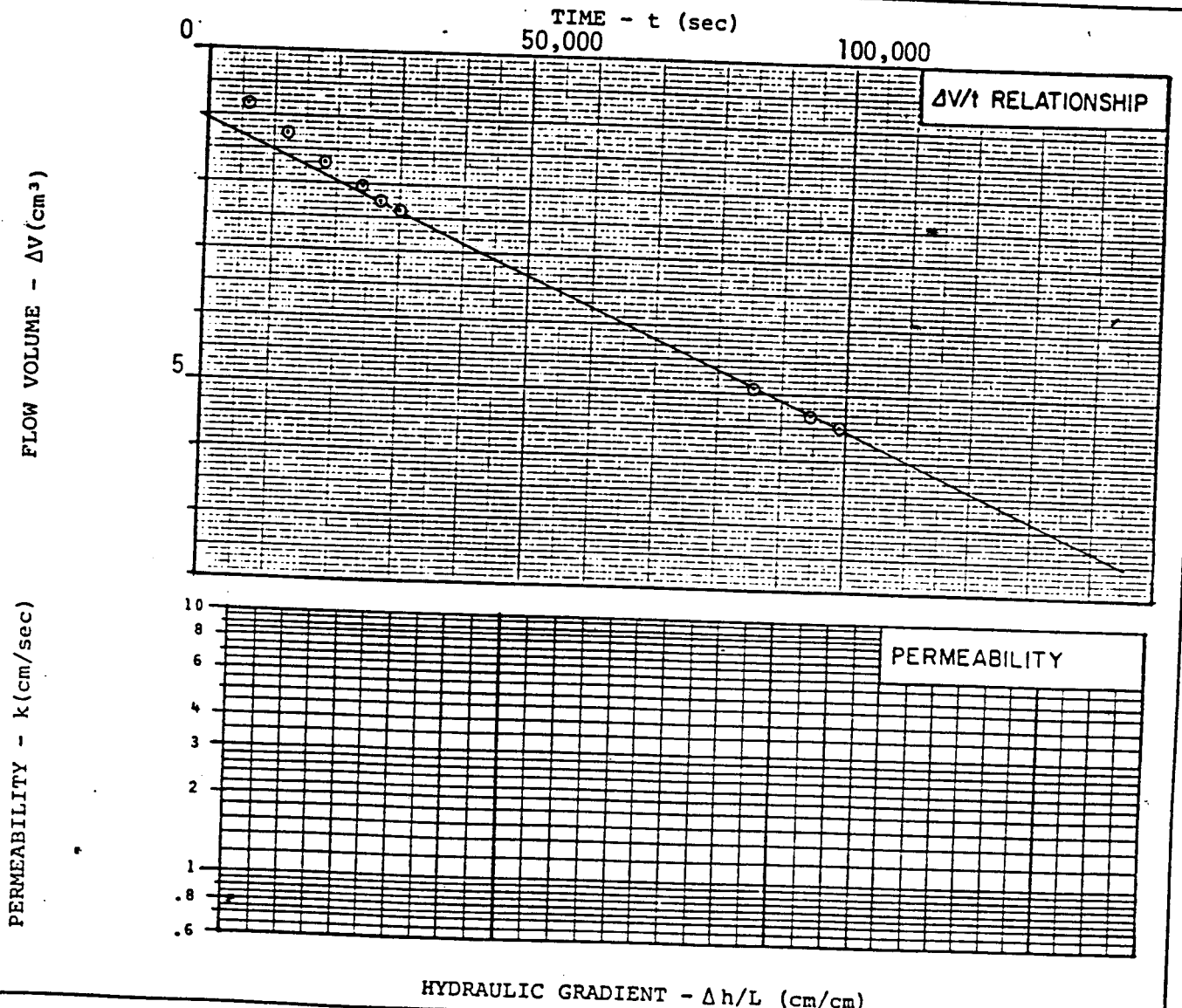
TEST DATA:

Specimen Height (cm): 10.20
Specimen Diameter (cm): 7.25
Dry Unit Weight (pcf): 101.3
Moisture Content Before Test (%): 24.7
Moisture Content After Test (%): 26.3
Cell Confining Pressure (psi): 95
Test Pressure (psi): 90
Back Pressure (psi): 80
Differential Head (psi): 10
Flow Rate (ΔV/t) (cm³/sec) ○ 4.60×10^{-5} Δ
Permeability (cm/sec): ○ 1.62×10^{-8} Δ

SAMPLE DATA:

Sample Identification: ST-36
Station 3+50 x 500' South, Area "0"
Visual Description: Red & grey mottled Silt and Clay, tr. gravel
Remarks:

Maximum Dry Density (ASTM D ____) (pcf):
Optimum Moisture Content (%):
Percent Compaction:
Permeameter Type: Constant Head Triaxial



EMPIRE SOILS INVESTIGATIONS INC

PERMEABILITY TEST REPORT

Union Carbide
Conestoga-Rovers & Associates

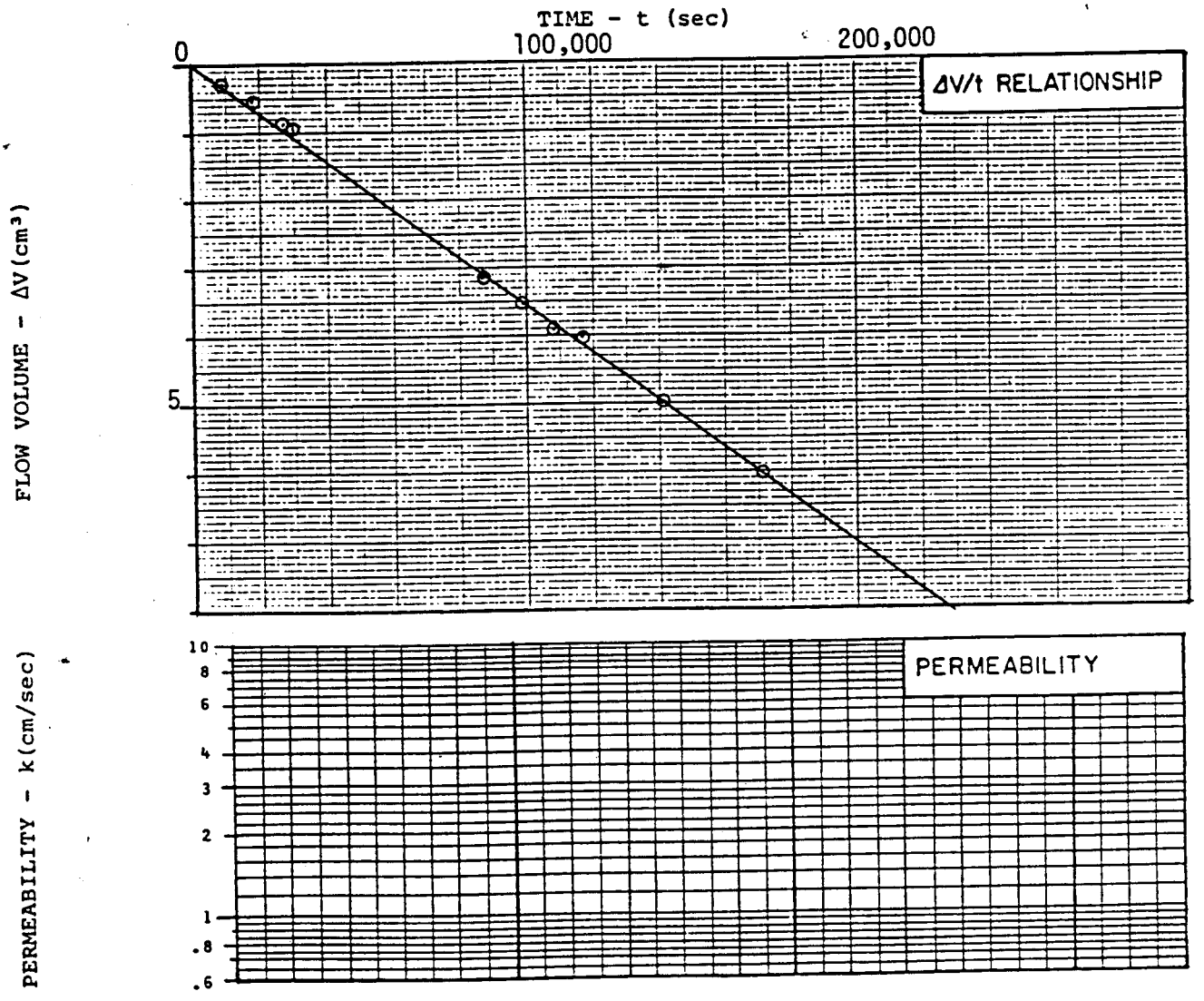
DR BY: re	CK'D. CCK	DATE: 6/30/87	PROJ. NO. BT-87-85

TEST DATA:

Specimen Height (cm): 9.14
Specimen Diameter (cm): 7.22
Dry Unit Weight (pcf): 102.7
Moisture Content Before Test (%): 23.9
Moisture Content After Test (%): 24.9
Cell Confining Pressure (psi): 95
Test Pressure (psi): 90
Back Pressure (psi): 80
Differential Head (psi): 10
Flow Rate ($\Delta V/t$) (cm^3/sec) O 3.53×10^{-5} Δ
Permeability (cm/sec): O 1.12×10^{-8} Δ

SAMPLE DATA:

Sample Identification: ST-37
Station 5+50x500' South, Area "O"
Visual Description: Brown & grey & red mottled stiff Silt and Clay, tr. gravel
Remarks:
Maximum Dry Density (ASTM D ____) (pcf):
Optimum Moisture Content (%):
Percent Compaction:
Permeameter Type: Constant Head Triaxial



EMPIRE SOILS INVESTIGATIONS INC

PERMEABILITY TEST REPORT

Union Carbide
Conestoga-Rovers & Associates

DR BY: DJC	CK'D: CK	DATE: 6/30/87	PROJ. NO. BT-87-85

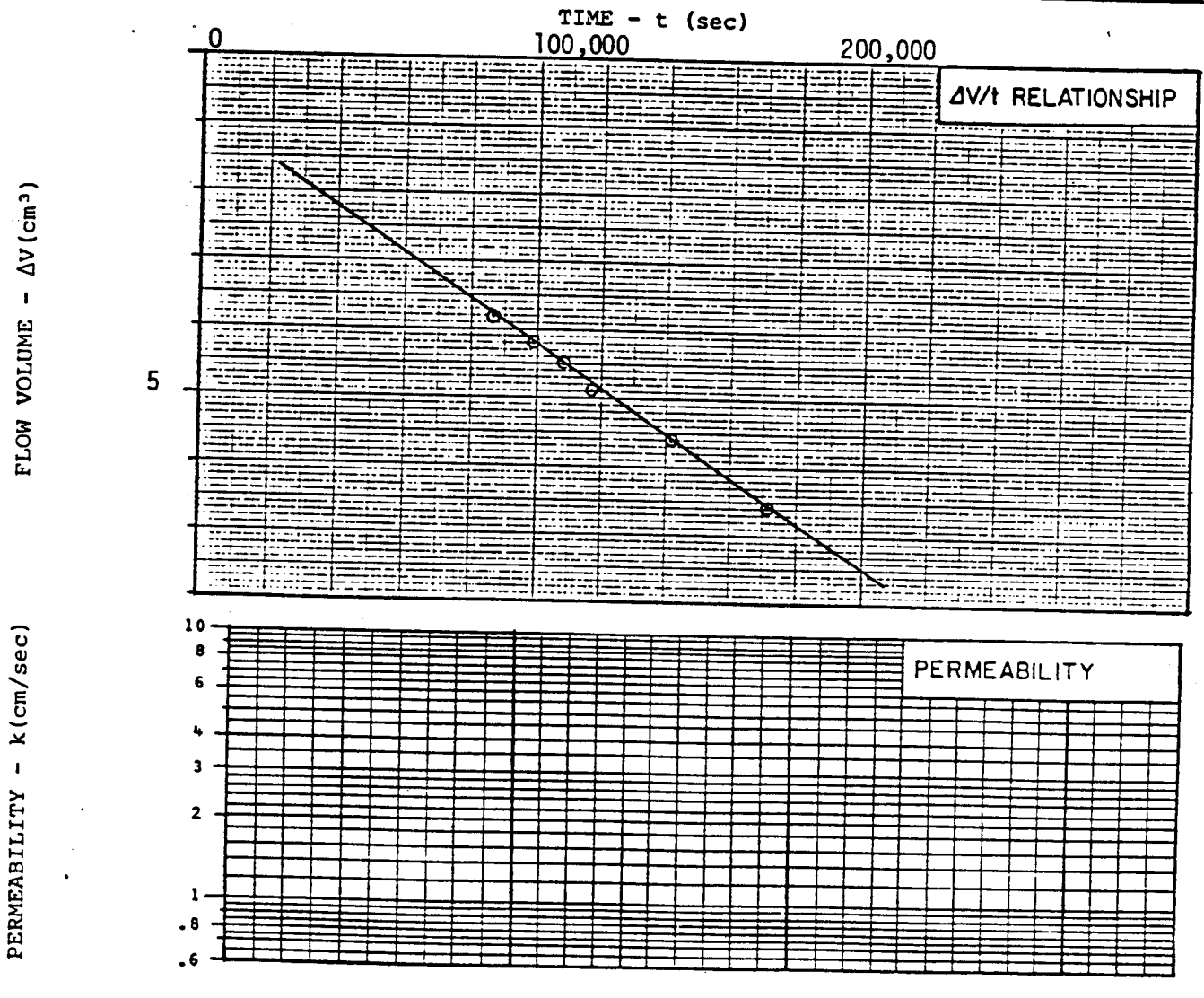
TEST DATA:

Specimen Height (cm): 9.14
Specimen Diameter (cm): 7.20
Dry Unit Weight (pcf): 104.3
Moisture Content Before Test (%): 21.0
Moisture Content After Test (%): 25.0
Cell Confining Pressure (psi): 95
Test Pressure (psi): 90
Back Pressure (psi): 80
Differential Head (psi): 10
Flow Rate (ΔV/t)(cm³/sec) O 3.30×10^{-5} Δ
Permeability (cm/sec): O 1.05×10^{-8} Δ

SAMPLE DATA:

Sample Identification: ST-38
Station 9+00 x 35' South Area "P"
Visual Description: Brown & tan & red Silt and clay
Remarks:

Maximum Dry Density (ASTM D ____) (pcf):
Optimum Moisture Content (%):
Percent Compaction:
Permeameter Type: Constant Head Triaxial



EMPIRE SOILS INVESTIGATIONS INC

PERMEABILITY TEST REPORT

Union Carbide
Conestoga-Rovers & Associates

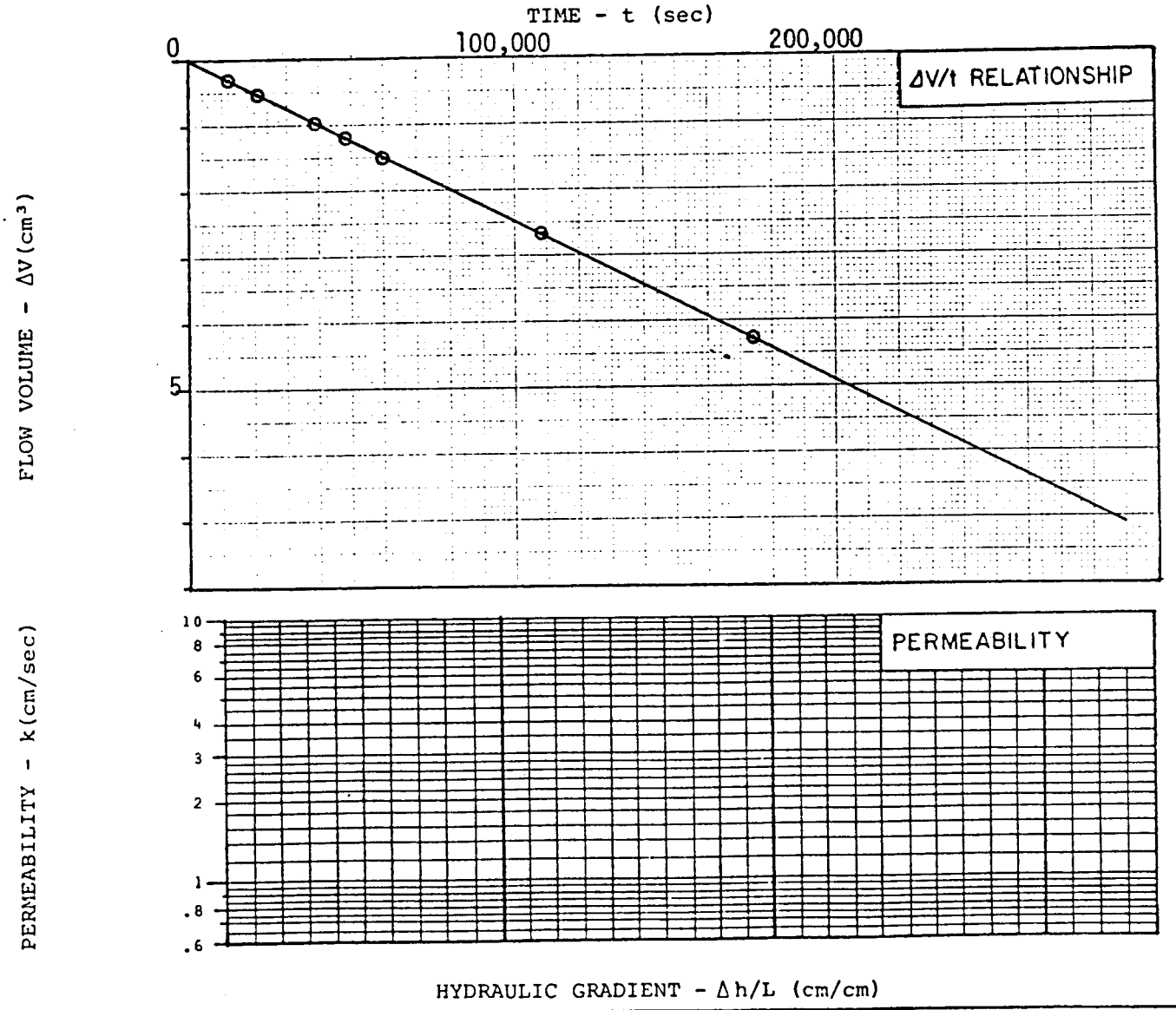
DR BY: DJG	CK'D. CK	DATE: 6/30/87	PROJ. NO. BT-87-85

TEST DATA:

Specimen Height (cm): 10.78
Specimen Diameter (cm): 7.02
Dry Unit Weight (pcf): 110.3
Moisture Content Before Test (%): 19.0
Moisture Content After Test (%): 19.9
Cell Confining Pressure (psi): 95
Test Pressure (psi): 90
Back Pressure (psi): 80
Differential Head (psi): 10
Flow Rate ($\Delta V/t$) (cm^3/sec) O 4.93×10^{-5} Δ
Permeability (cm/sec): O 1.95×10^{-8} Δ

SAMPLE DATA:

Sample Identification: ST-101
Cut-off area
Visual Description: Brown & Tan & red-brown Silt, some clay, trace gravel
Remarks:
Station 2+60, 570' South
Maximum Dry Density
(ASTM D ____) (pcf):
Optimum Moisture Content (%):
Percent Compaction:
Permeameter Type: Constant Head Triaxial



EMPIRE SOILS INVESTIGATIONS INC

PERMEABILITY TEST REPORT

Union Carbide
Conestoga-Rovers & Associates

DR BY: DJC	CK'D CCK	DATE: 5/29/87	PROJ.NO. BT-87-85