New Mexico Bureau of Mines and Mineral Resources

Open-File Report 216

PHASE-II RECHARGE STUDY AT THE NAVAJO MINE BASED ON CHLORIDE, STABLE ISOTOPES, AND TRITIUM IN THE UNSATURATED ZONE

by

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March 1986

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INTRODUCTION

Both state and federal law require restoration of premining ground-water recharge rates through reclamation (Anonymous, 1980; Department of Interior, 1983). Long-term average recharge rates for typical premining (undisturbed) and postmining (reclaimed) landscape settings must therefore be obtained.

Problems and Purpose

In an attempt to quantify ground-water recharge at the Navajo Coal Mine, operated by Utah International, Incorporated, southwest of Farmington, New Mexico (Figure 1), a preliminary (Phase-I) study was conducted by the New Mexico Bureau of Mines and Mineral Resources in 1984. In that study (Stone, 1984), local recharge rates for each of five major landscape settings recognized on the property were estimated using the chloride mass-balance method.

The preliminary study was expanded by means of a Phase-II study, reported on herein. The objective of the Phase-II study was to further evaluate recharge at the Navajo Mine. This was accomplished by 1) obtaining many additional recharge estimates for typical landscape settings based on the chloride method and 2) evaluating chloride recharge estimates for an undisturbed and a reclaimed site based on stable-isotope and tritium data.

Regional Setting

The Navajo Mine lies in the northwestern part of the structural feature known as the San Juan Basin, a Laramide (Late Cretaceous-Early Tertiary) depression at the eastern edge of the

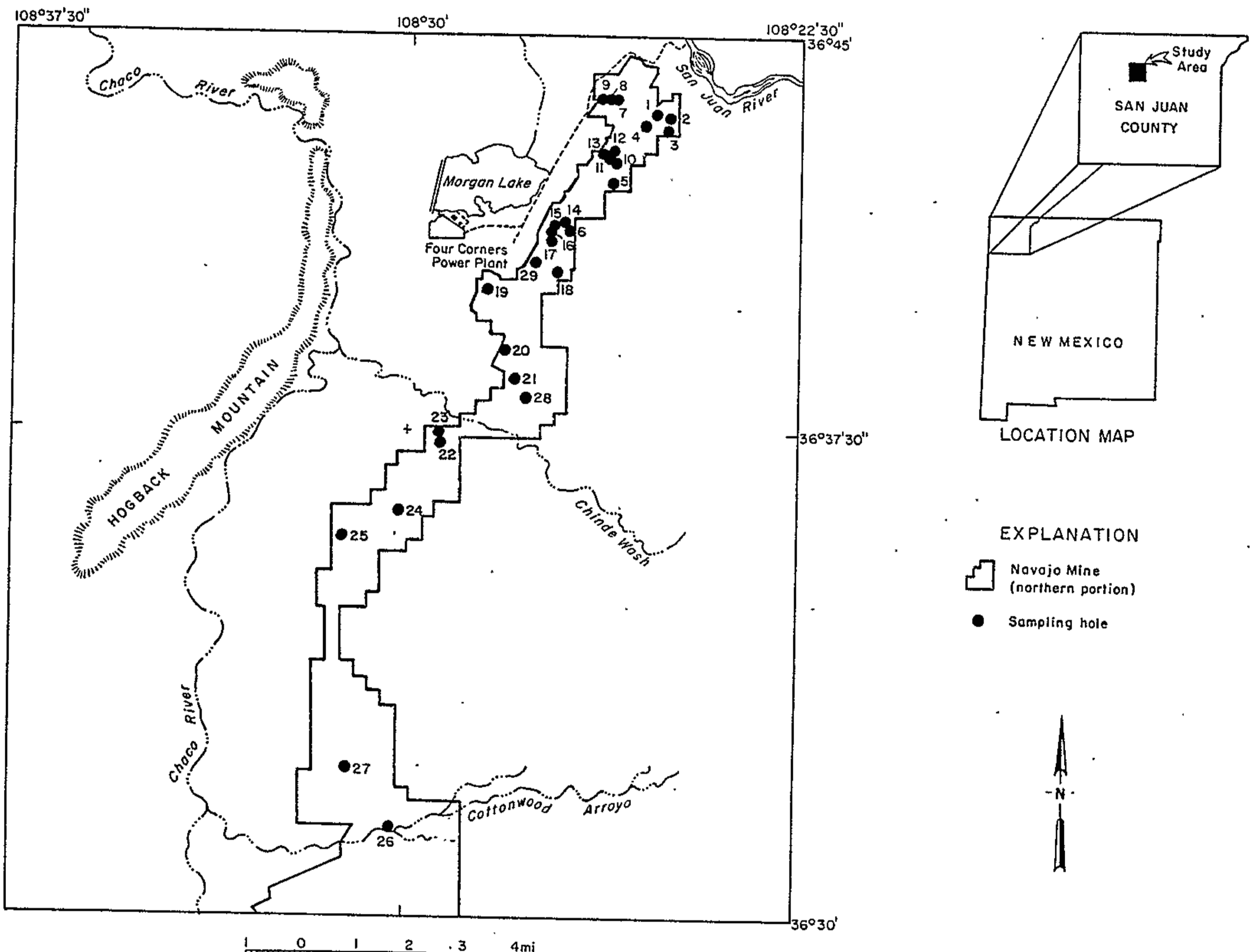

Figure 1. Location of Navajo Mine and sampling holes

Colorado Plateau. More specifically, it is situated just east of the Hogback Mountain Monocline which separates the Four Corners Platform from the central San Juan Basin in northwestern New Mexico.

Coal is strip-mined from the Fruitland Formation (Cretaceous) which lies at the surface in this area. The Fruitland is generally 200-300 ft thick and consists of interbedded sandy shale, carbonaceous shale, clayey sandstone, coal, and sandstone (Stone and others, 1983).

Data collected at the mine (Utah International, Incorporated, 1981) indicate the climate is arid with an average annual rainfall of 5.7 inches, based on the period 1962-1980. Greatest precipitation occurs in the period August through October. Average annual class-A pan-evaporation rate is 55.9 inches or nearly 10 times the rainfall.

The reclaimed areas studied were regraded or revegetated during the period 1975 to 1984. Water added during irrigation generally did not exceed 6 inches/year. The seed mix most commonly applied for revegetation was Atriplex. This mix includes alkali sacaton, galleta, globe mallow, Indian rice grass, and sand dropseed. The average rooting depth is probably <2 ft.

The mine area is drained by the San Juan River and its tributaries (Figure 1). The San Juan is perennial, but the tributaries are ephemeral.

APPROACH AND METHODS

Recharge may be determined by various physical and chemical methods (Stone, 1985). Common physical methods utilize the hydrologic balance, ground-water characteristics, or soil physics. Chemical methods may involve tracers, carbon 14, or radioactive isotopes. Most of these methods are either complex, expensive, or require data that may not be readily available. Therefore, as in the Phase-I study, recharge was determined by the chloride mass-balance method.

CHLORIDE MASS-BALANCE METHOD

The amount of common chloride (chlorine 35) in soil water provides a simple, inexpensive, but valid alternative chemical approach to recharge (Allison and Hughes, 1978). Chloride is a normal constituent of precipitation. It is picked up from the ocean and carried inland by major weather systems. Chloride may also be incorporated in precipitation where winds stir up dry, saline lake beds or soil. Industrial emissions also contribute chloride to precipitation. This is especially true of coal-fired power plants. Coal commonly contains chloride which is not soluble but is released to the environment during burning.

Chloride is a good tracer because it is constantly being added to the soil water and is conservative (it moves only with the water). Precipitation brings a quantity in, plants concentrate it during water uptake or evaporation causes salt buildup, and consecutive storm/infiltration events displace the chloride downward in discrete slugs (piston flow). Water escaping the root zone is assumed to become recharge.

The mass balance of chloride in the system provides a means of measuring recharge. More specifically, $PCl_p = RCl_{sw}$ (Gardner, 1967), where P = average annual precipitation, Cl_p = average annual chloride content of precipitation, R = recharge, and Cl_{sw} = average soil-water chloride content. Put another way, $R = Cl_p/Cl_{sw} \cdot P$ (Allison and others, 1985).

There are several assumptions in the chloride mass-balance method:

1) Precipitation is the sole source of chloride.
2) Recharge is strictly from precipitation.
3) Recharge is by piston flow.
4) Cl_p is constant through time.
5) P is constant through time.

Because these assumptions are not always met, results are considered estimates. For example, some chloride may be added to the soil surface through dry fall (dust, fertilizer, etc.). Also, some non-piston flow may occur locally (fractures, root tubes, burrows). Lateral flow may occur in or at the top of low permeability zones. No doubt both Cl_p and P have varied in the past, especially in the Pleistocene.

Nonetheless, results of the chloride method have been corroborated by those of other methods, where they have been applied to the same area. A plot of recharge based on chloride vs recharge based on tritium gave a straight line in an Australian study (Allison and Hughes, 1978). Furthermore, chlorine 36 results corroborated chloride mass-balance results in a New Mexico study (Phillips and others, 1984).

Clp and P are either obtained from the literature or determined at the study area. Data were available for P but not Clp at the Navajo Mine. In the Phase-I study, the Clp used was an average of published values for adjacent areas. This value (0.60 mg/L) was also used for determining recharge at undisturbed sites in the Phase-II study. A program of sampling and analyzing every precipitation event at the Navajo Mine was initiated in September 1984. Dust is not excluded from the rain gage where samples are collected, because dust is a natural source of chloride input to the soil profiles being studied. A Clp of 2.02 mg/L is obtained for precipitation samples taken over the 12-month period, mid-October 1984 to mid-October 1985. This higher value is presumably due to power-plant chloride emissions. Although no stack-emission data could be obtained, coal is known to contain insoluble chloride that is only released to the environment upon combustion (National Research Council, 1980). This higher calculated Clp value was used for computing recharge at reclaimed sites in the Phase-II study as it is more characteristic of conditions during mine/power-plant operations.

Irrigation during revegetation effects chloride recharge determinations in two ways. First, irrigation is an additional source of water for recharge. Secondly, irrigation water is an additional source of chloride. Ideally, P and Clp should be adjusted to allow for these additions. Practically, this is difficult.

Approaches to watering have varied since reclamation efforts began at the mine, but irrigation periods are generally short and the total amount of water added in a year usually does not exceed the average annual precipitation. Converting the water applied at a given site to an annual increment over the reclamation period for addition to P requires more specific data than generally available and was not attempted.

Chloride content of irrigation water was determined from 13 existing analyses supplied by Utah International and two analyses made in 1986 by the Bureau. An average value of 51 mg/L was obtained. This is two orders of magnitude higher than the Clp derived from the literature (0.6 mg/L) and one order of magnitude greater than the Clp based on local precipitation analyses (2.02 mg/L). The reason for the elevated chloride content is evaporation. The irrigation water is actually San Juan River water that is stored in Morgan Lake until used for cooling or boiler feed at the APS Power Plant. Both storage and cooling promote evaporation. The actual amount of chloride added to a specific reclaimed site or the appropriate adjustment for Clp at a given site is difficult to determine and was not assessed.

Runon, or ponding of runoff from surrounding slopes in depressions also effects recharge calculations. It is a source of additional water and chloride. The amount of water added to depressions in this way varies from storm to storm at a given site and from site to site for a given storm. Factors include such things as size of the depression, size of the catchment, slope of the catchment sides, vegetation type, vegetation density, texture of surface materials, presence of natural or manmade drainage ways, antecedent moisture, and storm intensity. The adjustment of P for runon water is therefore complex and none was made.

Sampling

Some 29 sites were sampled in May 1985. Of these, five were in undisturbed settings and 24 were in reclaimed areas (Table 1). From these sites, 1,243 samples were obtained.

Continuous core was taken with a hollow-stem auger rig. Solid-rod equipment permitted recovery of core 5 ft at a time. Recovery was generally 80-100%. A convention was adopted whereby partial cores were assigned to the upper part of the interval involved. For example, if only 4 ft of core were recovered in the 19-24-ft interval, the core was assigned to a depth of 19-23 ft.

Core obtained was approximately 2 inches in diameter. This was subsampled at regular intervals, more closely spaced in the upper core length. For example, samples were taken at 1/2-ft intervals in the upper core, but at 1-ft intervals in cores below that. Brief field descriptions of samples are given in Appendix A.

Samples were taken in 10-oz, screw-top, plastic jars. To prevent moisture loss, the joint between the cover and the jar was wrapped with plastic (electrical) tape and jars were stored in the shade in zip-top plastic bags until they could be taken to the lab. Samples never sat more than 7 days before moisture was measured.

Analysis

A general flow chart for analytical procedures is given in Figure 2. The first thing measured in the lab was moisture

Table 1. Source of samples.

Hole	Location	Setting	Total depth (ft)	Interval sampled (ft)
1	Bitsui/Watson	valley	48	0-48
2	Bitsui	reclaimed flat	64	0-59
3	Bitsui	badlands	81	0-81
4	N. Dodge	reclaimed flat	67	0-57
5	Dodge	upland flat	50	0-41
6	Custer	upland flat	99	0-99
7	Watson	reclaimed depression	77	0-41
8	Watson	reclaimed flat	69.5	0-46
9	Dodge	"undisturbed"	53	0-25
10	Dodge	fresh spoil	99	0-99
11	Dodge	reclaimed flat	93.5	0-93.5
12	Dodge	reclaimed depression	65	0-65
13	Dodge	reclaimed flat	64	0-58
14	Custer	reclaimed flat	73	0-73
15	Custer	reclaimed depression	18	0-15
16	Custer	reclaimed depression	72	0-72
17	Bighan	fresh spoil	73	0-72
18	Bighan	reclaimed flat	61.5	0-61
19	Pinto	reclaimed depression	40	0-24
20	Doby	reclaimed flat	61	0-61
21	Doby	reclaimed depression	40	0-31
22	Hosteen	reclaimed flat	67	0-65
23	Hosteen	reclaimed depression	31	0-25
24	N. Barber	reclaimed depression	75	0-75
25	Updip Barber	reclaimed depression	74	0-74
26	Cottonwood Arroyo	terrace	24	0-24
27	Area III	upland flat	19	0-19
28	Yazzie	reclaimed depression	23	0-23
29	Bighan	reclaimed flat	74	0-74

content. This was done gravimetrically, that is, by weighing samples wet, drying them, and reweighing the dried samples. The difference was attributed to moisture. Drying was done at 105°C overnight. Moisture is usually reported in terms of volumetric water content. This is obtained by multiplying the gravimetric value (g water/g soil) by the bulk density (g soil/cm^3 soil) of the unsaturated material. Bulk density of the material was not

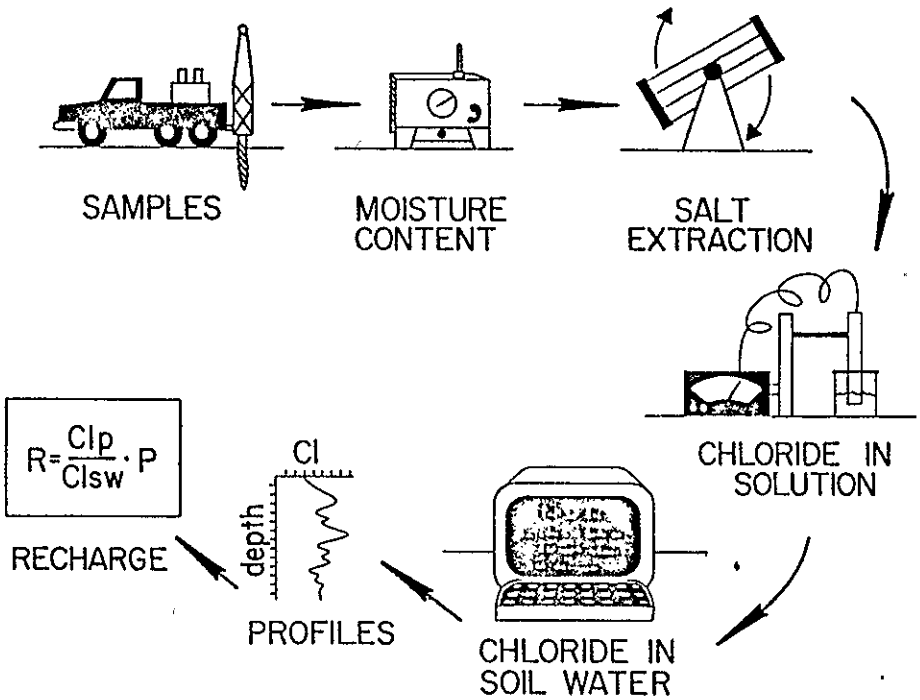

Figure 2. Flow chart for chloride method.

known but a value of 1.5 g soil/cm^3 soil is a reasonable approximation. The resulting volumetric water content, in g water/cm^3 soil, requires the following conversions for plotting purposes:

$$\frac{\text{g water}}{\text{cm}^3\ \text{soil}} \quad \text{to} \quad \frac{\text{cm}^3\ \text{water}}{\text{cm}^3\ \text{soil}} \quad \text{to} \quad \frac{\text{m}^3\ \text{water}}{\text{m}^3\ \text{soil}}$$

(see Appendix B for conversion factors).

Next, the salts containing the chloride were redissolved for measurement. In this step, samples were transferred to clean 4-oz screw-top, plastic jars, reweighed, and a known amount of deionized water was added. Samples were then shaken in a special mixer which thoroughly rotates the samples and water. After mixing, samples were allowed to settle overnight and the extract was decanted into clean 2-oz screw-top, plastic jars for chloride analysis. In some samples, swelling clay took up all the deionized water so no extract could be obtained (see Samples/Analyses Not Used below and Appendices C and D). Chloride content of the extacts was determined with a chloride electrode and pH meter. Laboratory procedures described here were shown to be valid by McGurk and Stone (1985).

From the chloride content of the extract, original soil-water chloride was determined: Clswo = (Clext · wt water added/dry wt sample)/(wet wt - dry wt/dry wt - wt jar) · Db, where Clswo = original soil-water chloride content, Clext = chloride content of the extract, wt water added = weight of deionized water added in extraction, dry wt sample = dry weight of sample before adding deionized water, wet wt = weight of field sample before drying, dry wt = weight of field sample after drying, wt jar = weight of original jar holding sample, and Db = bulk density of soil or rock material. Computer-generated tables of input data and resulting Clswo data are given in Appendix E.

When all original soil-water chloride values had been calculated they were plotted vs depth for each hole. Plotting was done by computer (Appendix F). Depth and chloride-content scales were standardized for ease in comparing profiles. Typical plots show simply an increase in chloride through the root zone, or an increase followed by a decrease to a value that is more or less maintained to the water table.

To assess possible changes in recharge through time, plots of cumulative chloride vs cumulative water content were prepared. Cumulative volumetric water content at any depth i = volumetric water content at depth i · sample interval at depth i. A computer-generated table of input and results of such calculations for the Phase-II sites is given in Appendix G. If there has been no change in conditions at the site, a straight line should be obtained. A curved line, however, indicates conditions were different in the past. Plots are given in Appendix H.

The age of individual sample points may be estimated, the former recharge rates may be calculated, and the approximate time of the changes determined. This is accomplished using modern Clp and P values in the equation, A = Clcum/(Clp · P), where A = age of a point, Clcum = cumulative chloride at that point, Clp = modern annual chloride content of precipitation, and P = modern average annual precipitation. The general age of the change in recharge may be compared with available Quaternary paleoclimate data as a check. Recharge in straight-line segments of the curve may be determined using R - ClpClsw · P. The significance of such analyses is that, because the Pleistocene and Holocene conditions were no doubt wetter than those at present, they provide a realistic worst-case recharge value for the mine area.

Samples/Analyses Not Used

For various reasons, certain sample numbers do not appear in the data tables (Appendix E). Some of these were never taken; others were taken but not analyzed (Appendix C). Also, some were analyzed but the analyses wer discarded as inappropriate (Appendix D).

Some samples were never taken because the wind blew the jars from the tailgate of the field vehicle where jars were numbered and lined up for sampling. When they were recovered they were deleted rather than used out of sequence.

Other samples were not analyzed because 1) swelling clay took up all the extraction water, 2) the hole was too shallow (too few samples for a profile), and 3) the jar was placed to close to the heating element and melted during oven drying.

Analyses were deleted because 1) samples came from below the water table or from a saturated zone, 2) chloride content of the extract was off scale and dilution was deemed unnecessary in view of the abundance of samples, and 3) hard drilling effected results. In the latter case, hard drilling causes heating which modifies moisture content if extreme. Samples subjected to this were identified by a combination of high chloride content, low water content, and a note in the field book that drilling was hard at that depth.

ISOTOPE METHODS

As a means of checking the chloride results, samples were also taken for stable-isotope (oxygen 18 and deuterium) and tritium analyses at two sites, one undisturbed and one reclaimed. For this, 500 ml of core were taken in large, widemouth plastic bottles. To prevent moisture loss, the caps were sealed with plastic tape and bottles were also placed in large plastic bags and sealed with tape.

Soil water was extracted by the solvent distillation method using toluene (Snell and Biffen, 1964). Samples were sent for analysis to the Environmental Isotope Laboratory, University of Waterloo, Waterloo, Ontario, Canada. Data are given in Appendix I. Plots of each isotope vs depth and O^{18} vs D were made by hand. Regressions and correlation coefficients were done by a hand-held calculator.

In arid settings, O^{18} vs D plots on an evaporation line, below and diagonal to the meteoric water line (the line on which O^{18} vs D in rain water fall). The displacement of deuterium from the meteoric line may be used to determine recharge (Allison and others, 1983). The relationship used is $R = (k/D)^{1/2}$, where R = recharge, k = a constant, and D = the displacement of deuterium from the meteoric line.

RESULTS

For ease of comparing results, sites have been grouped into three catagories, reflecting the major landscape types studied: undisturbed ground, reclaimed flats, and reclaimed depressions. For convenience in locating data on a given site, various types of tables and plots for all holes are presented in Appendices. Brief field descriptions of rock and sediment types encountered in drilling are given in Appendix A. Samples not analyzed (mainly due to swelling clay problems) are described in Appendix C. Samples analyzed but later deleted from recharge determinations (because of heating effects during drilling) are discussed in Appendix D. Basic moisture and chloride data are given in Appendix E. Moisture and chloride vs depth plots, as well as Clsw and recharge determinations, are given in Appendix F. Cumulative chloride vs cumulative water data are given in Appendix G and plots of such data are given in Appendix H.

Recharge determinations are summarized in Table 2.

UNDISTURBED GROUND

Undisturbed sites are those that have not been touched by mining operations. Five such sites were sampled in the Phase II study to supplement or verify results for such settings obtained in the preliminary study. Of these sites, one was in Fruitland badlands, two were on highwalls of open cuts, one was on a floodplain terrace of a major tributary of Chaco Wash, and one was the same upland flat sampled in the preliminary study. Each site was selected because it typified undisturbed settings in that area.

Table 2. Summary of chloride recharge calculations.

Hole	Location/Setting	Year Reclaimed[1]	Interval (ft)	Geology[2]	Clsw (mg/L)	R (inch/yr)
1	Bitsui/Watson Valley	1978	3-40	spoil	199.14	0.06
2	Bitsui Flat	1978	0-47	spoil	205.02	0.05
3	Bitsui Badlands	--	1.5-79	Kf	583.03	0.01
4	North Dodge Flat	1978	2.3-17	spoil	457.18	0.03
			46-57	Kf	457.92	0.01
5	Dodge Upland	--	4-40	Kf	65.73	0.05
6	Custer Upland	--	35-99	Kf	164.69	0.02
7	Watson Depression	1978	5-30	spoil	282.76	0.04
			31-39	Kf	43.85	0.08
8	Watson Flat	1978	1.7-28	spoil	323.91	0.04
			30-46	Kf	92.51	0.04
9	Watson "Undisturbed"	1978	0-25	spoil/Kf	(improper profile)	
10	Dodge Fresh Spoil	1984	0-99	spoil	510.70	0.02
11	Old Dodge Flat	1976	1.3-81	spoil	245.46	0.05
			81-93.5	Kf	69.44	0.05
12	Dodge Depression	1976	3-52	spoil	139.38	0.08
			55-64	Kf	34.32	0.10
13	Young Dodge Flat	1984	2-46	spoil	96.34	0.12
			47-58	Kf	18.52	0.18
14	Custer Flat	1982	1.7-73	spoil	503.73	0.02
15	Custer Depression	1975	(too shallow--samples not analyzed)			
16	Custer Depression	1975	2.3-72	spoil	404.21	0.03
17	Bighan Fresh Spoil	1982	1-71	spoil	331.16	0.03
18	Bighan Flat	1979	1-59	spoil	512.72	0.02
19	Pinto Depression	1975/76	3-16	spoil	291.45	0.04
			17-24	Kf	56.07	0.06
20	Doby Flat	1976	5-61	spoil	175.03	0.07
21	Doby Depression	1975/76	0.3-26	spoil	23.57	0.49
22	Hosteen Flat	1977/81	10-25	spoil	49.05	0.23
23	Hosteen Depression	1977/81	0.8-17	spoil	214.54	0.05
24	N. Barber Depression	1983	4-73	spoil	74.22	0.16
25	Updip Barber Depression	1977/79	1-62	spoil	67.24	0.17
			67-74	Kf	52.98	0.06
26	Cottonwood A. Terrace	--	10-24	Qal	38.95	0.09
27	Area III Flat	--	5.5-19	Qal/Kf	30.75	0.11
28	Yazzie Depression	1979	6.5-23	spoil	33.61	0.34
29	Bighan Flat	1975	1.3-61	spoil	944.16	0.01
			65-74	Kf	77.29	0.04

[1] blanks indicate undisturbed setting
[2] Qal = alluvium; Kf = Fruitland Formation

Hole 3: Bitsui Badlands

Hole 3 was located just southeast of piezometer KF 83-1, between the eastern property line and the road through the Bitsui area. The hole penetrated 81 ft of exclusively Fruitland Formation (Appendix A). Water was encountered in a coaly zone at a depth of 60.5 ft and again at 67 ft. Dropping a pebble in the hole at a depth of 74 ft, after a short period of no drilling (lunch break), indicated water had accumulated in the hole. Water also seemed to be leaking through the joints as drilling continued below that so when a hard zone was encountered at 81 ft, this hole was abandoned.

In the interval 0-20 ft, moisture content averages approximately 0.1 m^3/m^3 (Appendix F). From 20-60 ft moisture fluctuates about a value of 0.2 m^3/m^3. Moisture values between 60 ft and total depth are intermediate between these two values and result in part from draining of the local saturated intervals. The chloride content fluctuates considerably as did that of the badlands setting sampled in the preliminary study (Stone, 1984, Hole 3). Values range from approximately 500 mg/L to approximately 700 mg/L, averaging 583 mg/L over the interval 1.5 to 79 ft. The ground-water recharge rate is determined to be 0.01 inch/yr using this mean chloride value as Clsw.

The cumulative chloride vs cumulative water plot for Hole 3 was a straight line (Appendix H). No change in recharge through time is indicated.

Hole 5: Dodge Upland Flat

Hole 5 was located opposite a power-line pole on the highwall of Dodge Pit, between ramps 3 and 4. The hole penetrated approximately 1 ft of loose Quaternary dune sand and

49 ft of Fruitland Formation (Appendix A). Unlike the badlands setting (Hole 3), no water was encountered in drilling because of drainage of saturated zones into the adjacent open pit. No samples were obtained below a depth of 41 ft as a hard zone necessitated removing the core barrel and drilling with the center plug. Drilling was halted at 50 ft because of auger refusal (hard, cemented mudstone?).

Moisture content is fairly constant at approximately 0.2 m^3/m^3 (Appendix F). Chloride is quite low but constant. Values are typically <100 mg/L over most of the profile. The mean chloride content in the interval 4 to 40 ft is 66 mg/L. A recharge rate of 0.05 inch/yr is obtained for this site.

The cumulative plot for Hole 5 showed an increase in recharge followed by a decrease in recharge at various times in the past (Appendix H). More specifically, recharge was 0.02 inch/yr between 1,931 and 1,009 yrs ago. Between 1,009 and 766 yrs ago recharge increased to 0.07 inch/yr. Similarly, recharge increased to 0.12 inch/yr between 766 and 404 yrs ago. After that there was a decrease in recharge to the modern rate.

Hole 6: Custer Upland Flat

Hole 6 was located opposite ramp 6, just south of where the highwall road is closest to the eastern lease line, in a triangular area between two dirt roads, just east of the powerline. The hole penetrated 29 ft of loose Quaternary dune sand and 70 ft of Fruitland Formation (Appendix A). As in hole 5, no water was encountered due to the proximity to the open pit. This hole was one of the deepest drilled and reached 99 ft.

Drilling was suspended because this was the target depth. Six samples were not analyzed because they contained swelling clay which took up the deionized water during mixing and yielded no extract (Appendix C).

Moisture content in the dune sand is low at <0.1 m^3/m^3 whereas that for the Fruitland Formation is typical of other sites at approximately 0.2 m^3 (Appendix F). The chloride peak is fairly high and broad. It is associated mainly with the dune sand. Values in the Fruitland are low but constant as in the other highwall site (Hole 5). Mean chloride content over the interval 35 ft to 99 ft is 165 mg/L. Recharge is determined to be 0.02 inch/yr at this site.

The cumulative chloride/water plot for Hole 6 is similar to that for Hole 5 (Appendix H). Recharge increased from 0.01 inch/yr to 0.03 inch/yr 9,560 yrs ago. Recharge then decreased to the modern rate at 6,507 yrs ago.

Hole 26: Cottonwood Arroyo Terrace

Hole 26 lies along the west side of the main road connecting areas 3 and 4, near a piezometer on the terrace just north of the culvert at Cottonwood Arroyo. The hole penetrated 24 ft of exclusively alluvium (Appendix A). A saturated zone was encountered at a depth of 14.5 ft. Samples below this were wet due to drainage from above but not saturated. Samples were taken so as to avoid the wetted outer skin of the core. Due to this abundance of water, the hole was abandoned. After the augers were removed, water could be heard cascading down the hole.

Moisture content rises to a peak of nearly 0.4 m^3/m^3 at a depth of approximately 1.5 ft then drops to <0.1 m^3/m^3 for 10 ft or so and climbs to almost 0.3 m^3/m^3 below that (Appendix F). Chloride rises to a narrow peak of 1300 mg/L at a depth of 2 ft and declines to a value of <50 mg/L by 10 ft and maintains similar values to total depth (24 ft). A mean chloride value of 39 mg/L is obtained for the interval 10 to 20 ft. This gives a recharge rate of 0.09 inch/yr.

The cumulative plot for Hole 26 shows a decrease in recharge from 0.09 inch/yr to the modern rate at approximately 925 yrs ago (Appendix H).

Hole 27: Area III Upland Flat

Hole 27 lies midway between Holes 2a and 2b of the preliminary study. It was drilled mainly to permit sampling for stable-isotope and tritium analyses. The hole penetrated 0.5 ft of loose Quaternary dune sand, 9.5 ft of coaly soil (colluvium?), and 9 ft of Fruitland Formation (Appendix A). No water was encountered in drilling.

Moisture content rises to a peak of >1 m^3/m^3 at a depth of approximately 5 ft then declines, fluctuating around 0.4 m^3/m^3 below that (Appendix F). Chloride content rises to a peak of >500 mg/L at a depth of 1.5 ft then drops back to a very uniform value (<100 mg/L) between depths of 5 and 19 ft. A mean chloride value in this interval is 31 mg/L, giving a recharge rate of 0.11 inch/yr. The rate obtained in the Phase-I study (0.02 inch/yr) may be more reasonable (see Discussion).

Stable-isotope and tritium profiles are given in Figure 3. Typical of arid settings, O^{18}/D data plot along evaporation line,

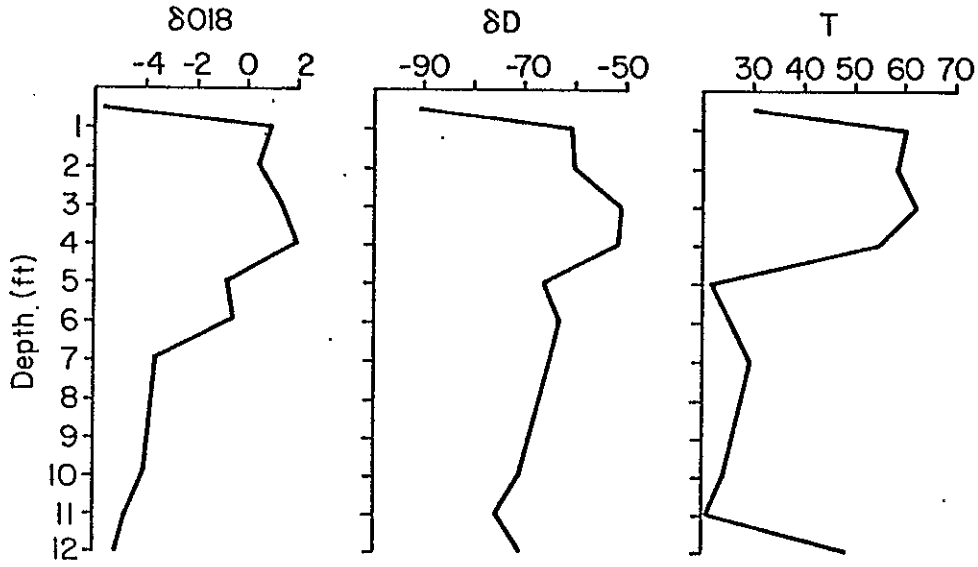

Figure 3. Stable-isotope and tritium profiles for the undisturbed flat (Hole 27).

lying to the right of and diagonal to the meteoric water line (Figure 4). The evaporation line has a slope of 2.3 and a regression correlation coefficient of 0.95. Recharge calculated by the displacement of deuterium from the meteoric line is 0.03 inch/yr. Tritium data give an unreasonable recharge rate. The 1960 bomb peak lies between approximately 1 and 4 ft, suggesting a recharge rate of 2.4 inch/yr.

The cumulative plot for the upland flat shows only a decline from a higher recharge rate of 0.10-0.13 inch/yr to the modern value at approximately 1,690 yrs ago (Appendix H). A similar plot from the Phase-I study shows similar paleorecharge rates but an older date for the decline (4,307 yrs). The reason for this difference is not clear.

RECLAIMED FLATS

Reclaimed flats are simply regraded or revegetated sites not on major slopes or in depressions. Fourteen such sites were sampled in the Phase-II study. Of these, two are characterized by fresh spoil, that is, graded but not vegetated overburden waste. The remaining sites have been revegetated at various times in the past. Specific dates are given below.

Cumulative chloride vs cumulative water plots were made for the reclaimed flats sites but these were not considered to be reliable (Appendix H). No paleorecharge calculations were made from these plots.

Hole 1: Bitsui/Watson Valley

Hole 1 was drilled south of the main road to the Bitsui pit, where it passes through a valley between two large bedrock

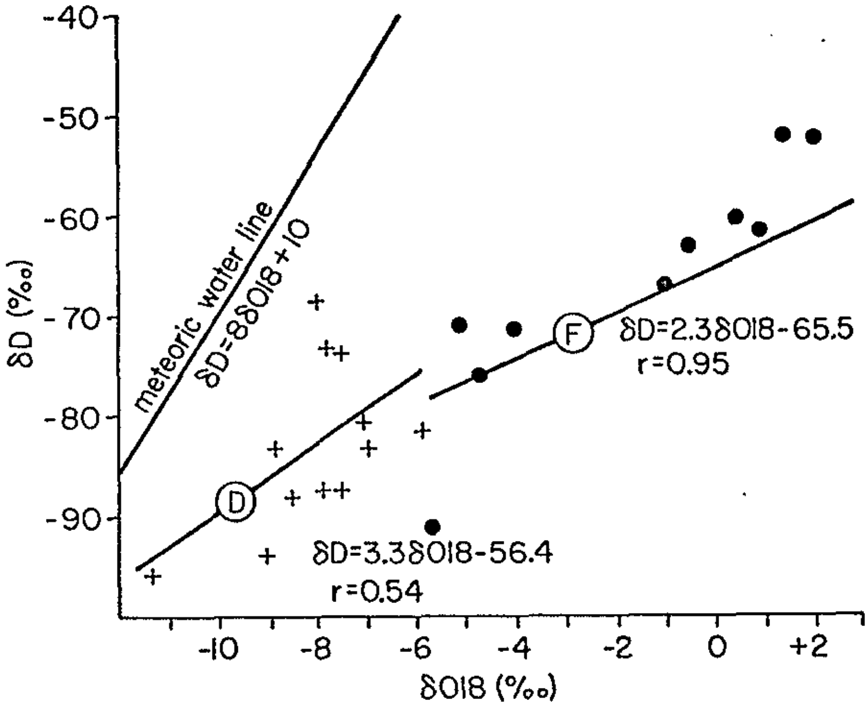

Figure 4. O^{18}/D plots for undisturbed flat (F) and reclaimed depression (D).

remnants south of the Watson water impoundments. Although essentially flat, this setting differs from the others in its valley setting. The area was reclaimed in 1978. The hole penetrated 48 ft of spoil (Appendix A). Water was encountered at 40 ft. The hole was extended another core length (5 ft) to see if saturation continued. Samples were still wet so the hole was abandoned. Analyses of samples between 43 and 48 ft were not used in the recharge calculation because they were saturated (Appendix D).

Moisture content is fairly uniform at approximately 0.2 m^3/m^3 (Appendix F). Chloride content is also fairly uniform at approximately 200 mg/L, except for a peak at a depth of 10 ft. The sample corresponding to this depth also had a very low moisture content (0.02 m^3/m^3) and a relatively high chloride content (>800 mg/L). No hard drilling or hot samples were identified at this depth so the results are considered to be reliable (Appendix H). No paleorecharge calculations were made from these plots.

Hole 2: Bitsui Flat

Hole 2 was drilled on the north side of the road along the eastern lease line, west of the Bitsui water impoundment and opposite piezometer Kf 83-1. The area was reclaimed in 1978. The hole penetrated 47 ft of spoil and 12 ft of Fruitland Formation (Appendix A). Water was encountered in coal at approximately 57 ft. No samples were recovered between 60 and 64 ft so the hole was abandoned. When the augers were removed 2.5 flights were wet, suggesting either 12.5 ft of water was standing in the hole or water was entering the hole 12.5 ft above the bottom. Swelling clay hindered the production of extract in several samples and they could not be analyzed (Appendix E).

Moisture content fluctuates but averages approximately 0.3 m^3/m^3 (Appendix F). Chloride content is relatively low but fluctuates between <100 and >400 mg/L (Appendix D). The average chloride content, in the interval 0 to 47 ft, is 252 mg/L. Recharge based on this average is 0.05 inch/yr.

Hole 4: North Dodge Flat

Hole 4 was drilled north of the north end of the Dodge pit, between ungraded spoil piles and undisturbed Fruitland badlands. The area was reclaimed in 1978. The hole penetrated 17 ft of spoil and 50 ft of Fruitland Formation (Appendix A). Hard drilling required the use of the center plug rather than the core barrel over much of the thickness of this hole. Thus, samples are not available for several intervals. One sample gave anomalous moisture and chloride values because of heating during hard drilling and was deleted from recharge calculations (Appendix D). No water was encountered in drilling.

Moisture content fluctuates between <0.1->0.2 m^3/m^3 (Appendix F). Chloride content hovers about 500 mg/L except for a peak of >3500 mg/L at a depth of 5 ft. Field notes indicate this sample is a cemented light-gray sandstone, but do not record any hard drilling or hot samples which would discredit this peak. More likely, the high chloride value is indicative of a relict saline water developed in this low permeability rock. Average chloride content is 457 mg/L for the interval 2.3 to 17 ft. This yields a recharge rate of 0.03 inch/yr for the spoil interval. Average chloride content is 458 mg/L for the Fruitland (17-57 ft). Indicated recharge there is 0.01 inch/yr.

Hole 8: Watson Flat

Hole 8 was drilled north of an east-west road extending from the Lake Haul Road toward the Watson Pit and the northern Research Area. The area was reclaimed in 1978. The hole penetrated 30 ft of spoil and 39.5 ft of Fruitland Formation (Appendix A). No samples were obtained in the interval 46 to 69.5 ft because of hard drilling with the center plug. No water was encountered in drilling.

Moisture content ranges from 0.1 to 0.2 m^3/m^3 to a depth of approximately 20 ft (Appendix F). Below that it rises, exceeding 0.4 m^3/m^3 in places. The lowest values are associated in part with intervals of yellow sand from which soil water drains quite readily. Highest values occur near the contact between the spoil and Fruitland Formation. The initial increase in moisture coincides with the position of coaly material just above the top of the Fruitland. This probably represents spillage that accumulated on the floor of the ramp that underlies this area. Chloride content is somewhat variable in the spoil but eventually stabilizes in the Fruitland part of the profile. A mean chloride value of 324 mg/L is obtained for the spoil interval (1.7 to 28 ft). This gives a recharge rate of 0.04 inch/yr. Mean chloride in the Fruitland (30-46 ft) is 92 mg/L for a recharge rate of 0.04 inch/yr.

Hole 9: Watson "Undisturbed" Ground

Hole 9 was drilled between hole 8 and the Lake Haul Road on the north side of the Watson Pit road. It was originally assumed to be an undisturbed setting but proved to be characterized by spoil smeared over undisturbed Fruitland in this pit-margin area. The area was reclaimed in 1978. The hole penetrated 17 ft of spoil and 36 ft of Fruitland Formation (Appendix A). No samples were taken from 25 to 53 ft due to hard drilling with the center plug. No water was encountered in drilling.

Moisture content fluctuates throughout the length of the hole (Appendix F). Chloride shows a general decline from a peak at a depth of 6 ft to 25 ft. Because the profile does not show equilibrium, mean chloride and recharge determinations were not attempted.

Hole 10: Dodge Fresh Spoil

Hole 10 was drilled at the extreme eastern edge of the reclaimed area north of ramp 3. More specifically, it lies between the recently revegetated area (1982) and the unworked spoil piles at the west edge of the Dodge pit. The hole penetrated exclusively spoil and was one of the deepest drilled in the Phase-II study at 99 ft (Appendix A). No water was encountered in drilling. Sample numbers 505 and 506 do not appear in the record of this hole because the jars labeled with these numbers were misplaced during sampling and never used (Appendix E).

The moisture profile is very uniform at approximately 0.2 m^3/m^3 (Appendix F). Chloride content is fairly uniform but increases between approximately 60 to 80 ft. A peak of 2,653 mg/L at 82 ft may be associated with relict saline water in a block of fine-grained sandstone. Below 90 ft chloride content drops back to a very low value, typical of undisturbed Fruitland elsewhere. However, the material in this interval was considered to be spoil at the time of drilling. A mean chloride value of 511 mg/L is obtained for the interval 0 to 99 ft. This gives a recharge rate of 0.02 inch/yr.

Hole 11: Old Dodge Flat

Hole 11 was drilled just west of Hole 10 in an area revegetated in 1975. There is a slight slope toward the north and runoff is evident. The hole penetrated 80 ft of spoil and 13.5 ft of Fruitland Formation (Appendix A). The hole struck a hard zone at 93.5 ft so was abandoned. No water was encountered in drilling.

Moisture content is fairly uniform, fluctuating around 0.2 m^3/m^3 (Appendix F). Chloride content fluctuates but is quite low. Below the top of the Fruitland chloride is lowest and very uniform. Mean chloride and recharge values were calculated for two different intervals: the spoil and the Fruitland Formation. Mean chloride value for the spoil (1.3-81 ft) is 245 mg/L and recharge is 0.05 inch/yr. Mean chloride in the Fruitland (81-93.5 ft) is 69 mg/L and gives the same recharge rate (0.05 inch/yr).

Hole 13: Young Dodge Flat

Hole 13 was drilled just west of Hole 12 at the top of a hill on the north side of the road north of ramp 3. The area was revegetated in 1984. The hole penetrated 46 ft of spoil and 18 ft of Fruitland Formation. A considerable thickness of power-plant ash was encountered within the spoil (Appendix A). No samples were obtained between 58 and 64 ft because of drilling a hard siltstone with the center plug. The hole also became tight so drilling was halted. No water was encountered in drilling.

Moisture content is quite uniform at approximately 0.2 m^3/m^3, but increases slightly down the hole (Appendix F). Chloride is very uniform with a slight decrease below the spoil/Fruitland contact. Mean chloride contents and corresponding recharge rates were calculated separately for the spoil and Fruitland portions of the hole. In the spoil (2-46 ft) the mean chloride value is 96 mg/L, indicating a recharge rate of 0.12 inch/yr. Chloride content of the Fruitland (47-58 ft) is only 18 mg/L, giving a recharge rate of 0.18 inch/yr.

Hole 14: Custer Flat

Hole 14 was drilled at the eastern edge of the reclaimed area north of ramp 6. Revegetation was completed in 1982. The hole penetrated exclusively spoil (Appendix A). Several samples yielded no extract due to swelling clay content (Appendix C). Hard and tight drilling was a problem below approximately 60 ft and the hole was eventually abandoned at a depth of 73 ft. No water was encountered in drilling.

Moisture fluctuates between approximately 0.15 and 0.2 m^3/m^3 (Appendix F). Chloride also fluctuates. A mean value of 504 mg/L is obtained for the interval 1.7 to 73 ft. The recharge rate for this chloride concentration would be 0.02 inch/yr.

Hole 17: Bighan Fresh Spoil

Hole 17 was drilled east of the Vinell Building, north of ramp 6, just southeast of a large white cross-shaped aerial survey marker. The hole penetrated 73 ft of exclusively spoil (Appendix A). Drilling extended another 1 ft but no samples were recovered. The hole was abandoned because a hard material (cemented sandstone?) caused difficult drilling. No water was encountered.

Moisture content was fairly uniform at 0.2 m^3/m^3 (Appendix F). Chloride was similarly uniform and generally <500 mg/L. The mean chloride content, in the interval 1 to 71 ft, is 331 mg/L. The indicated recharge rate is 0.03 inch/yr.

Hole 18: Bighan Flat

Hole 18 was drilled just north of ramp 8 approximately midway between the Main Haul Road and the ungraded spoil piles at the west edge of the Bighan Pit. The area was revegetated in 1976. The hole penetrated 61.5 ft of spoil (Appendix A). Tight drilling forced abandonment at this depth.

Moisture fluctuates at slightly >0.2 m^3/m^3 (Appendix F). Chloride content is fairly constant except near the bottom of the hole. The peak of 1,987 mg/L at 47 ft is probably associated with relict water in a block of fine-grained sandstone. Mean chloride content over the interval 1 to 59 ft is 513 mg/L. This gives a recharge rate of 0.02 inch/yr.

Hole 20: Doby Flat

Hole 20 was drilled close to the road south of ramp 12 and north of a large depression. The area was revegetated in 1976. The hole penetrated 61 ft of exclusively spoil (Appendix A). Drilling was halted when a hard zone was reached. No water was encountered.

Moisture content fluctuates about a value of approximately 0.1 m^3/m^3 (Appendix F). Chloride content is fairly constant below a peak of 1,050 mg/L at a depth of approximately 2 ft. The mean chloride content is 175 mg/L over the interval 5 to 61 ft. The indicated recharge rate is 0.07 inch/yr.

Hole 22: Hosteen Flat

Hole 22 was drilled close to the road in the area north of ramp 2. Although not the highest ground in the immediate vicinity, there is no runon due to the presence of an intervening saddle. The area was revegetated in 1977 and 1981. Reclamation work after May 1985 buried the site. The hole was 67 ft deep and 65 ft of spoil were recovered (Appendix A). Hard and tight drilling was a persistant problem below 25 ft. Analyses of samples between 25 ft and TD were anamolous due to heating during this difficult drilling and were discarded (Appendix D). No water was encountered in drilling.

Moisture content is slightly higher than in other holes. It fluctuates generally between 0.2 and 0.4 m^3/m^3 (Appendix F). Chloride rises to a peak of 592 mg/L at 1.67 ft then drops off to a fairly constant value of <100 mg/L. Mean chloride content is 49 mg/L in the interval 10 to 25 ft. Recharge rate for this value would be 0.23 inch/yr.

Hole 29: Bighan Ash Site

Hole 29 was drilled by Kpc piezometer GM6, between ramps 7 and 8. The area was revegetated in 1975. The hole penetrated 65 ft of spoil and 9 ft of Fruitland Formation (Appendix A). Although selected as an example of an ash disposal site, only a few inches of ash were cored. Perhaps the site was located too far west to encounter the major thickness of ash. A porous-cup soil lysimeter was installed in the hole when sampling was completed. No water was encountered in drilling.

Moisture content above 40 ft is fairly uniform at 0.2 m^3/m^3 (Appendix F). Between 40 and 65 ft the curve fluctuates considerably. The chloride profile is similar. No hard or tight drilling was noted in this interval so these peaks are concluded to be natural. They probably represent relict saline water in low-permeability, fine-grained sandstone. Below 65 ft, in the Fruitland, chloride values are very low and uniform. Mean chloride and recharge values were calculated for the spoil and Fruitland parts of the profile. In the spoil (1.3-61 ft), mean chloride is 944 mg/L, giving a recharge of 0.01 inch/yr. In the Fruitland (65-74 ft), mean chloride is 77 mg/L, indicating a recharge rate of 0.04 inch/yr.

RECLAIMED DEPRESSIONS

Reclaimed depressions are enclosed low-lying areas constructed during reclamation to control runoff and assure zero surface-water discharge. Nine such sites were sampled throughout the mine property. One of these is the same as in the preliminary (Phase-I) study, resampled this time for stable-isotope and tritium analysis. Other sites were selected because they typified depressions in their area.

Cumulative chloride vs cumulative water plots were made for the reclaimed depression sites but these were not considered reliable (Appendix H). No paleorecharge calculations were made from these plots.

Hole 7: Watson Depression

Hole 7 is one of three holes drilled in the Watson area, reclaimed in 1978. It was drilled east of holes 8 and 9, north of the road extending east from the Lake Haul Road. The hole penetrated 31 ft of spoil and 46 ft of Fruitland Formation (Appendix A). No samples were obtained between 42 and 77 ft because of hard drilling with the center plug. Two analyses were deleted because of heating effects of such difficult drilling (Appendix D). No water was encountered in drilling.

Moisture content is very uniform at 0.2 m^3/m^3 (Appendix F). Chloride content rises to a peak of 617 mg/L at a depth of 1.33 ft and then declines to a very uniform level throughout the rest of the spoil interval. At the spoil/bedrock contact chloride decreases to another uniform but lower level. Mean chloride contents and recharge rates were calculated for both the spoil and bedrock parts of the profile. In the spoil (5-30 ft), chloride averaged 283 mg/L, suggesting a recharge rate of 0.04 inch/yr. Mean chloride in the Fruitland (31-39 ft) is 44 mg/L, and recharge rate is 0.08 inch/yr.

Hole 12: Dodge Depression

Hole 12 was drilled north of ramp 3 and downslope of hole 11. It is not in the lowest point of the elongate depression here but in one of the low points. The hole penetrated 55 ft of spoil and 10 ft of Fruitland Formation (Appendix S). The hole was abandoned at a depth of 65 ft due to hard drilling. No water was encountered.

Moisture content is higher in the fine sediments at the surface, as might be expected (Appendix F). Below that there is a more or less uniform decline in moisture. Chloride is remarkably uniform in the spoil to a depth of approximately 30 ft. Between 30 and 55 ft (top of bedrock) chloride fluctuates more. In the Fruitland, chloride once again is very low and uniform. Mean chloride and recharge values were calculated for the spoil and Fruitland Formation. Mean chloride content of the spoil (3-52 ft) is 139 mg/L, giving a recharge of 0.01 inch/yr. In the Fruitland (55-64 ft) chloride averages 34 mg/L and recharge rate is 0.10 inch/yr.

Hole 16: Custer Depression

Hole 16 was drilled just south of ramp 6 in a large depression crossed by an east-west road. More specifically, it is southwest of a Forest Service experimental plot sign and west of a large rock pile. The area was reclaimed in 1975. The hole penetrated 72 ft of exclusively spoil (Appendix A). Several analyses were deleted because of heating during hard drilling (Appendix D). No water was encountered.

The moisture content fluctuates generally about 0.2 m^3/m^3

(Appendix F). A mean chloride value of 404 mg/L, in the interval 2.3 to 72 ft, indicates a recharge rate of 0.01 inch/yr.

Hole 19: Pinto Depression

Hole 19 was drilled in the large depression north of the road upslope of a deep cut east of the radio tower. The site was also characterized by large rocks at the surface. The area was reclaimed in 1975 and 1976. The hole penetrated 17 ft of spoil and 23 ft of Fruitland Formation (Appendix A). No samples were obtained between 24 and 40 ft due to hard drilling with the center plug. No water was encountered.

Moisture content is fairly uniform at approximately 0.2 m^3/m^3 (Appendix F). Between a peak of 1,353 mg/L at 1.33 ft and the top of the Fruitland at 16 ft, chloride content is fairly uniform at approximately 300 mg/L. Chloride content of the Fruitland is very uniform but lower (<100 mg/L). Mean chloride and recharge values were calculated for both the spoil and bedrock portions of the hole. In the spoil (3-16 ft), chloride averaged 291 mg/L, suggesting a recharge rate of 0.04 inch/yr. In the Fruitland Formation, mean chloride content is 56 mg/L, giving a recharge rate of 0.06 inch/yr.

Hole 21: Doby Depression

Hole 21 was drilled south of ramp 14 in a small depression on the south side of the road. The area was revegetated in 1975 and 1976. The hole penetrated 30.5 ft of spoil and 9.5 ft of Fruitland Formation (Appendix A). No samples were obtained from 32 to 40 ft due to drilling a hard zone with the center plug.

The core for the interval 30-30.5 was very wet. Perhaps water was perched at the spoil/Fruitland contact. Due to hard drilling and this presence of water, drilling was halted at a depth of 40 ft.

Moisture content hovers about a value of approximately 0.3 m^3/m^3 (Appendix F). Chloride content is very uniform, but increases very gradually down the hole. A mean value of 24 mg/L for the entire hole gives a recharge rate of 0.49 inch/yr.

Hole 23: Hosteen Depression

Hole 23 was drilled just east of Hole 22 in a deep depression to the south of the area with salt cedars growing in it. The area was reclaimed in 1975 and 1976. The hole penetrated 30 ft of spoil (Appendix A). No sample was obtained between 30 and 31 ft due to hard drilling with the center plug. No water was encountered.

Moisture content declines slightly down the hole (Appendix F). Chloride increases generally down the hole. A mean chloride value of 214 mg/L and a recharge rate of 0.05 inch/yr characterize the interval 0.8 to 17 ft.

Hole 24: North Barber Depression

Hole 24 was drilled in a large depression east of the coal stockpile area. The area was revegetated in 1979. The bottom of the depression was very soft so sampling was conducted near the edge in an effort to avoid getting the rig stuck. Considerable runoff is generated on the surrounding slopes based on the broken contour furrows and gulleys there. The hole penetrated 74 ft of spoil and 1 ft of Fruitland Formation (Appendix A). Due to hard drilling at a depth of 75 ft the hole was abandoned. Several samples contained swelling clay and yielded no extract (Appendix C). A wet zone was encountered at a depth of 170-171 ft.

Moisture content fluctuates about approximately 0.3 m^3/m^3 (Appendix F). Chloride content is very uniform (generally <100 mg/L) in the upper half of the profile. Below this values fluctuate more. A mean chloride content of 74 mg/L is obtained for the interval 4 to 73 ft. The indicated recharge rate is 0.16 inch/yr.

Hole 25: Up-dip Barber Depression

Hole 25 was drilled in a very small depression to the east of a large long valley. The area was reclaimed in 1977 and 1979. The hole penetrated 65 ft of spoil and 9 ft of Fruitland Formation (Appendix A). No water was encountered.

Moisture content is fairly constant at 0.3 m^3/m^3 (Appendix F). Chloride content is very low and uniform to 50 ft, where it increases toward the contact with bedrock. Below the contact it is low like the upper part of the spoil. Separate mean chloride and recharge values were calculated for the spoil and bedrock at this site. Mean chloride content of the spoil (1-62 ft) is 67 mg/L and recharge rate is 0.05 inch/yr. Chloride averages 53 mg/L in the Fruitland Formation (67-74 ft), giving a recharge rate of 0.17 inch/yr.

Hole 28: Yazzie Depression

This is the same depression sampled in the preliminary (Phase-I) study. It is located east of Yazzie ramp 1. The area was reclaimed in 1979. The hole was drilled mainly for isotope samples so was only 23 ft deep. It penetrated exclusively spoil (Appendix A).

Moisture content is approximately 4 m^3/m^3. Chloride content is very uniform. After a small peak at a depth of approximately 3 ft, chloride declines slightly below that to total depth. Values <100 mg/L are characteristic. Mean chloride content in the interval 6.5-23 ft is 34 mg/L. Indicated recharge rate is 0.34 inch/yr.

Stable-isotope profiles are erratic (Figure 5). The slope of the evaporation line along which these data plot is 3.3 and the regression correlation coefficient for the O^{18}/D plot is only 0.54 (Figure 4). The tritium plot (Figure 5) also appeared unreasonable. Thus, no recharge calculations were attempted.

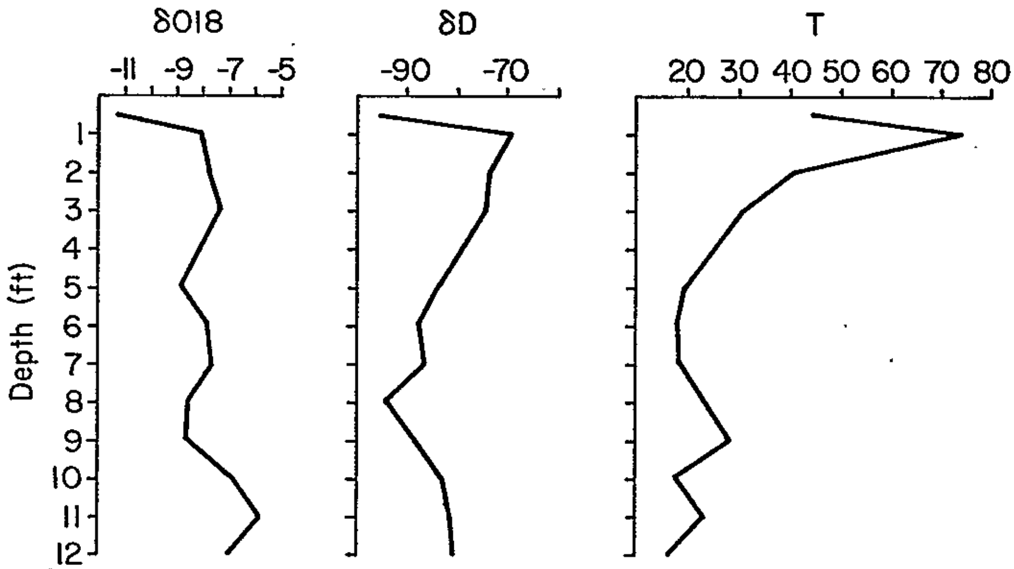

Figure 5. Stable-isotope and tritium profile for the reclaimed depression (Hole 28).

DISCUSSION

The Phase-II study provided an opportunity to further evaluate not only recharge at the Navajo Mine, but also the chloride mass-balance method of determining recharge. In this chapter, results are summarized, their validity is examined, the impact of mining on recharge is assessed, and needs for further work are described.

RECHARGE IN UNDISTURBED GROUND

Undisturbed or unmined ground was sampled in five settings, including badlands, uplands and highwalls in Fruitland Formation, and alluvial terraces. Recharge rates of 0.01-0.09 inch/yr were obtained by the chloride method (Table 3).

Badlands

The chloride vs depth profile obtained for this setting in the preliminary (Phase-I) study was erratic. This was attributed to a lack of equilibrium induced by erosion. Continental change in the position of the ground surface during erosion keeps the profile in a state of disequilibrium. The profile for the badlands example in this study (Hole 3) is quite variable, but gives no evidence of disequilibrium. The variability may be a reflection of the uneven buildup of chloride due to variation in rainfall intensity, different rock types or some lateral movement along the finer-grained horizons. The latter explanation is supported by the tendency on the profile for some higher moisture values to correspond with lower chloride values.

Recharge obtained for the badlands is low (0.01 inch/yr).

Table 3. Chloride recharge results by setting.

Hole[1]	Location/Setting	Recharge (inch/yr)	Statistics[3]
Undisturbed Ground			
3	Bitsui badlands	0.01	range = 0.01-0.09 inch/yr
5	Dodge upland	0.05	median = 0.04 inch/yr
6	Custer upland	0.02	mean = 0.04 inch/yr
26	Cottonwood Terrace	0.09	
27	Area III flat	0.02	
Reclaimed Flats			
1	Bitsui/Watson valley	0.01	range = 0.01-0.23
2	Bitsui flat	0.05	median = 0.11
4	N. Dodge flat	0.03	mean = 0.05
8	Watson flat	0.04	
10	Dodge fresh spoil	0.02	
11	Old Dodge flat	0.05	
13	Young Dodge flat	0.12/0.18[2]	
14	Custer flat	0.02	
17	Bighan fresh spoil	0.03	
18	Bighan flat	0.02	
20	Doby flat	0.07	
22	Hosteen flat	0.01/0.04	
Reclaimed Depressions			
7	Watson depression	0.04/0.08	range = 0.03-0.49
12	Dodge depression	0.08/0.10	median = 0.23
16	Custer depression	0.03	
19	Pinto depression	0.04	
21	Doby depression	0.49	
23	Hosteen depression	0.05	
24	N. Barber depression	0.16	
25	Updip Barber depression	0.17/0.06	
28	Yazzi depression	0.34	

1 Holes 9 and 15 yielded no recharge data so omitted
2 value for spoil/value for Fruitland Formation
3 only apply to spoil recharge values in reclaimed sites

This results either from rapid runoff from these clayey strata or more lateral than vertical soil water migration. Additionally, there are no doubt fractures along which more rapid recharge occurs. Inasmuch as the results of the chloride method are averages of lateral movement, vertical piston flow, and fracture seepage, they are probably reasonable estimates of recharge in this setting.

Upland Flats

The profiles for the three non-badlands Fruitland sites area among the most regular obtained. In all cases there was some thickness (1-29 ft) of dune sand or alluvium overlying the bedrock. All profiles show a chloride peak near the ground surface then a very uniform pattern below the peak (Appendix F, Holes 5, 6, 27). At first glance, one is tempted to attribute this profile shape to the presence of two different materials in the holes. However, the base of the peak is not always at the unconsolidated sediment/bedrock contact. Furthermore, the unconsolidated material has a higher conductivity, thus recharge should be higher there. The chloride peak suggests just the opposite (high chloride indicates low recharge). The answer to this contradiction may lie in evapotranspiration. This shallow zone includes the root zone, where chloride may be concentrated as plants selectively take up water, but leave salt behind. Such concentration has produced soil-water chloride contents as high as 15,000 mg/L in South Australia (Allison and others, 1985).

The highwall holes are so close (~1 mile apart) and so similar that they provide an opportunity to correlate chloride vs depth profiles. The only difference between them is the thickness of dune sand at the surface. Statistical correlation of profiles from these two sites (by cross-covariance) was attempted to document the response to the greater thickness of dune sand in Hole 6. The two profiles could not be matched directly, point by point. However, after various treatments, Hole 6 was shown to be a stretched, downward shifted correlative of Hole 5 (Appendix J). Such adjustment apparently occurred naturally, in response to the greater recharge through the thick dune sand.

The isotope studies of the upland flat (Area III) were quite instructive. Recharge based on displacement of deuterium from the meteoric line (0.03 inch/yr) agrees quite well with that obtained by the chloride method in the Phase-I study (0.02 inch/yr). The recharge value obtained for this site in the Phase-II study is an order of magnitude higher (0.11). The reason for this discrepancy is probably the difference in depth of the two holes. In Phase-I, the hole at this site was 39 ft deep and encountered a higher chloride peak below 30 ft (Stone, 1984, Figure 4). The Phase-II hole was only 19 ft deep and did not penetrate any high-chloride intervals. The Phase-I recharge value is more representative. The anomalous tritium results are attributed to movement of water in the vapor phase, as might be expected under these arid conditions. Chloride content is thus a very reasonable approach to recharge in such settings, because it moves only with water in the liquid phase.

Recharge rates obtained for this category of undisturbed ground range from 0.2 to 0.11 inch/yr. If the 0.11 value is dismissed as discussed above, the range is 0.02 to 0.04 inch/yr.

Alluvial Terraces

The chloride vs depth profile for the Cottonwood Arroyo terrace is very regular, like that for the uplands and highwalls.

Water table was shallow so the profile is short. Nonetheless, there is enough curve below the peak to determine recharge (Appendix F, Hole 26).

The recharge value (0.09 inch/yr) is the highest obtained for undisturbed ground, discounting the Phase-II upland flat value. The porous nature of the alluvium in the terrace is probably responsible for the higher recharge rate (Appendix A).

RECHARGE IN RECLAIMED AREAS

Reclaimed or mined ground was sampled at 24 sites, including fresh spoil, revegetated flats, and revegetated depressions. Recharge rates obtained by the chloride method range from 0.01 to 0.49 inch/yr (Table 3).

Application of Chloride Method to Spoil

As far as known, the chloride mass-balance method had not been applied to evaluating recharge in spoil prior to the Phase-I study (Stone, 1984). Because this is a new application, no conceptual model of recharge or chloride-profile adjustment in spoil exists. However, such a model is essential if results are to be interpreted properly. Three important questions must be answered before any conceptual model can be formulated.

1. How does texture affect recharge in spoil?
2. Is chloride flushed from or added to spoil?
3. How long does it take to redevelop an equilibrium profile in spoil?

The texture of spoil may be viewed on two levels, that of material forming the spoil blocks and that of the spoil itself.

The spoil blocks consist of the various rock types making up the Fruitland Formation. These include clay to sand sized materials and are thus texturally fine. The texture of the spoil itself is coarser but variable. Particles range from small grains (clay, silt, or sand) to very large blocks (up to several feet in diameter).

The textural change brought about by mining is misleading. Intuitively, one assumes that recharge is higher in the spoil because of its enhanced porosity. However, spoil particles are so large that most potential recharge water may be used up in merely wetting the spoil. In this event, little if any would be left for the pores between the blocks. Under unsaturated conditions, coarse material is actually a barrier to fluid movement. Gravels are used as barriers for toxic waste sites located in unsaturated zones (Arnould and others, 1985; Winograd, 1974 and 1981). Thus, for comparable settings, recharge may actually be lower in spoil. Manmade depressions, where excess water may collect through runon, and swallow holes or pipes, where water can move downward very rapidly, are exceptions.

Associated with the intuitive notion that recharge would be higher in spoil is the expectation that chloride would be flushed from spoil particles, at least until a new chloride level, compatible with the new recharge rate, is established. If this were true, the chloride content of spoil should be lower than that in undisturbed settings, or at least the undisturbed material underlying the spoil at that site. The profiles of reclaimed sites do not show this. In undisturbed sites (except badlands) chloride values are very low, often less than 50 mg/L. Few reclaimed profiles have values this low. Values for spoil in Hole 13 approach those of the underlying Fruitland Formation, but are still somewhat higher. In most cases, chloride values in spoil are much higher than those in non-badlands undisturbed sites (for example, Holes 4, 8, 9, 14, 18). Even in fresh spoil chloride values are higher than in nonbadlands undisturbed settings. The higher chloride contents suggest low recharge.

Reconcentration after flushing cannot account for higher chloride values. It may be that the reclaimed sites with high chloride values were badlands before mining or include material from deeper than sampled in the undisturbed (non-badlands) area. Maximum depth of sampling is 99 ft; mining extends to nearly twice that in places.

If flushing actually occurs, the chloride profiles should have a bulge, that is, there should be lower chloride values at the top of the profile and higher ones at the bottom. The profiles for Holes 10, 12, 18, 24, 25, and 29 suggest this. In most cases, chloride below the bulge is lower than even the top part of the profile. In Holes 12, 25, and 29, this corresponds to bedrock, but in Hole 10, no in-place Fruitland Formation was recognized during drilling.

It was thought that perhaps the depth of the top of such bulges and reclamation dates might be used to get at the rate of flushing. Depths range from 32 to 60 ft in the six profiles that appear to have bulges. Time since reclamation ranges from 1 to 10 yrs. These give apparent flushing rates of 4.6-60 ft/yr!

These rates are not to be taken as recharge rates because soil water is not uniformly distributed in the spoil. Unless it is, piston flow cannot operate. Flow is probably analogous to that in in-situ copper leaching operations. Movement of leaching solution is commonly along preferred vertical channels (Roman, 1977).

The flushing rates obtained seem unreasonable based on the small amount of water available from precipitation, even with the increases caused by runon and ponding. Flushing no doubt begins before regrading, let alone revegetation. A profile probably starts to develop while the spoil is in the ungraded piles. After grading and revegetation this profile is adjusted, in response to being nearer the surface (evapotranspiration).

Establishment of equilibrium profiles in spoil involves both physical and chemical processes. On the one hand, a soil-water continuum must be re-established. Moisture content within the spoil blocks must reach equilibrium with the water content between the spoil blocks. That is not to say moisture content within blocks and between blocks will be the same, as the presence of swelling clay barriers in or at the surface of the blocks may prevent it. On the other hand, chemical equilibrium of the soil water must also be re-established.

In terms of natural processes, fairly rapid changes in soil-water systems can result from land use changes. In an Australian study (Allison and others, 1985), it was found that recharge through sand dunes increased by more than two orders of magnitude following clearing of native vegetation (trees) only 50 yrs before. The areas sampled in Phase II were reclaimed during the period 1975-1984. Thus, the longest any reclaimed site has had to re-equilibrate is 10 yrs. The 1975 sites do not display any consistent evidence of this longer recovery time. For example, profiles for Holes 16 and 19 show a shallow peak, as in profiles for undisturbed sites. However, the profile for Hole 21 has no peak at all and chloride levels resemble those of the nonbadlands undisturbed Fruitland sites. Hole 29, cited as a possible example of flushing, is also an older (1975) hole.

Recharge results for reclaimed sites may appear at first to be unreasonable. For example, if a site has been reclaimed for 10 yrs and recharge is determined to be 0.5 inch/yr, it would seem that soil water should not be below a depth of 5 inches. However, as discussed above, the spoil is never totally without water and the recharge rate given is not the rate of rewatering the profile, but rather the average present flux of water in it, due to piston flow.

Four general types of profiles were obtained in reclaimed settings. Some showed wide variation in chloride content, some had possible flushing bulges as noted above, some were incredibly uniform with no peaks at all, and some looked like profiles from undisturbed sites, that is, they were characterized by a shallow peak followed by a uniform but lower chloride content below the peak. Stable-isotope analyses showed the bulge type profile was not in equilibrium. Stable-isotope analyses should also be made at sites having the other types of profiles.

In view of the difficulties in adjusting Clp and P for irrigation (see Chloride Method above), this was not attempted. Therefore, chloride recharge values given herein for reclaimed sites are somewhat conservative (low). The changes involved would presumably be small, so ignoring them probably does not significantly alter the results of the study.

In conclusion, the significance of the chloride recharge values obtained for the reclaimed sites is still uncertain. Stable isotopes showed that, in the depression sampled at least, equilibrium had not been re-established in 5 yrs time. If the results are representative, recharge is only slightly higher in the reclaimed sites than in the undisturbed sites. It should be noted, however, that in both cases, recharge rates are very low.

Flats in Reclaimed Areas

In this and other reclaimed settings, the chloride profiles are somewhat irregular. The variability is attributed to random mixing of various rock types during mining.

Recharge based on chloride ranges from 0.01 to 0.23 inch/yr. This is based on rates calculated for separate spoil intervals rather than the entire profile. Although some undisturbed sites have recharge rates higher than some reclaimed flat sites, the median of the range for reclaimed flats (0.11 inch/yr) is greater than any value obtained for undisturbed settings (Table 3).

Depressions in Reclaimed Areas

Highest recharge of all was expected in the depressions, because of the additional water input associated with runon in this setting. Studies of other areas have found higher recharge to occur in natural depressions than in other associated settings (Allison and others, 1985; Stone, 1984).

The preliminary (Phase-I) study was undertaken to learn, among other things, whether or not recharge is enhanced in depressions. However, in that study, both the depression and flat in reclaimed ground shared the highest recharge rate obtained (Stone, 1984). This supported the notion that reclamation enhances recharge, but no specific effect of runon was indicated.

It was hoped that additional data would shed some light on this problem. Phase-II recharge values (based on chloride) range from 0.03 to 0.49 inch/yr. In fact, the median value for this range, 0.23 inch/yr, is more than twice that of the reclaimed flats and nearly six times that for undisturbed settings.

Isotope analyses showed that equilibrium had not quite been re-established at the Yazzie depression in the 5 yrs since reclamation. This does not mean that none of the depressions have re-equilibrated. Some have very uniform profiles (Holes 7, 21, 28; Appendix F). These sites were revegetated in 1978, 1975/1976, and 1979, respectively. Re-equilibration presumably began with regrading a year or so earlier.

VALIDITY OF RESULTS

Both accuracy and precision of results were addressed. Accuracy (correctness) was evaluated by comparison of results with those of other methods. Precision (reproducibility) as tested by replication or sampling several examples of the same setting and resampling the same site.

It should be stressed that this work deals with recharge, <u>not</u> infiltration. Infiltration is the process by which water enters the soil profile at the ground surface. Such water may evaporate back to the atmosphere, be used or transpired by plants, or, escaping these, percolate to the water table. Recharge by contrast refers to only that water that has escaped the root zone and is largely destined to reach the water table. Recharge values given here are long-term, average fluxes, based on naturally available water input (precipitation). By contrast, infiltration (as determined by a ring infiltrometer) is the potential rate at which a hypothetical amount of water would enter the soil surface, if available. Thus, infiltrometer data are not a means of checking the chloride results.

The isotope study provided a means of checking the chloride results by another chemical method. The recharge value obtained from stable isotopes (displacement of deuterium from the meteoric line) for the undisturbed setting agreed quite well with that obtained by the chloride mass-balance method. It could be argued perhaps that one chemical method cannot be tested by another chemical method because some underlying assumption of chemical methods in general may be erroneous (the operation of piston flow, for example).

Therefore, a search was made for results of other studies of recharge in the San Juan Basin, especially those that employed physical methods. In a study of the Jackpile uranium mine, north of Laguna, New Mexico, Zehner (1985) obtained an average recharge value of 0.1 inch/yr over a 107 mi^2 area of the Rio Paguate drainage basin. He used the sum of base flow and underflow through alluvium to estimate recharge.

This is 0.01 inch higher than the highest recharge in undisturbed settings at the Navajo Mine. Greater precipitation at the Jackpile Mine is probably the reason. For the period 1919-1980, average annual precipitation there was 9.54 inches or 30% higher than at Navajo. Zehner (1985) noted that recharge would be greater at higher elevations or in alluvium and colluvium and less at lower elevations or through bedrock. Zehner's work generally confirms the chloride recharge results of the Phase-II study.

The results appear to be precise. Recharge rates for most examples of the same setting are similar (Table 3). The best test of precision would be a comparison of two profiles from the same site. This was possible for Phase-I and Phase-II results from the Area III upland flat. To standardize the comparison, recharge was calculated over a similar interval in each profile. Recharge obtained from both the Phase-I and Phase-II data was 0.02 inch/yr. This indicates that chloride-method results can be reproduced.

PALEORECHARGE IMPLICATIONS

Cumulative chloride vs cumulative water plots provide a means of evaluating change in recharge through time. Methods used to determine paleorecharge are explained under "Analyses" in the Introduction.

Plots for all but one of the undisturbed sites reflect natural variation in recharge through time in the Navajo Mine area. The plot for the badlands site gave a more or less straight line, indicating little change in recharge there (Hole

3, Appendix H). However, at the highwall sites (Holes 5 and 6), recharge apparently increased then decreased in the Quaternary. In plots for the Cottonwood Arroyo Terrace and Area III upland flat, only a decrease in recharge is indicated (Holes 26 and 27, Appendix H).

Paleorecharge values obtained are not exceptional and range from 0.01 to 0.13 inch/yr (Table 4). The minimum paleorecharge value matches the minimum modern value for both undisturbed ground and reclaimed flats (Tables 3 and 4). The maximum paleorecharge rate exceeds any obtained for undisturbed ground, but is less than the maximum values associated with reclaimed settings. At the highwall holes (5 and 6), the low (pre-increase) recharge rate is less than that taken to be the modern rate (that based on the entire profile). By contrast, the high (increased) rate exceeds the modern value. At Cottonwood Arroyo (Hole 26), the ancient and modern recharge rates are the same, probably due to the shallow depth of this hole. On the upland flat (Hole 27), paleorecharge rates are an order of magnitude higher than the modern value.

The cumulative plots for most reclaimed settings were generally irregular and showed considerable variation. However, the plot for Hole 22 (Appendix H) resembles those of undisturbed sites that have undergone a decrease in recharge. The plot was considered realistic, because the chloride vs depth profile (Appendix F) resembles those of undisturbed sites. Surprisingly, calculated ages are unreasonably high (thousands of years), considering this is spoil. The profile is probably not in

Table 4. Summary of chloride paleorecharge calculations.

Hole (site)	Sample	Depth (ft)	Cl cum (g/m^2)	Age[1] (yrs)	Cl tot (mg/L)	Clsw (mg/L)	R paleo[2] (inch/yr)
5	209	6	32.32	404			(0.05)[3]
(Dodge highwall)					507.55	28.20	0.12
	226	23	61.31	766			
					251.33	50.27	0.07
	232	29	80.76	1,009			
					1,229.37	153.67	0.02
	243	40	154.46	1,931			
6	279	30	520.54	6,507			(0.02)[3]
(Custer highwall)					4,006.27	102.72	0.03
	319	76	764.82	9,560			
					5,986.42	315.07	0.01
	342	99	1,136.83	14,210			
26	1151	10	74.01	925			(0.09)[3]
(Cottonwood T.)					467.45	38.95	0.09
	1162	24	106.34	1,329			
27	1167	4.5	135.21	1,690			(0.02)[3]
(Area III flat)					249.04	35.58	0.10
	1173	13	175.57	2,195			
					163.51	27.25	0.13
	1179	19	194.09	2,426			

[1] = Clcum/(Clp·P) = Clcum/(0.6·0.14) = Clcum/(0.08)
[2] = Clp/Clsw·P = 0.6/Clsw·5.7
[3] = recharge for entire profile

equilibrium and the chloride values are relict.

Greater recharge in the past could have been caused by a wetter climate or more effective infiltration. Wetter climate does not necessarily mean greater precipitation. A reduction in evapotranspiration due to a temperature drop could also produce moister conditions. Changes in vegetative cover could have enhanced infiltration.

One might expect the decrease in recharge to coincide with the end of the Pleistocene (10,000 yrs ago) which is generally conceded to have been wetter. The ages of the decrease in recharge at Navajo Mine are considerably younger than this, ranging from 404 to 6,507 yrs (Table 4). At Hole 5 the decrease would have occurred in the year 1581 or 41 years after Coronado visited New Mexico. At Hole 26 the decrease occurred in the year 1060 or 10 years after major construction of the dwellings in Chaco Canyon began and 67 years before it ceased (Love, 1977). At Hole 27 recharge decreased in the year 295 or about the time pithouses were being built on the floor of Chaco Canyon. At Hole 6 the decline in recharge was in the mid Holocene (6,507 yrs ago). Work in southwestern New Mexico (Fleischhauer and Stone, 1982) indicates that ancient lakes formed there in the latest Pleistocene and into the Holocene (3,000-6,000 yrs BP). The existence of such lakes suggests wetter conditions extended from the Pleistocene into the Holocene. The maximum date of the youngest lake coincides fairly well with the date of the decrease in recharge at Hole 6.

It should be noted that because the ages given in Table 4 are based on modern values for Clp and P, they are only estimates and can be off a bit. Clp is controlled in part by distance from the ocean (Hutton, 1976). During glacial intervals, sea level would be lower and shorelines would be displaced some distance seaward, depending on the slope of the coast. At such times Clp would presumably be lower. During interglacials sea level would be high or normal and Clp would be high or normal. Precipitation may have been higher in just glacials or in both glacials and interglacials. If Clp and/or P were higher than today, the ages would be less (younger). If these parameters were lower, the ages would be greater (older).

Similarly, paleorecharge calculations using modern Clp and P values may also be off a bit. If these parameters were higher in the past (most likely) the paleorecharge values obtained will be conservative (low).

To summarize, the cumulative plots indicate recharge in the Navajo Mine area has varied through time. More specifically, it has been greater than at present in undisturbed settings. The causes of these past increases were strictly natural.

IMPACT OF MINING ON RECHARGE

Recharge may be viewed in terms of three different scales (Stone, 1985). Local recharge is the velocity-style value obtained at a point. Areal recharge is a volumetric flux obtained by multiplying the local recharge by the areal extent of the setting to which it applies. Regional recharge is simply the sum of the areal values and is the total volumetric flux for the study region (Stone and McGurk, 1985).

Ideally, impact is assessed by comparing regional recharge volumes for pre-mining and post-mining conditions. Lacking regional volumes, the local, velocity-style recharge rates for undisturbed and reclaimed settings may be compared to gain some sense of the impact of mining. The Phase I and II studies have provided such local recharge values. From Phase II data (Table 3), recharge in undisturbed settings ranges from 0.01 to 0.09 inch/yr. In reclaimed flats, recharge ranges from 0.01 to 0.23. Results from reclaimed depressions indicate rates of 0.03-0.49

inch/yr.

These data support the conclusion that recharge at the Navajo Mine is very low, regardless of landscape setting or land use. The worst possible impact scenario, based on these data, would involve a change in recharge from the lowest premining rate (0.01 inch/yr) to the highest post-mining rate (0.49 inch/yr). Although this represents a 98% increase, the resulting recharge is still <0.5 inch/yr. This case is unrealistic because the values used are extremes and the maximum value used is from a shallow formless profile (Hole 21; 26 ft) and probably is anomalously high. Phase-I results suggest recharge is increased 50% by mining and reclamation. Based on mean recharge values for Phase II, increases of approximately 33% for reclaimed flats and 75% for reclaimed depressions are more realistic.

The reason for the low recharge rates is the low precipitation (5.7 inches). Annual precipitation in the Navajo Mine area is the lowest in the state (Bureau of Reclamation, 1976). Low recharge is to be expected in an area with such low precipitation.

FURTHER WORK NEEDED

Three general categories of further work at Utah's northwest New Mexico mines are recognized. First, recharge in reclaimed sites should be re-evaluated by resampling 1-3 sites, which seem to yield equilibrium profiles, for stable-isotope and tritium analysis. Second, in order to better assess the impact of mining on recharge at the Navajo Mine, areal and regional recharge volumes should be determined for both pre-mining and post-mining conditions. Third, recharge at the San Juan and La Plata Mines should also be determined. Many of the landscape settings sampled at the Navajo Mine also occur at the San Juan Mine and recharge for them can be determined without additional sampling or analysis. Recharge in any new or different settings will require sampling. By contrast, most La Plata settings will be different and require additional sampling due to the location and elevation of this mine.

CONCLUSIONS

Several conclusions are possible from the Phase-II study.

1. The tendency of chloride-versus-depth profiles to show a peak near the surface then a uniform pattern of lower values below the peak is probably related to evapotranspiration in the root zone, rather than the presence of different geologic materials.

2. The lowest recharge rate, 0.01 inch/yr, was obtained for both undisturbed and reclaimed settings alike.

3. The highest reliable recharge rate obtained, 0.49 inch/yr, is associated with a reclaimed depression.

4. Recharge based on chloride for undisturbed settings ranges from 0.01 to 0.09 inch/yr. The median and mean values are both 0.04 inch/yr.

5. Recharge based on chloride for reclaimed flats ranges from 0.01 to 0.23 inch/yr. The median value is 0.11 inch/yr and

the mean is 0.05 inch/yr.

6. Recharge based on chloride for reclaimed depressions ranges from 0.03 to 0.49 inch/yr. The median is 0.23 inch/yr and the mean is 0.16 inch/yr.

7. Mining and reclamation appear to increase recharge by approximately 33% in the case of reclaimed flats and 75% in the case of depressions.

8. However, recharge at Navajo Mine is very low (<0.5 inch/yr), regardless of setting or land use, because of the very low precipitation in the area.

9. Plots of cumulative chloride vs cumulative water indicate recharge in the Navajo Mine area has fluctuated through time in response to purely natural phenomena.

10. Profiles of nearby holes in similar upland settings (except thicker dune sand at one of the holes) correlate when shifted downward, supporting the notion that the dune sand enhances recharge.

11. Replication at the upland flat site shows that results are reproducible.

12. The chloride recharge value for an undisturbed setting was confirmed by stable-isotope data.

13. Tritium gave an unrealistic recharge value because of movement of water in the vapor phase.

14. The depression sampled for isotopes had not regained equilibrium in the 5 yrs since reclamation.

15. Additional stable-isotope analyses at a few selected reclaimed sites at Navajo Mine should clarify which are in equilibrium.

16. Areal and regional recharge volumes should be determined for both pre-mining and post-mining conditions.

17. Determination of recharge at San Juan and La Plata Mines would require minimal additional sampling.

ACKNOWLEDGMENTS

This study was funded by a contract with Utah International, Incorporated. Tim Hobbs (Hydrologist, Utah International) assisted in site selection and provided necessary background data for the study. Laboratory and computer work was done by Darla Curtis and David Jenkins (undergraduate students, New Mexico Tech). Dave Jenkins also did the statistical correlation of the profiles for holes 5 and 6 (as a class project for a math course). Kelly Summers reviewed the report and made many useful sugestions.

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APPENDIX A

BRIEF FIELD DESCRIPTIONS OF SAMPLES

Explanation

If description not preceded by "Spoil", material is in-place Fruitland Formation.

Hole 1 Bitsui/Watson Valley

Drilled on irregular sloping surface south of road to Bitsui area.

Sample No.	Depth (ft)	General Lithology
1,2	0.3-0.6	Spoil - green clay
3-17	1-13	Spoil - light gray sandstone and gray clay with coal fragments
18-24	15-22	Spoil - green clay with brittle dark gray shale and loose gray sandy material
25-38	25-48	Spoil - as above but with sandstone and coal fragments; saturated below 40 ft

Hole 2 Bitsui Flat

Drilled opposite piezometer Kf 83-1, west of road.

Sample No.	Depth (ft)	General Lithology
39-44	1-10	Spoil - dark green claystone and large blocks of cemented gray siltstone
45	11	Spoil - yellowish green claystone
46-48	12-16	Spoil - green claystone
49,50	17,20	Spoil - dark gray, cemented, carbonaceous shale
51,52	21,22	Spoil - dark green, very coaly
53-56	25-28	Spoil - as above but some yellowish green
57-60	30-33	Spoil - dark, cemented carbonaceous shale
61-69	35-43	Spoil - yellowish green claystone
70-72	45-47	Spoil - as above but very coaly
73	48	Coal, in place
74-83	50-59	Carbonaceous shale and coal; saturated coal at 81 ft

Hole 3 Bitsui Badlands

Drilled southeast of piezometer Kf 83-1 between cliff and small water impoundment.

Sample No.	Depth (ft)	General Lithology
84-90	0.5-3.5	Claystone, yellow-green
91-101	5-15	Carbonaceous shale, as above; white gypsum crystals on bedding/fracture surfaces
102-105	16-19	Carbonaceous shale, silty, cemented
106-119	25-38	Carbonaceous shale, dark gray - olive
120	39	Coal
121-131	40-51	Carbonaceous shale, dark gray; wet just beneath coal
132	52	Coal
133-147	53-69	Carbonaceous shale
14	70	As above, but very coaly; wet at 60-61.5 ft and 67 ft
148-154	70-76	Carbonaceous shale, as above but brittle
155-159	77-81	Carbonaceous shale, as above but with laminar silty/sandy beds

Hole 4 North Dodge Flat

Drilled at north end of open Dodge pit, between spoil piles and undisturbed badlands.

Sample No.	Depth (ft)	General Lithology
160-162	0.3-1	Yellow sand (topsoil?)
163-171	1.3-48	Spoil - carbonaceous
172	5	Spoil - cemented, light gray sandstone
173	6	Spoil - carbonaceous
174	7	Spoil - sandstone as above
175	10-10.5	Spoil - carbonaceous
176-178	11-13	Spoil - sandy
179	14	Spoil - carbonaceous
180-182	15-17	Spoil - rusty olive carbonaceous shale
183	30-30.5	Sandstone, light gray (in place)
184	46	Coal
185-187	47-49	Carbonaceous shale, light gray
188-192	50-54	Carbonaceous shale, medium gray
193-195	55-57	Carbonaceous siltstone/sandstone, cemented

Hole 5 Dodge Highwall

Drilled opposite power-line pole, between ramps 3 and 4.

Sample No.	Depth (ft)	General Lithology
196-198	0.3-1	Blow sand
199-207	1.3-4	Shale, rusty green
208-214	5-11	Carbonaceous shale, rusty green
215	12	Coal
216-226	13-23	Shale, rusty green
227,228	24,25	Coal
229	26	Carbonaceous shale
230-232	27-29	Mudstone, medium dark gray, carbonaceous
233-237	30-34	Carbonaceous shale, dark gray, silty, some cemented, some soft
238-242	35-39	Carbonaceous shale, medium gray
243	40	Siltstone, dark gray, cemented
244	41	Mudstone, medium gray, cemented

Hole 6 Custer Highwall

Drilled just south of where road closest to lease line, in triangle between two roads.

Sample No.	Depth (ft)	General Lithology
245-278	0.3-29	Blow sand, yellow; contains more clay and carbonate in lower part
279	30	Sandstone, hard, gray, very fine
280-284	35-39	Carbonaceous shale, yellow to olive
285-290	40-45	Carbonaceous shale, rusty olive
291-293	46-48	Carbonaceous shale, gray
294-300	50-57	Claystone, very dark gray to black, very coaly
301,302	58,59	Coal
303-321	60-78	Carbonaceous shale, dark gray to black; lower 1 ft very coaly
322	79	Coal
323-325	80-82	Carbonaceous shale, very dark; nearly coal
326-328	83-85	Carbonaceous shale, medium gray
329-331	86-85	Coal
332	89	Carbonaceous shale, light gray
333-337	90-94	Carbonaceous shale, gray/green, slightly silty in places
338-342	95-99	Carbonaceous shale, gray, silty; slightly cemented, laminated

Hole 7 Watson Depression

Drilled north of road that runs east from frontage road into Watson area.

Sample No.	Depth (ft)	General Lithology
343-369	0.3-31	Spoil - yellowish olive claystone, coal, carbonaceous shale
370-375	32-39	Carbonaceous shale, green
376,377	40,41	Carbonaceous mudstone, gray, with white pelecypods (shell material)

Hole 8 Watson Flat

Drilled just west of Hole 7 but on ridge, north of road.

Sample No.	Depth (ft)	General Lithology
378-396	0.3-17	Spoil - mixed sand, carbonaceous shale, coal
397	20	Spoil - carbonaceous shale, green
398-401	21-25	Spoil - yellow sand
402-404	26-28	Spoil - soft black coaly material (ramp floor?)
405-408	30-33	Carbonaceous shale, very coaly, and light gray clay
409-413	35-39	Carbonaceous shale, light gray to cream, rusty
414-419	40-45	Carbonaceous shale, olive to gray
	46	Mudstone, fossiliferous

Hole 9 Watson "Undisturbed"

Drilled just west of Hole 8, between ridge and main mine road.

Sample No.	Depth (ft)	General Lithology
421-428	1-10	Yellow sand with some carbonaceous spoil
429-431	11-13	Spoil - rusty olive to buff carbonaceous shale
432	15	Spoil - olive carbonaceous shale
433,434	16,17	Spoil - buff colored
435-437	18-20	Sandstone, buff, cemented, with coaly fragments
438-440	21-23	Carbonaceous shale, rusty olive
441	24	Coal
442	25	Sandstone, laminated, cemented, coaly

Hole 10 Dodge Fresh Spoil

Drilled at eastern edge of reclaimed area, north of ramp 3, between unworked spoil piles and recently vegetated area (1982).

Sample No.	Depth (ft)	General Lithology
443-448	0.3-2	Spoil - carbonaceous shale and cemented sandstone
449-451	5-7	Spoil - carbonaceous shale
452-454	10-12	Spoil - dense, gray mudstone
455-478	15-52	Spoil - carbonaceous shale and gray mudstone
479-481	55-57	Spoil - as above but larger fragments
482-493	60-77	Spoil - rusty gray carbonaceous shale and white sandstone
494-500	80-87	Spoil - as above but larger blocks
501-511	90-99	Spoil - rusty carbonaceous shale

Hole 11 Old Dodge Flat

Drilled west of Hole 10, north of ramp 3.

Sample No.	Depth (ft)	General Lithology
512-519	0.3-6	Spoil - carbonaceous shale, red dog, cemented sandstone/siltstone
520-528	10-22	Spoil - as above with coal
529-534	25-31	Spoil - yellow sand
535	32	Spoil - carbonaceous shale
536-550	35-53	Spoil - carbonaceous shale; coal fragments at 46.5 ft
551-553	55-57	Spoil - as above but much yellow sand
554-556	60-62	Spoil - coaly at base
557-563	65-73	Spoil - as above
564-567	75-78	Spoil - as above with yellow sand
568	80	Spoil - carbonaceous shale and yellow sand; coaly in lower half
569	81	Carbonaceous shale, gray/green, silty at base
578	90	Carbonaceous shale, medium gray
579-582	91-93.5	Cemented siltstone nor very fine sandstone, light gray

Hole 12 Dodge Depression

Drilled northwest of Hole 11, downslope in low but not lowest point of depression.

Sample No.	Depth (ft)	General Lithology
583-594	0.3-4	Spoil - carbonaceous shale, rusty/green; quite moist, plastic
595-603	5-13	Spoil - as above with black carbonaceous shale fragments
604	14	Spoil - sandy
605-614	15-24	Spoil - clayey, soft, with coal fragments
615,616	25,26	Spoil - as above but drier
617-633	30-55	Spoil - as above with larger, harder blocks of carbonaceous shale
634-641	56-63	Carbonaceous shale, green/gray
642	64	Siltstone - very fine sandstone, cream colored; waxy claystone in basal 2 inches
643	65	Sandstone, hard cemented, light gray

Hole 13 Young Dodge Flat

Drilled just west of Hole 12 on top of hill, north of ramp 3.

Sample No.	Depth (ft)	General Lithology
644-646	0.3-1	Spoil - yellow sand
647-649	1-2	Spoil - carbonaceous shale and coaly fragments
650-652	2-3	Ash, light gray, fine grained material
653	5	Ash(?) as above
654	6	Spoil - carbonaceous shale
655,656	7,8	Ash, as above
657	10	Spoil - carbonaceous shale
658-660	11-13	Spoil - carbonaceous shale and ash
661-666	15-23	Ash, as above
667	25	Spoil - carbonaceous shale and coal
668-680	26-42	Ash, as above
681,682	45,46	Spoil - coaly
683-685	47-49	Carbonaceous shale, rusty gray/brown
686-692	50-56	Carbonaceous shale,
693,694	57,58	Siltstone, carbonaceous, cemented, hard

Hole 14 Custer Flat

Drilled west of spoil at eastern edge of revegetation north of ramp 6.

Sample No.	Depth (ft)	General Lithology
695-722	0.3-41	Spoil - carbonaceous shale, coal fragments, and gray cemented siltstone or very fine sandstone
723,724	42,43	Spoil - as above with gray sandstone in basal 2 ft
725-731	45-52	Spoil - carbonaceous shale and sandstone as above
732	53	Spoil - yellow sand
733-747	55-73	Spoil - carbonaceous shale, gray sandstone and yellow sand

Hole 16 Custer Depression

Drilled just south of ramp 6 road in large depression near rock pile and Forest Service sign.

Sample No.	Depth (ft)	General Lithology
755	0.3	Spoil - carbonaceous shale, olive, soft
756-765	0.6-6	Spoil - sandstone, light gray to buff, hard
766-783	10-35	Spoil - carbonaceous shale and light gray sandstone
784	40	Spoil - as above with hard, silty, light green claystone
785-790	45-53	Spoil - hard, light gray sandstone
791-793	55-57	Spoil - hard sandstone and green carbonaceous shale
794-796	60-62	Spoil - 6 inches green claystone at top; rest hard sandstone
797-803	65-72	Spoil - as above but rusty, clayey sandstone fragments

Hole 17   Bighan Fresh Spoil

Drilled behind vinell Building, north of ramp 7.

Sample No.	Depth (ft)	General Lithology
804-806	1-3	Spoil - carbonaceous shale, green/rust
807-816	5-20	Spoil - carbonaceous shale, dark gray and light gray siltstone
817	21	Spoil - yellow sand
818-825	22-35	Spoil - as above
826-828	36-45	Spoil - hard, light gray sandstone
829-844	50-72	Spoil - carbonaceous shale, green, and gray sandstone

Hole 18 Bighan Flat

Drilled west of spoil piles and north of ramp 8.

Sample No.	Depth (ft)	General Lithology
845-853	0.3-7	Spoil - carbonaceous shale, rusty olive, and coaly fragments
854-856	10-12	Spoil - as above with black carbonaceous shale
857-862	15-22	Spoil - gray and rusty green carbonaceous shale
863-865	25-27	Spoil - crumbly, green/brown
866-880	30-52	Spoil - carbonaceous shale as above
881-887	55-61	Spoil - soft, crumbly, yellow/green with secondary gypsum at 58 ft

Hole 19 Pinto Depression

Drilled northwest of road by radio tower.

Sample No.	Depth (ft)	General Lithology
888-902	0.3-12	Spoil - carbonaceous shale, coal, crumbly in upper 2 ft
903-905	15-17	Spoil - yellow/green carbonaceous shale
906-907	20-21	Carbonaceous sandstone/siltstone, gray
908-910	22-24	Coal sandstone or siltstone, as above

Hole 20 Doby Flat

Drilled south of ramp 12, close to road.

Sample No.	Depth (ft)	General Lithology
911-921	0.3-6	Spoil - mostly yellow sand (topsoil) with a few fragments of hard sandstone
922-926	10-17	Spoil - with dark gray carbonaceous shale
927-943	20-47	Spoil - gray, hard sandstone fragments and yellow sand
944-946	50-52	Spoil - all yellow sand
947-951	55-61	Spoil - hard blocks of mudstone, sandstone

Hole 21 Doby Depression

Drilled in small closed depression, not largest here.

Sample No.	Depth (ft)	General Lithology
952-971	0.3-15	Spoil - carbonaceous shale and coaly fragments
972	20	Spoil - sandy yellow clay with coal fragments
977,978	30.5,31.5	Carbonaceous shale

Hole 22 Hosteen Flat

Drilled north of ramp 2 on area intermediate in height between upper reclaimed surface and a depression.

Sample No.	Depth (ft)	General Lithology
979-983	0.3-1.6	Spoil - yellow sand at top; rest carbonaceous shale
984-986	5-7	Spoil - yellow clay with coaly fragments
987-997	10-26	Spoil - with green carbonaceous shale and hard sandstone
998-1010	35-65	Spoil - as above with many hard, cemented siltstone or very fine sandstone

Hole 23 Hosteen Depression

Drilled northeast of Hole 22 in low area beside one with salt cedars.

Sample No.	Depth (ft)	General Lithology
1011-1019	0.4-3.7	Spoil - dark gray/black carbonaceous shale
1020-1023	5-8	Spoil - as above with coaly fragments
1024-1031	10-25	Spoil - as above with hard zones (cemented siltstone or very fine sandstone)

Hole 24 North Barber Depression

Drilled in fairly large depression east of coal stockpile.

Sample No.	Depth (ft)	General Lithology
1032-1040	0.3-3	Clay from ephemeral lake deposition
1041-1065	3.3-47	Spoil - carbonaceous shale, dark gray to black, soft
1066-1069	50-53	Spoil - as above, very coaly and moist
1070,1071	55,56	Spoil - as above, very wet
1072,1073	57,58	Spoil - very clayey
1074-1077	60-66	Spoil - carbonaceous shale
1078-1083	70-75	Spoil - as above with large blocks of green/gray carbonaceous shale and rusty gray sandstone

Hole 25 Up-dip Barber Depression

Drilled in small closure, east of large, long valley.

Sample No.	Depth (ft)	General Lithology
1084-1087	1-4	Spoil - clayey, moist
1088-1096	5-14	Spoil - rusty dark gray carbonaceous shale, soft
1097-1099	15-17	Spoil - dark green carbonaceous shale, gypsiferous
1100-1102	20-22	Spoil - as above with hard mudstone fragments
1103-1108	25-32	Spoil - carbonaceous shale as above, moist
1109-1111	35-37	Spoil - as above with hard mudstone blocks
1112-1128	40-62	Spoil - as above with hard carbonaceous mudstone; wet at 45 ft
1129-1133	65-69	Carbonaceous shale, green/gray with white bivalves
1134-1138	70-74	Carbonaceous shale as above without fossils

Hole 26 Cottonwood Arroyo Terrace

Drilled west of road, north of culvert by alluvium piezometer.

Sample No.	Depth (ft)	General Lithology
1139-1147	0.3-3	Yellow sand, clayey
1148-1153	5-12	Sand as above, slightly cemented
1154,1155	14.5,15.5	Gravelly sand; wet
1156,1157	16,17	Sand, as above but very fine, very clayey
1158-1162	20-24	Sand, as above but siltier, clayier; all wet

Hole 27 Area III Upland Flat

Drilled mid way between Holes 2a and 2b of Phase-I study.

Sample No.	Depth (ft)	General Lithology
1163	0.5	Yellow sand
1164-1170	1.5-9.5	Spoil - coaly soil and carbonaceous shale
1171-1174	10.5-14	Carbonaceous shale
1175,1176	15,16	Carbonaceous shale, rusty green
1177-1179	17-19	Mudstone, black/brown coaly, crumbly, slightly fissile

Hole 28 Yazzie Depression

Drilled at same place as Hole 4 of Phase-I study.

Sample No.	Depth (ft)	General Lithology
1180-1183	0.5-3.5	Spoil - clayey, moist at top
1184-1199	5.6-23	Spoil - carbonaceous shale and mudstone

(shallower than in Phase I; did not reach alluvium or Fruitland Formation)

Hole 29 Bighan Ash Site

Drilled between ramps 7 and 8 by piezometer GM6.

Sample No.	Depth (ft)	General Lithology
1200-11219	0.3-31	Spoil - coaly, clayey, crumbly
1220-1223	35-40	Spoil - as above but yellow/gray
1224-1234	41-59	Spoil - yellow sand
1235,1236	60,61	Spoil - as above with approximately 1 ft of ash at base
1237-1246	65-74	Carbonaceous shale, green and carbonaceous mudstone, gray

APPENDIX B

CONVERSION FACTORS

acres x 4,047	= m^2
acre-ft x 1,233	= m^3
cm^3 x 0.00001	= m^3
ft x 0.3048	= m
inches x 25.4	= mm
m x 3.281	= ft
m^2 x 0.0002471	= acres
m^3 ÷ 1,233	= acre-ft
m^3 x 1,000,000	= cm^3
mm x 0.03937	= inches

APPENDIX C

SAMPLES NOT ANALYZED

Table C-1. Samples not analyzed.

Hole	Sample	Depth (ft)	Reason
NVII02	42*	5	Swelling clay, no extract produced
	43	6	Swelling clay, no extract produced
	48	16	Swelling clay, no extract produced
	49	17	Swelling clay, no extract produced
	69	43	Swelling clay, no extract produced
3	152	74	Swelling clay, no extract produced
	156*	78	Swelling clay, no extract produced
5	229	26	Swelling clay, no extract produced
	239	36	Swelling clay, no extract produced
	240	37	Swelling clay, no extract produced
	242*	39	Swelling clay, no extract produced
6	281	36	Swelling clay, no extract produced
	289*	44	Swelling clay, no extract produced
	320	77	Swelling clay, no extract produced
	325*	82	Swelling clay, no extract produced
	326	83	Swelling clay, no extract produced
	327	84	Swelling clay, no extract produced
10	505	--	Sample number not used
	506	--	Sample number not used
14	710	20	Swelling clay, no extract produced
	711	21	Swelling clay, no extract produced
	713	25	Swelling clay, no extract produced
	714	26	Swelling clay, no extract produced
	723	42	Swelling clay, no extract produced
	725	45	Swelling clay, no extract produced
	729	50	Swelling clay, no extract produced
	730	51	Swelling clay, no extract produced
	734	56	Swelling clay, no extract produced
15	748	1	Hole too shallow
	749	2	Hole too shallow
	750	--	Sample number not used
	751	5	Hole too shallow
	752	6	Hole too shallow
	753	10	Hole too shallow
	754	15	Hole too shallow
24	1078	70	Swelling clay, no extract
	1079	71	Swelling clay, no extract
	1080	72	Swelling clay, no extract
	1082	74	Swelling clay, no extract

Table C-1 (cont'd)

Hole	Sample	Depth (ft)	Reason
25	1130	66	Swelling clay, no extract
	1135	71	Swelling clay, no extract
	1136	72	Swelling clay, no extract
29	1209	7	Swelling clay, no extract
	1212	12	Swelling clay, no extract
	1213	15	Swelling clay, no extract
	1216	20	Swelling clay, no extract
	1241	69	Sample jar melted in oven

* analyzed for clay types (Table C-2)

Table C-2. Samples used for clay identification.*

No.	Hole	Depth (ft)	Description
42	NVII02	5	Spoil: dark green claystone
156	3	78	Kf: carbonaceous shale
242	5	39	Kf: carbonaceous shale
289	6	44	Kf: carbonaceous shale
325	6	82	Kf: carbonaceous shale

* all swelled excessively in extraction (shaking with deionized water).

Table C-3. Results of semiquantitative clay analysis clay species (parts per 10).

Sample	Kaolinite	Smectite	Illite	Chlorite	Mixed Smectite/Illite	Total
42	1.2	8.8	---	---	---	10.0
156	5.6	4.2	0.5	---	---	10.3
242	3.1	6.7	---	0.1	---	9.9
289	2.8	1.4	0.8	---	4.7	9.7
325	3.0	5.7	0.6	---	0.6	9.9

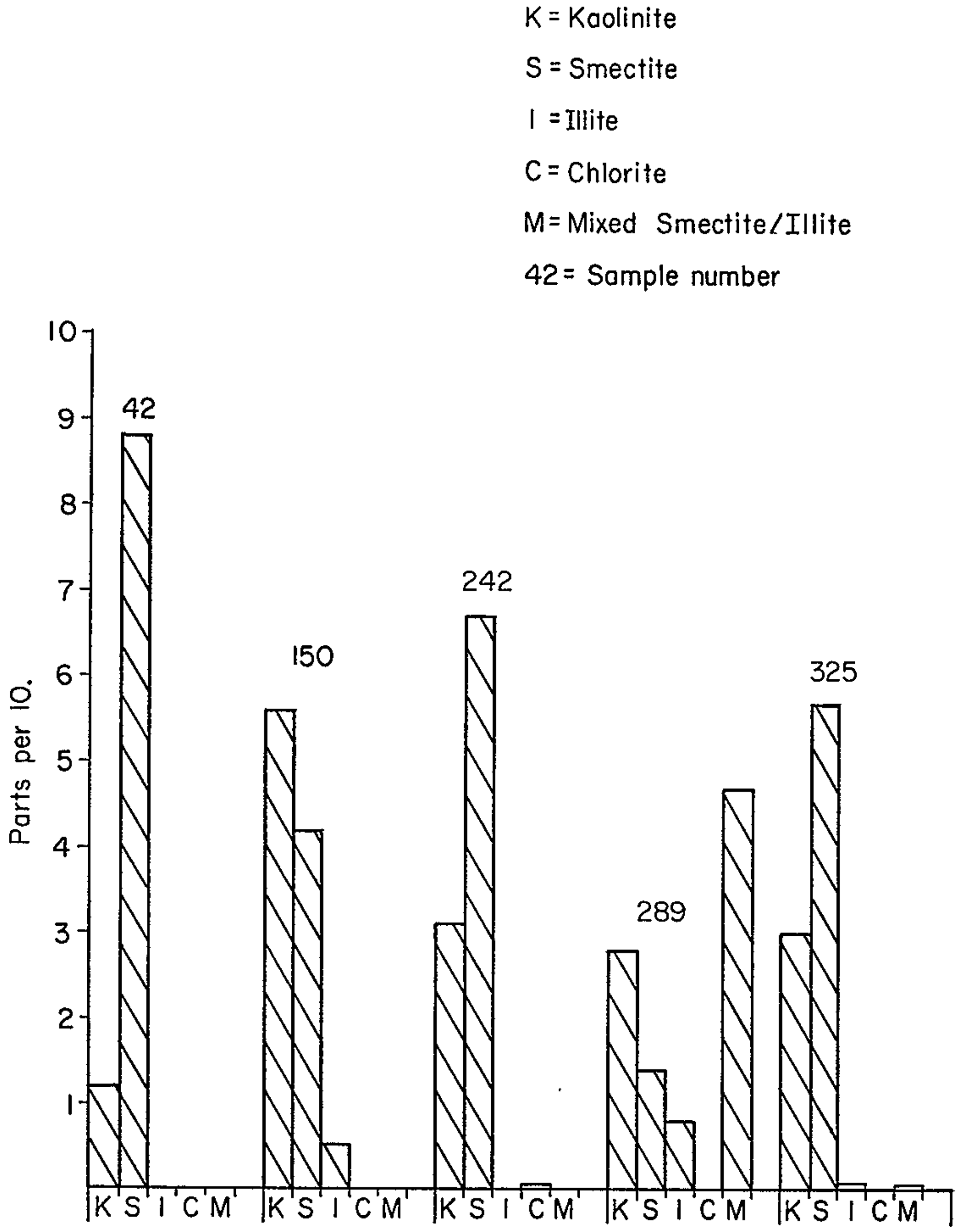

Figure C-1. Distribution of clay types in samples yielding no extract.

APPENDIX D

SAMPLES ANALYZED BUT NOT USED

Hole	Sample	Depth (ft)	Reason
NVII01	33	43	below water table
	34	44	below water table
	35	45	below water table
	36	46	below water table
	37	47	below water table
	38	48	chloride extract off scale (>100 ppm)
3	158	80	hard drilling, wet zone
	159	81	hard drilling, wet zone
4	183	30.5	hard drilling, sample heated, moisture lost
5	244	41	hard drilling, sample heated, moisture lost
7	376	40	
	377	41	hard drilling, sample heated, moisture lost
12	643	65	hard drilling, sample heated, moisture lost
16	779	25	hard drilling, sample heated, moisture lost
	780	26	hard drilling, sample heated, moisture lost
	781	30	hard drilling, sample heated, moisture lost
	782	31	hard drilling, sample heated, moisture lost
	783	35	hard drilling, sample heated, moisture lost
	784	40	hard drilling, sample heated, moisture lost
	785	45	hard drilling, sample heated, moisture lost
	786	46	hard drilling, sample heated, moisture lost
	787	50	hard drilling, sample heated, moisture lost
	788	51	hard drilling, sample heated, moisture lost
	789	52	hard drilling, sample heated, moisture lost
18	886	60	hard drilling, sample heated, moisture lost
	887	61	hard drilling, sample heated, moisture lost
21	977	30	hard drilling, sample heated, moisture lost
	978	31	hard drilling, sample heated, moisture lost
23	1030	20	hard drilling, sample heated, moisture lost
	1031	25	hard drilling, sample heated, moisture lost

APPENDIX E

DATA USED FOR CHLORIDE VS DEPTH PLOTS

Explanation

NVIII 01 = Navajo Mine, Phase II, Hole 1
Dry Wt. Soil = weight of soil used in salt extraction
Wt. Wtr. Added = weight of deionized water used in salt extraction

NVII01

Sample No.	Sample Depth (ft)	Moist. Content (cu.m/cu.m)	Dry Wt. Soil (gm)	Wt. Wtr. Added (gm)	Cl in Extract (ppm)	Cl in Soil Wtr. (mg/l)
1	0.33	0.17	34.74	80.11	3.60	48.44
2	0.67	0.33	25.81	78.67	5.60	52.22
3	1.00	0.31	34.77	80.54	3.50	26.40
4	1.33	0.16	37.58	73.80	4.25	53.13
5	1.67	0.14	35.66	76.70	5.10	81.07
6	2.00	0.15	37.93	79.06	8.25	117.17
7	2.33	0.18	32.04	75.59	19.00	255.83
8	2.67	0.17	30.72	77.04	19.00	285.45
9	3.00	0.19	30.34	76.89	12.00	161.49
10	4.00	0.14	36.85	71.78	10.00	138.77
11	5.00	0.14	26.44	79.88	9.10	199.78
12	6.00	0.13	33.33	82.24	11.00	213.44
13	7.00	0.12	28.38	80.39	10.50	257.68
14	10.00	0.02	21.44	78.66	5.30	883.03
15	11.00	0.16	29.76	89.37	9.50	173.25
16	12.00	0.17	28.56	76.24	10.00	153.36
17	13.00	0.19	33.29	79.18	16.00	196.37
18	15.00	0.17	29.83	84.85	8.00	132.99
19	16.00	0.21	26.46	76.50	11.00	153.06
20	17.00	0.34	29.36	81.36	11.00	89.25
21	18.00	0.20	22.16	89.26	6.40	130.48
22	20.00	0.19	21.78	72.82	6.70	117.47
23	21.00	0.20	24.00	81.03	6.60	109.00
24	22.00	0.23	26.49	75.46	8.00	100.04
25	25.00	0.21	24.98	81.19	7.50	117.27
26	26.00	0.28	25.83	84.55	16.50	194.63
27	27.00	0.25	30.01	78.18	33.00	338.87
28	30.00	0.22	28.13	76.80	30.00	380.83
29	31.00	0.27	24.77	77.33	14.00	164.60
30	35.00	0.25	53.34	80.45	12.50	75.07
31	36.00	0.29	22.35	79.84	8.10	99.58

NVII02

Sample No.	Sample Depth (ft)	Moist. Content (cu.m/cu.m)	Dry Wt. Soil (gm)	Wt. Wtr. Added (gm)	Cl in Extract (ppm)	Cl in Soil Wtr. (mg/l)
39	1.00	0.15	35.20	86.94	31.00	507.69
40	2.00	0.18	37.20	75.59	42.00	482.68
41	3.00	0.18	32.02	82.82	34.50	490.50
44	10.00	0.08	27.67	82.07	16.50	581.34
45	11.00	0.14	32.80	71.68	27.00	430.95
46	12.00	0.13	38.26	71.27	32.50	459.26
47	15.00	0.18	33.79	77.70	29.00	373.67
50	20.00	0.16	34.79	73.00	34.00	459.18
51	21.00	0.19	34.85	77.51	22.50	267.33
52	22.00	0.25	28.55	74.11	16.00	163.10
53	25.00	0.48	29.29	80.94	25.50	148.27
54	26.00	0.31	34.91	80.25	7.70	56.23
55	27.00	0.29	32.09	72.16	9.00	70.03
56	28.00	0.22	27.60	84.74	5.70	79.36
57	30.00	0.20	33.62	73.92	8.70	96.58
58	31.00	0.19	27.59	81.64	7.30	111.90
59	32.00	0.21	30.89	79.26	5.90	73.36
60	33.00	0.23	31.10	77.88	6.10	65.97
61	35.00	0.31	32.06	88.41	6.50	57.92
62	36.00	0.29	28.60	74.58	8.40	75.30
63	37.00	0.28	28.71	73.56	10.00	90.57
64	38.00	0.31	32.85	83.75	11.30	91.55
65	39.00	0.29	28.61	77.40	9.40	88.95
66	40.00	0.30	28.22	85.03	8.90	90.39
67	41.00	0.28	31.83	80.28	10.00	91.34
68	42.00	0.26	27.71	89.45	8.80	110.12
70	45.00	0.35	27.32	77.14	15.50	124.15
71	46.00	0.35	31.89	73.24	17.00	111.93
72	47.00	0.42	22.12	88.18	31.50	301.12
73	48.00	0.39	17.93	77.11	25.00	276.63
74	50.00	0.20	33.11	79.49	32.00	391.80
75	51.00	0.24	30.66	76.37	41.00	424.80
76	52.00	0.23	33.38	77.87	43.00	439.82
77	53.00	0.25	27.74	83.04	45.00	542.12
78	54.00	0.18	29.02	82.78	36.50	585.12
79	55.00	0.25	30.99	74.85	55.00	524.28

NVII03

Sample No.	Sample Depth (ft)	Moist. Content (cu.m/cu.m)	Dry Wt. Soil (gm)	Wt. Wtr. Added (gm)	Cl in Extract (ppm)	Cl in Soil Wtr. (mg/l)
86	1.50	0.18	25.79	84.82	50.00	923.30
87	2.00	0.17	26.24	88.98	32.00	655.79
88	2.50	0.16	25.86	83.01	31.00	611.53
89	3.00	0.13	26.66	77.50	33.00	740.29
90	3.50	0.13	27.38	74.49	34.00	687.04
91	5.00	0.15	30.28	74.44	26.20	439.89
92	6.00	0.16	27.30	77.63	26.00	466.87
93	7.00	0.18	36.27	76.60	40.00	479.08
94	8.00	0.10	28.85	75.17	14.00	365.98
95	9.00	0.11	30.50	79.76	20.50	506.49
96	10.00	0.13	26.51	84.02	20.50	510.21
97	11.00	0.11	28.41	76.19	17.00	429.08
98	12.00	0.11	24.91	79.38	18.30	529.33
99	13.00	0.08	24.91	79.38	10.70	416.71
100	14.00	0.13	33.26	76.64	14.00	245.26
101	15.00	0.06	30.91	73.91	3.50	145.42
102	16.00	0.08	24.71	70.49	8.40	308.89
103	17.00	0.06	28.91	81.91	28.00	1259.88
104	18.00	0.10	34.31	73.71	28.00	610.51
105	19.00	0.06	31.52	74.93	20.50	794.43
106	25.00	0.17	25.93	79.27	20.00	368.85
107	26.00	0.17	28.41	74.49	23.00	356.19
108	27.00	0.17	27.61	74.89	23.00	375.71
109	28.00	0.26	25.19	73.37	38.00	418.80
110	29.00	0.16	27.57	72.11	24.00	398.44
111	30.00	0.14	22.11	77.59	18.60	453.88
112	31.00	0.14	29.94	78.87	25.00	461.73
113	32.00	0.14	25.13	92.82	20.00	534.92
114	33.00	0.14	27.10	75.02	24.00	483.54
115	34.00	0.17	31.68	77.10	37.00	528.56
116	35.00	0.21	25.45	73.38	35.00	473.89
117	36.00	0.20	26.60	74.29	30.00	419.45
118	37.00	0.22	36.16	73.09	44.00	395.94
119	38.00	0.21	17.31	82.73	43.00	997.67
120	39.00	0.27	28.75	75.83	90.00	884.55
121	40.00	0.16	34.45	74.21	46.00	611.65
122	41.00	0.22	31.35	79.60	32.00	375.90
123	42.00	0.23	30.73	78.60	51.00	575.63
124	43.00	0.17	26.49	83.73	27.50	511.36
125	44.00	0.21	36.61	81.74	56.00	597.12
126	45.00	0.25	30.60	86.60	42.00	479.91
127	46.00	0.23	31.42	78.07	52.00	550.04
128	47.00	0.19	30.26	72.03	31.00	381.64
129	48.00	0.21	31.25	82.49	2.75	34.70
130	50.00	0.27	30.40	74.41	57.00	525.55
131	51.00	0.27	37.57	72.23	56.00	401.12
132	52.00	0.22	16.89	74.78	55.00	1112.85
133	53.00	0.22	32.06	90.18	35.50	447.66
134	55.00	0.22	25.56	75.28	35.00	469.31
135	56.00	0.25	29.92	79.98	47.00	497.01

136	57.00	0.22	26.12	96.28	35.00	583.51
137	58.00	0.19	23.89	74.11	27.00	435.81
138	59.00	0.23	36.16	72.81	53.00	471.32
139	60.00	0.25	16.42	72.46	55.00	961.16
140	61.00	0.20	31.81	79.29	37.00	467.90
141	62.00	0.18	33.77	79.82	45.00	603.41
142	63.00	0.17	38.94	80.83	48.50	583.06
143	65.00	0.13	30.37	79.51	35.50	705.07
144	66.00	0.13	31.74	84.18	38.00	794.63
145	67.00	0.18	40.89	87.16	67.00	774.81
146	68.00	0.12	30.59	90.12	24.50	606.07
147	69.00	0.11	31.02	82.78	31.00	734.75
148	70.00	0.11	32.05	74.56	36.50	800.06
149	71.00	0.12	33.81	84.71	34.00	712.19
150	72.00	0.12	29.19	75.27	33.00	691.07
151	73.00	0.12	31.01	71.23	38.00	704.75
152	74.00	0.10	30.53	79.34	32.00	847.10
153	75.00	0.13	26.49	77.06	34.00	762.34
154	76.00	0.13	28.86	73.19	41.00	820.36
155	77.00	0.11	31.42	83.10	43.00	1017.25
157	79.00	0.13	30.45	74.16	57.00	1068.96

NVII04

Sample No.	Sample Depth (ft)	Moist. Content (cu.m/cu.m)	Dry Wt. Soil (gm)	Wt. Wtr. Added (gm)	Cl in Extract (ppm)	Cl in Soil Wtr. (mg/l)
160	0.33	0.24	34.47	83.99	5.60	55.97
161	0.67	0.19	34.23	77.81	5.60	65.52
162	1.00	0.27	45.18	79.31	12.00	77.31
163	1.33	0.27	25.79	82.32	44.00	525.06
164	1.67	0.21	23.13	76.20	46.00	729.88
165	2.00	0.21	22.18	79.83	23.70	397.94
166	2.33	0.22	28.03	74.33	16.00	190.26
167	2.67	0.23	33.01	72.94	18.00	169.95
168	3.00	0.23	34.38	75.65	19.00	182.41
169	3.33	0.24	31.04	80.24	12.30	131.65
170	3.67	0.22	34.74	73.37	21.00	203.26
171	4.00	0.11	36.50	77.09	27.00	529.31
172	5.00	0.01	27.09	77.32	18.00	3792.56
173	6.00	0.15	39.72	79.18	23.00	314.86
174	7.00	0.03	31.13	78.33	7.60	661.12
175	10.00	0.13	29.01	73.59	7.00	133.77
176	11.00	0.19	23.13	86.22	6.80	134.51
177	12.00	0.19	23.13	80.71	6.50	120.48
178	13.00	0.16	26.83	73.20	5.10	89.43
179	14.00	0.17	32.75	81.13	8.00	119.74
180	15.00	0.18	32.80	74.21	13.00	160.55
181	16.00	0.15	30.13	85.43	28.00	535.84
182	17.00	0.20	27.53	91.71	18.50	302.36
184	46.00	0.14	29.42	74.18	28.00	495.87
185	47.00	0.09	26.25	78.03	17.30	545.21
186	48.00	0.09	28.27	74.73	20.00	604.04
187	49.00	0.09	31.20	73.88	17.00	427.18
188	50.00	0.11	30.68	81.62	13.00	326.13
189	51.00	0.11	26.36	82.15	14.50	429.60
190	52.00	0.11	22.39	77.18	13.50	438.89
191	53.00	0.12	30.13	72.62	20.00	418.96
192	54.00	0.10	25.85	81.13	18.00	556.07
193	55.00	0.10	30.39	81.03	15.00	411.93
194	56.00	0.09	25.34	75.23	14.00	470.22
195	57.00	0.03	29.97	78.89	5.70	526.48

NVII05

Sample No.	Sample Depth (ft)	Moist. Content (cu.m/cu.m)	Dry Wt. Soil (gm)	Wt. Wtr. Added (gm)	Cl in Extract (ppm)	Cl in Soil Wtr. (mg/l)
196	0.33	0.19	37.32	75.06	2.70	28.18
197	0.67	0.34	43.98	86.85	2.90	16.61
198	1.00	0.34	35.55	88.12	5.20	37.95
199	1.33	0.23	30.87	79.05	27.00	296.41
200	1.67	0.14	29.78	79.22	16.00	305.18
201	2.00	0.15	35.31	75.10	13.00	186.77
202	2.33	0.14	35.08	76.11	9.40	144.80
203	2.67	0.14	32.36	75.97	9.90	169.49
204	3.00	0.13	28.99	76.34	9.00	186.41
205	3.33	0.10	33.52	72.03	8.30	174.97
206	3.67	0.06	35.28	77.28	5.80	202.24
207	4.00	0.09	26.62	81.23	3.00	106.54
208	5.00	0.09	28.98	72.27	2.55	74.25
209	6.00	0.08	30.16	74.53	2.80	85.89
210	7.00	0.24	33.35	79.80	3.00	29.59
211	8.00	0.25	25.66	78.76	1.50	18.29
212	9.00	0.26	29.83	77.27	1.70	16.86
213	10.00	0.26	26.69	73.91	1.90	20.30
214	11.00	0.28	31.37	82.05	1.50	13.91
215	12.00	0.23	34.44	84.12	1.80	19.03
216	13.00	0.20	28.93	75.31	1.65	21.08
217	14.00	0.23	32.19	74.28	1.90	18.72
218	15.00	0.25	32.45	79.33	2.30	22.33
219	16.00	0.22	33.35	83.19	2.05	22.80
220	17.00	0.25	33.44	77.03	2.80	26.31
221	18.00	0.25	29.47	77.73	3.20	33.42
222	19.00	0.25	24.46	78.04	2.15	27.25
223	20.00	0.30	28.07	74.19	2.90	25.26
224	21.00	0.24	27.88	87.78	1.95	26.03
225	22.00	0.20	29.45	78.36	2.00	26.85
226	23.00	0.13	26.77	74.33	2.60	53.63
227	24.00	0.25	29.28	73.74	3.10	31.25
228	25.00	0.32	29.44	77.27	4.60	37.58
230	27.00	0.20	27.44	79.85	3.50	51.10
231	28.00	0.18	30.15	82.41	3.65	56.13
232	29.00	0.17	35.63	89.66	5.20	75.27
233	30.00	0.21	36.07	75.50	10.40	103.01
234	31.00	0.14	31.58	72.08	5.70	90.31
235	32.00	0.14	33.30	75.92	6.20	103.96
236	33.00	0.24	35.24	73.48	5.60	49.10
237	34.00	0.17	28.24	72.21	30.00	444.95
238	35.00	0.18	31.47	85.84	5.10	78.88
241	38.00	0.16	32.78	82.02	7.20	114.06
243	40.00	0.14	22.62	81.66	9.40	245.10

NVII06

Sample No.	Sample Depth (ft)	Moist. Content (cu.m/cu.m)	Dry Wt. Soil (gm)	Wt. Wtr. Added (gm)	Cl in Extract (ppm)	Cl in Soil Wtr. (mg/l)
245	0.33	0.10	43.81	81.43	1.90	34.20
246	0.67	0.08	40.13	76.18	2.50	58.25
248	1.33	0.10	47.32	74.28	2.00	30.84
249	1.67	0.11	46.23	73.70	2.30	32.79
250	2.00	0.16	40.52	73.67	2.90	32.64
251	2.33	0.16	51.62	81.28	2.75	26.69
252	2.67	0.17	47.41	76.15	3.50	32.32
253	3.00	0.23	35.59	78.65	3.90	36.82
254	5.00	0.07	43.03	76.91	55.00	1490.29
256	7.00	0.08	35.70	78.22	54.00	1561.10
257	8.00	0.04	33.56	73.65	32.50	1790.51
258	9.00	0.05	42.86	73.83	42.00	1473.92
259	10.00	0.05	35.45	77.81	39.00	1666.65
260	11.00	0.04	31.96	72.51	29.00	1604.34
261	12.00	0.05	32.18	72.35	36.00	1710.40
262	13.00	0.05	34.77	78.94	26.00	1242.18
263	14.00	0.05	37.94	74.19	31.00	1236.82
264	15.00	0.04	31.98	75.45	16.30	1088.46
265	16.00	0.04	37.67	83.15	23.30	1201.27
266	17.00	0.06	32.27	78.44	25.00	1093.51
267	18.00	0.09	35.77	81.50	32.00	839.59
268	19.00	0.03	38.41	76.41	18.30	1256.67
269	20.00	0.11	27.09	80.39	26.00	718.86
270	21.00	0.07	36.82	76.64	24.00	723.22
271	22.00	0.08	34.10	72.68	23.00	633.02
272	23.00	0.06	35.71	74.68	19.00	699.63
273	24.00	0.06	34.62	72.25	20.00	740.66
274	25.00	0.06	35.85	84.96	14.50	548.21
275	26.00	0.08	32.48	83.67	16.50	519.81
276	27.00	0.04	38.36	75.74	10.50	565.12
278	29.00	0.07	36.23	74.77	20.50	644.26
279	30.00	0.05	29.79	82.59	12.00	605.20
280	35.00	0.20	20.34	73.89	7.20	131.29
282	37.00	0.21	31.50	80.52	6.70	80.39
283	38.00	0.29	35.04	72.78	12.30	86.75
284	39.00	0.18	29.55	77.60	8.00	114.63
285	40.00	0.16	28.90	74.10	3.90	62.02
286	41.00	0.15	24.87	76.65	6.40	133.79
287	42.00	0.07	32.09	78.70	5.20	192.57
288	43.00	0.16	32.19	74.97	3.30	48.99
290	45.00	0.12	31.46	80.92	3.70	79.42
291	46.00	0.14	33.90	74.46	4.80	74.04
292	47.00	0.15	29.80	76.63	4.40	73.10
293	48.00	0.15	31.65	74.34	4.40	69.79
294	50.00	0.26	30.25	74.67	4.60	43.24
295	51.00	0.29	30.21	74.16	4.90	42.09
296	52.00	0.28	33.44	76.97	5.20	42.21
297	53.00	0.23	34.74	77.41	6.20	60.32
298	55.00	0.19	33.78	87.08	4.50	62.36
299	56.00	0.26	31.54	79.02	6.20	60.18

300	57.00	0.27	30.77	74.36	6.40	57.73
301	58.00	0.21	20.30	72.73	19.00	317.67
302	59.00	0.23	37.93	72.13	9.00	75.26
303	60.00	0.22	33.41	89.43	7.00	86.47
304	61.00	0.20	37.86	72.66	7.30	69.79
305	62.00	0.21	38.03	73.60	8.00	74.74
306	63.00	0.23	36.29	77.65	8.80	81.89
307	64.00	0.22	40.15	86.07	8.80	86.57
308	65.00	0.22	37.52	81.57	8.00	80.51
309	66.00	0.21	33.90	77.62	8.00	86.83
310	67.00	0.24	31.67	78.43	8.40	86.59
311	68.00	0.24	37.40	78.37	8.40	74.58
312	69.00	0.21	36.53	77.07	7.90	79.25
313	70.00	0.18	41.43	76.92	8.20	82.77
314	71.00	0.15	42.59	73.57	8.50	99.40
315	72.00	0.25	32.93	77.12	9.80	92.15
316	73.00	0.24	35.32	73.94	11.00	96.16
317	74.00	0.24	39.37	75.24	12.50	97.92
318	75.00	0.26	30.50	76.09	11.30	109.79
319	76.00	0.24	38.98	74.17	13.50	107.82
321	78.00	0.27	30.34	80.80	18.00	178.50
322	79.00	0.25	31.08	74.23	25.50	243.53
323	80.00	0.29	36.34	82.68	17.00	133.63
324	81.00	0.26	35.93	85.71	12.50	113.31
328	85.00	0.17	22.99	76.76	18.00	349.95
329	86.00	0.13	21.27	81.08	13.00	384.56
330	87.00	0.26	20.01	78.50	40.50	620.63
331	88.00	0.23	18.26	72.17	42.00	713.74
332	89.00	0.22	24.48	80.78	23.50	358.54
333	90.00	0.16	20.23	75.30	11.50	272.29
334	91.00	0.16	23.52	74.73	12.50	240.76
335	92.00	0.16	28.12	87.83	12.00	230.45
336	93.00	0.14	29.99	78.55	12.00	228.60
337	94.00	0.15	25.73	78.76	13.00	267.12
338	95.00	0.15	23.77	80.23	13.50	313.56
339	96.00	0.13	26.97	77.09	14.00	313.51
340	97.00	0.14	26.21	86.01	11.50	273.50
341	98.00	0.14	25.72	80.76	12.00	278.61
342	99.00	0.13	23.26	78.43	18.50	471.63

NVII07

Sample No.	Sample Depth (ft)	Moist. Content (cu.m/cu.m)	Dry Wt. Soil (gm)	Wt. Wtr. Added (gm)	Cl in Extract (ppm)	Cl in Soil Wtr. (mg/l)
343	0.33	0.30	21.62	84.50	5.40	69.79
344	0.67	0.28	35.91	83.85	20.50	172.93
345	1.00	0.17	34.63	73.93	40.00	514.37
346	1.33	0.17	33.29	77.18	44.00	617.94
347	1.67	0.16	35.06	82.91	40.00	580.29
348	2.00	0.17	38.69	73.70	44.00	506.69
349	2.33	0.19	35.58	83.98	39.00	473.87
350	2.67	0.19	35.60	78.75	44.00	505.69
351	3.00	0.20	35.79	88.62	37.00	467.71
352	5.00	0.20	36.93	77.64	28.00	291.21
353	6.00	0.19	41.13	86.55	28.00	317.52
354	7.00	0.20	42.65	76.21	29.00	263.28
355	8.00	0.19	42.07	80.59	29.00	292.92
356	10.00	0.19	41.72	87.50	28.00	305.20
357	11.00	0.19	38.63	81.25	28.00	302.87
358	12.00	0.19	36.59	75.79	25.00	274.15
359	15.00	0.18	40.30	75.92	22.50	239.13
360	16.00	0.20	36.36	83.30	23.30	272.95
361	17.00	0.20	35.07	87.97	22.00	281.57
362	20.00	0.20	40.01	82.44	25.00	254.69
363	21.00	0.19	36.74	84.75	23.00	278.40
364	22.00	0.19	30.63	85.45	17.50	261.44
365	25.00	0.18	39.38	81.36	24.00	269.84
366	26.00	0.17	35.52	79.49	20.00	262.69
367	27.00	0.20	34.05	82.04	24.50	302.65
368	30.00	0.23	21.65	80.71	21.00	336.49
369	31.00	0.28	24.49	82.51	4.10	48.65
370	32.00	0.19	19.35	83.30	2.80	63.85
371	35.00	0.20	20.85	86.01	1.90	39.01
372	36.00	0.23	23.69	83.19	2.30	34.50
373	37.00	0.22	21.11	88.99	1.80	33.92
374	38.00	0.16	21.88	87.29	1.80	45.15
375	39.00	0.17	33.41	78.49	2.95	41.90

NVII08

Sample No.	Sample Depth (ft)	Moist. Content (cu.m/cu.m)	Dry Wt. Soil (gm)	Wt. Wtr. Added (gm)	Cl in Extract (ppm)	Cl in Soil Wtr. (mg/l)
378	0.33	0.34	30.74	83.20	5.40	43.00
379	0.67	0.33	35.00	88.57	37.00	282.00
380	1.00	0.21	36.80	78.04	66.00	673.09
381	1.33	0.20	28.66	83.45	29.00	427.37
382	1.67	0.18	45.70	78.72	28.50	272.37
383	2.00	0.17	39.35	76.30	23.50	266.20
384	2.33	0.17	40.40	78.72	20.50	239.31
385	2.67	0.22	26.46	100.78	15.00	258.75
386	3.00	0.18	40.61	80.17	17.50	188.57
387	5.00	0.21	38.45	80.88	22.00	219.45
388	6.00	0.20	35.79	79.02	18.00	203.55
389	7.00	0.21	38.23	75.73	28.00	261.49
390	10.00	0.21	27.92	75.61	23.50	309.52
391	11.00	0.18	35.99	86.16	25.00	339.70
392	12.00	0.14	41.73	78.46	37.00	513.01
393	13.00	0.07	39.21	90.42	22.00	687.60
394	15.00	0.07	43.76	78.03	22.00	551.91
395	16.00	0.10	42.53	75.78	16.00	272.52
396	17.00	0.16	30.74	88.97	11.00	194.60
397	20.00	0.08	42.27	78.43	8.40	205.27
398	21.00	0.05	40.56	81.31	6.10	270.12
399	22.00	0.04	42.89	82.43	7.10	377.31
400	23.00	0.03	44.32	83.29	7.70	483.61
401	25.00	0.28	25.49	78.79	42.00	457.45
402	26.00	0.36	26.89	78.63	48.00	393.81
403	27.00	0.66	17.00	75.63	41.00	275.75
404	28.00	0.72	17.32	76.18	34.00	208.07
405	30.00	0.23	31.47	75.31	20.00	207.94
406	31.00	0.62	16.66	76.47	16.50	121.71
407	32.00	0.25	19.11	84.58	9.00	158.89
408	33.00	0.76	16.97	77.18	12.30	73.24
409	35.00	0.48	18.03	78.66	6.60	59.63
410	36.00	0.20	19.35	78.04	3.80	76.18
411	37.00	0.31	29.56	81.06	7.00	61.89
412	38.00	0.26	28.70	79.24	6.00	62.91
413	39.00	0.23	17.87	81.86	5.60	113.02
414	40.00	0.23	16.31	75.02	3.20	63.19
415	41.00	0.27	31.46	76.66	5.80	53.29
416	42.00	0.31	16.64	76.92	4.10	62.09
417	43.00	0.26	19.06	94.15	3.60	69.26
418	44.00	0.20	22.74	92.63	4.40	87.93
419	45.00	0.14	20.05	83.83	3.30	97.78
420	46.00	0.12	21.70	81.36	3.60	111.13

NVII09

Sample No.	Sample Depth (ft)	Moist. Content (cu.m/cu.m)	Dry Wt. Soil (gm)	Wt. Wtr. Added (gm)	Cl in Extract (ppm)	Cl in Soil Wtr. (mg/l)
421	1.00	0.20	39.76	81.65	4.10	42.44
422	2.00	0.23	33.01	82.56	23.00	252.59
423	3.00	0.13	15.06	77.49	12.00	487.58
424	4.00	0.04	45.97	74.68	26.50	1126.42
425	5.00	0.04	44.60	80.83	35.00	1685.68
426	6.00	0.04	43.63	84.95	36.00	1735.83
427	7.00	0.10	20.08	77.86	32.00	1248.14
428	10.00	0.04	46.27	80.41	24.00	1054.08
429	11.00	0.18	27.25	80.05	59.00	948.75
430	12.00	0.10	41.59	77.33	53.00	990.52
431	13.00	0.18	25.95	88.80	39.00	728.45
432	15.00	0.08	21.18	80.06	17.50	856.88
433	16.00	0.08	21.17	84.96	16.00	758.81
434	17.00	0.11	21.03	79.70	20.00	681.70
435	18.00	0.07	23.45	82.04	16.00	833.56
436	19.00	0.05	27.49	85.67	13.00	742.85
437	20.00	0.15	17.81	81.20	16.50	494.22
438	21.57	0.17	21.57	79.29	18.00	379.57
439	22.00	0.25	18.89	87.99	18.50	347.18
440	23.00	0.38	29.21	84.63	47.00	354.36
441	24.00	0.25	26.52	83.75	10.30	127.59
442	25.00	0.11	38.82	76.27	10.50	180.05

NVII10

Sample No.	Sample Depth (ft)	Moist. Content (cu.m/cu.m)	Dry Wt. Soil (gm)	Wt. Wtr. Added (gm)	Cl in Extract (ppm)	Cl in Soil Wtr. (mg/l)
443	0.33	0.12	34.27	75.60	50.00	941.23
444	0.67	0.13	16.22	78.26	27.00	987.30
445	1.00	0.15	16.03	88.37	16.50	594.86
446	1.33	0.18	19.00	78.85	13.50	317.15
447	1.67	0.21	18.98	76.22	17.00	327.91
448	2.00	0.10	26.68	75.46	10.00	271.50
449	5.00	0.26	18.10	86.84	9.00	168.83
450	6.00	0.23	27.97	81.87	11.00	141.47
451	7.00	0.20	19.94	78.59	9.00	173.10
452	10.00	0.18	19.35	78.78	18.50	408.25
453	11.00	0.11	20.51	79.58	17.00	603.84
454	12.00	0.16	22.59	82.54	20.00	452.13
455	15.00	0.21	21.32	77.21	14.50	248.31
456	16.00	0.20	18.88	80.73	15.00	317.59
457	17.00	0.24	23.05	82.15	16.00	240.02
458	20.00	0.23	29.31	78.12	21.50	251.68
459	21.00	0.18	24.05	77.50	15.50	282.14
460	22.00	0.21	24.49	78.14	22.00	330.27
461	25.00	0.24	19.10	83.28	15.00	273.05
462	26.00	0.21	21.09	77.05	14.50	255.77
463	27.00	0.21	21.57	73.36	14.00	231.93
464	30.00	0.21	19.53	78.28	17.50	333.73
465	31.00	0.20	20.33	78.58	19.00	365.22
466	32.00	0.22	30.16	83.22	20.00	247.07
467	35.00	0.22	20.17	75.88	24.00	418.90
468	36.00	0.22	18.38	81.32	16.50	333.86
469	37.00	0.21	17.45	74.79	14.50	300.79
470	40.00	0.21	20.77	79.18	20.00	357.82
471	41.00	0.22	25.30	80.94	21.00	312.43
472	42.00	0.16	19.51	79.40	14.00	349.61
473	45.00	0.16	19.52	80.77	24.00	605.37
474	46.00	0.20	18.27	80.52	17.00	377.75
475	47.00	0.19	20.24	79.80	20.00	425.56
476	50.00	0.17	18.67	91.43	14.00	400.75
477	51.00	0.18	20.54	78.32	14.50	301.61
478	52.00	0.18	23.85	80.79	16.00	300.63
479	55.00	0.17	31.46	86.46	18.00	291.71
480	56.00	0.12	25.27	83.60	20.00	547.16
481	57.00	0.14	27.58	77.84	20.50	415.54
482	60.00	0.13	30.57	77.20	42.00	793.43
483	61.00	0.18	29.61	80.47	63.00	943.25
484	62.00	0.18	21.92	75.59	32.00	629.97
485	65.00	0.18	21.89	74.24	27.00	509.76
486	66.00	0.15	35.34	80.37	44.00	646.89
487	67.00	0.17	21.87	79.55	32.50	696.08
488	70.00	0.12	35.31	85.17	47.00	960.17
489	71.00	0.11	19.48	77.84	44.00	1619.53
490	72.00	0.14	26.37	84.44	45.00	1031.77
491	75.00	0.11	23.43	89.20	30.00	1036.67
492	76.00	0.12	22.56	78.25	33.00	920.20

493	77.00	0.16	20.24	76.20	30.00	701.98
494	80.00	0.21	37.25	78.34	74.00	735.68
495	81.00	0.13	18.26	76.05	27.00	841.83
496	82.00	0.06	38.77	88.12	74.00	2653.04
497	83.00	0.16	21.75	76.08	75.00	1652.39
498	85.00	0.22	27.70	75.37	66.00	823.44
499	86.00	0.21	35.98	91.88	94.00	1147.73
500	87.00	0.21	40.67	76.11	56.00	500.14
501	90.00	0.11	36.05	84.02	46.00	1003.17
502	91.00	0.18	41.39	76.96	50.00	525.34
503	92.00	0.32	20.27	76.24	11.00	127.56
504	93.00	0.25	26.46	87.42	10.00	131.00
507	95.00	0.27	22.15	78.62	10.00	132.56
508	96.00	0.29	23.95	76.35	9.00	99.79
509	97.00	0.26	23.16	78.09	10.50	138.82
510	98.00	0.24	26.83	80.45	8.00	101.34
511	99.00	0.25	20.57	76.68	9.50	141.65

NVII11

Sample No.	Sample Depth (ft)	Moist. Content (cu.m/cu.m)	Dry Wt. Soil (gm)	Wt. Wtr. Added (gm)	Cl in Extract (ppm)	Cl in Soil Wtr. (mg/l)
512	0.33	0.34	20.35	79.20	8.50	97.12
513	0.67	0.15	42.27	75.88	68.00	832.59
514	1.00	0.13	20.42	74.41	16.00	446.72
515	1.33	0.15	41.05	78.87	8.00	103.21
516	1.67	0.11	22.34	86.73	4.20	152.77
517	2.00	0.11	41.25	79.87	12.50	221.37
518	5.00	0.12	24.61	82.08	3.75	103.25
519	6.00	0.18	42.98	78.29	7.20	71.25
520	10.00	0.20	39.97	80.06	12.50	123.26
521	11.00	0.26	32.69	84.32	17.50	170.51
522	12.00	0.21	40.69	78.14	10.70	97.52
523	15.00	0.24	43.80	84.05	9.40	75.25
524	16.00	0.21	39.72	79.99	14.00	131.14
525	17.00	0.21	41.46	76.58	20.00	173.97
526	20.00	0.23	26.79	77.38	11.00	140.54
527	21.00	0.21	38.30	76.54	20.00	193.00
528	22.00	0.35	32.40	76.16	36.00	238.60
529	25.00	0.12	43.30	77.41	34.00	515.58
530	26.00	0.14	44.63	84.98	35.00	467.99
531	27.00	0.14	40.89	76.45	35.00	470.87
532	28.00	0.11	43.80	84.05	30.00	515.73
533	30.00	0.15	43.12	78.50	27.00	323.37
534	31.00	0.14	42.29	76.29	23.50	309.18
535	32.00	0.19	23.27	80.26	9.00	163.19
536	35.00	0.23	37.52	77.23	21.00	188.11
537	36.00	0.25	38.26	75.93	22.00	177.65
538	37.00	0.15	19.15	77.21	8.50	232.16
539	40.00	0.16	37.59	79.99	8.00	109.05
540	41.00	0.23	33.34	79.14	7.80	80.56
541	42.00	0.22	40.96	77.37	8.40	73.57
542	43.00	0.21	37.86	76.82	9.50	91.45
543	45.00	0.12	19.35	81.65	3.70	131.25
544	46.00	0.20	19.18	76.78	5.50	109.41
545	47.00	0.25	22.46	91.42	14.00	225.78
546	48.00	0.20	23.47	82.11	8.20	143.85
547	50.00	0.17	19.47	78.37	8.00	189.10
548	51.00	0.39	30.59	82.08	31.00	215.10
549	52.00	0.26	36.77	76.38	48.00	380.69
550	53.00	0.21	36.97	84.83	36.00	386.97
551	55.00	0.17	37.22	76.54	43.00	512.12
552	56.00	0.20	20.03	79.96	26.00	530.44
553	57.00	0.06	41.40	76.76	22.50	744.55
554	60.00	0.22	39.26	82.32	48.00	466.08
555	61.00	0.12	22.45	82.23	8.20	240.43
556	62.00	0.18	34.46	83.53	10.50	141.73
557	65.00	0.23	23.89	89.23	8.40	138.66
558	66.00	0.30	35.23	78.98	7.10	52.33
559	67.00	0.22	34.05	84.06	11.00	121.49
560	70.00	0.24	27.50	82.77	38.00	475.62
561	71.00	0.21	38.27	86.83	32.00	342.26

562	72.00	0.35	31.32	81.31	35.50	261.04
563	73.00	0.25	19.88	76.30	21.50	329.40
564	75.00	0.17	22.45	77.58	11.50	231.77
565	76.00	0.15	43.65	84.12	33.00	432.96
566	77.00	0.21	15.70	79.44	15.50	372.22
567	78.00	0.21	15.63	79.80	14.00	339.00
568	80.00	0.38	34.78	75.90	28.50	163.53
569	81.00	0.19	17.68	86.75	4.20	108.30
570	82.00	0.18	21.03	82.85	3.20	68.17
571	83.00	0.20	21.31	80.81	3.10	58.07
572	84.00	0.18	18.00	80.25	2.95	73.70
573	85.00	0.16	19.95	82.16	2.00	50.86
574	86.00	0.17	20.86	76.93	1.95	41.99
575	87.00	0.16	17.38	78.53	1.80	52.14
576	88.00	0.13	23.11	84.71	1.45	40.76
577	89.00	0.16	22.75	80.55	2.80	62.52
578	90.00	0.15	17.46	90.33	2.25	77.09
579	91.00	0.09	30.98	75.87	3.30	87.58
580	92.00	0.14	18.28	86.55	2.50	84.15
581	93.00	0.12	16.89	77.58	1.70	63.68
582	93.50	0.10	18.55	74.37	2.60	103.18

NVII12

Sample No.	Sample Depth (ft)	Moist. Content (cu.m/cu.m)	Dry Wt. Soil (gm)	Wt. Wtr. Added (gm)	Cl in Extract (ppm)	Cl in Soil Wtr. (mg/l)
583	0.33	0.33	35.42	73.91	16.00	100.47
584	0.67	0.40	16.84	77.25	12.00	135.95
585	1.00	0.58	18.25	79.11	27.00	200.18
586	1.33	0.44	24.54	84.20	26.50	205.22
587	1.67	0.35	15.99	82.81	16.50	245.64
588	2.00	0.40	23.14	81.05	24.00	209.33
589	2.33	0.37	16.63	86.06	16.00	221.24
590	2.67	0.27	20.67	94.55	13.00	217.18
591	3.00	0.25	23.96	85.65	10.00	140.93
592	3.33	0.23	23.86	83.47	7.80	117.42
593	3.67	0.24	17.58	82.09	6.70	131.91
594	4.00	0.26	20.77	77.57	6.00	86.84
595	5.00	0.30	19.15	80.27	9.00	124.51
596	6.00	0.30	23.29	82.37	6.70	79.90
597	7.00	0.38	18.81	77.72	7.80	85.79
598	8.00	0.45	17.36	79.85	6.00	61.32
599	9.00	0.41	20.12	75.57	5.90	54.02
600	10.00	0.41	21.17	81.88	5.20	48.92
601	11.00	0.49	18.05	89.28	2.65	26.70
602	12.00	0.53	40.94	91.38	4.90	20.45
603	13.00	0.38	24.40	84.39	2.75	25.36
604	14.00	0.42	21.37	83.58	3.20	30.09
605	15.00	0.40	34.84	77.92	5.00	28.15
606	16.00	0.35	22.44	86.70	4.10	45.04
607	17.00	0.38	21.21	77.75	4.10	39.72
608	18.00	0.40	34.31	79.40	9.20	52.98
609	19.00	0.38	18.77	78.92	6.00	66.22
610	20.00	0.39	19.61	80.43	10.50	109.66
611	21.00	0.47	22.33	88.74	14.50	123.81
612	22.00	0.29	17.95	91.30	8.00	141.11
613	23.00	0.25	16.79	82.51	8.00	158.61
614	24.00	0.27	23.78	78.88	11.00	137.16
615	25.00	0.17	23.34	84.53	2.30	47.87
616	26.00	0.24	16.90	81.96	4.20	86.12
617	30.00	0.21	18.68	80.68	5.00	101.13
618	31.00	0.15	26.76	87.23	5.30	114.65
619	32.00	0.23	18.71	79.05	21.00	384.53
620	35.00	0.28	35.29	88.99	14.00	124.27
621	36.00	0.25	19.55	83.70	10.00	168.60
622	37.00	0.26	23.74	84.72	19.50	268.44
623	40.00	0.33	25.16	79.39	40.00	377.11
624	41.00	0.39	31.17	74.15	62.00	376.82
625	42.00	0.18	33.16	79.31	24.50	323.30
626	45.00	0.11	19.67	89.60	2.90	115.25
627	46.00	0.13	19.67	86.10	6.80	232.55
628	47.00	0.14	21.11	79.14	3.10	81.83
629	48.00	0.15	20.89	84.26	4.60	126.63
630	50.00	0.14	18.38	78.76	6.80	204.05
631	51.00	0.23	28.78	79.90	53.00	636.32
632	52.00	0.26	36.76	92.46	15.00	147.90

633	55.00	0.25	20.09	83.14	4.20	69.80
634	56.00	0.17	19.86	89.27	1.15	30.03
635	57.00	0.19	34.71	79.66	1.75	20.95
636	58.00	0.22	27.35	83.25	1.50	20.98
637	59.00	0.15	19.78	78.91	1.40	37.92
638	60.00	0.16	19.35	89.43	1.00	28.41
639	61.00	0.19	18.42	97.67	1.25	34.01
640	62.00	0.13	28.06	78.93	1.20	25.82
641	63.00	0.13	17.72	83.25	1.07	37.43
642	64.00	0.15	20.33	79.22	1.50	37.83

NVII13

Sample No.	Sample Depth (ft)	Moist. Content (cu.m/cu.m)	Dry Wt. Soil (gm)	Wt. Wtr. Added (gm)	Cl in Extract (ppm)	Cl in Soil Wtr. (mg/l)
644	0.33	0.16	46.65	87.84	3.20	38.51
645	0.67	0.15	42.65	81.16	5.60	70.37
646	1.00	0.15	43.53	81.75	13.50	172.05
647	1.33	0.28	28.73	80.58	15.50	154.94
648	1.67	0.24	37.21	83.16	14.50	133.99
649	2.00	0.26	36.54	95.09	7.40	74.33
650	2.33	0.12	29.25	77.93	6.40	148.12
651	2.67	0.21	21.26	76.86	7.20	125.82
652	3.00	0.15	30.03	76.54	5.20	85.70
653	5.00	0.25	36.53	75.49	13.50	112.04
654	6.00	0.23	34.91	76.43	19.00	184.14
655	7.00	0.16	29.91	73.17	11.50	175.52
656	8.00	0.22	33.19	80.41	9.80	106.68
657	10.00	0.26	37.64	76.96	33.00	257.35
658	11.00	0.25	35.08	83.37	12.50	116.71
659	12.00	0.18	25.05	91.39	4.20	86.56
660	13.00	0.34	35.21	73.33	8.80	54.13
661	15.00	0.21	27.01	82.83	4.40	64.72
662	16.00	0.16	22.08	85.42	3.15	75.03
663	20.00	0.30	30.23	74.46	9.80	79.93
664	21.00	0.33	26.33	81.64	9.20	85.56
665	22.00	0.19	25.89	75.27	5.60	85.43
666	23.00	0.29	29.23	81.81	8.40	82.41
667	25.00	0.28	27.33	78.50	7.50	76.40
668	26.00	0.35	24.68	77.10	23.00	207.78
669	27.00	0.28	26.22	79.80	13.50	149.26
670	28.00	0.23	29.19	78.27	10.00	115.18
671	30.00	0.24	21.09	88.25	4.60	81.28
672	31.00	0.22	19.66	79.12	3.85	70.41
673	32.00	0.26	32.45	83.80	6.50	65.81
674	35.00	0.32	22.04	77.34	5.50	60.08
675	36.00	0.41	23.06	77.97	5.60	46.35
677	38.00	0.28	27.21	81.06	5.40	56.63
678	40.00	0.28	25.32	79.78	4.20	47.62
679	41.00	0.31	23.47	77.78	4.50	47.44
680	42.00	0.20	28.33	80.67	6.60	92.94
681	45.00	0.39	29.73	82.81	4.90	35.32
682	46.00	0.36	31.16	86.09	3.45	26.53
683	47.00	0.28	22.41	78.42	0.50	6.31
684	48.00	0.24	18.45	85.76	0.50	9.61
685	49.00	0.26	35.05	82.73	1.35	12.28
686	50.00	0.20	23.64	79.47	0.50	8.33
687	51.00	0.16	20.05	95.91	1.35	41.07
688	52.00	0.19	21.46	81.68	1.10	21.66
689	53.00	0.22	33.98	80.41	1.10	12.06
690	54.00	0.24	19.97	87.45	1.30	23.43
691	55.00	0.17	24.80	85.88	0.50	10.19
692	56.00	0.18	20.28	82.62	1.50	33.48
693	57.00	0.18	23.88	80.11	1.45	27.06
694	58.00	0.16	36.61	91.48	1.10	16.81

NVII14

Sample No.	Sample Depth (ft)	Moist. Content (cu.m/cu.m)	Dry Wt. Soil (gm)	Wt. Wtr. Added (gm)	Cl in Extract (ppm)	Cl in Soil Wtr. (mg/l)
695	0.33	0.36	21.15	100.30	35.00	459.87
696	0.67	0.23	42.94	82.22	96.00	816.64
697	1.00	0.14	20.53	83.33	33.50	991.81
698	1.33	0.15	27.36	80.19	40.00	765.18
699	1.67	0.22	25.32	77.67	38.00	530.56
700	2.00	0.19	19.54	85.94	18.50	439.08
701	2.33	0.16	26.22	76.60	18.50	345.88
702	2.67	0.17	37.57	86.78	45.00	599.79
703	3.00	0.17	21.95	79.03	30.00	619.19
704	5.00	0.22	33.73	80.68	47.00	500.61
705	6.00	0.13	42.75	77.71	38.00	526.70
706	7.00	0.13	38.04	78.28	42.00	648.35
707	10.00	0.15	22.86	78.10	26.00	577.45
708	11.00	0.06	30.29	78.60	32.00	1455.34
709	15.00	0.17	37.93	81.49	21.00	260.96
712	22.00	0.15	29.59	81.02	12.50	230.44
715	30.00	0.20	17.77	74.39	16.50	347.20
716	31.00	0.22	21.18	84.42	16.00	289.00
717	32.00	0.23	24.00	82.16	13.50	200.16
718	35.00	0.16	21.57	83.41	16.00	392.89
719	36.00	0.19	22.10	82.17	22.50	430.62
720	37.00	0.14	41.38	82.36	42.00	584.37
721	40.00	0.20	21.47	71.24	22.00	365.78
722	41.00	0.09	35.60	81.38	31.00	748.23
724	43.00	0.15	19.85	84.71	13.50	389.42
726	46.00	0.13	33.21	88.79	28.50	605.18
727	47.00	0.12	32.44	85.37	36.00	773.58
728	48.00	0.12	32.19	86.47	36.50	789.09
731	52.00	0.14	47.72	83.66	14.00	174.34
732	53.00	0.04	42.76	81.63	9.00	411.96
733	55.00	0.21	39.83	80.58	26.00	254.37
735	57.00	0.26	20.46	87.71	27.00	451.08
736	60.00	0.22	43.88	84.67	54.00	475.96
737	61.00	0.25	20.72	80.16	28.00	428.72
738	62.00	0.24	39.58	86.71	41.00	378.05
739	63.00	0.10	47.58	81.89	48.00	796.06
740	65.00	0.24	23.48	80.73	30.50	438.72
741	66.00	0.27	24.74	80.17	48.00	577.95
742	67.00	0.07	49.46	82.76	38.00	876.94
743	68.00	0.18	20.60	83.94	24.00	545.23
744	70.00	0.24	21.30	78.54	29.00	449.18
745	71.00	0.19	20.16	87.55	18.00	409.52
746	72.00	0.22	25.35	79.43	28.50	403.19
747	73.00	0.19	30.10	81.99	30.00	428.12

NVII16

Sample No.	Sample Depth (ft)	Moist. Content (cu.m/cu.m)	Dry Wt. Soil (gm)	Wt. Wtr. Added (gm)	Cl in Extract (ppm)	Cl in Soil Wtr. (mg/l)
755	0.33	0.46	14.68	85.35	18.50	234.04
756	0.67	0.29	21.17	86.35	39.00	554.71
757	1.00	0.22	23.71	77.79	100.00	1503.10
758	1.33	0.12	25.33	78.92	55.00	1437.09
759	1.67	0.11	30.65	32.55	94.00	894.56
760	2.00	0.08	32.21	83.94	50.00	1688.09
761	2.33	0.05	35.25	91.84	12.50	617.10
762	2.67	0.08	33.07	83.24	16.00	488.35
763	3.00	0.12	36.45	78.07	28.00	504.88
764	5.00	0.11	46.23	81.70	41.00	638.82
765	6.00	0.25	17.86	108.29	19.50	478.42
766	10.00	0.20	24.72	87.42	14.00	242.34
767	11.00	0.25	17.16	87.11	16.50	330.81
768	12.00	0.22	18.81	83.82	15.00	304.91
769	13.00	0.17	33.68	84.06	25.00	360.91
770	14.00	0.22	22.83	80.22	28.00	450.06
771	15.00	0.24	17.72	78.16	28.00	507.85
772	16.00	0.25	29.64	86.73	30.00	347.32
773	17.00	0.23	36.05	79.15	30.00	283.19
774	18.00	0.32	33.42	89.10	10.00	83.47
775	19.00	0.25	30.23	82.52	22.00	237.18
776	20.00	0.25	35.18	76.59	22.00	188.65
777	21.00	0.15	28.72	77.15	49.00	899.97
778	22.00	0.12	23.13	83.27	19.00	591.00
790	53.00	0.10	42.70	83.95	21.00	400.91
791	55.00	0.25	17.43	80.58	9.00	163.40
792	56.00	0.43	17.96	81.44	12.50	132.80
793	57.00	0.23	25.21	80.88	5.60	79.62
794	60.00	0.12	39.29	80.14	16.00	267.90
795	61.00	0.09	39.46	81.84	23.00	526.26
796	62.00	0.15	24.87	80.02	18.00	382.15
797	65.00	0.18	22.40	74.87	32.00	606.87
798	66.00	0.20	20.93	78.23	24.00	442.45
799	67.00	0.09	45.45	78.97	24.00	465.86
800	68.00	0.20	28.98	86.43	31.00	455.59
801	70.00	0.18	27.39	84.55	29.00	500.58
802	71.00	0.16	44.07	87.09	42.00	508.69
803	72.00	0.21	20.95	83.15	24.00	446.37

NVII17

Sample No.	Sample Depth (ft)	Moist. Content (cu.m/cu.m)	Dry Wt. Soil (gm)	Wt. Wtr. Added (gm)	Cl in Extract (ppm)	Cl in Soil Wtr. (mg/l)
804	1.00	0.22	20.75	83.58	14.00	257.71
805	2.00	0.27	39.81	77.61	33.00	241.01
806	3.00	0.25	38.18	79.83	16.00	133.42
807	5.00	0.15	21.79	78.30	12.00	282.07
808	6.00	0.17	21.32	81.48	6.00	134.69
809	7.00	0.18	23.63	82.12	7.70	151.60
810	10.00	0.17	26.50	83.63	7.50	141.15
811	11.00	0.10	38.96	86.86	10.50	233.98
812	12.00	0.10	29.19	79.51	15.50	441.24
813	15.00	0.18	17.67	82.03	9.00	231.50
814	16.00	0.08	21.67	82.90	8.50	424.48
815	19.00	0.21	18.99	76.79	13.50	259.47
816	20.00	0.19	26.94	78.23	22.00	332.79
817	21.00	0.13	24.32	77.54	11.30	286.86
818	22.00	0.18	18.94	78.71	18.50	429.32
819	25.00	0.23	19.09	78.07	22.00	399.63
820	26.00	0.09	38.74	73.15	29.00	620.76
821	27.00	0.20	21.29	76.87	17.50	322.23
822	30.00	0.23	19.65	82.58	17.00	315.02
823	31.00	0.24	25.88	76.50	27.00	325.96
824	32.00	0.26	20.48	95.62	23.00	413.05
825	35.00	0.24	27.65	71.68	26.00	285.97
826	36.00	0.10	39.58	77.12	23.00	470.19
827	40.00	0.12	20.79	75.85	5.60	166.28
828	45.00	0.09	32.23	82.30	13.50	374.01
829	50.00	0.12	18.96	75.69	9.20	309.30
830	51.00	0.17	22.62	74.56	14.00	269.58
831	52.00	0.18	21.59	75.92	27.00	516.39
832	55.00	0.09	19.37	82.14	17.50	851.68
833	56.00	0.15	25.04	78.65	12.30	258.09
834	57.00	0.13	25.80	93.68	13.50	380.90
835	60.00	0.35	26.97	78.09	15.00	122.44
836	61.00	0.24	18.85	76.86	10.00	172.77
837	62.00	0.18	30.47	74.63	23.00	315.65
838	63.00	0.14	19.71	77.64	13.00	374.59
839	65.00	0.16	21.32	84.46	11.50	276.46
840	66.00	0.09	36.45	83.49	24.00	600.04
841	67.00	0.17	19.59	85.58	13.50	349.21
842	70.00	0.12	25.83	76.24	17.00	414.56
843	71.00	0.13	45.80	88.09	23.50	360.40

NVII18

Sample No.	Sample Depth (ft)	Moist. Content (cu.m/cu.m)	Dry Wt. Soil (gm)	Wt. Wtr. Added (gm)	Cl in Extract (ppm)	Cl in Soil Wtr. (mg/l)
845	0.33	0.19	34.77	79.95	37.00	457.51
846	0.67	0.17	24.25	77.23	25.00	474.87
847	1.00	0.33	21.31	75.14	13.00	137.81
848	1.33	0.45	17.97	86.12	13.50	143.28
849	1.67	0.18	19.40	80.48	9.20	216.50
850	2.00	0.21	21.51	77.13	7.00	119.78
851	5.00	0.16	20.28	79.69	24.00	605.90
853	7.00	0.15	20.03	74.85	7.00	180.15
854	10.00	0.15	23.03	79.64	11.00	253.24
855	11.00	0.18	20.65	76.53	10.00	208.17
856	12.00	0.15	21.99	80.20	34.50	821.00
857	15.00	0.16	21.36	76.27	12.50	287.34
858	16.00	0.20	20.16	78.32	11.50	220.81
859	17.00	0.23	21.66	78.87	23.00	362.60
860	20.00	0.24	23.89	74.81	22.00	281.50
861	21.00	0.28	40.32	75.35	55.00	371.82
862	22.00	0.21	19.64	80.86	10.00	192.08
863	25.00	0.26	41.27	79.92	21.50	161.42
864	26.00	0.21	25.83	88.35	25.00	403.18
865	27.00	0.18	23.74	75.48	13.50	242.61
866	30.00	0.20	20.23	80.63	17.00	342.65
867	31.00	0.18	19.09	77.25	12.50	275.67
868	32.00	0.18	19.76	75.22	11.30	242.50
869	35.00	0.24	22.25	78.79	17.50	255.78
870	36.00	0.23	21.24	73.95	20.00	304.21
871	37.00	0.22	25.73	76.40	25.00	345.13
872	40.00	0.25	19.50	83.84	22.00	377.44
873	41.00	0.25	24.60	79.88	31.00	408.30
874	42.00	0.25	20.25	87.12	29.00	508.85
875	45.00	0.22	24.07	75.84	79.50	1130.63
876	46.00	0.23	19.58	80.19	59.00	1037.76
877	47.00	0.15	21.31	79.47	82.00	1987.92
878	50.00	0.20	23.43	87.43	86.00	1632.00
879	51.00	0.17	19.68	82.09	45.00	1094.81
880	52.00	0.18	23.89	90.35	39.00	814.99
881	55.00	0.22	21.86	74.94	47.00	734.47
882	56.00	0.25	19.07	83.46	38.00	674.28
883	57.00	0.25	20.10	76.59	50.00	753.20
884	58.00	0.28	19.46	77.99	43.00	615.97
885	59.00	0.25	19.65	82.92	44.00	737.70

NVII19

Sample No.	Sample Depth (ft)	Moist. Content (cu.m/cu.m)	Dry Wt. Soil (gm)	Wt. Wtr. Added (gm)	Cl in Extract (ppm)	Cl in Soil Wtr. (mg/l)
888	0.33	0.31	17.78	79.16	1.50	21.38
889	0.67	0.32	21.69	77.08	9.40	103.71
890	1.00	0.29	21.24	78.01	66.00	838.91
891	1.33	0.18	22.78	82.52	66.00	1352.97
892	1.67	0.17	21.47	76.34	52.00	1092.58
893	2.00	0.16	22.90	77.26	39.00	809.81
894	2.33	0.16	18.51	79.39	21.00	563.86
895	2.67	0.14	20.06	77.32	17.00	454.25
896	3.00	0.17	20.15	76.46	17.50	393.45
897	5.00	0.27	25.58	78.35	17.50	198.38
898	6.00	0.22	21.67	80.92	15.00	254.10
899	7.00	0.25	18.94	77.79	19.50	314.50
900	10.00	0.08	51.13	79.05	22.00	412.78
901	11.00	0.27	20.69	76.32	13.50	183.06
902	12.00	0.21	19.29	77.28	16.50	317.25
903	15.00	0.23	19.66	78.77	13.50	236.82
904	16.00	0.22	20.01	77.57	18.00	312.70
905	17.00	0.18	19.97	75.74	1.90	40.58
906	20.00	0.14	19.74	78.69	2.10	59.71
907	21.00	0.12	18.14	79.84	1.90	67.75
908	22.00	0.26	33.62	74.63	3.10	26.86
909	23.00	0.13	19.81	75.09	2.60	74.86
910	24.00	0.13	19.74	76.39	2.20	66.67

NVII20

Sample No.	Sample Depth (ft)	Moist. Content (cu.m/cu.m)	Dry Wt. Soil (gm)	Wt. Wtr. Added (gm)	Cl in Extract (ppm)	Cl in Soil Wtr. (mg/l)
911	0.33	0.10	46.60	81.96	1.30	22.50
912	0.67	0.16	41.53	81.43	2.10	26.54
913	1.00	0.10	44.15	81.31	1.40	25.64
914	1.33	0.13	52.37	75.68	2.10	23.66
915	1.67	0.13	47.67	79.30	9.80	124.07
916	2.00	0.14	22.57	79.09	27.50	702.67
917	2.33	0.06	44.68	76.72	35.00	1050.05
918	2.67	0.08	45.52	75.21	31.50	668.97
919	3.00	0.07	48.44	77.40	17.00	396.73
920	5.00	0.07	54.66	74.15	11.00	205.28
921	6.00	0.07	45.20	75.48	8.00	186.19
922	10.00	0.18	23.73	74.45	6.00	104.66
923	11.00	0.15	22.55	70.43	3.70	76.70
924	15.00	0.17	45.67	86.92	4.60	50.23
925	16.00	0.18	21.95	74.04	2.30	43.29
926	17.00	0.11	25.16	74.42	3.60	94.28
927	20.00	0.09	20.30	78.08	3.00	122.15
928	21.00	0.14	21.58	77.26	2.20	57.55
929	22.00	0.09	20.66	76.40	3.00	118.89
930	25.00	0.12	22.81	75.84	4.80	129.30
931	26.00	0.20	21.57	77.56	7.20	129.53
932	27.00	0.07	47.89	77.18	9.80	233.22
933	30.00	0.06	19.89	76.62	2.90	177.47
934	31.00	0.08	19.73	77.18	4.40	224.45
935	35.00	0.07	23.80	73.39	3.80	170.72
936	36.00	0.12	19.59	77.38	3.00	100.18
937	37.00	0.09	20.36	76.72	1.85	80.01
938	40.00	0.04	22.00	78.37	2.10	176.06
939	41.00	0.10	23.30	76.19	1.80	56.14
940	42.00	0.15	26.75	71.50	2.20	40.00
941	45.00	0.18	23.03	87.75	5.80	125.79
942	46.00	0.06	47.18	74.54	10.50	263.04
943	47.00	0.06	50.37	76.02	11.50	302.36
944	50.00	0.05	46.09	76.84	10.50	351.73
945	51.00	0.06	44.92	74.26	15.00	410.41
946	52.00	0.07	20.86	75.02	6.60	347.05
947	55.00	0.07	35.39	78.43	7.20	227.84
948	56.00	0.16	19.99	74.91	6.80	163.25
949	57.00	0.07	25.38	76.07	9.30	416.26
950	60.00	0.10	19.92	75.23	7.00	262.15
951	61.00	0.05	32.33	73.65	3.20	154.74

NVII21

Sample No.	Sample Depth (ft)	Moist. Content (cu.m/cu.m)	Dry Wt. Soil (gm)	Wt. Wtr. Added (gm)	Cl in Extract (ppm)	Cl in Soil Wtr. (mg/l)
952	0.33	0.37	24.17	73.83	1.55	12.94
953	0.67	0.26	41.38	74.61	1.90	12.96
954	1.00	0.38	36.45	71.43	2.50	12.74
955	1.33	0.22	19.54	76.21	1.55	26.94
956	1.67	0.28	45.10	77.27	2.20	13.68
957	2.00	0.33	41.90	74.23	2.80	15.03
958	2.33	0.33	18.09	79.29	2.20	29.47
959	2.67	0.32	45.66	74.31	3.40	17.48
960	3.00	0.36	19.25	78.08	3.00	33.84
961	3.33	0.30	47.57	74.45	3.20	16.94
962	3.67	0.28	36.67	73.90	3.40	24.75
963	4.00	0.26	47.93	79.38	3.30	21.02
964	5.00	0.22	45.75	83.89	2.90	23.73
965	6.00	0.35	53.17	75.23	4.60	18.38
966	7.00	0.36	21.99	74.66	3.40	31.80
967	10.00	0.40	21.85	86.23	2.60	25.36
968	11.00	0.39	49.70	78.41	3.60	14.50
969	12.00	0.31	50.38	74.70	2.90	13.88
970	13.00	0.29	38.14	83.14	4.00	30.33
971	15.00	0.27	24.90	75.38	3.40	38.45
972	20.00	0.34	40.90	78.28	3.30	18.33
973	21.00	0.29	42.47	79.05	3.60	22.88
974	22.00	0.31	35.35	77.79	3.80	27.17
975	25.00	0.25	38.19	76.51	4.10	33.21
976	26.00	0.33	33.11	75.99	7.60	53.42

NVII22

Sample No.	Sample Depth (ft)	Moist. Content (cu.m/cu.m)	Dry Wt. Soil (gm)	Wt. Wtr. Added (gm)	Cl in Extract (ppm)	Cl in Soil Wtr. (mg/l)
979	0.33	0.07	47.28	81.29	5.20	120.14
980	0.67	0.15	39.80	74.10	68.00	832.85
981	1.00	0.25	36.90	72.09	59.00	458.50
982	1.33	0.23	22.47	74.69	20.50	293.86
983	1.67	0.22	22.45	75.84	38.50	592.22
984	5.00	0.37	21.05	83.23	23.00	245.97
985	6.00	0.46	33.36	75.62	33.00	161.96
986	7.00	0.32	40.67	80.15	14.00	87.07
987	10.00	0.24	37.07	79.94	2.60	23.81
988	11.00	0.34	32.16	74.45	2.00	13.51
989	12.00	0.26	21.81	76.06	2.50	33.17
990	13.00	0.21	22.00	73.09	2.30	36.50
991	15.00	0.30	39.83	79.80	4.80	32.39
992	16.00	0.12	35.44	70.34	3.80	61.50
993	17.00	0.14	23.69	74.00	3.20	73.74
994	20.00	0.38	26.59	74.12	6.20	45.95
995	21.00	0.23	33.94	77.89	4.80	48.04
996	25.00	0.19	38.50	73.54	12.00	121.89

NVII23

Sample No.	Sample Depth (ft)	Moist. Content (cu.m/cu.m)	Dry Wt. Soil (gm)	Wt. Wtr. Added (gm)	Cl in Extract (ppm)	Cl in Soil Wtr. (mg/l)
1011	0.42	0.10	50.15	72.27	2.10	31.23
1012	0.83	0.33	19.10	76.47	2.10	25.11
1013	1.25	0.37	21.85	72.68	2.30	20.53
1014	1.67	0.41	19.16	72.97	4.20	38.95
1015	2.08	0.38	26.25	73.55	5.80	43.17
1016	2.50	0.33	18.91	72.26	5.20	60.20
1017	2.92	0.34	47.56	73.33	19.50	88.04
1018	3.33	0.12	34.85	73.99	13.00	226.91
1019	3.75	0.31	26.27	74.40	21.00	193.19
1020	5.00	0.35	38.49	72.87	42.00	228.63
1021	6.00	0.36	22.10	82.29	23.00	239.19
1022	7.00	0.31	21.71	75.79	16.50	184.66
1023	8.00	0.32	42.53	75.43	39.50	219.17
1024	10.00	0.31	26.67	76.99	17.00	159.83
1025	11.00	0.31	20.56	73.71	15.50	179.40
1026	12.00	0.21	45.20	72.77	34.00	255.22
1027	15.00	0.25	44.24	73.73	78.00	515.80
1028	16.00	0.15	34.43	80.07	56.00	885.95
1029	17.00	0.07	39.79	78.08	11.30	297.80

NVII24

Sample No.	Sample Depth (ft)	Moist. Content (cu.m/cu.m)	Dry Wt. Soil (gm)	Wt. Wtr. Added (gm)	Cl in Extract (ppm)	Cl in Soil Wtr. (mg/l)
1032	0.33	0.53	32.14	74.83	1.90	8.33
1033	0.67	0.38	46.82	77.29	2.10	9.18
1034	1.00	0.29	46.91	74.43	4.00	22.21
1035	1.33	0.29	41.08	78.06	4.80	31.70
1036	1.67	0.35	42.82	72.96	4.90	23.81
1037	2.00	0.35	40.28	76.07	5.00	26.85
1038	2.33	0.30	38.55	78.53	6.00	41.28
1039	2.67	0.35	39.75	75.55	7.80	42.09
1040	3.00	0.34	42.16	78.71	8.20	45.24
1041	3.33	0.38	36.43	76.22	10.50	58.57
1042	3.67	0.34	45.68	80.65	14.50	76.40
1043	4.00	0.44	36.80	78.64	8.20	40.27
1044	5.00	0.35	37.16	72.28	9.00	50.03
1045	6.00	0.38	42.35	80.51	6.80	34.16
1046	10.00	0.28	40.85	72.82	5.40	33.95
1047	11.00	0.35	40.87	75.74	2.80	15.04
1048	15.00	0.28	38.07	75.60	4.20	30.19
1049	16.00	0.32	41.13	75.72	4.90	27.99
1050	20.00	0.18	37.93	72.00	2.20	22.99
1051	21.00	0.15	38.97	74.65	2.30	28.79
1052	25.00	0.30	39.12	72.59	5.40	33.88
1053	26.00	0.14	46.15	74.17	3.10	34.69
1054	27.00	0.21	39.94	73.71	3.50	31.42
1056	30.00	0.18	40.82	75.48	2.80	28.68
1057	31.00	0.20	37.41	73.24	2.80	26.79
1059	35.00	0.28	33.64	82.35	1.80	15.94
1060	36.00	0.13	43.28	72.54	16.00	200.92
1061	40.00	0.09	36.88	77.73	4.20	98.86
1062	41.00	0.27	39.54	71.96	8.20	54.29
1063	45.00	0.27	45.07	74.02	2.50	15.44
1064	46.00	0.28	43.87	78.60	2.80	17.89
1065	47.00	0.22	29.06	70.71	2.30	25.16
1066	50.00	0.39	35.98	76.10	9.20	49.35
1067	51.00	0.36	38.76	71.05	3.40	17.46
1068	52.00	0.43	36.23	72.53	8.00	36.95
1069	53.00	0.39	38.01	72.94	13.00	64.52
1070	55.00	0.50	41.71	73.17	14.00	48.75
1071	56.00	0.50	37.00	73.48	19.50	77.43
1072	57.00	0.49	42.90	72.08	42.00	143.23
1073	58.00	0.24	42.64	73.56	30.00	215.43
1074	60.00	0.16	47.19	78.25	19.00	193.53
1075	61.00	0.42	37.60	70.19	34.00	150.71
1076	65.00	0.13	40.10	70.37	35.00	472.10
1077	66.00	0.13	40.45	74.46	9.90	136.42
1081	73.00	0.30	31.16	72.23	6.50	50.21
1083	75.00	0.08	37.88	78.69	7.90	210.34

NVII25

Sample No.	Sample Depth (ft)	Moist. Content (cu.m/cu.m)	Dry Wt. Soil (gm)	Wt. Wtr. Added (gm)	Cl in Extract (ppm)	Cl in Soil Wtr. (mg/l)
1084	1.00	0.33	47.20	77.61	1.30	6.57
1085	2.00	0.40	40.59	74.58	1.15	5.32
1086	3.00	0.36	27.83	71.91	1.00	7.19
1087	4.00	0.39	36.05	74.90	1.30	7.01
1088	5.00	0.38	43.14	72.93	2.00	8.91
1089	6.00	0.35	39.31	72.97	2.00	10.63
1090	7.00	0.16	41.42	75.97	1.60	18.37
1091	8.00	0.34	40.15	74.18	2.90	15.94
1092	10.00	0.45	40.06	76.40	2.75	11.78
1093	11.00	0.36	37.99	74.07	2.20	11.82
1094	12.00	0.23	33.10	70.49	21.50	197.65
1095	13.00	0.44	26.87	72.44	2.00	12.23
1096	14.00	0.31	32.20	73.13	1.85	13.67
1097	15.00	0.32	37.35	76.25	2.60	16.73
1098	16.00	0.27	46.35	71.16	3.20	18.23
1099	17.00	0.23	43.29	77.66	3.15	24.51
1100	20.00	0.32	40.77	73.74	2.90	16.57
1101	21.00	0.24	43.92	73.33	2.90	20.09
1102	22.00	0.21	35.44	72.99	2.70	27.02
1103	25.00	0.25	49.19	75.50	3.70	23.10
1104	26.00	0.25	41.53	73.02	3.40	24.20
1105	27.00	0.22	42.40	71.16	2.90	22.51
1106	30.00	0.29	39.09	73.70	2.10	13.84
1107	31.00	0.21	43.35	74.72	2.60	21.42
1108	32.00	0.32	42.52	72.42	2.70	14.23
1109	35.00	0.30	45.95	77.52	4.60	26.17
1110	36.00	0.29	42.94	73.63	4.20	25.17
1111	37.00	0.30	35.65	75.07	3.70	26.27
1112	40.00	0.36	38.50	76.04	4.40	24.34
1113	41.00	0.34	39.56	70.11	6.00	31.42
1114	42.00	0.31	37.85	72.50	4.80	29.34
1115	45.00	0.34	44.00	73.48	6.20	30.85
1116	46.00	0.31	38.91	74.93	4.20	26.48
1117	47.00	0.31	39.68	74.56	3.00	18.07
1118	48.00	0.18	41.15	75.52	2.25	22.70
1119	50.00	0.13	36.16	77.04	1.65	26.64
1120	51.00	0.21	38.77	74.88	6.60	61.65
1121	52.00	0.20	39.38	72.62	17.00	158.24
1122	53.00	0.19	40.56	78.46	9.20	95.93
1123	55.00	0.15	47.45	75.86	17.00	180.36
1124	56.00	0.35	44.44	73.46	96.00	450.04
1125	57.00	0.28	30.49	68.63	16.50	134.40
1126	60.00	0.19	37.26	76.93	28.50	316.41
1127	61.00	0.16	37.74	71.79	29.00	342.17
1128	62.00	0.29	37.45	75.33	67.00	469.27
1129	62.00	0.22	21.69	71.38	1.85	27.66
1131	67.00	0.18	28.08	77.30	2.10	31.91
1132	68.00	0.21	31.11	68.72	3.70	38.10

1133	69.00	0.22	20.63	78.03	2.60	45.28
1134	70.00	0.35	33.74	78.14	4.40	29.21
1137	73.00	0.17	32.11	75.75	4.50	62.00
1138	74.00	0.12	35.02	69.51	6.80	111.35

NVII26

Sample No.	Sample Depth (ft)	Moist. Content (cu.m/cu.m)	Dry Wt. Soil (gm)	Wt. Wtr. Added (gm)	Cl in Extract (ppm)	Cl in Soil Wtr. (mg/l)
1139	0.33	0.20	53.48	70.80	1.30	8.66
1140	0.67	0.25	53.54	68.64	2.25	11.35
1141	1.00	0.34	48.78	69.69	2.60	10.94
1142	1.33	0.36	47.01	84.14	17.50	88.00
1143	1.67	0.13	47.80	72.68	100.00	1181.43
1144	2.00	0.08	41.88	70.85	62.00	1308.92
1145	2.33	0.11	41.80	71.45	46.00	716.81
1146	2.67	0.07	43.67	69.65	25.00	597.95
1147	3.00	0.09	47.47	68.64	24.50	411.00
1148	5.00	0.06	44.74	74.06	8.20	212.80
1149	6.00	0.08	40.78	67.00	9.50	186.97
1150	7.00	0.06	51.03	75.86	5.80	154.61
1151	10.00	0.09	41.91	66.68	2.70	49.01
1152	11.00	0.04	52.37	72.39	2.20	74.55
1153	12.00	0.10	52.00	74.51	3.50	51.78
1154	14.50	0.21	25.90	72.59	2.60	35.37
1155	15.00	0.35	42.14	75.89	2.85	14.71
1156	16.00	0.29	45.82	73.48	3.90	21.66
1157	17.00	0.25	24.75	72.77	3.35	38.98
1158	20.00	0.33	46.62	76.10	5.20	26.00
1159	21.00	0.29	29.81	79.56	4.00	37.37
1160	22.00	0.29	23.77	65.95	3.60	34.77
1161	23.00	0.26	28.45	70.72	4.00	38.47
1162	24.00	0.26	29.41	77.00	4.40	44.78

NVII27

Sample No.	Sample Depth (ft)	Moist. Content (cu.m/cu.m)	Dry Wt. Soil (gm)	Wt. Wtr. Added (gm)	Cl in Extract (ppm)	Cl in Soil Wtr. (mg/l)
1163	0.50	0.20	48.65	77.01	7.90	62.74
1164	1.50	0.35	31.97	80.34	88.00	633.81
1165	2.50	0.46	27.39	80.62	47.00	300.37
1166	3.50	0.38	24.00	66.36	20.50	149.42
1167	4.50	0.49	30.74	69.93	9.40	43.61
1168	5.50	1.08	17.95	71.42	9.60	35.27
1169	6.50	0.67	26.57	68.25	8.60	32.82
1170	9.50	0.31	35.81	73.91	5.10	33.78
1171	10.50	0.23	42.06	76.66	3.50	27.44
1172	11.50	0.24	34.96	72.45	4.40	37.46
1173	13.00	0.26	36.31	77.35	4.80	38.66
1174	14.00	0.26	39.91	77.07	4.00	29.84
1175	15.00	0.30	34.29	77.05	3.50	26.63
1176	16.00	0.53	27.94	82.41	5.20	28.70
1177	17.00	0.50	29.15	69.81	5.00	23.77
1178	18.00	0.50	32.12	75.24	6.00	27.97
1179	19.00	0.37	35.19	71.75	4.80	26.61

NVII28

Sample No.	Sample Depth (ft)	Moist. Content (cu.m/cu.m)	Dry Wt. Soil (gm)	Wt. Wtr. Added (gm)	Cl in Extract (ppm)	Cl in Soil Wtr. (mg/l)
1180	0.50	0.49	42.20	74.66	9.80	35.72
1181	1.50	0.40	42.56	76.10	19.50	87.62
1182	2.50	0.34	42.86	71.11	23.50	115.46
1183	3.50	0.41	42.92	84.14	17.50	83.51
1184	5.50	0.36	39.13	77.29	11.50	62.80
1185	6.50	0.33	46.05	80.19	9.40	49.26
1186	7.50	0.32	45.03	72.57	11.00	54.78
1187	8.50	0.34	48.10	69.88	14.50	62.61
1188	9.50	0.34	42.18	78.71	11.50	62.83
1189	10.50	0.35	42.42	73.62	10.50	52.18
1190	11.50	0.33	38.51	69.51	9.00	49.04
1191	13.00	0.39	39.17	72.79	5.80	27.85
1192	14.00	0.37	39.85	76.17	3.10	15.86
1193	15.00	0.32	39.29	75.98	3.10	18.63
1194	16.00	0.35	41.13	70.93	5.60	27.22
1195	17.00	0.29	56.54	75.50	5.90	26.88
1196	20.00	0.35	45.53	76.88	2.30	11.19
1197	21.00	0.26	40.67	74.66	1.85	13.22
1198	22.00	0.38	43.12	77.07	3.50	16.45
1199	23.00	0.42	38.77	85.11	3.10	16.09

NVII29

Sample No.	Sample Depth (ft)	Moist. Content (cu.m/cu.m)	Dry Wt. Soil (gm)	Wt. Wtr. Added (gm)	Cl in Extract (ppm)	Cl in Soil Wtr. (mg/l)
1200	0.33	0.26	38.95	82.27	14.50	119.54
1201	0.67	0.24	45.37	78.09	38.00	274.73
1202	1.00	0.23	38.20	68.13	32.00	253.52
1203	1.33	0.19	44.61	75.03	7.90	69.89
1204	1.67	0.21	41.42	77.22	3.50	30.97
1205	2.00	0.23	40.98	76.40	7.90	64.98
1206	2.33	0.18	26.32	71.37	7.20	108.94
1207	5.00	0.21	45.03	79.41	19.00	160.79
1208	6.00	0.23	24.46	81.00	22.00	311.44
1210	10.00	0.14	23.23	74.52	3.40	75.29
1211	11.00	0.17	37.33	70.80	6.70	76.24
1214	16.00	0.15	40.85	71.64	18.50	220.84
1215	17.00	0.16	42.72	85.83	18.00	221.71
1217	21.00	0.15	24.59	75.05	22.00	455.91
1218	30.00	0.21	25.95	69.90	2.90	37.64
1219	31.00	0.14	40.44	78.76	40.00	547.72
1220	35.00	0.16	47.72	81.26	44.00	480.34
1221	36.00	0.16	44.71	74.02	48.00	488.97
1222	37.00	0.17	42.73	74.70	52.00	537.43
1223	40.00	0.16	38.95	73.08	46.00	544.90
1224	41.00	0.16	47.16	72.66	83.00	810.53
1225	42.00	0.34	37.65	71.61	96.00	541.43
1226	45.00	0.44	33.72	75.61	60.00	302.39
1227	46.00	0.09	46.04	74.41	110.00	2075.86
1228	47.00	0.10	38.33	70.75	120.00	2288.14
1229	50.00	0.05	49.04	72.46	100.00	2915.86
1230	51.00	0.06	32.05	71.01	88.00	3164.25
1231	52.00	0.10	37.00	74.92	100.00	2075.02
1232	55.00	0.27	34.51	72.94	85.00	664.75
1233	56.00	0.08	49.07	71.75	60.00	1120.32
1234	57.00	0.04	48.15	79.51	72.00	3195.62
1235	60.00	0.02	44.32	71.44	51.00	4520.50
1236	61.00	0.11	26.09	78.91	8.10	216.21
1237	65.00	0.21	36.81	73.19	6.60	62.11
1238	66.00	0.15	28.04	85.89	3.80	76.96
1239	67.00	0.13	35.85	74.62	4.10	64.23
1240	68.00	0.16	37.71	73.01	8.00	97.00
1242	70.00	0.21	20.49	79.75	4.40	82.83
1243	71.00	0.20	24.33	83.84	4.20	72.63
1244	72.00	0.11	26.47	81.48	2.60	70.00
1245	73.00	0.13	25.74	81.04	3.30	81.91
1246	74.00	0.09	37.91	77.56	4.00	87.93

APPENDIX F

CHLORIDE VS DEPTH PLOTS

Explanation

NVII 01 = Navajo Mine, Phase II, Hole 1
MEAN = Clsw (mean soil-water chloride; vertical line shows mean graphically
(0.00'-99.00) = depth interval over which MEAN calculated; vertical line shows interval graphically
R = recharge based on chloride mass-balance method using P = 5.7 inches, Clsw = MEAN shown, Clp = 0.60 mg/L for undisturbed sites or Fruitland portion of profile, and Clp = 2.02 mg/L for spoil.

14-Apr-86 10:51:52
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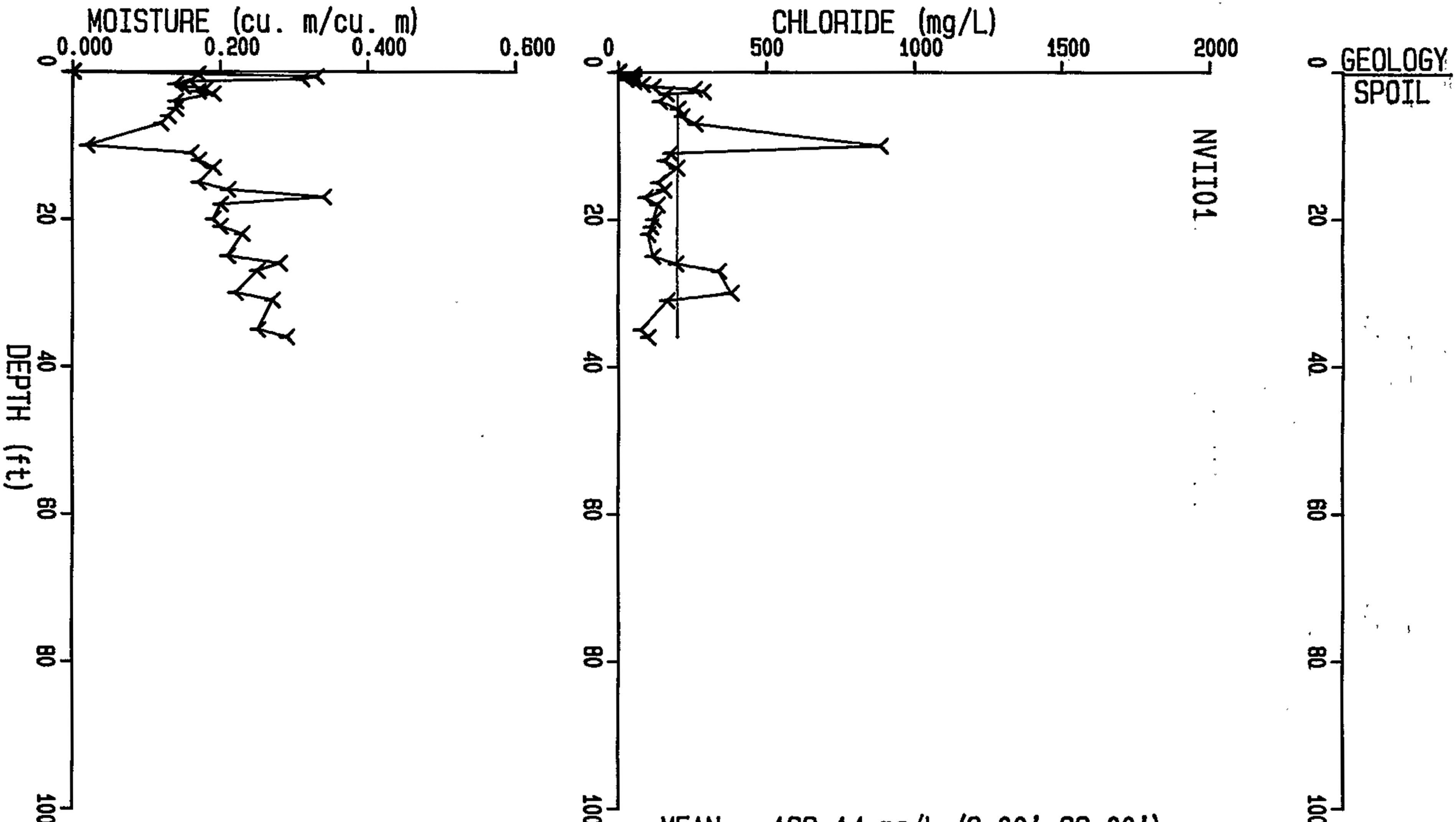

MEAN = 199.14 mg/L (3.00'-36.00')
R = 0.06 in/yr

139

14-Apr-86 11:05:24
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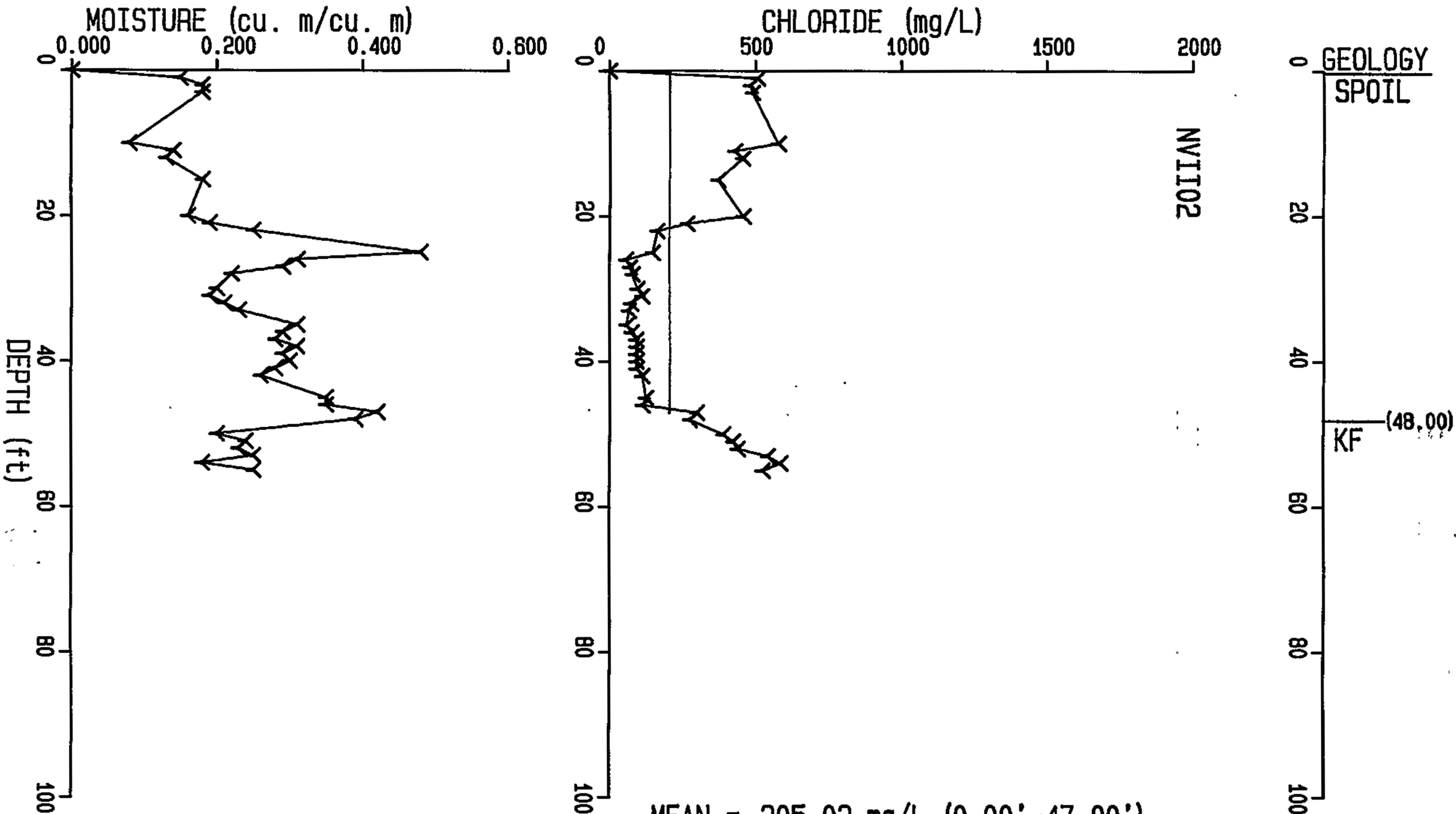

MEAN = 205.02 mg/L (0.00'-47.00')
R = 0.06 in/yr

140

14-Mar-86 12: 12: 38
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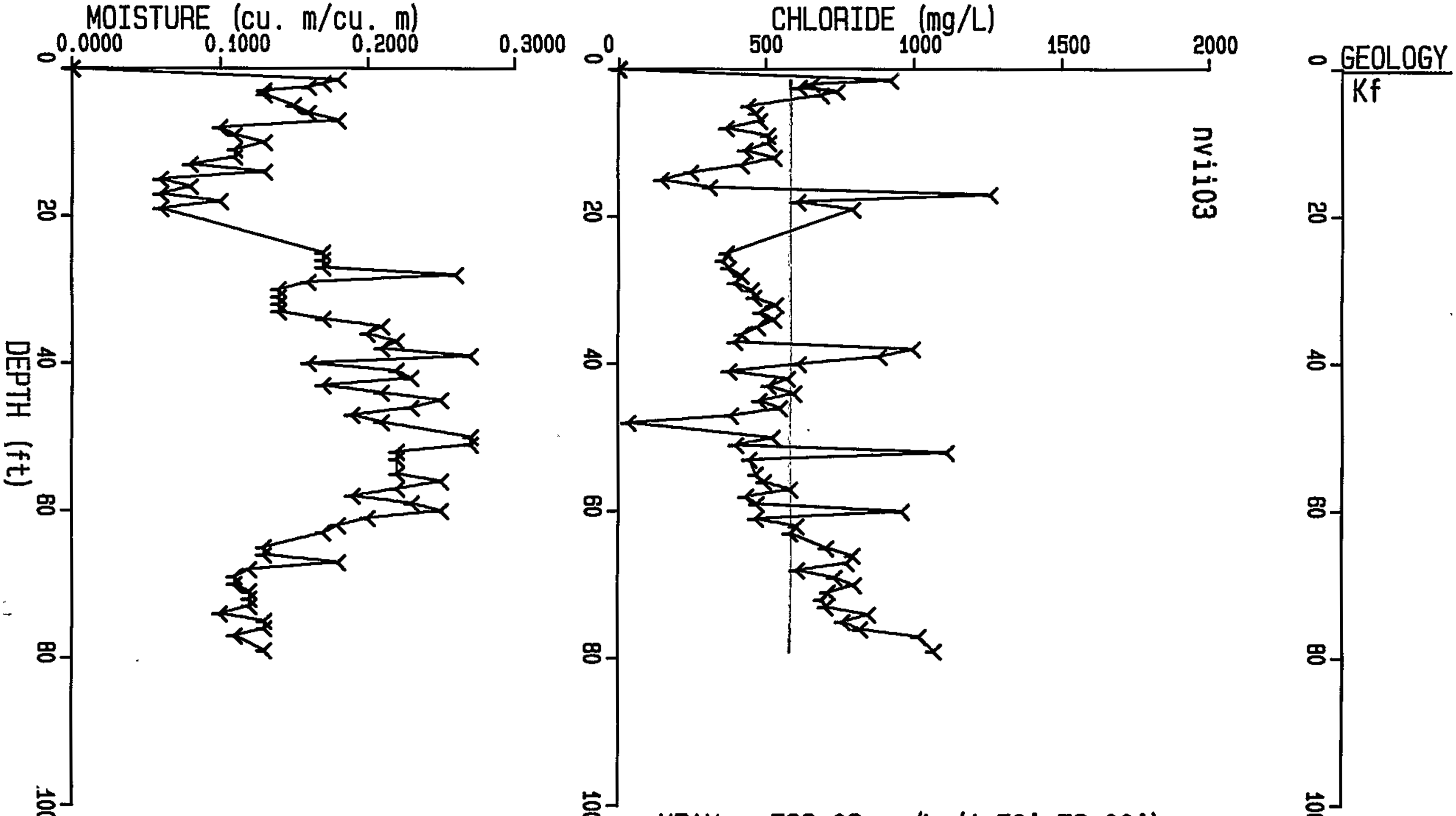

MEAN = 583.03 mg/L (1.50'-79.00')
R = 0.01 in/yr

17-Apr-86 09: 05: 44
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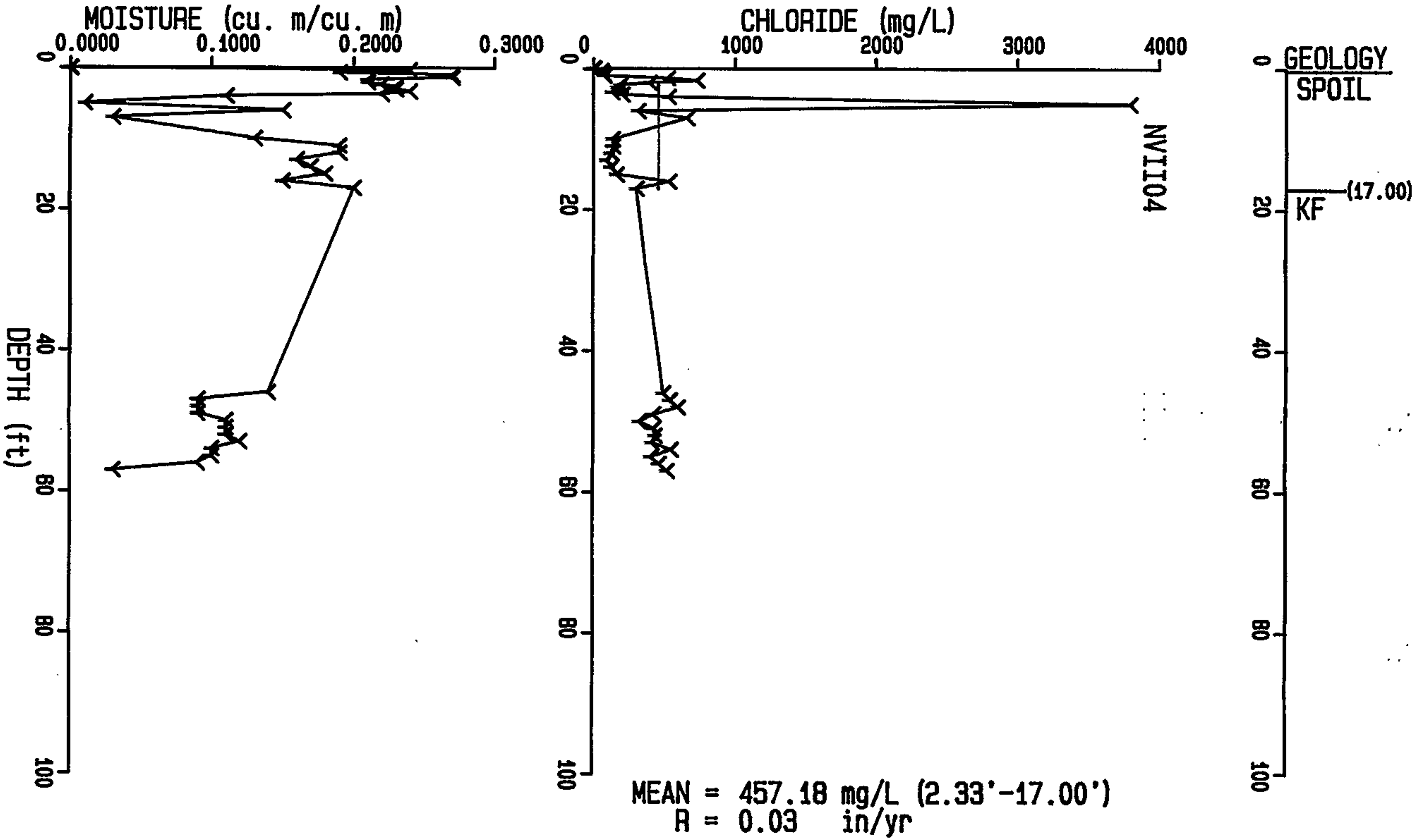

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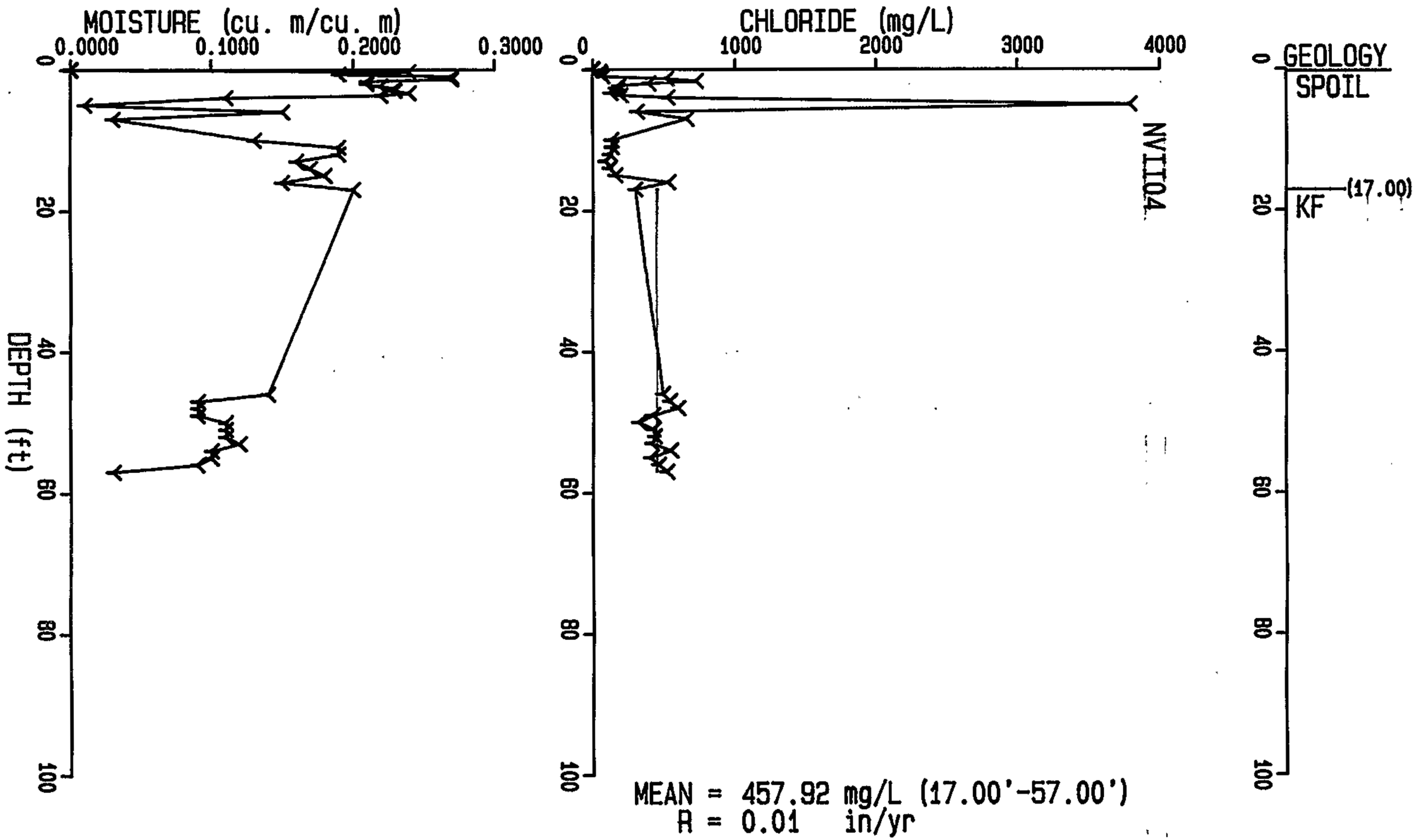

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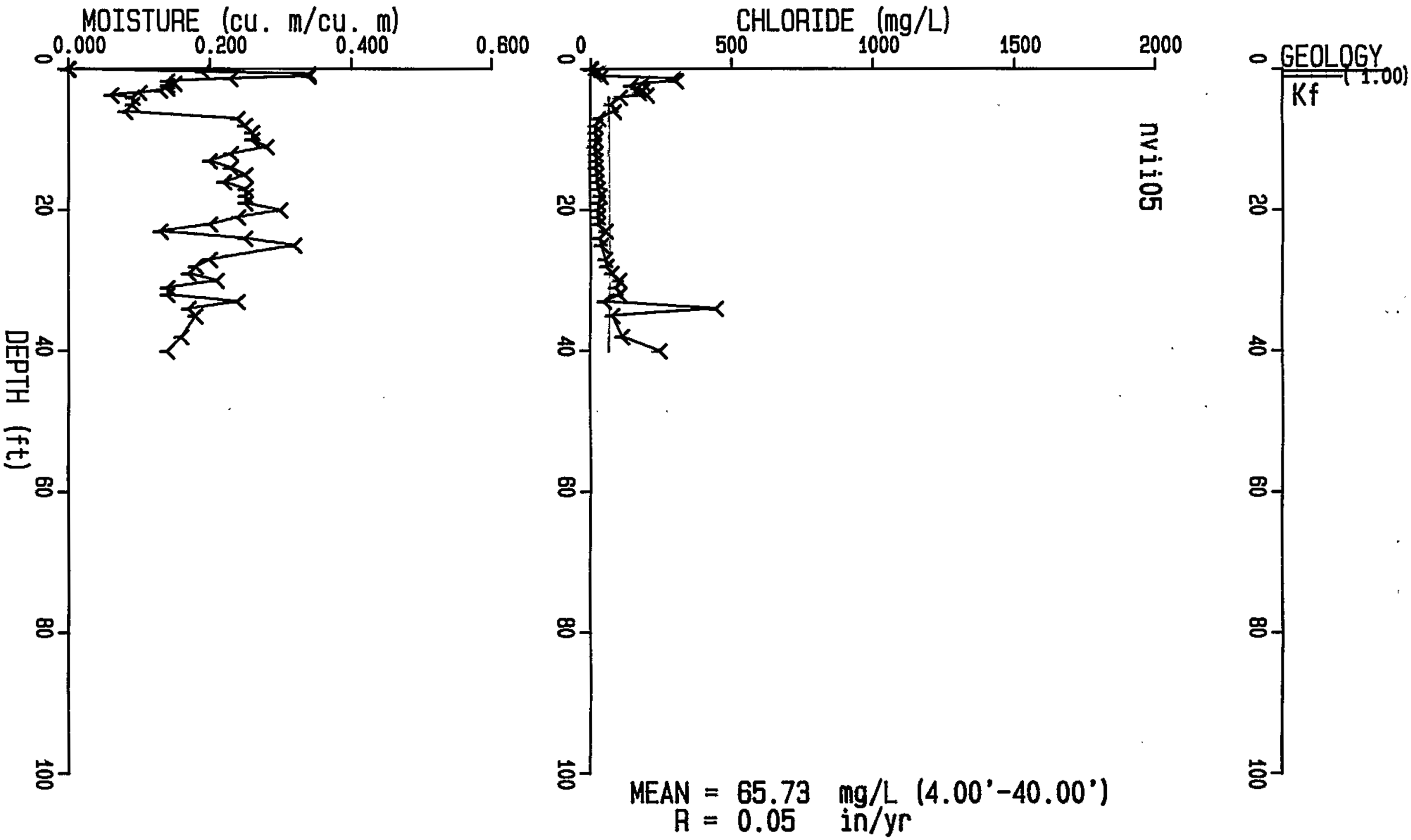

144

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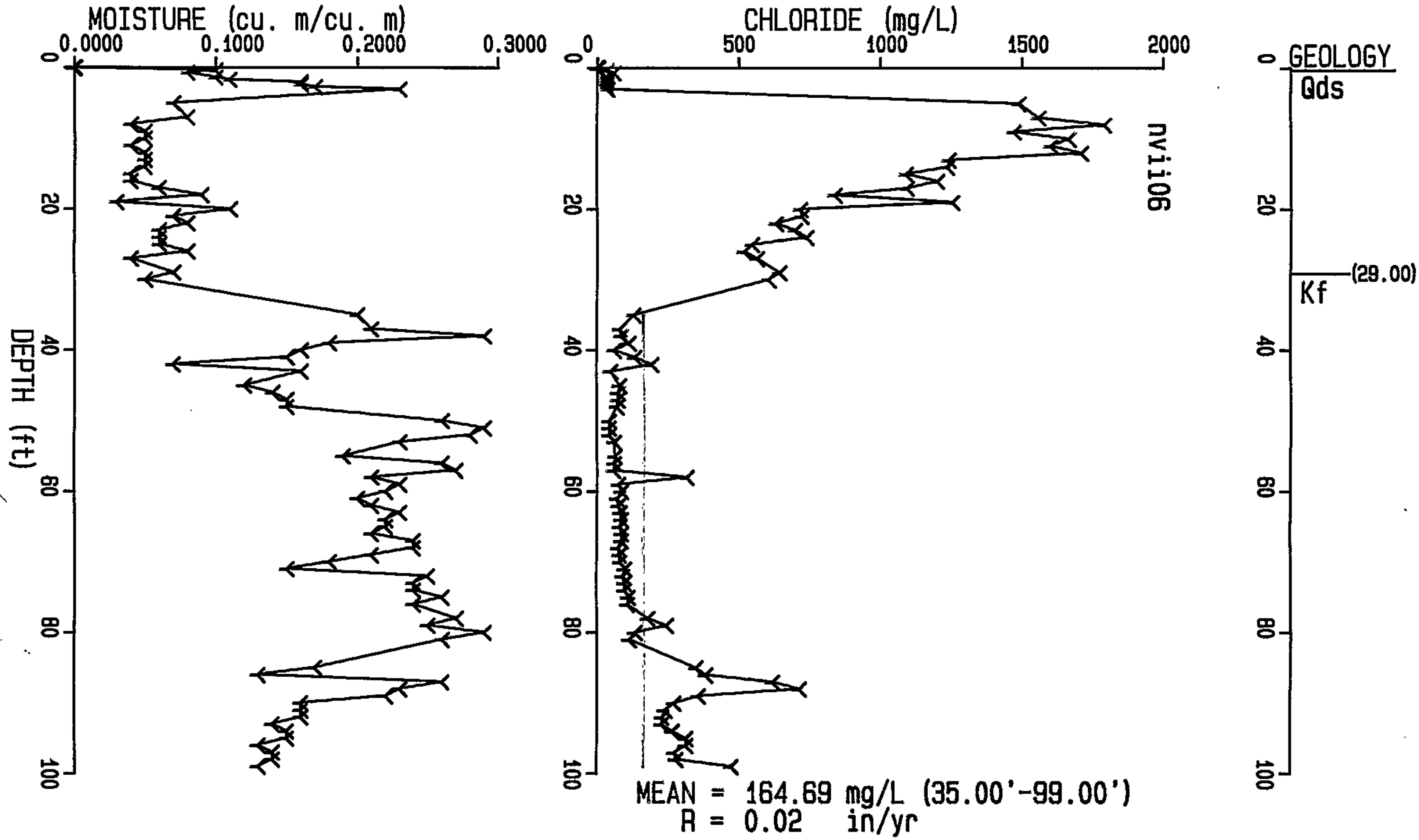

145

14-Apr-86 10:56:11
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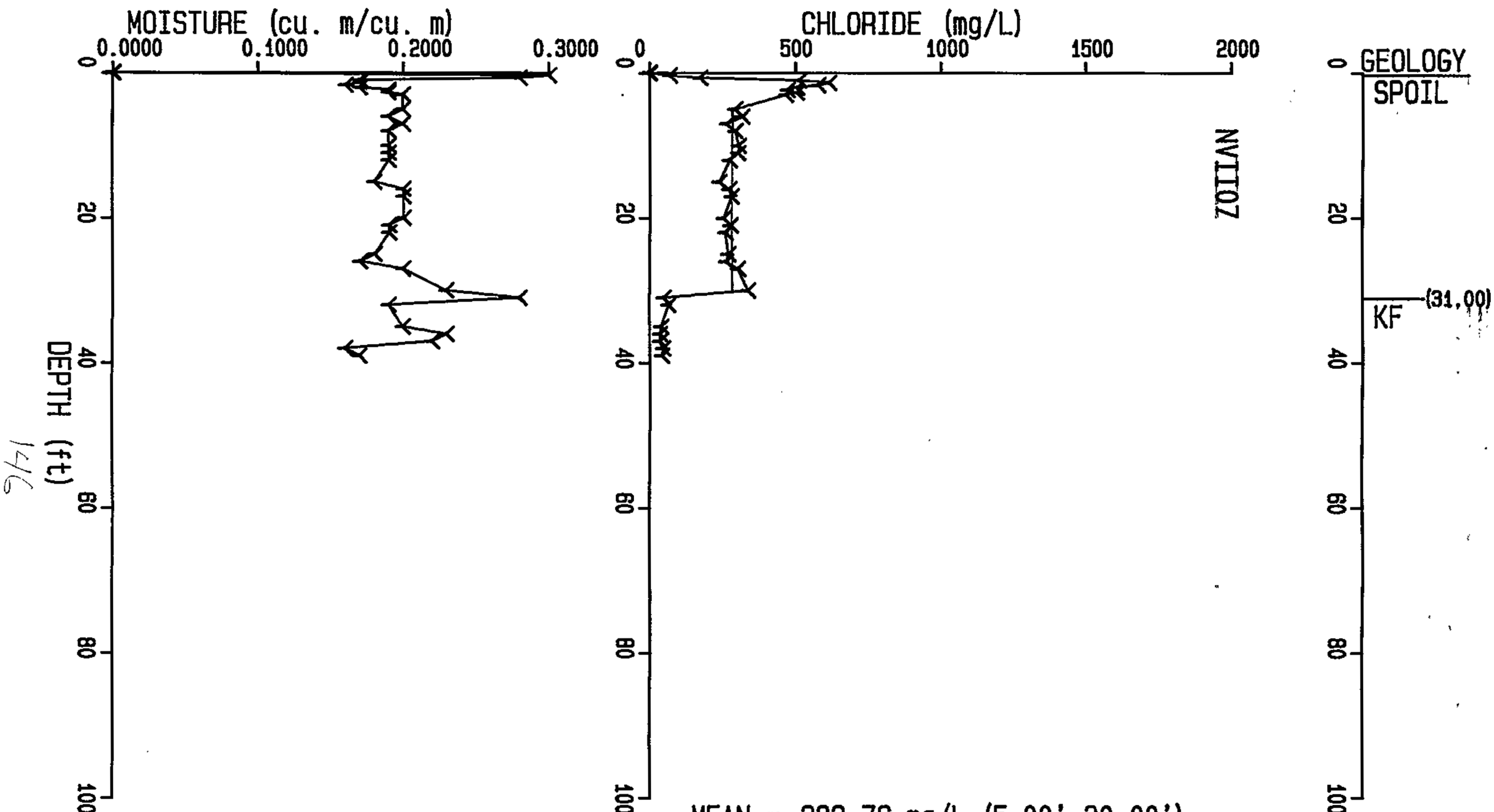

MEAN = 282.76 mg/L (5.00'-30.00')
R = 0.04 in/yr

14-Mar-86 11: 45: 14
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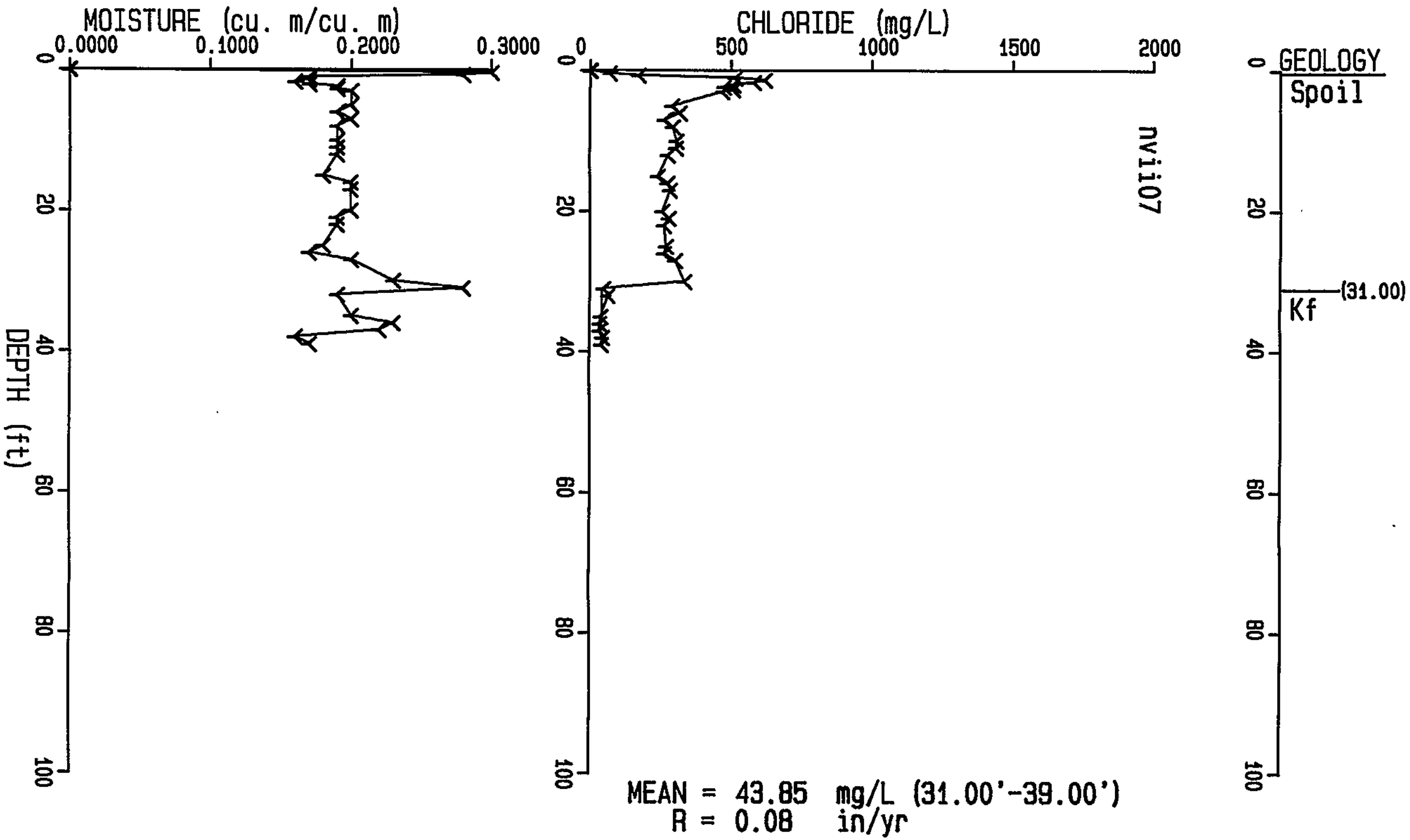

14-Apr-86 11:00:44
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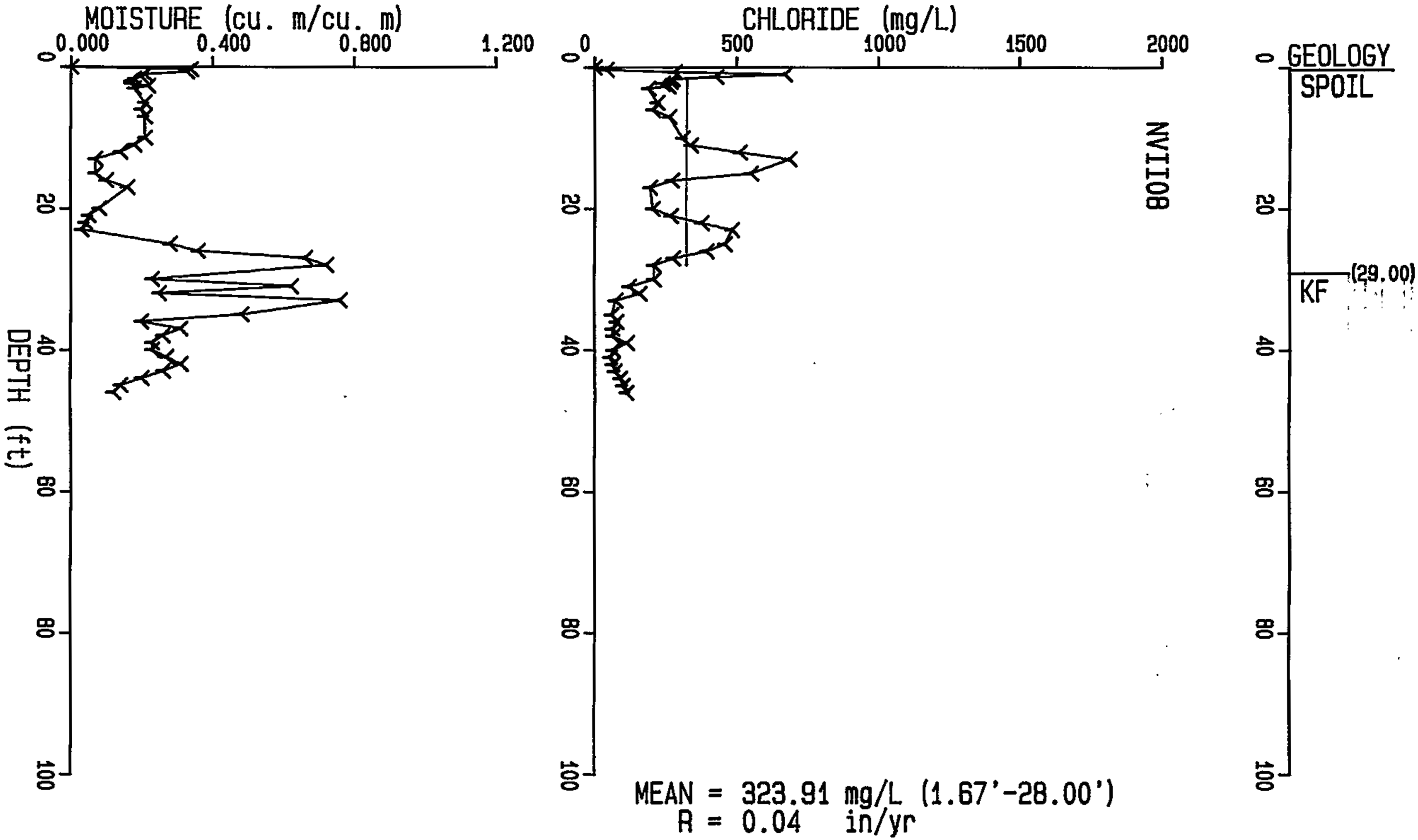

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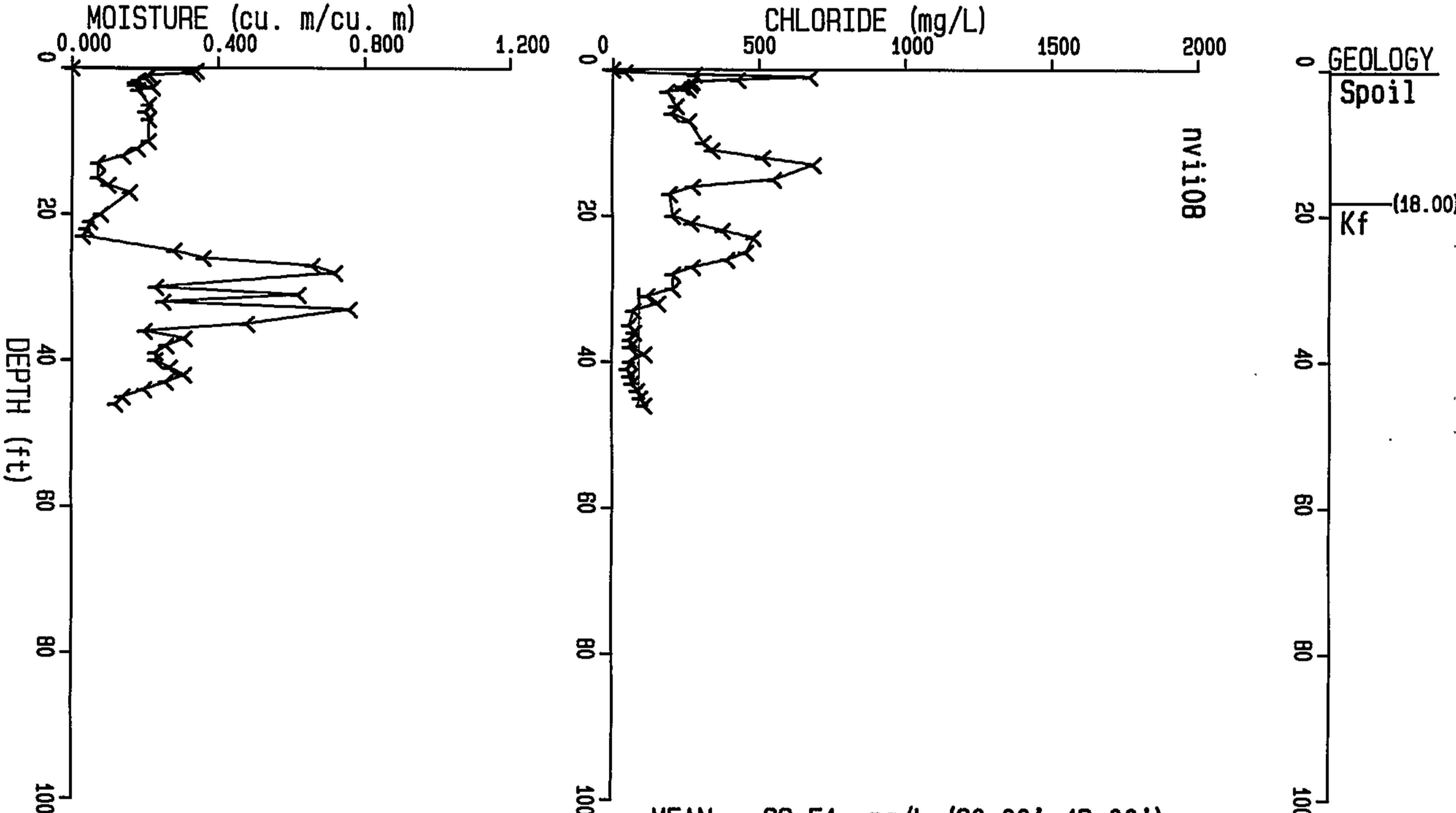
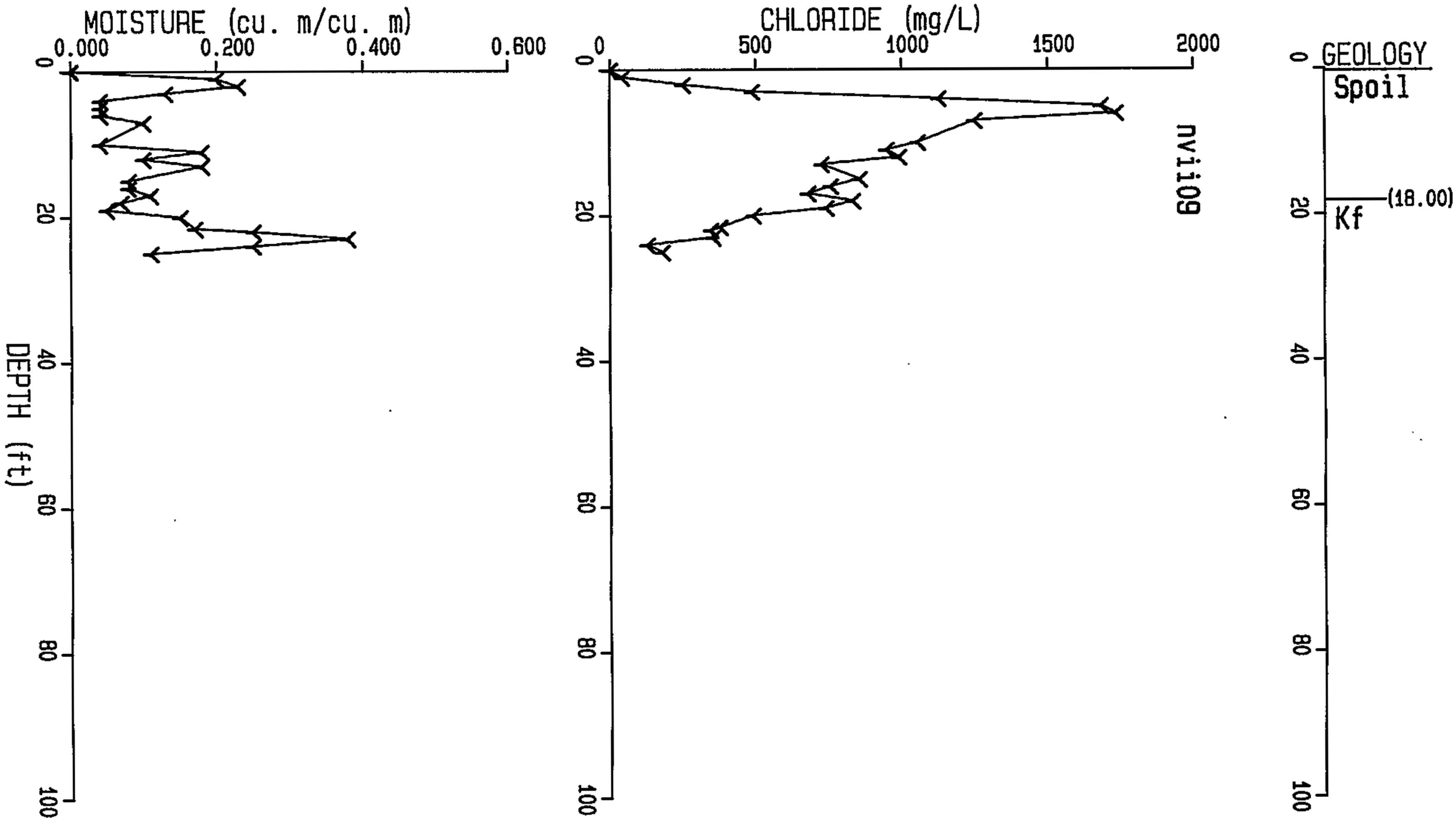


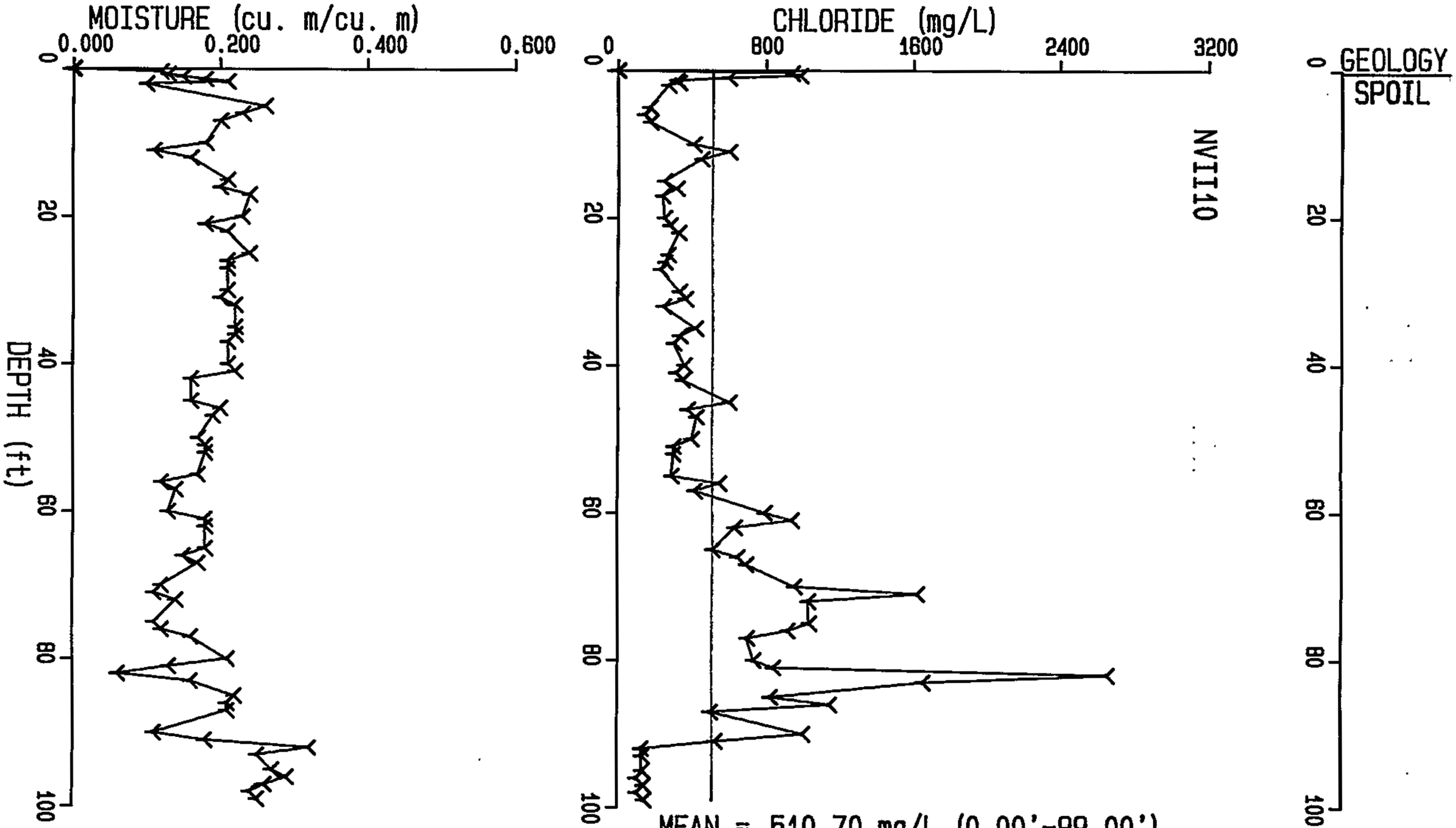
MEAN = 92.51 mg/L (30.00'-46.00')
R = 0.04 in/yr

14-Mar-86 10: 40: 36
JOB: NVII09 FILE: <BUREAU-RESEARCH>NVII09.PLT.6 USER: BUREAU-RESEARCH



150

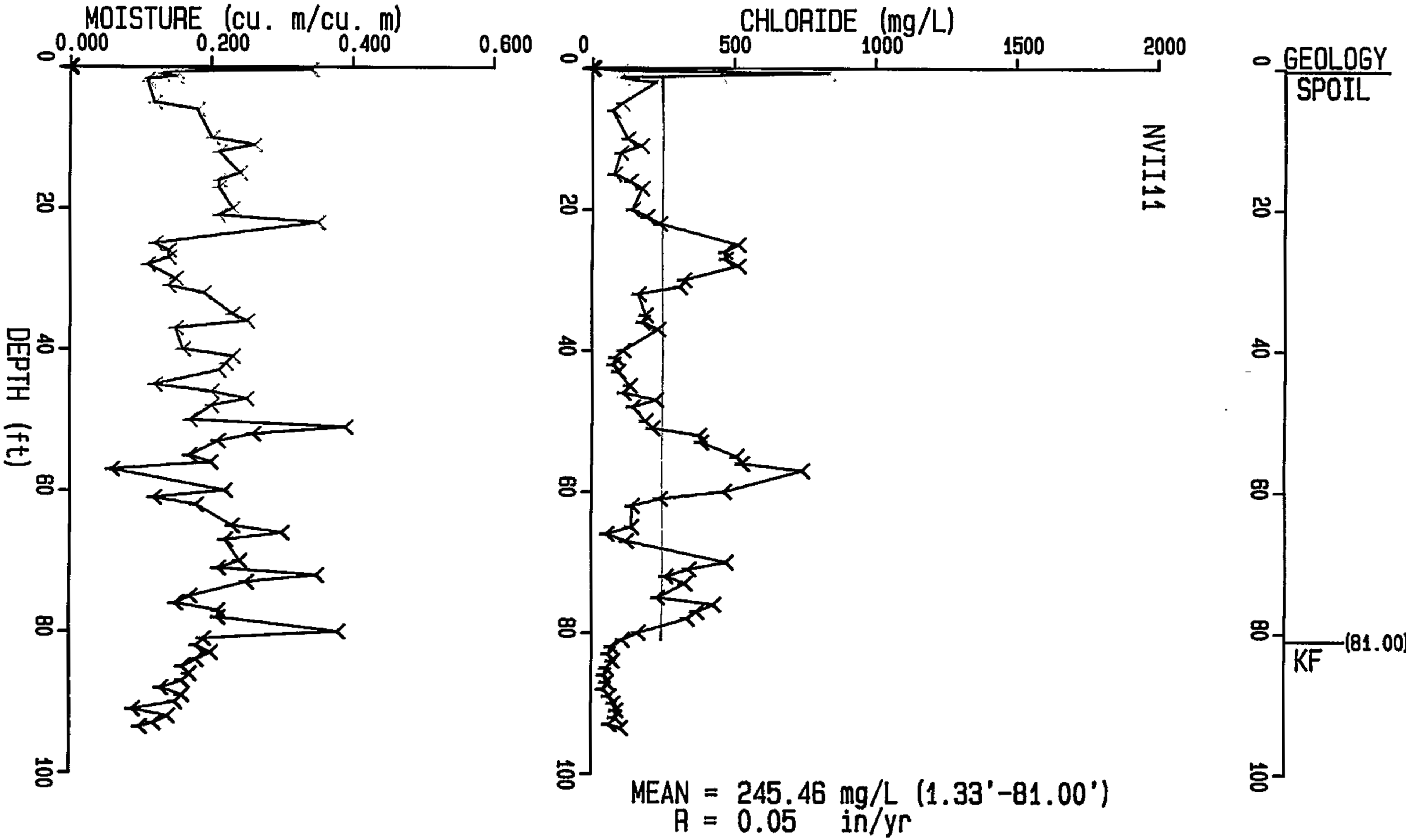
14-Apr-86 11:09:58
JOB: NVII10 FILE: <BUREAU-RESEARCH>NVII10.PLT.10 USER: BUREAU-RESEARCH



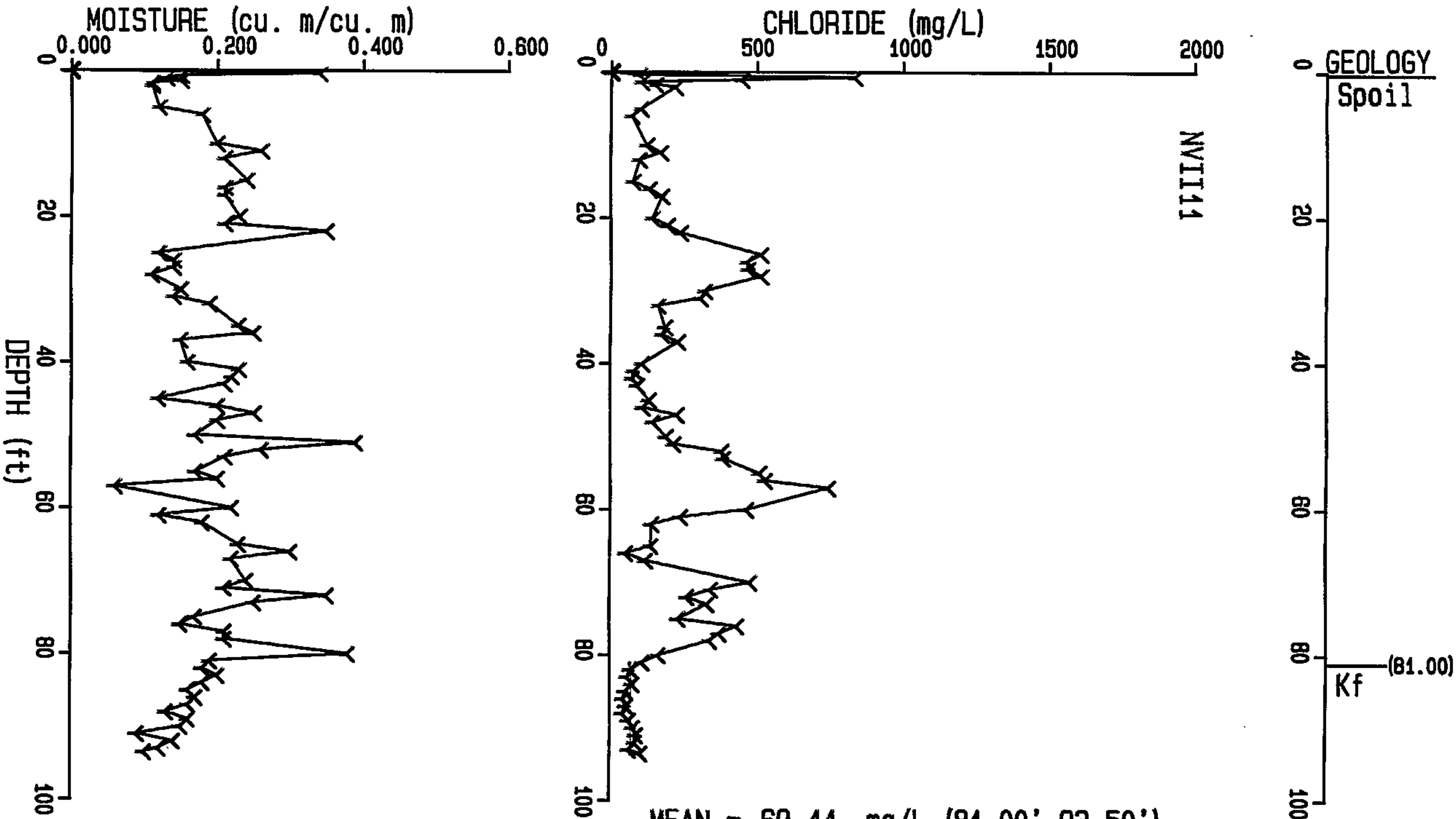
MEAN = 510.70 mg/L (0.00'-99.00')
R = 0.02 in/yr

151

15-Apr-86 12: 08: 19
JOB: NVII11 FILE: <BUREAU-RESEARCH>NVII11.PLT.3 USER: BUREAU-RESEARCH

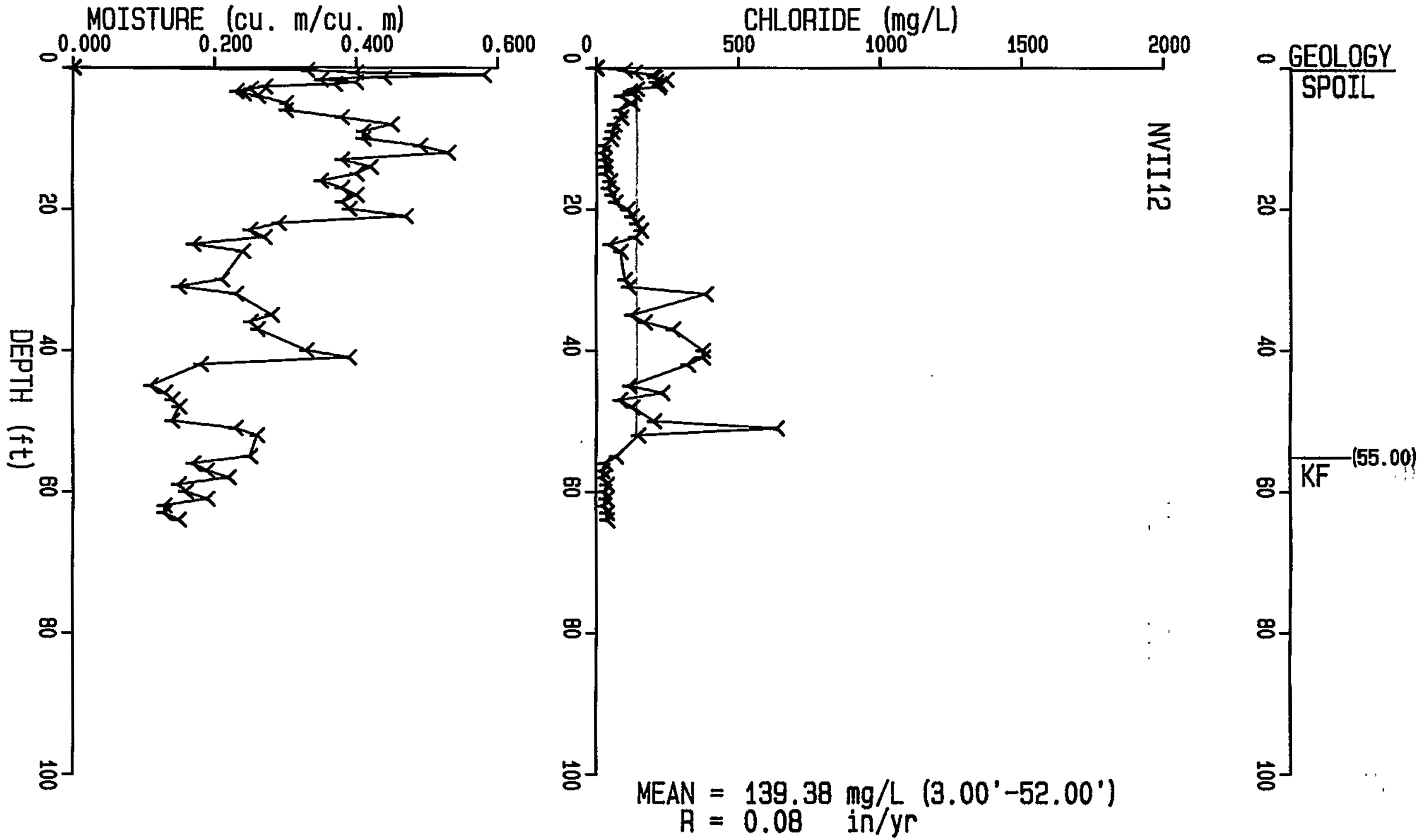


14-Mar-86 13: 23: 47
JOB: NVII11 FILE: <BUREAU-RESEARCH>NVII11.PLT.1 USER: BUREAU-RESEARCH

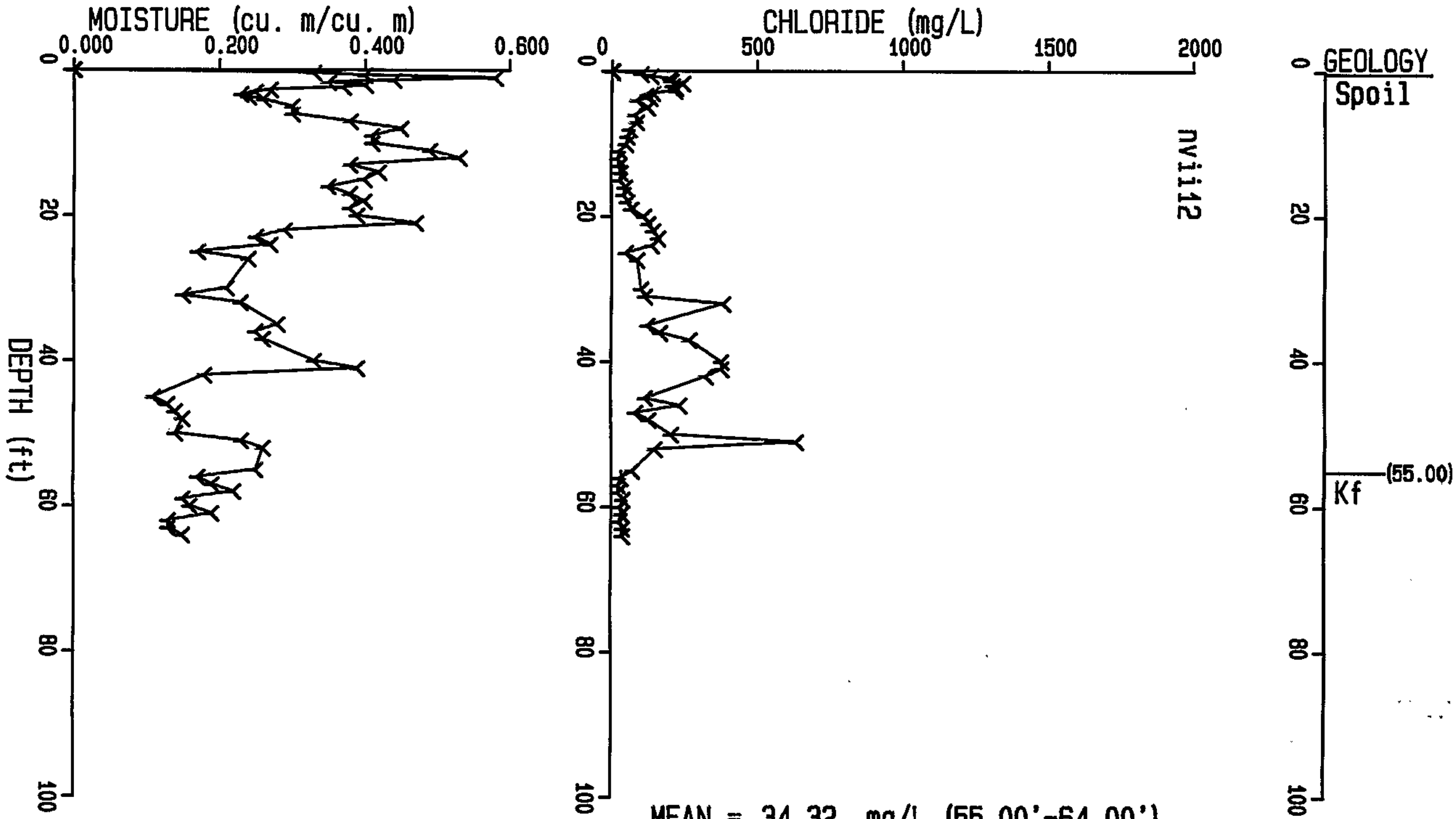


MEAN = 69.44 mg/L (81.00'-93.50')
R = 0.05 in/yr

14-Apr-86 11: 20: 26
JOB: NVII12 FILE: <BUREAU-RESEARCH>NVII12.PLT.2 USER: BUREAU-RESEARCH



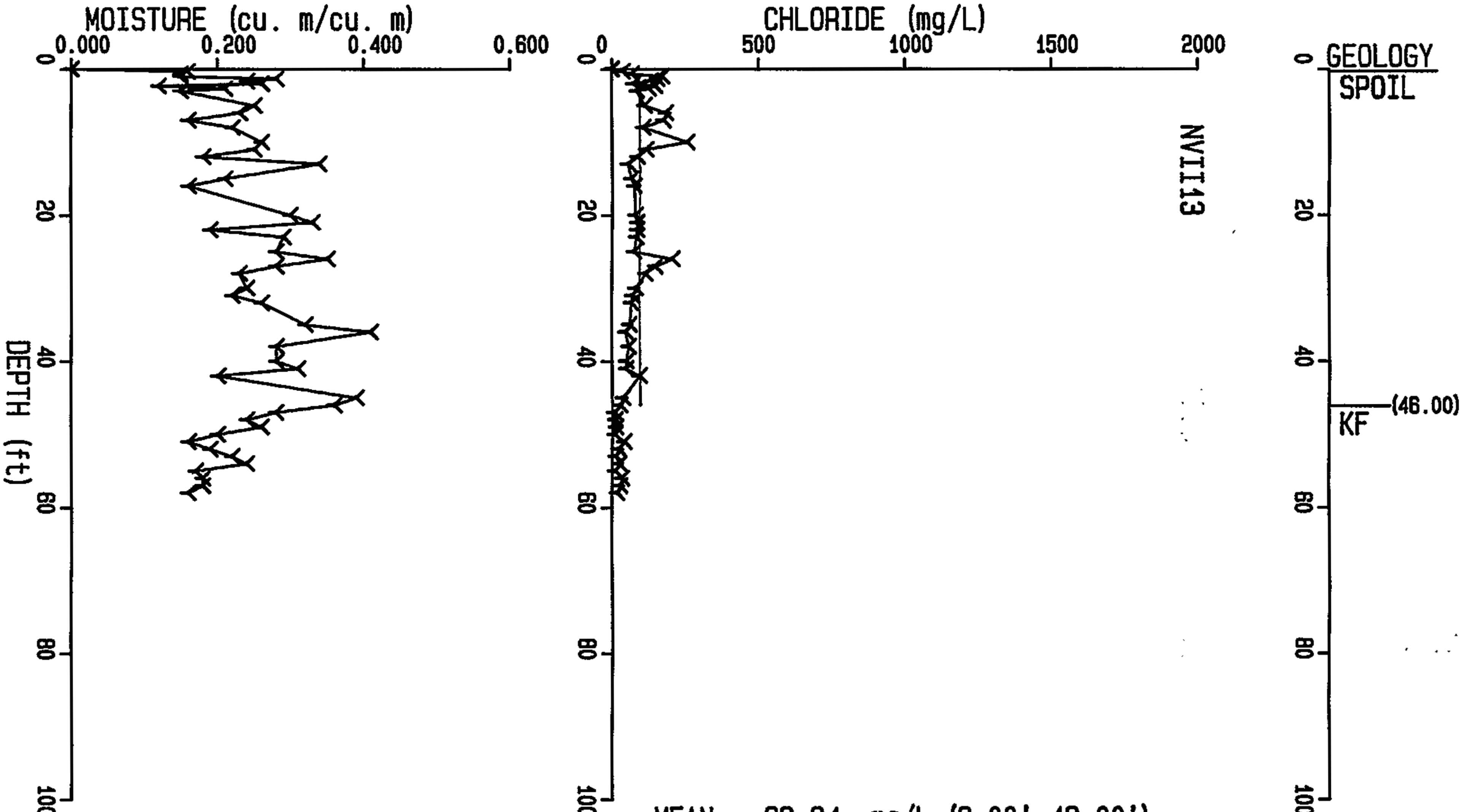
14-Mar-86 13: 08: 58
JOB: NVII12 FILE: <BUREAU-RESEARCH>NVII12.PLT.1 USER: BUREAU-RESEARCH



MEAN = 34.32 mg/L (55.00'-64.00')
R = 0.10 in/yr

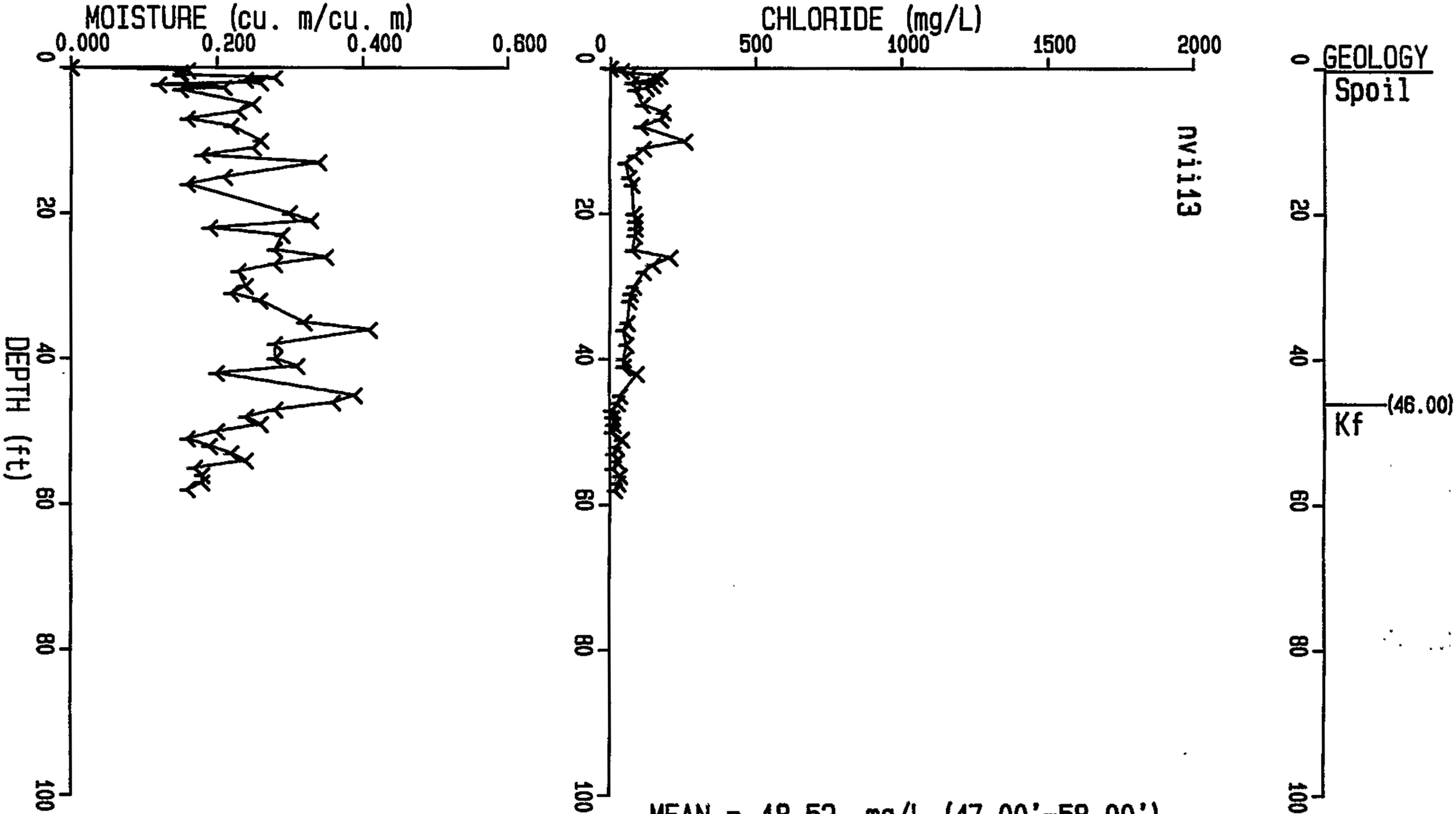
155

16-Apr-86 10: 43: 52
JOB: NVII13 FILE: <BUREAU-RESEARCH>NVII13.PLT.4 USER: BUREAU-RESEARCH



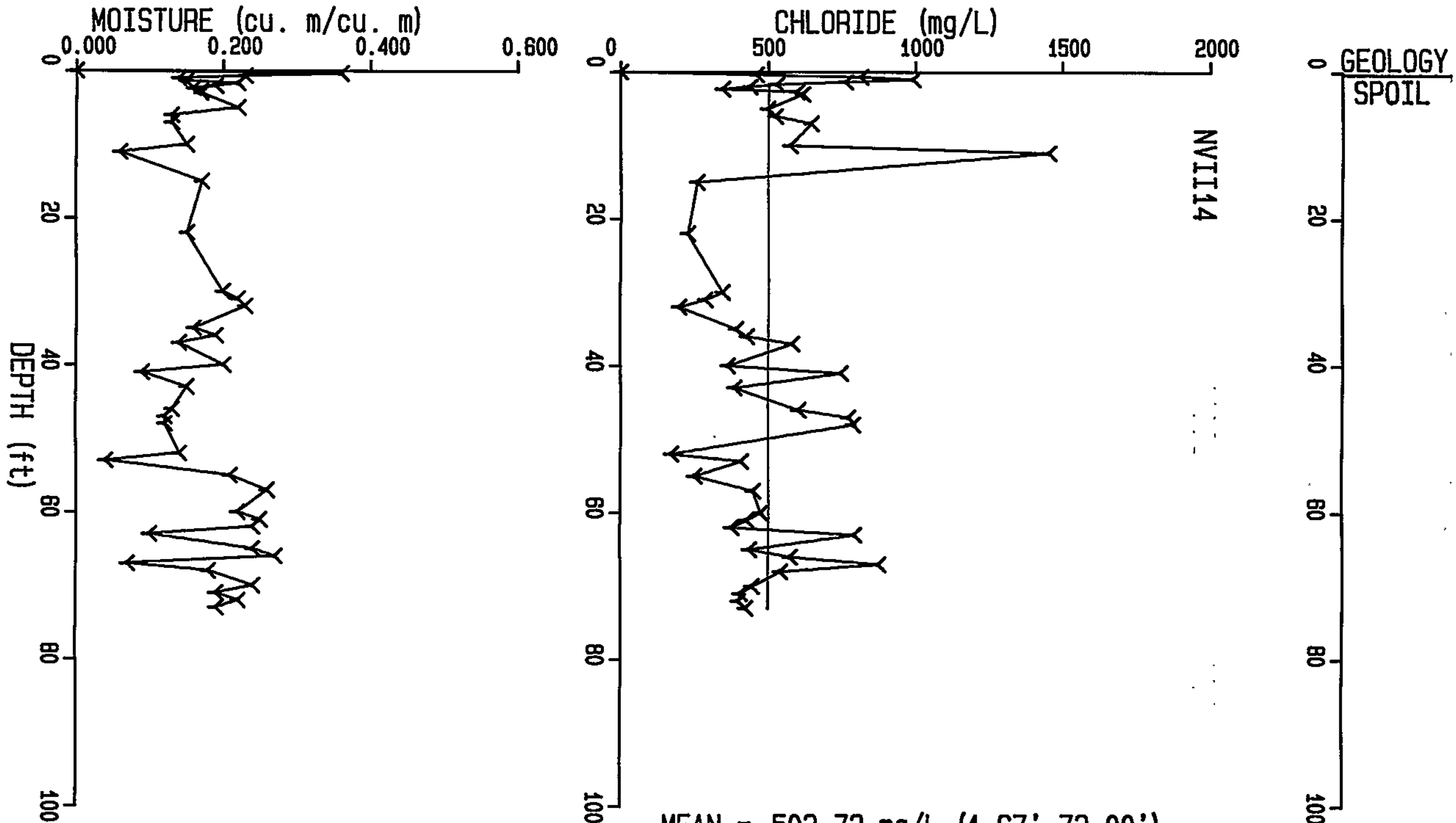
MEAN = 96.34 mg/L (2.00'-46.00')
R = 0.12 in/yr

14-Mar-86 13: 14: 03
JOB: NVII13 FILE: <BUREAU-RESEARCH>NVII13.PLT.1 USER: BUREAU-RESEARCH



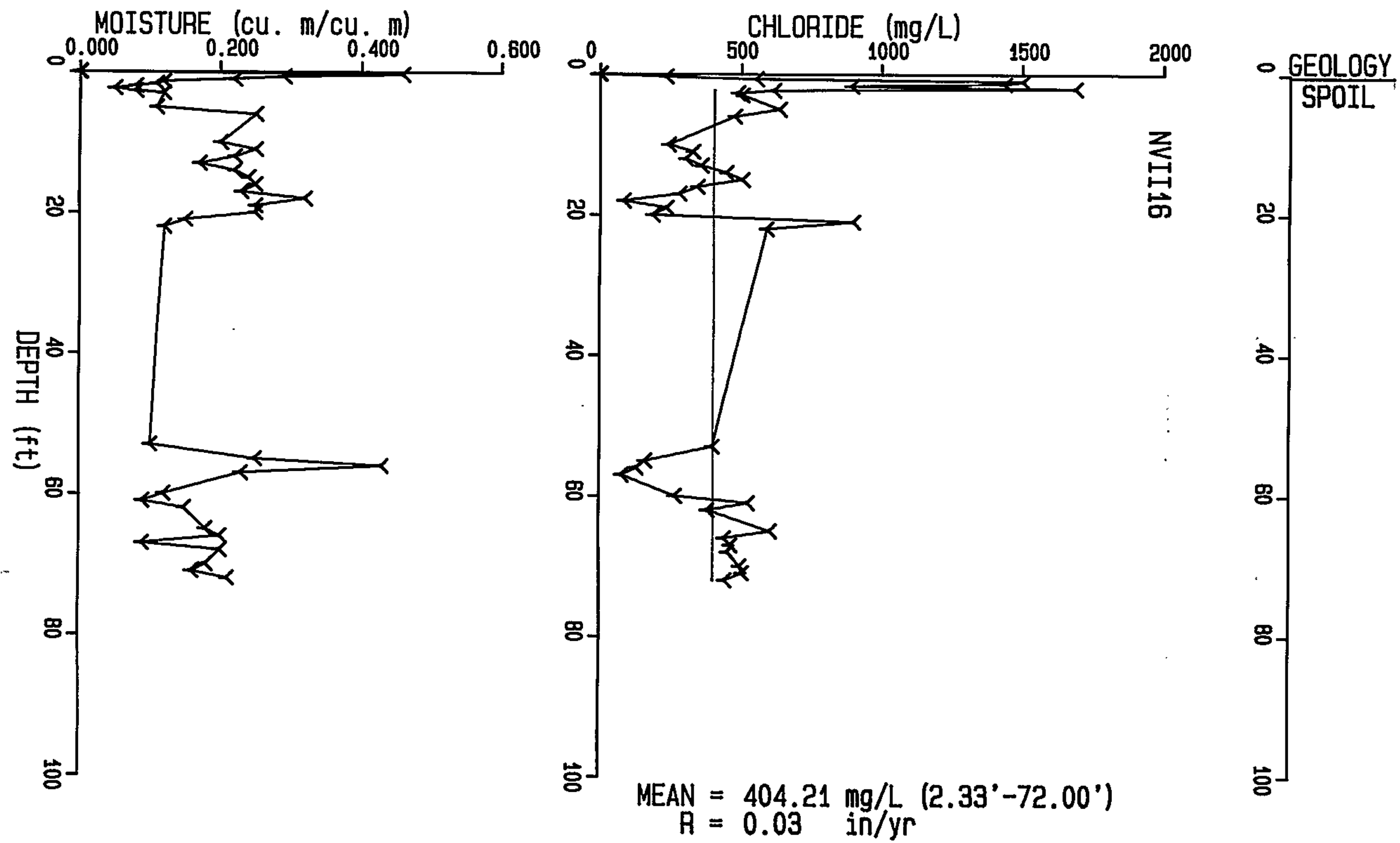
MEAN = 18.52 mg/L (47.00'-58.00')
R = 0.18 in/yr

15-Apr-86 10:46:23
JOB: NVII14 FILE: <BUREAU-RESEARCH>NVII14.PLT.6 USER: BUREAU-RESEARCH

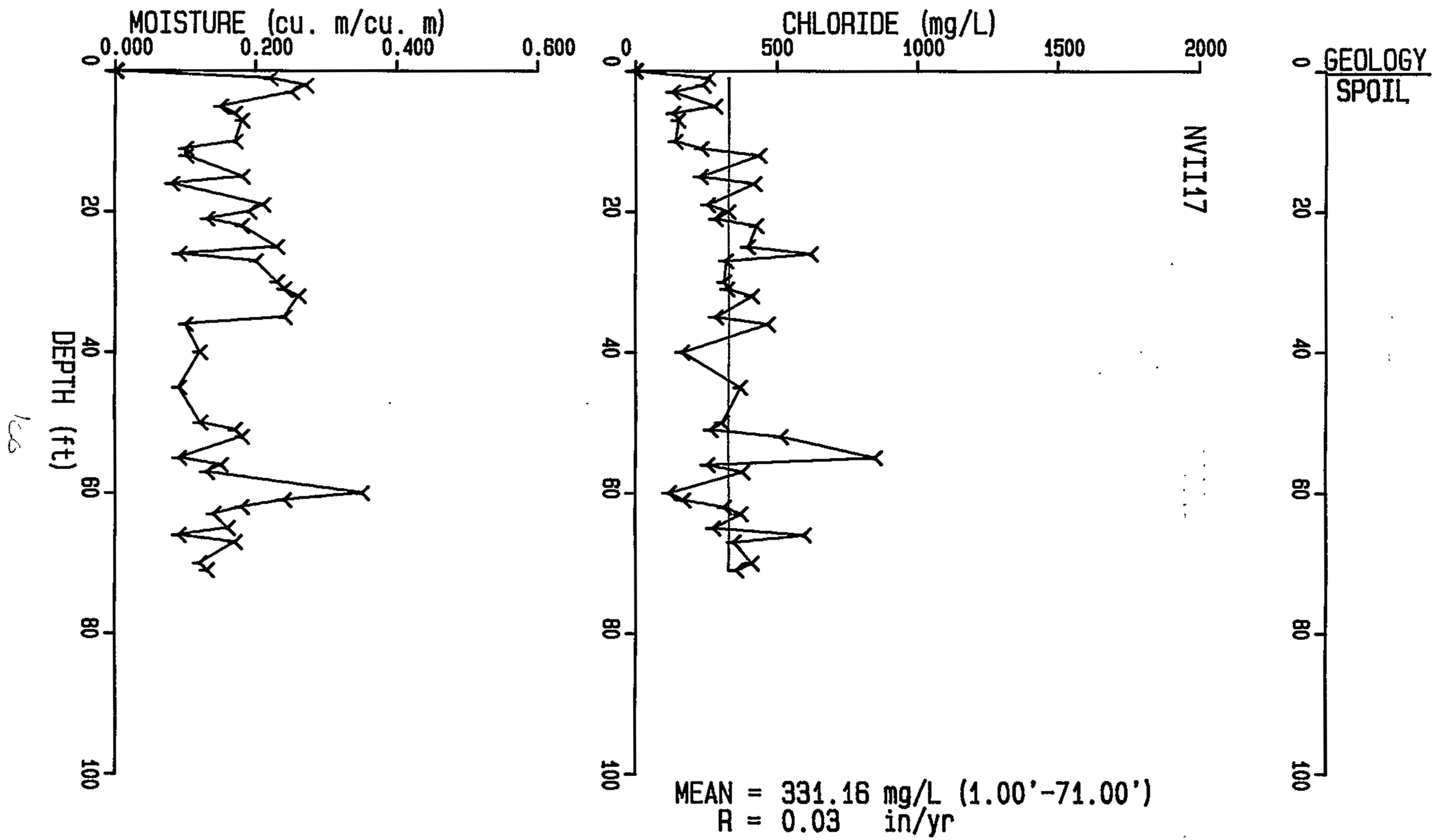


MEAN = 503.73 mg/L (1.67'-73.00')
R = 0.02 in/yr

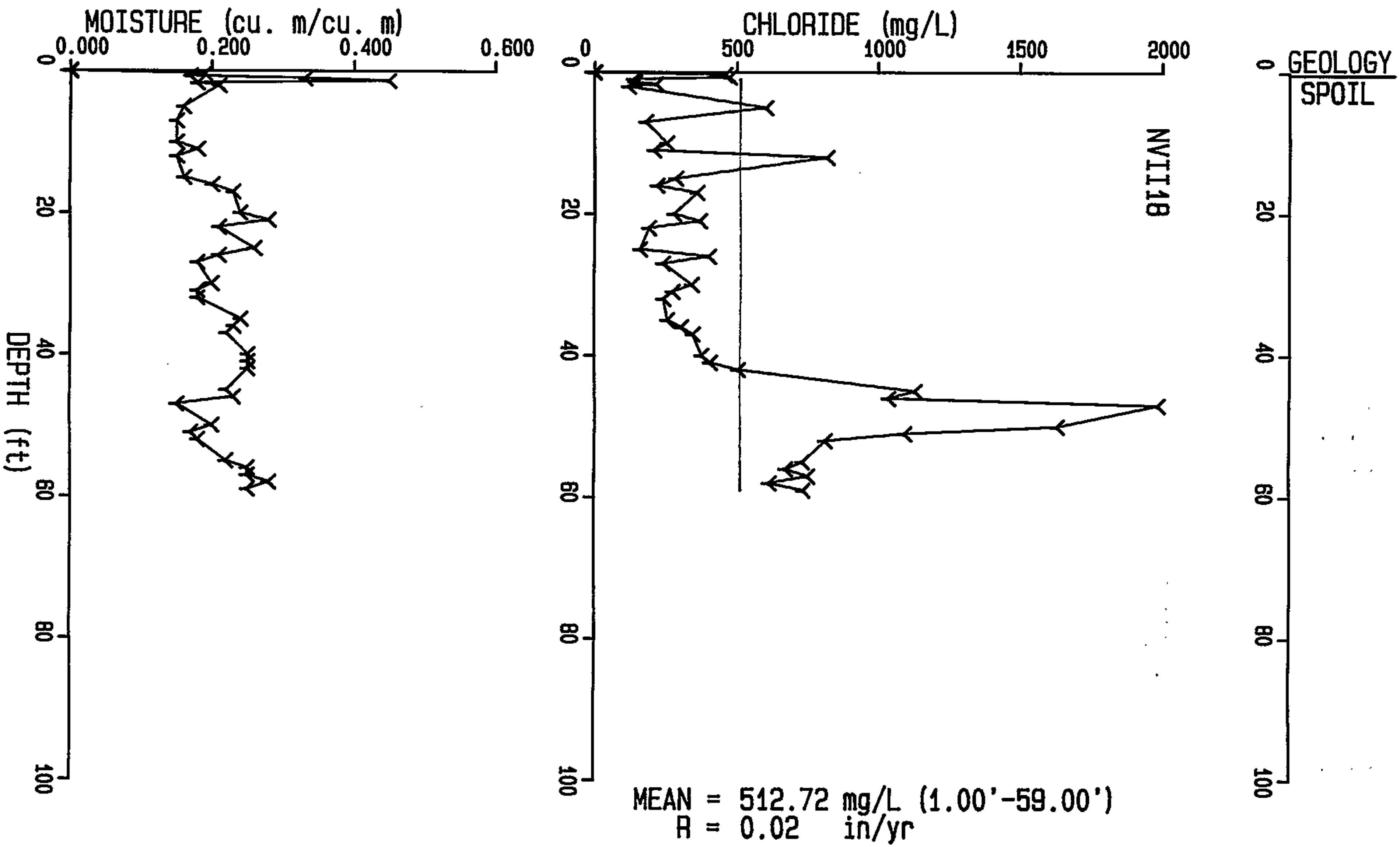
15-Apr-86 10:51:03
JOB: NVII16 FILE: <BUREAU-RESEARCH>NVII16.PLT.10 USER: BUREAU-RESEARCH



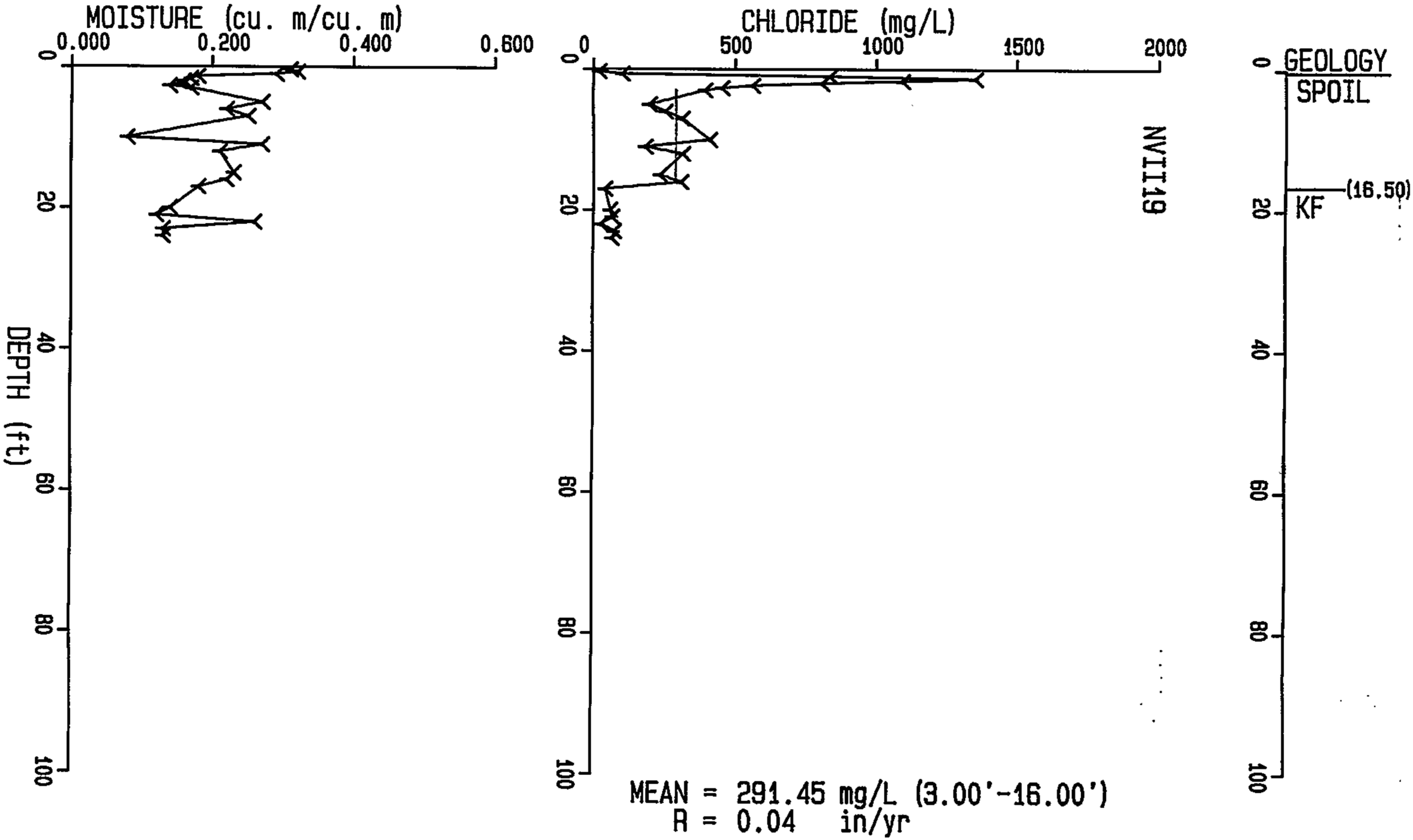
15-Apr-86 10:55:38
JOB: NVII17 FILE: <BUREAU-RESEARCH>NVII17.PLT.7 USER: BUREAU-RESEARCH



15-Apr-86 11: 00: 13
JOB: NVII18 FILE: <BUREAU-RESEARCH>NVII18.PLT.7 USER: BUREAU-RESEARCH



15-Apr-86 11:04:50
JOB: NVII19 FILE: <BUREAU-RESEARCH>NVII19.PLT.2 USER: BUREAU-RESEARCH



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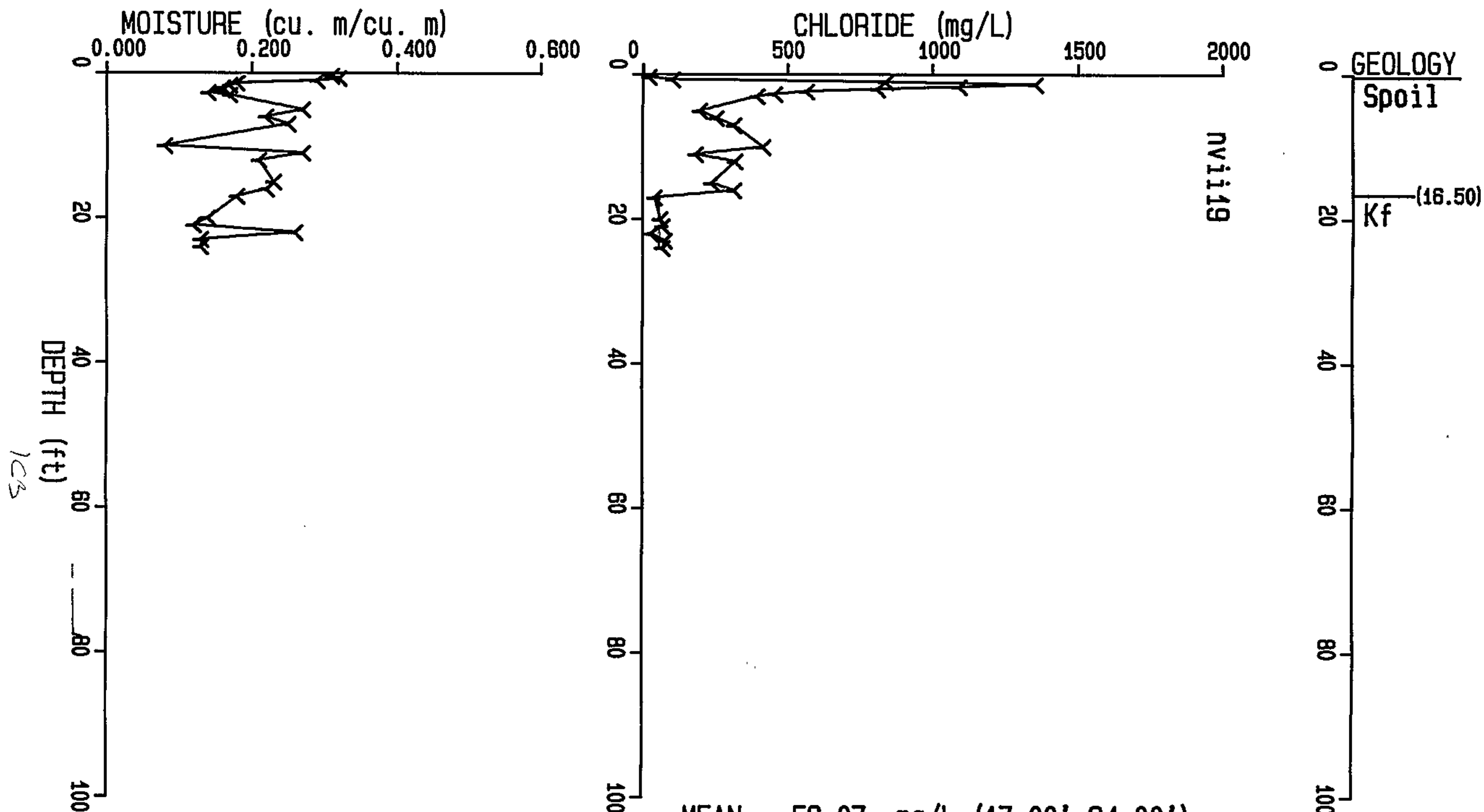
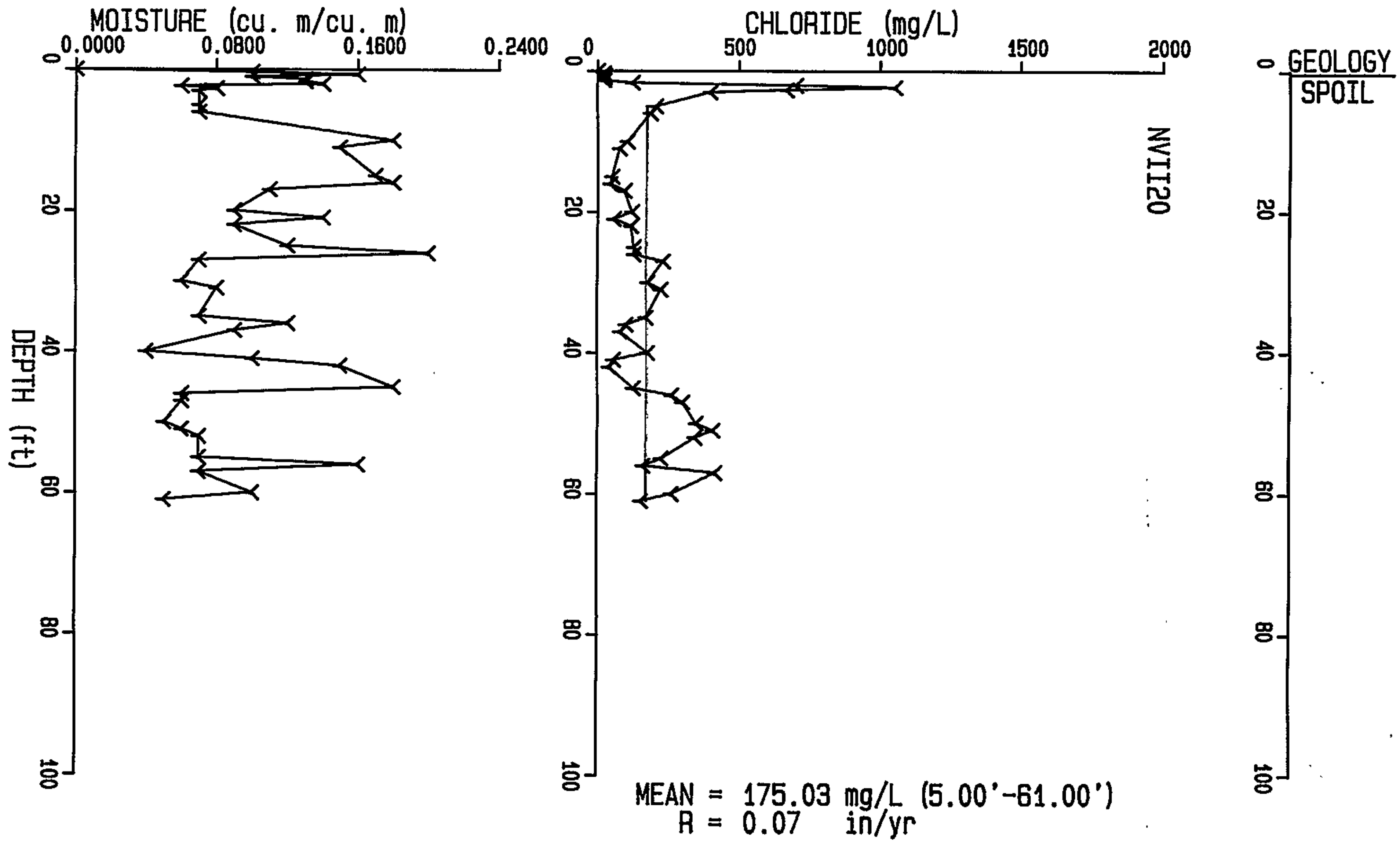
14-Mar-86 11:54:29
JOB: NVII19 FILE: <BUREAU-RESEARCH>NVII19.PLT.1 USER: BUREAU-RESEARCH

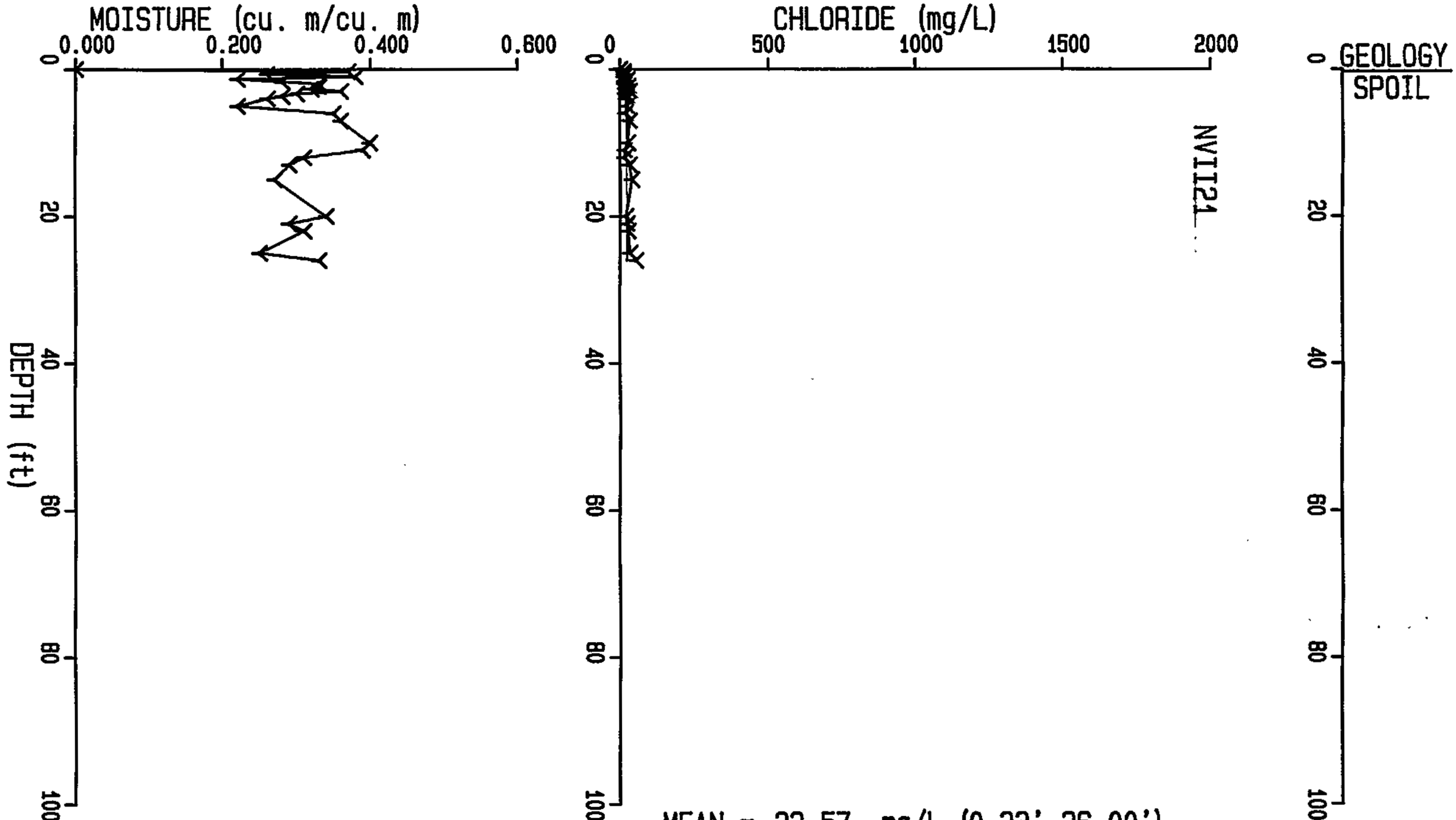


MEAN = 56.07 mg/L (17.00'-24.00')
R = 0.06 in/yr

15-Apr-86 11:09:11
JOB: NVII20 FILE: <BUREAU-RESEARCH>NVII20.PLT.8 USER: BUREAU-RESEARCH

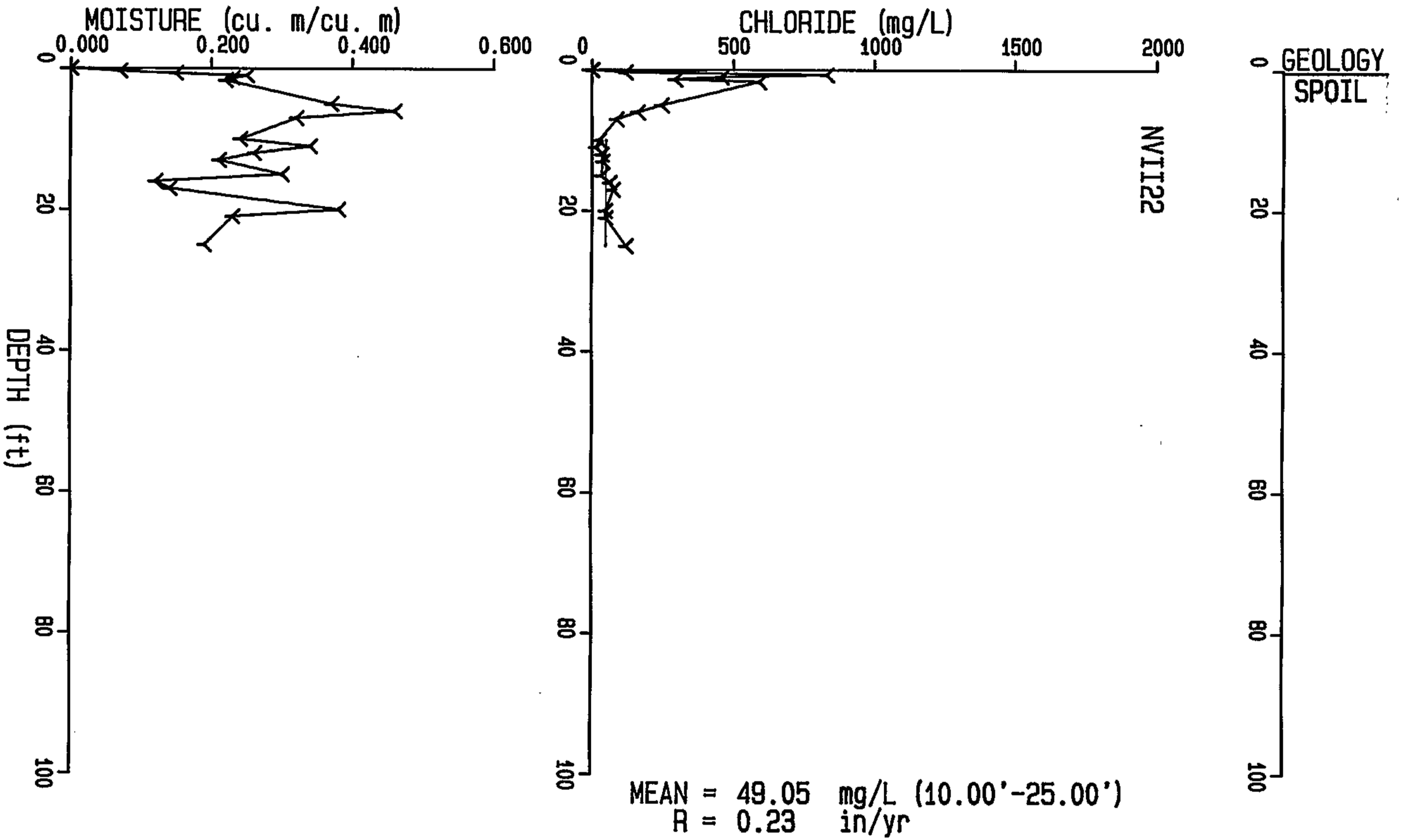


15-Apr-86 11:13:51
JOB: NVII21 FILE: <BUREAU-RESEARCH>NVII21.PLT.7 USER: BUREAU-RESEARCH

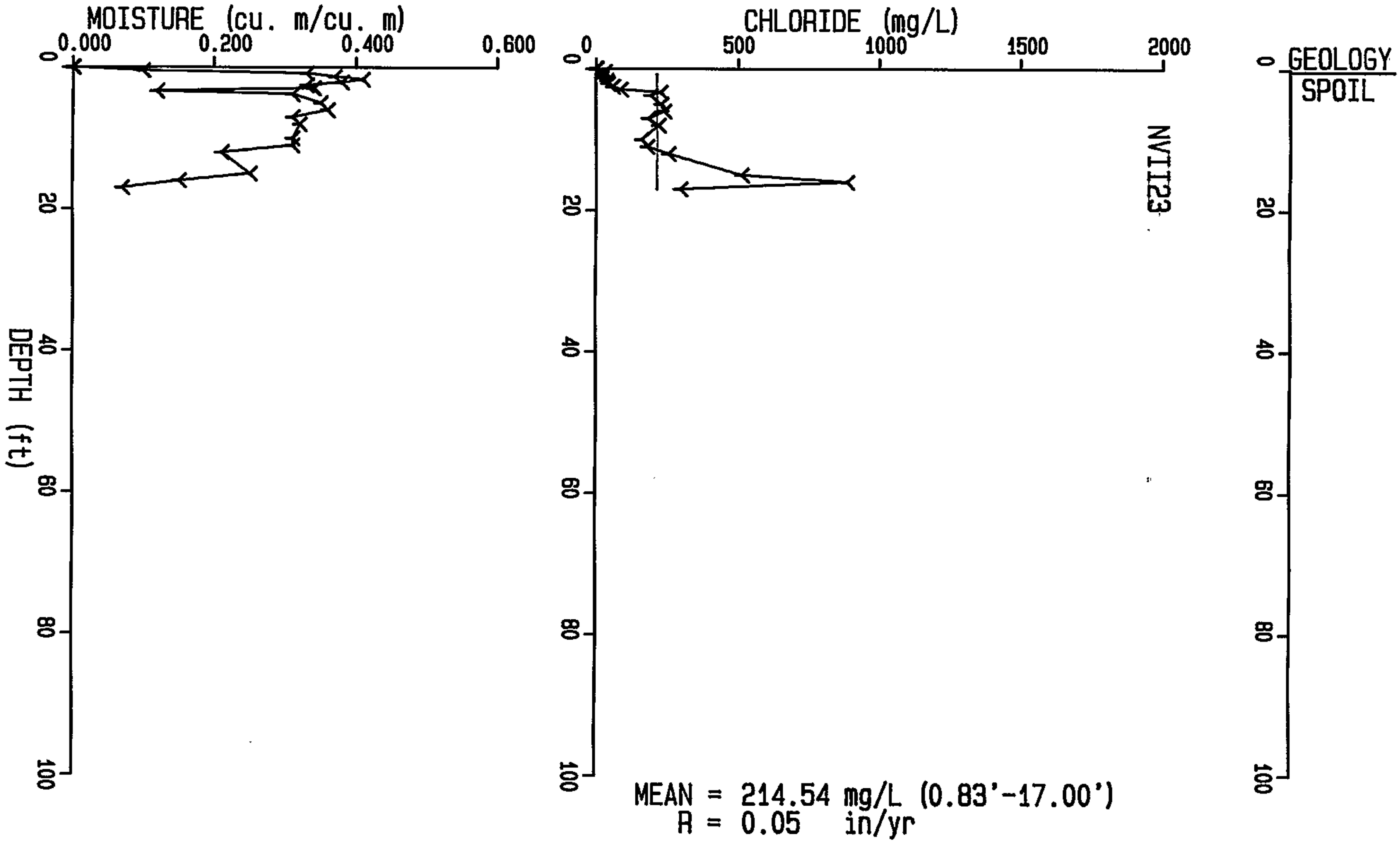


MEAN = 23.57 mg/L (0.33'-26.00')
R = 0.49 in/yr

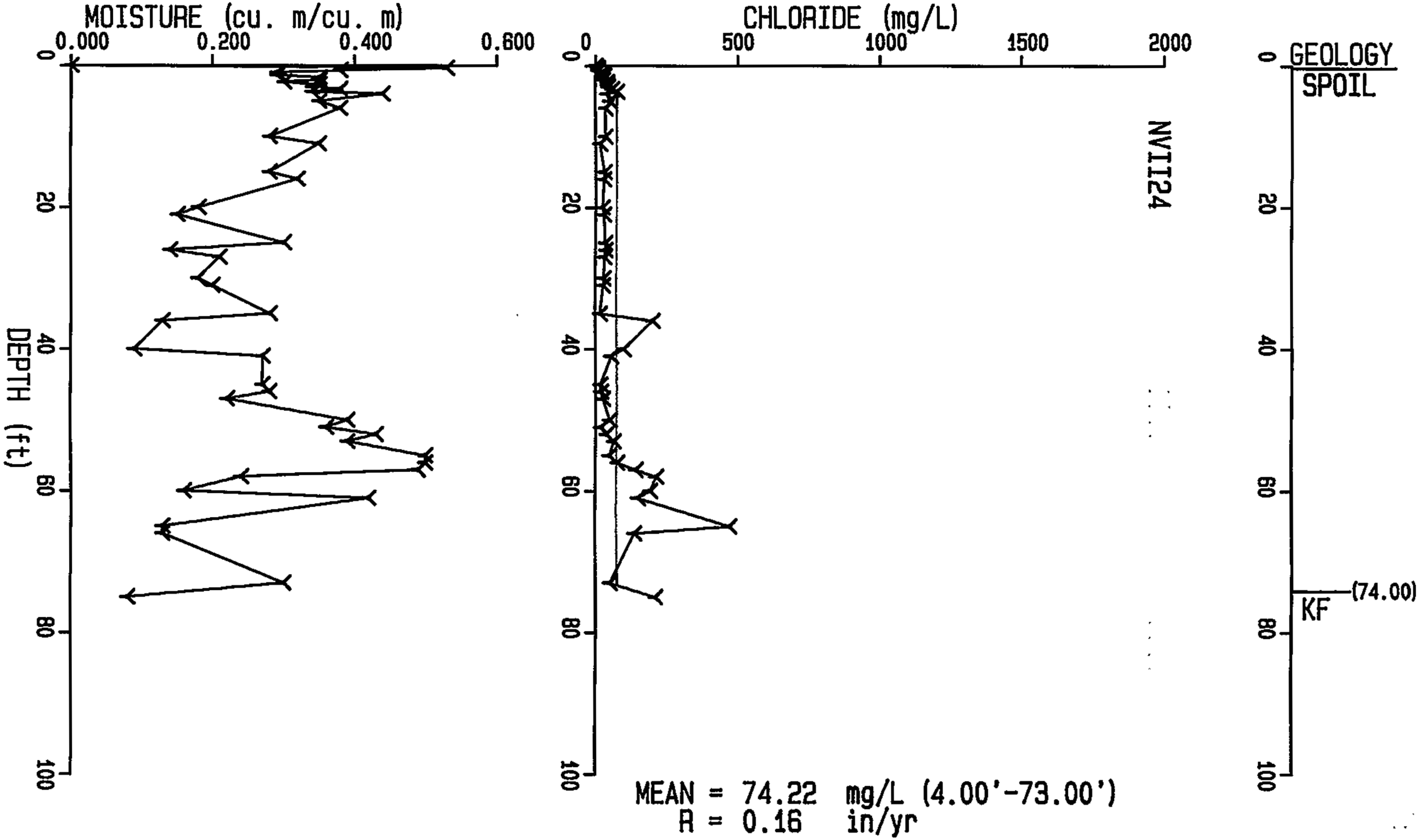
15-Apr-86 11:18:02
JOB: NVII22 FILE: <BUREAU-RESEARCH>NVII22.PLT.7 USER: BUREAU-RESEARCH



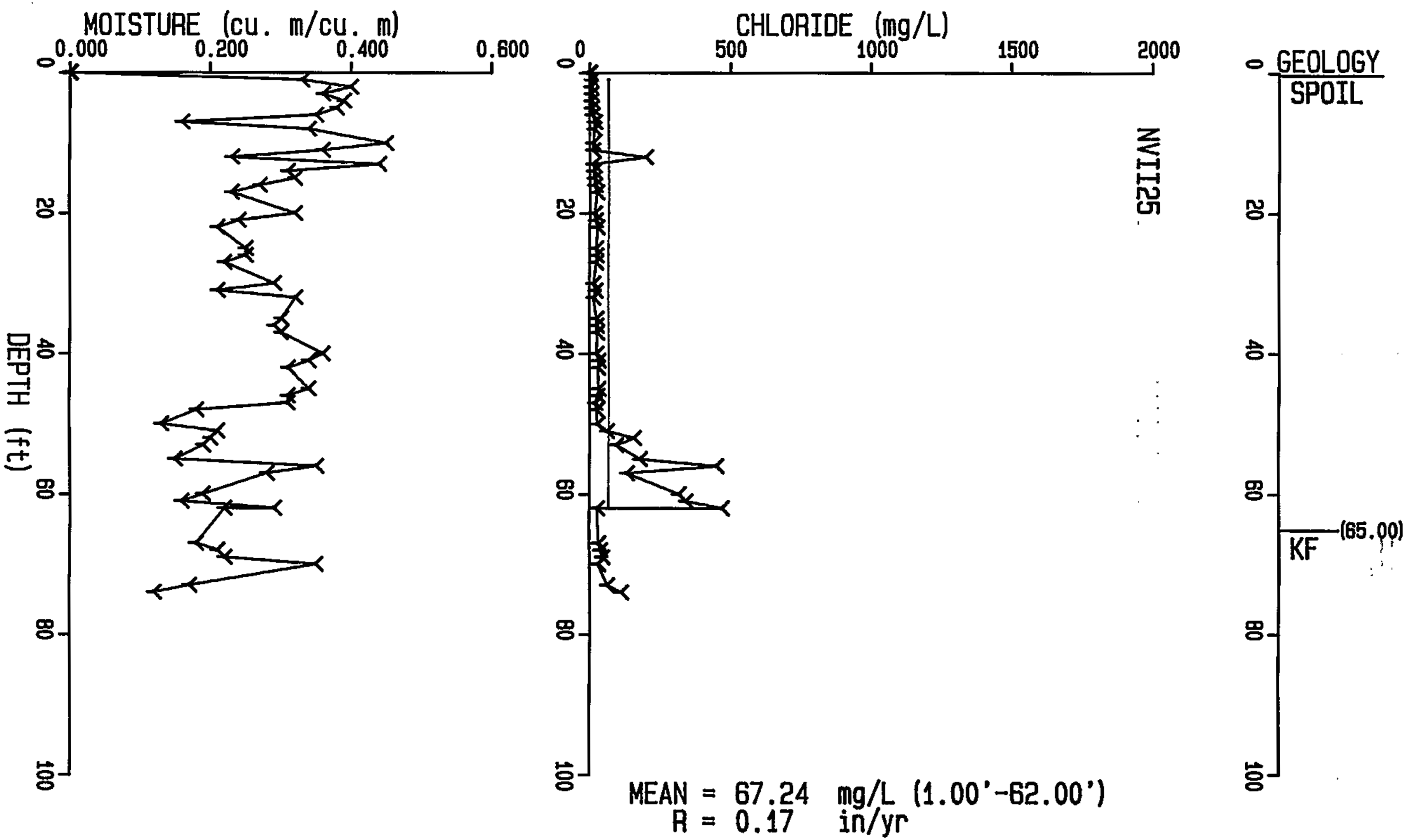
15-Apr-86 11: 22: 08
JOB: NVII23 FILE: <BUREAU-RESEARCH>NVII23.PLT.9 USER: BUREAU-RESEARCH



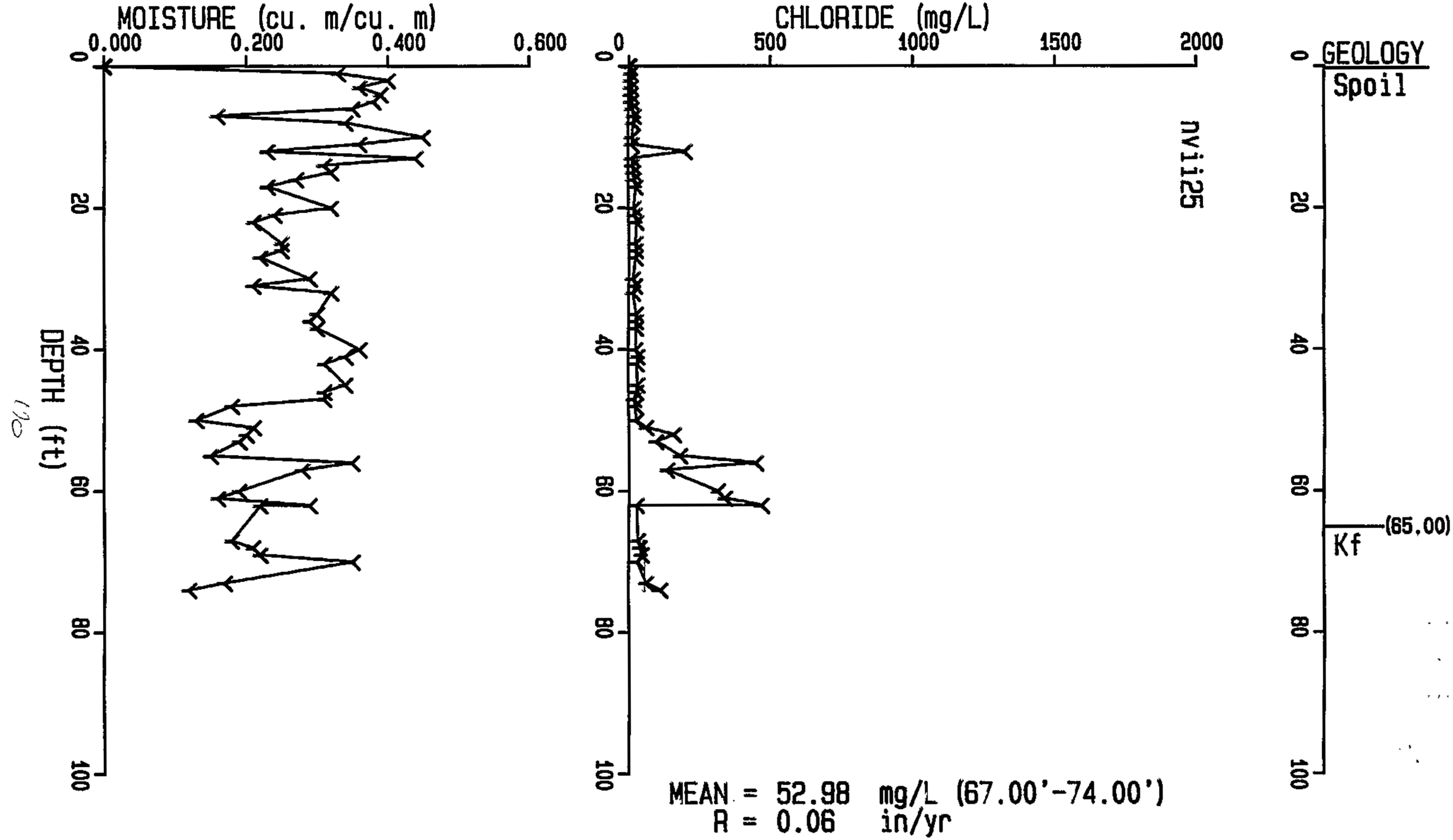
15-Apr-86 11: 58: 38
JOB: NVII24 FILE: <BUREAU-RESEARCH>NVII24.PLT.6 USER: BUREAU-RESEARCH



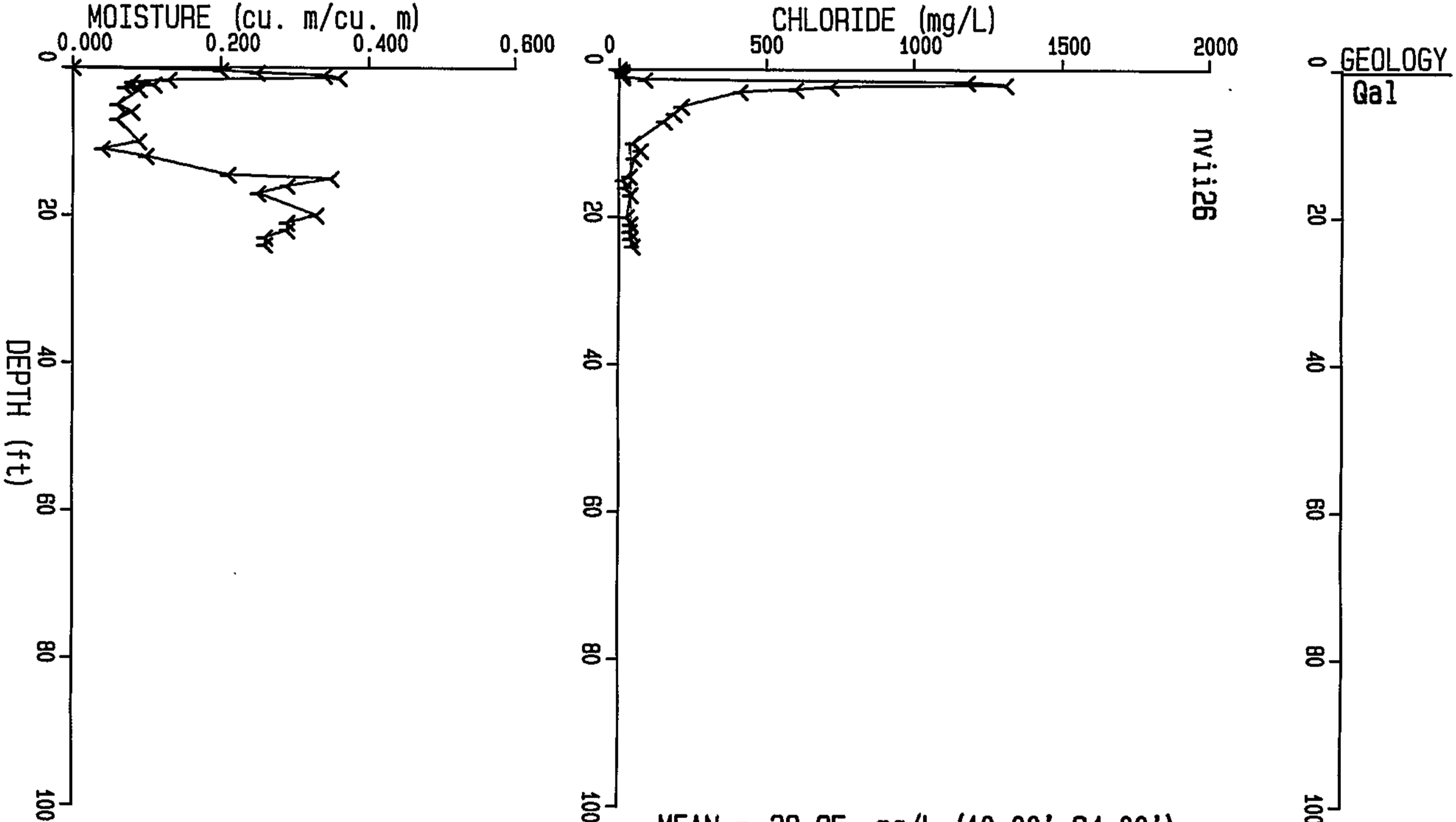
15-Apr-86 12: 03: 24
JOB: NVII25 FILE: <BUREAU-RESEARCH>NVII25.PLT.2 USER: BUREAU-RESEARCH



14-Mar-86 13: 18: 52
JOB: NVII25 FILE: <BUREAU-RESEARCH>NVII25.PLT.1 USER: BUREAU-RESEARCH

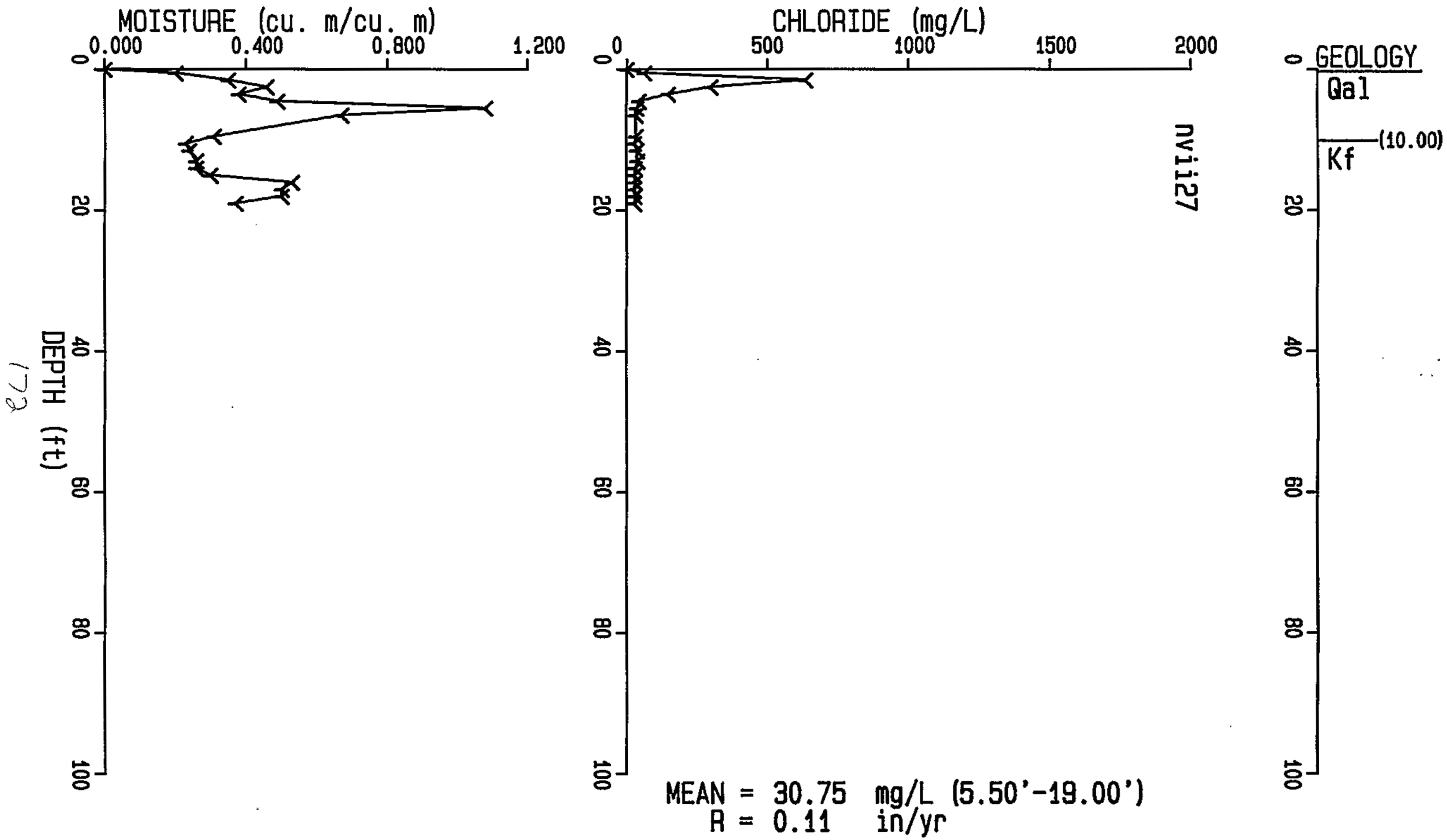


14-Mar-86 11: 23: 44
JOB: NVII26 FILE: <BUREAU-RESEARCH>NVII26.PLT.9 USER: BUREAU-RESEARCH



MEAN = 38.95 mg/L (10.00'-24.00')
R = 0.09 in/yr

14-Mar-86 11:27:51
JOB: NVII27 FILE: <BUREAU-RESEARCH>NVII27.PLT.9 USER: BUREAU-RESEARCH



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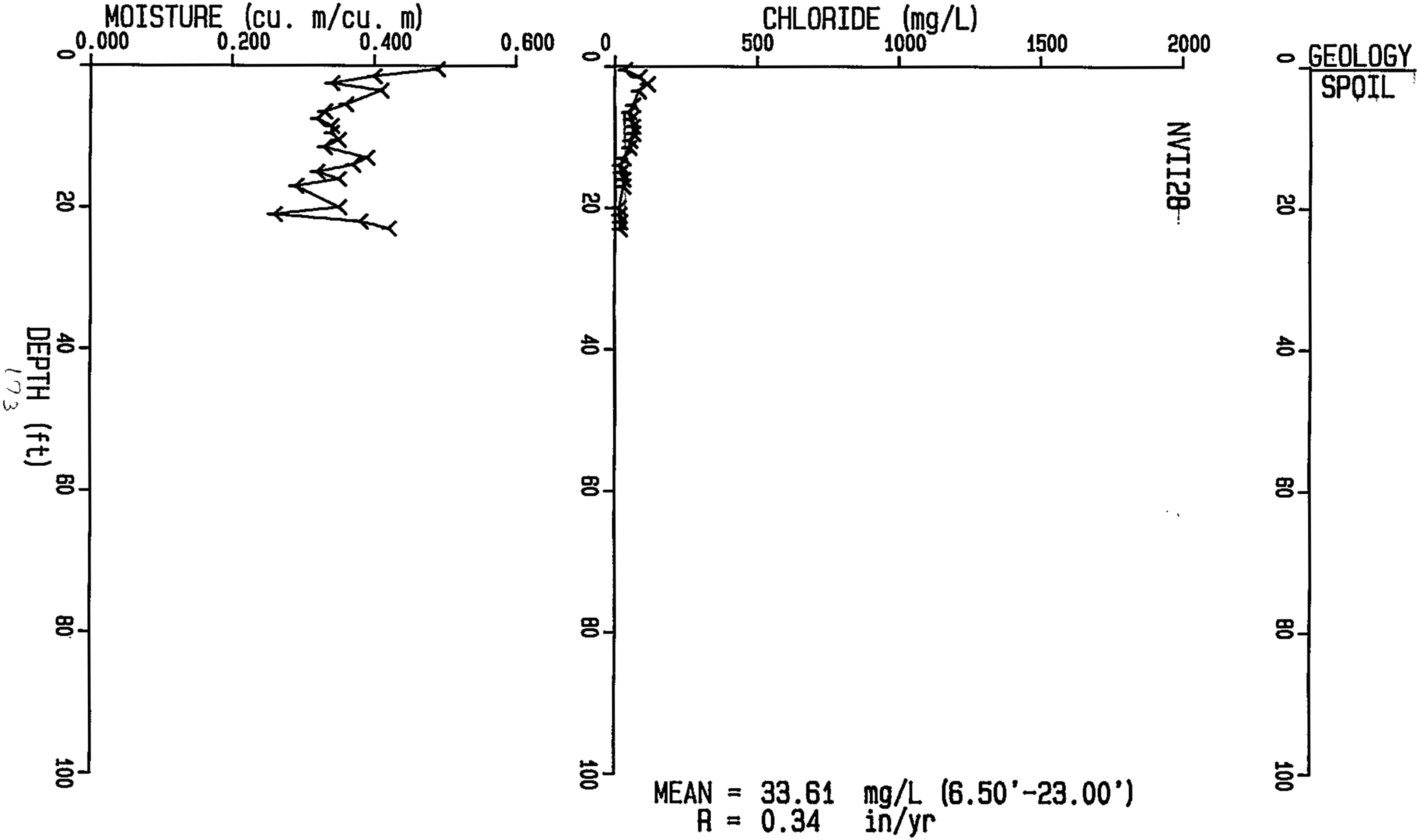
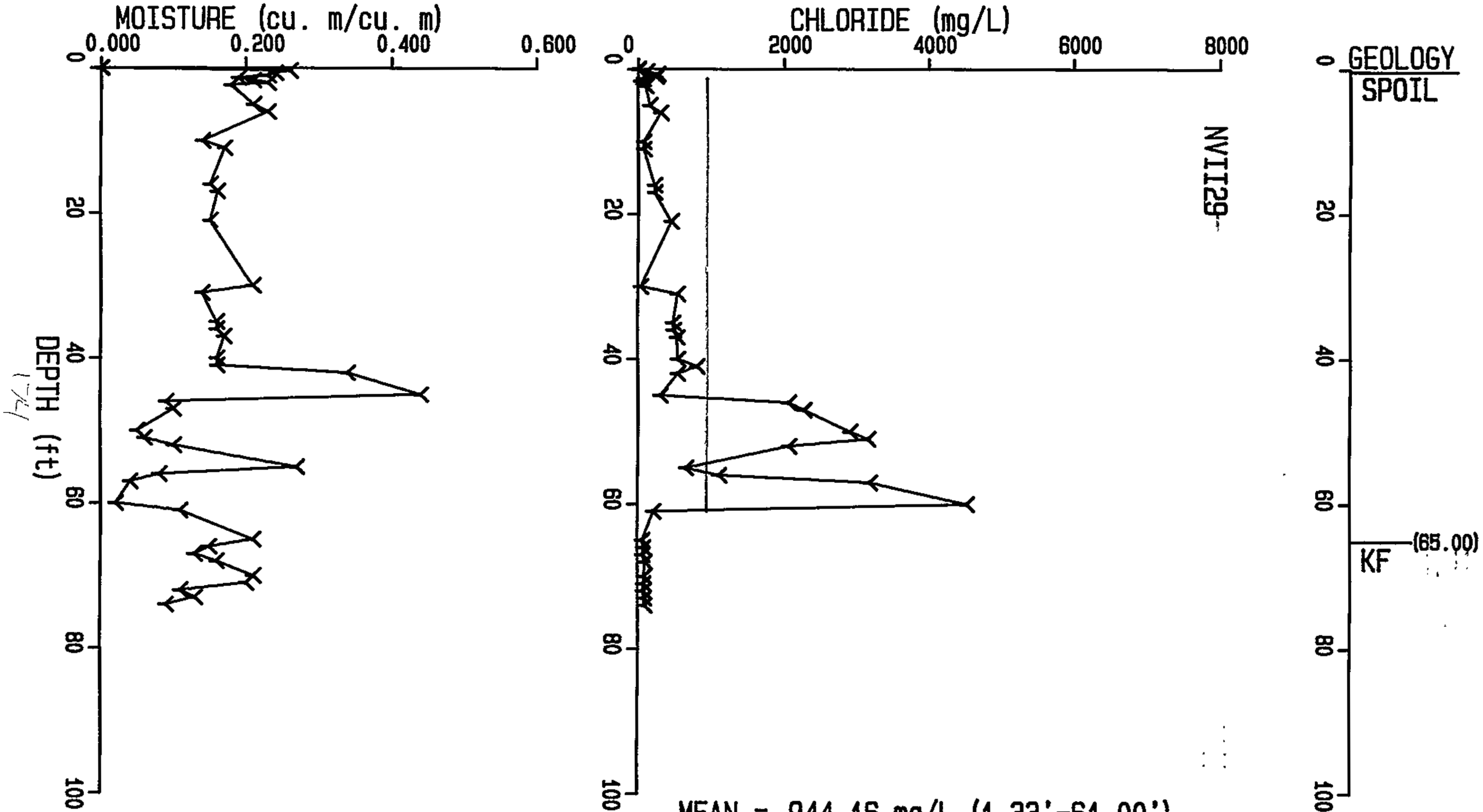
15-Apr-86 11:26:17
JOB: NVII28 FILE: <BUREAU-RESEARCH>NVII28.PLT.7 USER: BUREAU-RESEARCH

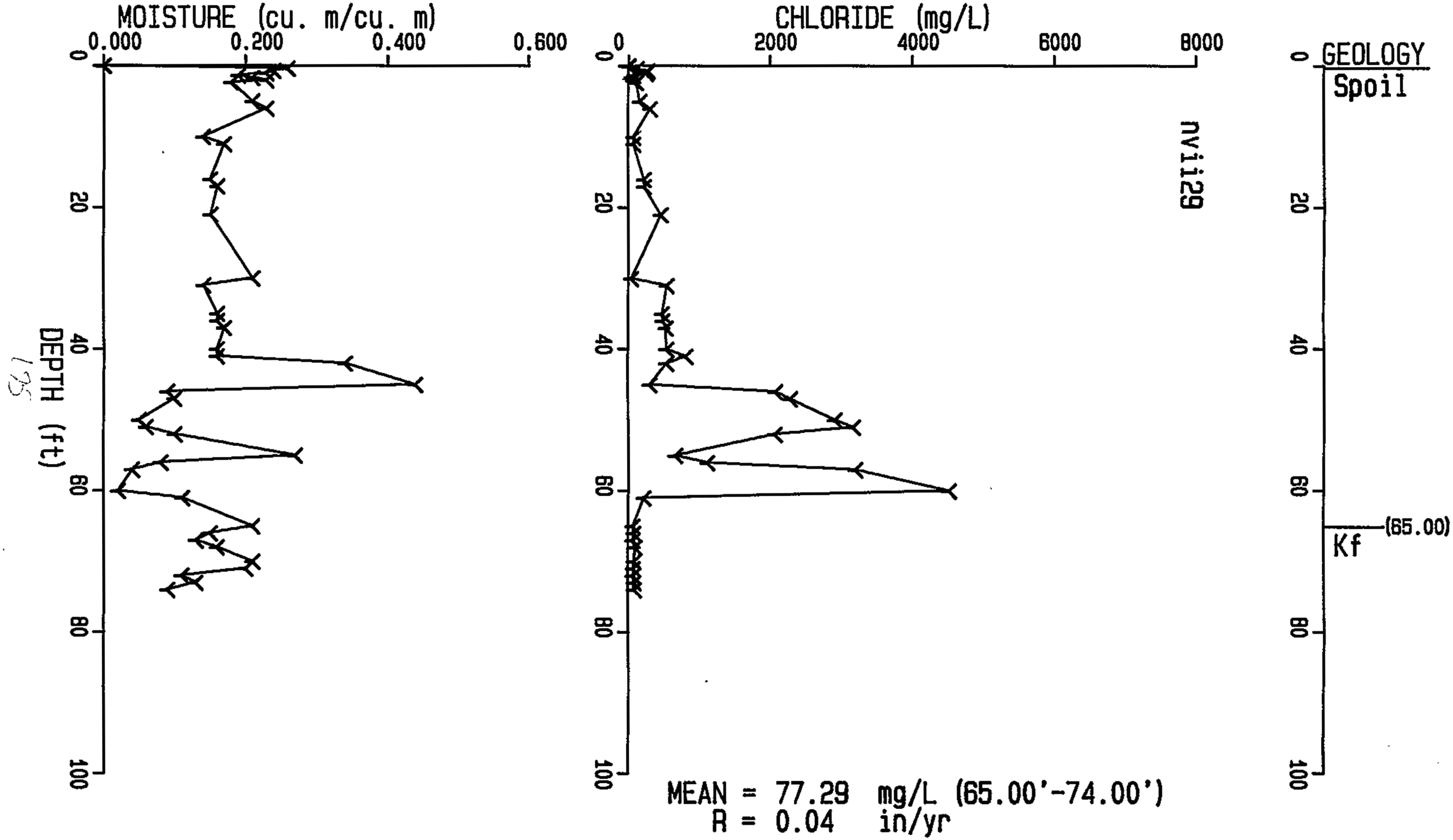


15-Apr-86 11: 30: 21
JOB: NVII29 FILE: <BUREAU-RESEARCH>NVII29.PLT.3 USER: BUREAU-RESEARCH



MEAN = 944.16 mg/L (1.33'-61.00')
R = 0.01 in/yr

14-Mar-86 11:58:44
JOB: NVII29 FILE: <BUREAU-RESEARCH>NVII29.PLT.2 USER: BUREAU-RESEARCH



APPENDIX G

DATA FOR CUMULATIVE CHLORIDE VS CUMULATIVE WATER PLOTS

Explanation

NVII 01 = Navajo Mine, Phase II, Hole 1
Vol. Water Content = volumetric water content (gravimetric water content · bulk density)

NVII01

Sample No.	Sample Interval Length (m)	Vol. Water Content (cu m/cu m)	Cl in Soil (g/cu m)	Cl in Soil (g/sq m)	Cum. Cl in Soil (g/sq m)	Vol. Water Cont. (m)	Cum. Vol. Wtr. Content (m)
1	0.15	0.17	8.23	1.24	1.24	0.03	0.03
2	0.10	0.33	17.23	1.72	2.96	0.03	0.06
3	0.10	0.31	8.18	0.82	3.78	0.03	0.09
4	0.10	0.16	8.50	0.85	4.63	0.02	0.11
5	0.10	0.14	11.35	1.13	5.76	0.01	0.12
6	0.10	0.15	17.58	1.76	7.52	0.01	0.13
7	0.10	0.18	46.05	4.60	12.12	0.02	0.15
8	0.10	0.17	48.53	4.85	16.98	0.02	0.17
9	0.20	0.19	30.68	6.14	23.11	0.04	0.21
10	0.30	0.14	19.43	5.83	28.94	0.04	0.25
11	0.30	0.14	27.97	8.39	37.33	0.04	0.29
12	0.30	0.13	27.75	8.32	45.66	0.04	0.33
13	0.61	0.12	30.92	18.86	64.52	0.07	0.40
14	0.61	0.02	17.66	10.77	75.29	0.01	0.42
15	0.30	0.16	27.72	8.32	83.61	0.05	0.46
16	0.30	0.17	26.07	7.82	91.43	0.05	0.51
17	0.46	0.19	37.31	17.16	108.59	0.09	0.60
18	0.46	0.17	22.61	10.40	118.99	0.08	0.68
19	0.30	0.21	32.14	9.64	128.63	0.06	0.74
20	0.30	0.34	30.35	9.10	137.74	0.10	0.85
21	0.46	0.20	26.10	12.00	149.74	0.09	0.94
22	0.46	0.19	22.32	10.27	160.01	0.09	1.02
23	0.30	0.20	21.80	6.54	166.55	0.06	1.08
24	0.61	0.23	23.01	14.04	180.58	0.14	1.23
25	0.61	0.21	24.63	15.02	195.61	0.13	1.35
26	0.30	0.28	54.50	16.35	211.96	0.08	1.44
27	0.61	0.25	84.72	51.68	263.63	0.15	1.59
28	0.61	0.22	83.78	51.11	314.74	0.13	1.72
29	0.76	0.27	44.44	33.78	348.52	0.21	1.93
30	0.76	0.25	18.77	14.26	362.78	0.19	2.12
31	0.15	0.29	28.88	4.33	367.11	0.04	2.16

NVII02

Sample No.	Sample Interval Length (m)	Vol. Water Content (cu m/cu m)	Cl in Soil (g/cu m)	Cl in Soil (g/sq m)	Cum. Cl in Soil (g/sq m)	Vol. Water Cont. (m)	Cum. Vol. Wtr. Content (m)
39	0.46	0.15	76.15	35.03	35.03	0.07	0.07
40	0.30	0.18	86.88	26.06	61.10	0.05	0.12
41	1.22	0.18	88.29	107.71	168.81	0.22	0.34
44	1.22	0.08	46.51	56.74	225.55	0.10	0.44
45	0.30	0.14	60.33	18.10	243.65	0.04	0.48
46	0.61	0.13	59.70	36.42	280.07	0.08	0.56
47	1.22	0.18	67.26	82.06	362.13	0.22	0.78
50	0.91	0.16	73.47	66.86	428.98	0.15	0.93
51	0.30	0.19	50.79	15.24	444.22	0.06	0.98
52	0.61	0.25	40.77	24.87	469.09	0.15	1.14
53	0.61	0.48	71.17	43.41	512.51	0.29	1.43
54	0.30	0.31	17.43	5.23	517.74	0.09	1.52
55	0.30	0.29	20.31	6.09	523.83	0.09	1.61
56	0.46	0.22	17.46	8.03	531.86	0.10	1.71
57	0.46	0.20	19.32	8.89	540.74	0.09	1.80
58	0.30	0.19	21.26	6.38	547.12	0.06	1.86
59	0.30	0.21	15.41	4.62	551.74	0.06	1.92
60	0.46	0.23	15.17	6.98	558.72	0.11	2.03
61	0.46	0.31	17.96	8.26	566.98	0.14	2.17
62	0.30	0.29	21.84	6.55	573.53	0.09	2.26
63	0.30	0.28	25.36	7.61	581.14	0.08	2.34
64	0.30	0.31	28.38	8.51	589.66	0.09	2.43
65	0.30	0.29	25.80	7.74	597.40	0.09	2.52
66	0.30	0.30	27.12	8.14	605.53	0.09	2.61
67	0.30	0.28	25.58	7.67	613.20	0.08	2.70
68	0.61	0.26	28.63	17.47	630.67	0.16	2.85
70	0.61	0.35	43.45	26.51	657.17	0.21	3.07
71	0.30	0.35	39.18	11.75	668.93	0.11	3.17
72	0.30	0.42	126.47	37.94	706.87	0.13	3.30
73	0.46	0.39	107.89	49.63	756.49	0.18	3.48
74	0.46	0.20	78.36	36.05	792.54	0.09	3.57
75	0.30	0.24	101.95	30.59	823.13	0.07	3.64
76	0.30	0.23	101.16	30.35	853.47	0.07	3.71
77	0.30	0.25	135.53	40.66	894.13	0.07	3.79
78	0.30	0.18	105.32	31.60	925.73	0.05	3.84
79	0.15	0.25	131.07	19.66	945.39	0.04	3.88

NVII03

Sample No.	Sample Interval Length (m)	Vol. Water Content (cu m/cu m)	Cl in Soil (g/cu m)	Cl in Soil (g/sq m)	Cum. Cl in Soil (g/sq m)	Vol. Water Cont. (m)	Cum. Vol. Wtr. Content (m)
86	0.53	0.18	166.19	88.08	88.08	0.10	0.10
87	0.15	0.17	111.48	16.72	104.81	0.03	0.12
88	0.15	0.16	97.84	14.68	119.48	0.02	0.14
89	0.15	0.13	96.24	14.44	133.92	0.02	0.16
90	0.30	0.13	89.32	26.79	160.71	0.04	0.20
91	0.38	0.15	65.98	25.07	185.79	0.06	0.26
92	0.30	0.16	74.70	22.41	208.20	0.05	0.31
93	0.30	0.18	86.23	25.87	234.07	0.05	0.36
94	0.30	0.10	36.60	10.98	245.05	0.03	0.39
95	0.30	0.11	55.71	16.71	261.76	0.03	0.43
96	0.30	0.13	66.33	19.90	281.66	0.04	0.46
97	0.30	0.11	47.20	14.16	295.82	0.03	0.50
98	0.30	0.11	58.23	17.47	313.29	0.03	0.53
99	0.30	0.08	33.34	10.00	323.29	0.02	0.55
100	0.30	0.13	31.88	9.57	332.85	0.04	0.59
101	0.30	0.06	8.73	2.62	335.47	0.02	0.61
102	0.30	0.08	24.71	7.41	342.88	0.02	0.64
103	0.30	0.06	75.59	22.68	365.56	0.02	0.65
104	0.30	0.10	61.05	18.32	383.88	0.03	0.68
105	1.07	0.06	47.67	51.00	434.88	0.06	0.75
106	1.07	0.17	62.70	67.09	501.97	0.18	0.93
107	0.30	0.17	60.55	18.17	520.14	0.05	0.98
108	0.30	0.17	63.87	19.16	539.30	0.05	1.03
109	0.30	0.26	108.89	32.67	571.97	0.08	1.11
110	0.30	0.16	63.75	19.13	591.09	0.05	1.16
111	0.30	0.14	63.54	19.06	610.15	0.04	1.20
112	0.30	0.14	64.64	19.39	629.55	0.04	1.24
113	0.30	0.14	74.89	22.47	652.01	0.04	1.28
114	0.30	0.14	67.70	20.31	672.32	0.04	1.33
115	0.30	0.17	89.86	26.96	699.28	0.05	1.38
116	0.30	0.21	99.52	29.86	729.13	0.06	1.44
117	0.30	0.20	83.89	25.17	754.30	0.06	1.50
118	0.30	0.22	87.11	26.13	780.43	0.07	1.57
119	0.30	0.21	209.51	62.85	843.29	0.06	1.63
120	0.30	0.27	238.83	71.65	914.93	0.08	1.71
121	0.30	0.16	97.86	29.36	944.29	0.05	1.76
122	0.30	0.22	82.70	24.81	969.10	0.07	1.82
123	0.30	0.23	132.39	39.72	1008.82	0.07	1.89
124	0.30	0.17	86.93	26.08	1034.90	0.05	1.94
125	0.30	0.21	125.40	37.62	1072.52	0.06	2.01
126	0.30	0.25	119.98	35.99	1108.51	0.07	2.08
127	0.30	0.23	126.51	37.95	1146.46	0.07	2.15
128	0.30	0.19	72.51	21.75	1168.22	0.06	2.21
129	0.46	0.21	7.29	3.35	1171.57	0.10	2.30
130	0.46	0.27	141.90	65.27	1236.84	0.12	2.43
131	0.30	0.27	108.30	32.49	1269.33	0.08	2.51
132	0.30	0.22	244.83	73.45	1342.78	0.07	2.58

133	0.46	0.22	98.49	45.30	1388.09	0.10	2.68
134	0.46	0.22	103.25	47.49	1435.58	0.10	2.78
135	0.30	0.25	124.25	37.28	1472.86	0.07	2.85
136	0.30	0.22	128.37	38.51	1511.37	0.07	2.92
137	0.30	0.19	82.80	24.84	1536.21	0.06	2.98
138	0.30	0.23	108.40	32.52	1568.73	0.07	3.04
139	0.30	0.25	240.29	72.09	1640.82	0.07	3.12
140	0.30	0.20	93.58	28.07	1668.89	0.06	3.18
141	0.30	0.18	108.61	32.58	1701.47	0.05	3.23
142	0.46	0.17	99.12	45.60	1747.07	0.08	3.31
143	0.46	0.13	91.66	42.16	1789.23	0.06	3.37
144	0.30	0.13	103.30	30.99	1820.22	0.04	3.41
145	0.30	0.18	139.47	41.84	1862.06	0.05	3.46
146	0.30	0.12	72.73	21.82	1883.88	0.04	3.50
147	0.30	0.11	80.82	24.25	1908.13	0.03	3.53
148	0.30	0.11	88.01	26.40	1934.53	0.03	3.57
149	0.30	0.12	85.46	25.64	1960.17	0.04	3.60
150	0.30	0.12	82.93	24.88	1985.05	0.04	3.64
151	0.30	0.12	84.57	25.37	2010.42	0.04	3.67
152	0.30	0.10	84.71	25.41	2035.83	0.03	3.70
153	0.30	0.13	99.10	29.73	2065.56	0.04	3.74
154	0.30	0.13	106.65	31.99	2097.56	0.04	3.78
155	0.46	0.11	111.90	51.47	2149.03	0.05	3.83
157	0.30	0.13	138.96	41.69	2190.72	0.04	3.87

NVII04

Sample No.	Sample Interval Length (m)	Vol. Water Content (cu m/cu m)	Cl in Soil (g/cu m)	Cl in Soil (g/sq m)	Cum. Cl in Soil (g/sq m)	Vol. Water Cont. (m)	Cum. Vol. Wtr. Content (m)
160	0.15	0.24	13.43	2.01	2.01	0.04	0.04
161	0.10	0.19	12.45	1.24	3.26	0.02	0.05
162	0.10	0.27	20.87	2.09	5.35	0.03	0.08
163	0.10	0.27	141.77	14.18	19.52	0.03	0.11
164	0.10	0.21	153.27	15.33	34.85	0.02	0.13
165	0.10	0.21	83.57	8.36	43.21	0.02	0.15
166	0.10	0.22	41.86	4.19	47.39	0.02	0.17
167	0.10	0.23	39.09	3.91	51.30	0.02	0.20
168	0.10	0.23	41.95	4.20	55.50	0.02	0.22
169	0.10	0.24	31.60	3.16	58.66	0.02	0.24
170	0.10	0.22	44.72	4.47	63.13	0.02	0.27
171	0.20	0.11	58.22	11.64	74.77	0.02	0.29
172	0.30	0.01	37.93	11.38	86.15	0.00	0.29
173	0.30	0.15	47.23	14.17	100.32	0.04	0.33
174	0.61	0.03	19.83	12.10	112.42	0.02	0.35
175	0.61	0.13	17.39	10.61	123.03	0.08	0.43
176	0.30	0.19	25.56	7.67	130.69	0.06	0.49
177	0.30	0.19	22.89	6.87	137.56	0.06	0.55
178	0.30	0.16	14.31	4.29	141.85	0.05	0.59
179	0.30	0.17	20.36	6.11	147.96	0.05	0.65
180	0.30	0.18	28.90	8.67	156.63	0.05	0.70
181	0.30	0.15	80.38	24.11	180.74	0.04	0.74
182	4.57	0.20	60.47	276.36	457.10	0.91	1.66
184	4.57	0.14	69.42	317.26	774.36	0.64	2.30
185	0.30	0.09	49.07	14.72	789.08	0.03	2.33
186	0.30	0.09	54.36	16.31	805.39	0.03	2.35
187	0.30	0.09	38.45	11.53	816.92	0.03	2.38
188	0.30	0.11	35.87	10.76	827.68	0.03	2.41
189	0.30	0.11	47.26	14.18	841.86	0.03	2.45
190	0.30	0.11	48.28	14.48	856.34	0.03	2.48
191	0.30	0.12	50.28	15.08	871.43	0.04	2.51
192	0.30	0.10	55.61	16.68	888.11	0.03	2.54
193	0.30	0.10	41.19	12.36	900.47	0.03	2.57
194	0.30	0.09	42.32	12.70	913.16	0.03	2.60
195	0.15	0.03	15.79	2.37	915.53	0.00	2.61

NVII05

Sample No.	Sample Interval Length (m)	Vol. Water Content (cu m/cu m)	Cl in Soil (g/cu m)	Cl in Soil (g/sq m)	Cum. Cl in Soil (g/sq m)	Vol. Water Cont. (m)	Cum. Vol. Wtr. Content (m)
196	0.15	0.19	5.35	0.80	0.80	0.03	0.03
197	0.10	0.34	5.65	0.56	1.37	0.03	0.06
198	0.10	0.34	12.90	1.29	2.66	0.03	0.10
199	0.10	0.23	68.17	6.82	9.48	0.02	0.12
200	0.10	0.14	42.73	4.27	13.75	0.01	0.13
201	0.10	0.15	28.02	2.80	16.55	0.01	0.15
202	0.10	0.14	20.27	2.03	18.58	0.01	0.16
203	0.10	0.14	23.73	2.37	20.95	0.01	0.18
204	0.10	0.13	24.23	2.42	23.37	0.01	0.19
205	0.10	0.10	17.50	1.75	25.12	0.01	0.20
206	0.10	0.06	12.13	1.21	26.34	0.01	0.21
207	0.20	0.09	9.59	1.92	28.25	0.02	0.22
208	0.30	0.09	6.68	2.00	30.26	0.03	0.25
209	0.30	0.08	6.87	2.06	32.32	0.02	0.27
210	0.30	0.24	7.10	2.13	34.45	0.07	0.35
211	0.30	0.25	4.57	1.37	35.82	0.07	0.42
212	0.30	0.26	4.38	1.32	37.14	0.08	0.50
213	0.30	0.26	5.28	1.58	38.72	0.08	0.58
214	0.30	0.28	3.89	1.17	39.89	0.08	0.66
215	0.30	0.23	4.38	1.31	41.20	0.07	0.73
216	0.30	0.20	4.22	1.26	42.47	0.06	0.79
217	0.30	0.23	4.31	1.29	43.76	0.07	0.86
218	0.30	0.25	5.58	1.67	45.43	0.07	0.93
219	0.30	0.22	5.02	1.50	46.94	0.07	1.00
220	0.30	0.25	6.58	1.97	48.91	0.07	1.08
221	0.30	0.25	8.35	2.51	51.42	0.07	1.15
222	0.30	0.25	6.81	2.04	53.46	0.07	1.23
223	0.30	0.30	7.58	2.27	55.74	0.09	1.32
224	0.30	0.24	6.25	1.87	57.61	0.07	1.39
225	0.30	0.20	5.37	1.61	59.22	0.06	1.45
226	0.30	0.13	6.97	2.09	61.31	0.04	1.49
227	0.30	0.25	7.81	2.34	63.66	0.07	1.56
228	0.46	0.32	12.03	5.53	69.19	0.15	1.71
230	0.46	0.20	10.22	4.70	73.89	0.09	1.80
231	0.30	0.18	10.10	3.03	76.92	0.05	1.85
232	0.30	0.17	12.80	3.84	80.76	0.05	1.91
233	0.30	0.21	21.63	6.49	87.25	0.06	1.97
234	0.30	0.14	12.64	3.79	91.04	0.04	2.01
235	0.30	0.14	14.55	4.37	95.41	0.04	2.05
236	0.30	0.24	11.78	3.54	98.94	0.07	2.12
237	0.30	0.17	75.64	22.69	121.64	0.05	2.18
238	0.61	0.18	14.20	8.66	130.30	0.11	2.29
241	0.76	0.16	18.25	13.87	144.17	0.12	2.41
243	0.30	0.14	34.31	10.29	154.46	0.04	2.45

NVII06

Sample No.	Sample Interval Length (m)	Vol. Water Content (cu m/cu m)	Cl in Soil (g/cu m)	Cl in Soil (g/sq m)	Cum. Cl in Soil (g/sq m)	Vol. Water Cont. (m)	Cum. Vol. Wtr. Content (m)
245	0.15	0.10	3.42	0.51	0.51	0.02	0.02
246	0.15	0.08	4.66	0.70	1.21	0.01	0.03
248	0.15	0.10	3.08	0.46	1.67	0.02	0.04
249	0.10	0.11	3.61	0.36	2.04	0.01	0.05
250	0.10	0.16	5.22	0.52	2.56	0.02	0.07
251	0.10	0.16	4.27	0.43	2.98	0.02	0.08
252	0.10	0.17	5.49	0.55	3.53	0.02	0.10
253	0.36	0.23	8.47	3.05	6.58	0.08	0.18
254	0.61	0.07	104.32	63.64	70.22	0.04	0.23
256	0.46	0.08	124.89	57.45	127.67	0.04	0.26
257	0.30	0.04	71.62	21.49	149.15	0.01	0.28
258	0.30	0.05	73.70	22.11	171.26	0.01	0.29
259	0.30	0.05	83.33	25.00	196.26	0.01	0.31
260	0.30	0.04	64.17	19.25	215.51	0.01	0.32
261	0.30	0.05	85.52	25.66	241.17	0.01	0.33
262	0.30	0.05	62.11	18.63	259.80	0.01	0.35
263	0.30	0.05	61.84	18.55	278.35	0.01	0.36
264	0.30	0.04	43.54	13.06	291.42	0.01	0.38
265	0.30	0.04	48.05	14.42	305.83	0.01	0.39
266	0.30	0.06	65.61	19.68	325.51	0.02	0.41
267	0.30	0.09	75.56	22.67	348.18	0.03	0.43
268	0.30	0.03	37.70	11.31	359.49	0.01	0.44
269	0.30	0.11	79.07	23.72	383.22	0.03	0.47
270	0.30	0.07	50.63	15.19	398.40	0.02	0.50
271	0.30	0.08	50.64	15.19	413.60	0.02	0.52
272	0.30	0.06	41.98	12.59	426.19	0.02	0.54
273	0.30	0.06	44.44	13.33	439.52	0.02	0.56
274	0.30	0.06	32.89	9.87	449.39	0.02	0.57
275	0.30	0.08	41.58	12.48	461.86	0.02	0.60
276	0.46	0.04	22.60	10.40	472.26	0.02	0.62
278	0.46	0.07	45.10	20.75	493.01	0.03	0.65
279	0.91	0.05	30.26	27.54	520.54	0.05	0.69
280	1.07	0.20	26.26	28.10	548.64	0.21	0.91
282	0.46	0.21	16.88	7.77	556.41	0.10	1.00
283	0.30	0.29	25.16	7.55	563.95	0.09	1.09
284	0.30	0.18	20.63	6.19	570.14	0.05	1.14
285	0.30	0.16	9.92	2.98	573.12	0.05	1.19
286	0.30	0.15	20.07	6.02	579.14	0.04	1.24
287	0.30	0.07	13.48	4.04	583.18	0.02	1.26
288	0.46	0.16	7.84	3.61	586.79	0.07	1.33
290	0.46	0.12	9.53	4.38	591.17	0.06	1.39
291	0.30	0.14	10.37	3.11	594.28	0.04	1.43
292	0.30	0.15	10.96	3.29	597.57	0.04	1.47
293	0.46	0.15	10.47	4.82	602.39	0.07	1.54
294	0.46	0.26	11.24	5.17	607.56	0.12	1.66
295	0.30	0.29	12.21	3.66	611.22	0.09	1.75
296	0.30	0.28	11.82	3.55	614.77	0.08	1.83

297	0.46	0.23	13.87	6.38	621.15	0.11	1.94
298	0.46	0.19	11.85	5.45	626.60	0.09	2.03
299	0.30	0.26	15.65	4.69	631.29	0.08	2.11
300	0.30	0.27	15.59	4.68	635.97	0.08	2.19
301	0.30	0.21	66.71	20.01	655.98	0.06	2.25
302	0.30	0.23	17.31	5.19	661.18	0.07	2.32
303	0.30	0.22	19.02	5.71	666.88	0.07	2.38
304	0.30	0.20	13.96	4.19	671.07	0.06	2.44
305	0.30	0.21	15.70	4.71	675.78	0.06	2.51
306	0.30	0.23	18.83	5.65	681.43	0.07	2.58
307	0.30	0.22	19.05	5.71	687.14	0.07	2.64
308	0.30	0.22	17.71	5.31	692.46	0.07	2.71
309	0.30	0.21	18.23	5.47	697.93	0.06	2.77
310	0.30	0.24	20.78	6.23	704.16	0.07	2.84
311	0.30	0.24	17.90	5.37	709.53	0.07	2.92
312	0.30	0.21	16.64	4.99	714.52	0.06	2.98
313	0.30	0.18	14.90	4.47	718.99	0.05	3.03
314	0.30	0.15	14.91	4.47	723.47	0.04	3.08
315	0.30	0.25	23.04	6.91	730.38	0.07	3.15
316	0.30	0.24	23.08	6.92	737.30	0.07	3.22
317	0.30	0.24	23.50	7.05	744.35	0.07	3.30
318	0.30	0.26	28.55	8.56	752.92	0.08	3.37
319	0.46	0.24	25.88	11.90	764.82	0.11	3.48
321	0.46	0.27	48.19	22.17	786.99	0.12	3.61
322	0.30	0.25	60.88	18.26	805.25	0.07	3.68
323	0.30	0.29	38.75	11.63	816.88	0.09	3.77
324	0.76	0.26	29.46	22.39	839.27	0.20	3.97
328	0.76	0.17	59.49	45.21	884.48	0.13	4.10
329	0.30	0.13	49.99	15.00	899.48	0.04	4.14
330	0.30	0.26	161.36	48.41	947.89	0.08	4.21
331	0.30	0.23	164.16	49.25	997.14	0.07	4.28
332	0.30	0.22	78.88	23.66	1020.80	0.07	4.35
333	0.30	0.16	43.57	13.07	1033.87	0.05	4.40
334	0.30	0.16	38.52	11.56	1045.43	0.05	4.45
335	0.30	0.16	36.87	11.06	1056.49	0.05	4.49
336	0.30	0.14	32.00	9.60	1066.09	0.04	4.54
337	0.30	0.15	40.07	12.02	1078.11	0.04	4.58
338	0.30	0.15	47.03	14.11	1092.22	0.04	4.63
339	0.30	0.13	40.76	12.23	1104.45	0.04	4.66
340	0.30	0.14	38.29	11.49	1115.94	0.04	4.71
341	0.30	0.14	39.01	11.70	1127.64	0.04	4.75
342	0.15	0.13	61.31	9.20	1136.83	0.02	4.77

NVII07

Sample No.	Sample Interval Length (m)	Vol. Water Content (cu m/cu m)	Cl in Soil (g/cu m)	Cl in Soil (g/sq m)	Cum. Cl in Soil (g/sq m)	Vol. Water Cont. (m)	Cum. Vol. Wtr. Content (m)
343	0.15	0.30	20.94	3.14	3.14	0.05	0.05
344	0.10	0.28	48.42	4.84	7.98	0.03	0.07
345	0.10	0.17	87.44	8.74	16.73	0.02	0.09
346	0.10	0.17	105.05	10.50	27.23	0.02	0.11
347	0.10	0.16	92.85	9.28	36.52	0.02	0.12
348	0.10	0.17	86.14	8.61	45.13	0.02	0.14
349	0.10	0.19	90.04	9.00	54.13	0.02	0.16
350	0.10	0.19	96.08	9.61	63.74	0.02	0.18
351	0.36	0.20	93.54	33.68	97.42	0.07	0.25
352	0.46	0.20	58.24	26.79	124.21	0.09	0.34
353	0.30	0.19	60.33	18.10	142.31	0.06	0.40
354	0.30	0.20	52.66	15.80	158.10	0.06	0.46
355	0.46	0.19	55.65	25.60	183.70	0.09	0.55
356	0.46	0.19	57.99	26.67	210.38	0.09	0.63
357	0.30	0.19	57.55	17.26	227.64	0.06	0.69
358	0.61	0.19	52.09	31.77	259.42	0.12	0.81
359	0.61	0.18	43.04	26.26	285.67	0.11	0.92
360	0.30	0.20	54.59	16.38	302.05	0.06	0.98
361	0.61	0.20	56.31	34.35	336.40	0.12	1.10
362	0.61	0.20	50.94	31.07	367.47	0.12	1.22
363	0.30	0.19	52.90	15.87	383.34	0.06	1.28
364	0.61	0.19	49.67	30.30	413.64	0.12	1.39
365	0.61	0.18	48.57	29.63	443.27	0.11	1.50
366	0.30	0.17	44.66	13.40	456.67	0.05	1.55
367	0.61	0.20	60.53	36.92	493.59	0.12	1.68
368	0.61	0.23	77.39	47.21	540.80	0.14	1.82
369	0.30	0.28	13.62	4.09	544.89	0.08	1.90
370	0.61	0.19	12.13	7.40	552.29	0.12	2.02
371	0.61	0.20	7.80	4.76	557.05	0.12	2.14
372	0.30	0.23	7.93	2.38	559.43	0.07	2.21
373	0.30	0.22	7.46	2.24	561.67	0.07	2.27
374	0.30	0.16	7.22	2.17	563.83	0.05	2.32
375	0.15	0.17	7.12	1.07	564.90	0.03	2.35

NVII08

Sample No.	Sample Interval Length (m)	Vol. Water Content (cu m/cu m)	Cl in Soil (g/cu m)	Cl in Soil (g/sq m)	Cum. Cl in Soil (g/sq m)	Vol. Water Cont. (m)	Cum. Vol. Wtr. Content (m)
378	0.15	0.34	14.62	2.19	2.19	0.05	0.05
379	0.10	0.33	93.06	9.31	11.50	0.03	0.08
380	0.10	0.21	141.35	14.13	25.63	0.02	0.11
381	0.10	0.20	85.47	8.55	34.18	0.02	0.13
382	0.10	0.18	49.03	4.90	39.08	0.02	0.14
383	0.10	0.17	45.25	4.53	43.61	0.02	0.16
384	0.10	0.17	40.68	4.07	47.68	0.02	0.18
385	0.10	0.22	56.92	5.69	53.37	0.02	0.20
386	0.36	0.18	33.94	12.22	65.59	0.06	0.26
387	0.46	0.21	46.08	21.20	86.79	0.10	0.36
388	0.30	0.20	40.71	12.21	99.00	0.06	0.42
389	0.61	0.21	54.91	33.50	132.50	0.13	0.55
390	0.61	0.21	65.00	39.65	172.15	0.13	0.68
391	0.30	0.18	61.15	18.34	190.49	0.05	0.73
392	0.30	0.14	71.82	21.55	212.04	0.04	0.77
393	0.46	0.07	48.13	22.14	234.18	0.03	0.80
394	0.46	0.07	38.63	17.77	251.95	0.03	0.84
395	0.30	0.10	27.25	8.18	260.13	0.03	0.87
396	0.61	0.16	31.14	18.99	279.12	0.10	0.96
397	0.61	0.08	16.42	10.02	289.14	0.05	1.01
398	0.30	0.05	13.51	4.05	293.19	0.01	1.03
399	0.30	0.04	15.09	4.53	297.72	0.01	1.04
400	0.46	0.03	14.51	6.67	304.39	0.01	1.05
401	0.46	0.28	128.09	58.92	363.31	0.13	1.18
402	0.30	0.36	141.77	42.53	405.84	0.11	1.29
403	0.30	0.66	182.00	54.60	460.44	0.20	1.49
404	0.46	0.72	149.81	68.91	529.35	0.33	1.82
405	0.46	0.23	47.83	22.00	551.35	0.11	1.93
406	0.30	0.62	75.46	22.64	573.99	0.19	2.11
407	0.30	0.25	39.72	11.92	585.91	0.07	2.19
408	0.46	0.76	55.66	25.60	611.51	0.35	2.54
409	0.46	0.48	28.62	13.17	624.68	0.22	2.76
410	0.30	0.20	15.24	4.57	629.25	0.06	2.82
411	0.30	0.31	19.19	5.76	635.00	0.09	2.91
412	0.30	0.26	16.36	4.91	639.91	0.08	2.99
413	0.30	0.23	25.99	7.80	647.71	0.07	3.06
414	0.30	0.23	14.53	4.36	652.07	0.07	3.13
415	0.30	0.27	14.39	4.32	656.39	0.08	3.21
416	0.30	0.31	19.25	5.77	662.16	0.09	3.30
417	0.30	0.26	18.01	5.40	667.56	0.08	3.38
418	0.30	0.20	17.59	5.28	672.84	0.06	3.44
419	0.30	0.14	13.69	4.11	676.95	0.04	3.48
420	0.15	0.12	13.34	2.00	678.95	0.02	3.50

NVII09

Sample No.	Sample Interval Length (m)	Vol. Water Content (cu m/cu m)	Cl in Soil (g/cu m)	Cl in Soil (g/sq m)	Cum. Cl in Soil (g/sq m)	Vol. Water Cont. (m)	Cum. Vol. Wtr. Content (m)
421	0.46	0.20	8.49	3.90	3.90	0.09	0.09
422	0.30	0.23	58.10	17.43	21.33	0.07	0.16
423	0.30	0.13	63.39	19.02	40.35	0.04	0.20
424	0.30	0.04	45.06	13.52	53.87	0.01	0.21
425	0.30	0.04	67.43	20.23	74.09	0.01	0.22
426	0.30	0.04	69.43	20.83	94.92	0.01	0.24
427	0.61	0.10	124.81	76.14	171.06	0.06	0.30
428	0.61	0.04	42.16	25.72	196.78	0.02	0.32
429	0.30	0.18	170.77	51.23	248.01	0.05	0.38
430	0.30	0.10	99.05	29.72	277.73	0.03	0.41
431	0.46	0.18	131.12	60.32	338.04	0.08	0.49
432	0.46	0.08	68.55	31.53	369.58	0.04	0.53
433	0.30	0.08	60.70	18.21	387.79	0.02	0.55
434	0.30	0.11	74.99	22.50	410.28	0.03	0.58
435	0.30	0.07	58.35	17.50	427.79	0.02	0.60
436	0.30	0.05	37.14	11.14	438.93	0.01	0.62
437	0.39	0.15	74.13	28.91	467.84	0.06	0.68
438	0.30	0.17	64.53	19.36	487.20	0.05	0.73
439	0.22	0.25	86.79	19.09	506.30	0.05	0.78
440	0.30	0.38	134.66	40.40	546.69	0.11	0.90
441	0.30	0.25	31.90	9.57	556.26	0.07	0.97
442	0.15	0.11	19.81	2.97	559.23	0.02	0.99

NVII10

Sample No.	Sample Interval Length (m)	Vol. Water Content (cu m/cu m)	Cl in Soil (g/cu m)	Cl in Soil (g/sq m)	Cum. Cl in Soil (g/sq m)	Vol. Water Cont. (m)	Cum. Vol. Wtr. Content (m)
443	0.15	0.12	112.95	16.94	16.94	0.02	0.02
444	0.10	0.13	128.35	12.83	29.78	0.01	0.03
445	0.10	0.15	89.23	8.92	38.70	0.01	0.05
446	0.10	0.18	57.09	5.71	44.41	0.02	0.06
447	0.10	0.21	68.86	6.89	51.29	0.02	0.08
448	0.51	0.10	27.15	13.85	65.14	0.05	0.14
449	0.61	0.26	43.90	26.78	91.92	0.16	0.29
450	0.30	0.23	32.54	9.76	101.68	0.07	0.36
451	0.61	0.20	34.62	21.12	122.80	0.12	0.49
452	0.61	0.18	73.48	44.83	167.62	0.11	0.60
453	0.30	0.11	66.42	19.93	187.55	0.03	0.63
454	0.61	0.16	72.34	44.13	231.68	0.10	0.73
455	0.61	0.21	52.15	31.81	263.49	0.13	0.85
456	0.30	0.20	63.52	19.06	282.54	0.06	0.91
457	0.61	0.24	57.60	35.14	317.68	0.15	1.06
458	0.61	0.23	57.89	35.31	352.99	0.14	1.20
459	0.30	0.18	50.79	15.24	368.23	0.05	1.25
460	0.61	0.21	69.36	42.31	410.53	0.13	1.38
461	0.61	0.24	65.53	39.97	450.51	0.15	1.53
462	0.30	0.21	53.71	16.11	466.62	0.06	1.59
463	0.61	0.21	48.71	29.71	496.33	0.13	1.72
464	0.61	0.21	70.08	42.75	539.08	0.13	1.85
465	0.30	0.20	73.04	21.91	561.00	0.06	1.91
466	0.61	0.22	54.36	33.16	594.15	0.13	2.04
467	0.61	0.22	92.16	56.22	650.37	0.13	2.18
468	0.30	0.22	73.45	22.03	672.40	0.07	2.24
469	0.61	0.21	63.17	38.53	710.94	0.13	2.37
470	0.61	0.21	75.14	45.84	756.77	0.13	2.50
471	0.30	0.22	68.73	20.62	777.39	0.07	2.57
472	0.61	0.16	55.94	34.12	811.51	0.10	2.66
473	0.61	0.16	96.86	59.08	870.60	0.10	2.76
474	0.30	0.20	75.55	22.67	893.26	0.06	2.82
475	0.61	0.19	80.86	49.32	942.59	0.12	2.94
476	0.61	0.17	68.13	41.56	984.14	0.10	3.04
477	0.30	0.18	54.29	16.29	1000.43	0.05	3.09
478	0.61	0.18	54.11	33.01	1033.44	0.11	3.20
479	0.61	0.17	49.59	30.25	1063.69	0.10	3.31
480	0.30	0.12	65.66	19.70	1083.39	0.04	3.34
481	0.61	0.14	58.18	35.49	1118.88	0.09	3.43
482	0.61	0.13	103.15	62.92	1181.79	0.08	3.51
483	0.30	0.18	169.78	50.94	1232.73	0.05	3.56
484	0.61	0.18	113.39	69.17	1301.90	0.11	3.67
485	0.61	0.18	91.76	55.97	1357.87	0.11	3.78
486	0.30	0.15	97.03	29.11	1386.98	0.04	3.83
487	0.61	0.17	118.33	72.18	1459.17	0.10	3.93
488	0.61	0.12	115.22	70.28	1529.45	0.07	4.00
489	0.30	0.11	178.15	53.44	1582.89	0.03	4.04

490	0.61	0.14	144.45	88.11	1671.01	0.09	4.12
491	0.61	0.11	114.03	69.56	1740.57	0.07	4.19
492	0.30	0.12	110.42	33.13	1773.70	0.04	4.23
493	0.61	0.16	112.32	68.51	1842.21	0.10	4.32
494	0.61	0.21	154.49	94.24	1936.45	0.13	4.45
495	0.30	0.13	109.44	32.83	1969.28	0.04	4.49
496	0.30	0.06	159.18	47.75	2017.04	0.02	4.51
497	0.46	0.16	264.38	121.62	2138.65	0.07	4.58
498	0.46	0.22	181.16	83.33	2221.98	0.10	4.68
499	0.30	0.21	241.02	72.31	2294.29	0.06	4.75
500	0.61	0.21	105.03	64.07	2358.36	0.13	4.87
501	0.61	0.11	110.35	67.31	2425.67	0.07	4.94
502	0.30	0.18	94.56	28.37	2454.04	0.05	4.99
503	0.30	0.32	40.82	12.25	2466.29	0.10	5.09
504	0.46	0.25	32.75	15.06	2481.35	0.11	5.21
507	0.46	0.27	35.79	16.46	2497.81	0.12	5.33
508	0.30	0.29	28.94	8.68	2506.50	0.09	5.42
509	0.30	0.26	36.09	10.83	2517.32	0.08	5.50
510	0.30	0.24	24.32	7.30	2524.62	0.07	5.57
511	0.15	0.25	35.41	5.31	2529.93	0.04	5.60

NVII11

Sample No.	Sample Interval Length (m)	Vol. Water Content (cu m/cu m)	Cl in Soil (g/cu m)	Cl in Soil (g/sq m)	Cum. Cl in Soil (g/sq m)	Vol. Water Cont. (m)	Cum. Vol. Wtr. Content (m)
512	0.15	0.34	33.02	4.95	4.95	0.05	0.05
513	0.10	0.15	124.89	12.49	17.44	0.01	0.07
514	0.10	0.13	58.07	5.81	23.25	0.01	0.08
515	0.10	0.15	15.48	1.55	24.80	0.01	0.09
516	0.10	0.11	16.80	1.68	26.48	0.01	0.10
517	0.51	0.11	24.35	12.42	38.90	0.06	0.16
518	0.61	0.12	12.39	7.56	46.45	0.07	0.23
519	0.76	0.18	12.82	9.75	56.20	0.14	0.37
520	0.76	0.20	24.65	18.74	74.94	0.15	0.52
521	0.30	0.26	44.33	13.30	88.24	0.08	0.60
522	0.61	0.21	20.48	12.49	100.73	0.13	0.73
523	0.61	0.24	18.06	11.02	111.75	0.15	0.88
524	0.30	0.21	27.54	8.26	120.01	0.06	0.94
525	0.61	0.21	36.53	22.29	142.29	0.13	1.07
526	0.61	0.23	32.32	19.72	162.01	0.14	1.21
527	0.30	0.21	40.53	12.16	174.17	0.06	1.27
528	0.61	0.35	83.51	50.94	225.11	0.21	1.48
529	0.61	0.12	61.87	37.74	262.85	0.07	1.56
530	0.30	0.14	65.52	19.66	282.51	0.04	1.60
531	0.30	0.14	65.92	19.78	302.28	0.04	1.64
532	0.46	0.11	56.73	26.10	328.38	0.05	1.69
533	0.46	0.15	48.51	22.31	350.69	0.07	1.76
534	0.30	0.14	43.29	12.99	363.68	0.04	1.80
535	0.61	0.19	31.01	18.91	382.59	0.12	1.92
536	0.61	0.23	43.27	26.39	408.98	0.14	2.06
537	0.30	0.25	44.41	13.32	422.31	0.07	2.13
538	0.61	0.15	34.82	21.24	443.55	0.09	2.22
539	0.61	0.16	17.45	10.64	454.19	0.10	2.32
540	0.30	0.23	18.53	5.56	459.75	0.07	2.39
541	0.30	0.22	16.19	4.86	464.61	0.07	2.46
542	0.46	0.21	19.20	8.83	473.44	0.10	2.55
543	0.46	0.12	15.75	7.24	480.69	0.06	2.61
544	0.30	0.20	21.88	6.56	487.25	0.06	2.67
545	0.30	0.25	56.44	16.93	504.18	0.07	2.74
546	0.46	0.20	28.77	13.23	517.42	0.09	2.84
547	0.46	0.17	32.15	14.79	532.21	0.08	2.91
548	0.30	0.39	83.89	25.17	557.37	0.12	3.03
549	0.30	0.26	98.98	29.69	587.07	0.08	3.11
550	0.46	0.21	81.26	37.38	624.45	0.10	3.21
551	0.46	0.17	87.06	40.05	664.50	0.08	3.28
552	0.30	0.20	106.09	31.83	696.32	0.06	3.34
553	0.61	0.06	44.67	27.25	723.57	0.04	3.38
554	0.61	0.22	102.54	62.55	786.12	0.13	3.52
555	0.30	0.12	28.85	8.66	794.78	0.04	3.55
556	0.61	0.18	25.51	15.56	810.34	0.11	3.66
557	0.61	0.23	31.89	19.45	829.79	0.14	3.80
558	0.30	0.30	15.70	4.71	834.50	0.09	3.89

559	0.61	0.22	26.73	16.30	850.81	0.13	4.03
560	0.61	0.24	114.15	69.63	920.44	0.15	4.17
561	0.30	0.21	71.87	21.56	942.00	0.06	4.23
562	0.30	0.35	91.36	27.41	969.41	0.11	4.34
563	0.46	0.25	82.35	37.88	1007.29	0.11	4.45
564	0.46	0.17	39.40	18.12	1025.41	0.08	4.53
565	0.30	0.15	64.94	19.48	1044.90	0.04	4.58
566	0.30	0.21	78.17	23.45	1068.35	0.06	4.64
567	0.46	0.21	71.19	32.75	1101.09	0.10	4.74
568	0.46	0.38	62.14	28.59	1129.68	0.17	4.91
569	0.30	0.19	20.58	6.17	1135.85	0.06	4.97
570	0.30	0.18	12.27	3.68	1139.53	0.05	5.02
571	0.30	0.20	11.61	3.48	1143.02	0.06	5.08
572	0.30	0.18	13.27	3.98	1147.00	0.05	5.14
573	0.30	0.16	8.14	2.44	1149.44	0.05	5.19
574	0.30	0.17	7.14	2.14	1151.58	0.05	5.24
575	0.30	0.16	8.34	2.50	1154.08	0.05	5.28
576	0.30	0.13	5.30	1.59	1155.67	0.04	5.32
577	0.30	0.16	10.00	3.00	1158.67	0.05	5.37
578	0.30	0.15	11.56	3.47	1162.14	0.04	5.42
579	0.30	0.09	7.88	2.36	1164.51	0.03	5.44
580	0.30	0.14	11.78	3.53	1168.04	0.04	5.49
581	0.23	0.12	7.64	1.76	1169.80	0.03	5.51
582	0.08	0.10	10.32	0.83	1170.62	0.01	5.52

NVII12

Sample No.	Sample Interval Length (m)	Vol. Water Content (cu m/cu m)	Cl in Soil (g/cu m)	Cl in Soil (g/sq m)	Cum. Cl in Soil (g/sq m)	Vol. Water Cont. (m)	Cum. Vol. Wtr. Content (m)
583	0.15	0.33	33.16	4.97	4.97	0.05	0.05
584	0.10	0.40	54.38	5.44	10.41	0.04	0.09
585	0.10	0.58	116.10	11.61	22.02	0.06	0.15
586	0.10	0.44	90.30	9.03	31.05	0.04	0.19
587	0.10	0.35	85.97	8.60	39.65	0.04	0.23
588	0.10	0.40	83.73	8.37	48.02	0.04	0.27
589	0.10	0.37	81.86	8.19	56.21	0.04	0.30
590	0.10	0.27	58.64	5.86	62.07	0.03	0.33
591	0.10	0.25	35.23	3.52	65.59	0.02	0.36
592	0.10	0.23	27.01	2.70	68.30	0.02	0.38
593	0.10	0.24	31.66	3.17	71.46	0.02	0.40
594	0.20	0.26	22.58	4.52	75.98	0.05	0.45
595	0.30	0.30	37.35	11.21	87.18	0.09	0.54
596	0.30	0.30	23.97	7.19	94.37	0.09	0.63
597	0.30	0.38	32.60	9.78	104.15	0.11	0.75
598	0.30	0.45	27.59	8.28	112.43	0.13	0.88
599	0.30	0.41	22.15	6.64	119.08	0.12	1.01
600	0.30	0.41	20.06	6.02	125.09	0.12	1.13
601	0.30	0.49	13.08	3.92	129.02	0.15	1.28
602	0.30	0.53	10.84	3.25	132.27	0.16	1.44
603	0.30	0.38	9.64	2.89	135.16	0.11	1.55
604	0.30	0.42	12.64	3.79	138.95	0.13	1.68
605	0.30	0.40	11.26	3.38	142.33	0.12	1.80
606	0.30	0.35	15.76	4.73	147.06	0.11	1.90
607	0.30	0.38	15.09	4.53	151.59	0.11	2.01
608	0.30	0.40	21.19	6.36	157.95	0.12	2.13
609	0.30	0.38	25.16	7.55	165.49	0.11	2.25
610	0.30	0.39	42.77	12.83	178.32	0.12	2.37
611	0.30	0.47	58.19	17.46	195.78	0.14	2.51
612	0.30	0.29	40.92	12.28	208.06	0.09	2.59
613	0.30	0.25	39.65	11.90	219.95	0.07	2.67
614	0.30	0.27	37.03	11.11	231.06	0.08	2.75
615	0.30	0.17	8.14	2.44	233.51	0.05	2.80
616	0.76	0.24	20.67	15.71	249.21	0.18	2.98
617	0.76	0.21	21.24	16.14	265.35	0.16	3.14
618	0.30	0.15	17.20	5.16	270.51	0.04	3.19
619	0.61	0.23	88.44	53.95	324.46	0.14	3.33
620	0.61	0.28	34.80	21.23	345.69	0.17	3.50
621	0.30	0.25	42.15	12.64	358.33	0.07	3.57
622	0.61	0.26	69.79	42.57	400.91	0.16	3.73
623	0.61	0.33	124.45	75.91	476.82	0.20	3.93
624	0.30	0.39	146.96	44.09	520.91	0.12	4.05
625	0.61	0.18	58.19	35.50	556.41	0.11	4.16
626	0.61	0.11	12.68	7.73	564.14	0.07	4.23
627	0.30	0.13	30.23	9.07	573.21	0.04	4.27
628	0.30	0.14	11.46	3.44	576.65	0.04	4.31
629	0.46	0.15	18.99	8.74	585.38	0.07	4.38

630	0.46	0.14	28.57	13.14	598.52	0.06	4.44
631	0.30	0.23	146.35	43.91	642.43	0.07	4.51
632	0.61	0.26	38.45	23.46	665.89	0.16	4.67
633	0.61	0.25	17.45	10.64	676.53	0.15	4.82
634	0.30	0.17	5.11	1.53	678.06	0.05	4.87
635	0.30	0.19	3.98	1.19	679.26	0.06	4.93
636	0.30	0.22	4.62	1.38	680.64	0.07	5.00
637	0.30	0.15	5.69	1.71	682.35	0.04	5.04
638	0.30	0.16	4.55	1.36	683.71	0.05	5.09
639	0.30	0.19	6.46	1.94	685.65	0.06	5.15
640	0.30	0.13	3.36	1.01	686.66	0.04	5.18
641	0.30	0.13	4.87	1.46	688.12	0.04	5.22
642	0.15	0.15	5.67	0.85	688.97	0.02	5.25

NVII13

Sample No.	Sample Interval Length (m)	Vol. Water Content (cu m/cu m)	Cl in Soil (g/cu m)	Cl in Soil (g/sq m)	Cum. Cl in Soil (g/sq m)	Vol. Water Cont. (m)	Cum. Vol. Wtr. Content (m)
644	0.15	0.16	6.16	0.92	0.92	0.02	0.02
645	0.10	0.15	10.56	1.06	1.98	0.01	0.04
646	0.10	0.15	25.81	2.58	4.56	0.01	0.05
647	0.10	0.28	43.38	4.34	8.90	0.03	0.08
648	0.10	0.24	32.16	3.22	12.11	0.02	0.11
649	0.10	0.26	19.33	1.93	14.05	0.03	0.13
650	0.10	0.12	17.77	1.78	15.82	0.01	0.14
651	0.10	0.21	26.42	2.64	18.47	0.02	0.16
652	0.36	0.15	12.85	4.63	23.09	0.05	0.22
653	0.46	0.25	28.01	12.88	35.98	0.11	0.33
654	0.30	0.23	42.35	12.71	48.68	0.07	0.40
655	0.30	0.16	28.08	8.42	57.11	0.05	0.45
656	0.46	0.22	23.47	10.80	67.91	0.10	0.55
657	0.46	0.26	66.91	30.78	98.68	0.12	0.67
658	0.30	0.25	29.18	8.75	107.44	0.07	0.75
659	0.30	0.18	15.58	4.67	112.11	0.05	0.80
660	0.46	0.34	18.40	8.47	120.58	0.16	0.96
661	0.46	0.21	13.59	6.25	126.83	0.10	1.05
662	0.76	0.16	12.00	9.12	135.95	0.12	1.18
663	0.76	0.30	23.98	18.22	154.18	0.23	1.40
664	0.30	0.33	28.23	8.47	162.65	0.10	1.50
665	0.30	0.19	16.23	4.87	167.52	0.06	1.56
666	0.46	0.29	23.90	10.99	178.51	0.13	1.69
667	0.46	0.28	21.39	9.84	188.35	0.13	1.82
668	0.30	0.35	72.72	21.82	210.17	0.11	1.93
669	0.30	0.28	41.79	12.54	222.71	0.08	2.01
670	0.46	0.23	26.49	12.19	234.89	0.11	2.12
671	0.46	0.24	19.51	8.97	243.87	0.11	2.23
672	0.30	0.22	15.49	4.65	248.51	0.07	2.29
673	0.61	0.26	17.11	10.44	258.95	0.16	2.45
674	0.61	0.32	19.23	11.73	270.68	0.20	2.65
675	0.46	0.41	19.00	8.74	279.42	0.19	2.84
677	0.61	0.28	15.86	9.67	289.09	0.17	3.01
678	0.46	0.28	13.33	6.13	295.23	0.13	3.13
679	0.30	0.31	14.71	4.41	299.64	0.09	3.23
680	0.61	0.20	18.59	11.34	310.98	0.12	3.35
681	0.61	0.39	13.77	8.40	319.38	0.24	3.59
682	0.30	0.36	9.55	2.87	322.24	0.11	3.70
683	0.30	0.28	1.77	0.53	322.77	0.08	3.78
684	0.30	0.24	2.31	0.69	323.47	0.07	3.85
685	0.30	0.26	3.19	0.96	324.42	0.08	3.93
686	0.30	0.20	1.67	0.50	324.92	0.06	3.99
687	0.30	0.16	6.57	1.97	326.89	0.05	4.04
688	0.30	0.19	4.12	1.23	328.13	0.06	4.09
689	0.30	0.22	2.65	0.80	328.93	0.07	4.16
690	0.30	0.24	5.62	1.69	330.61	0.07	4.23
691	0.30	0.17	1.73	0.52	331.13	0.05	4.28

692	0.30	0.18	6.03	1.81	332.94	0.05	4.34
693	0.30	0.18	4.87	1.46	334.40	0.05	4.39
694	0.15	0.16	2.69	0.40	334.80	0.02	4.42

NVII14

Sample No.	Sample Interval Length (m)	Vol. Water Content (cu m/cu m)	Cl in Soil (g/cu m)	Cl in Soil (g/sq m)	Cum. Cl in Soil (g/sq m)	Vol. Water Cont. (m)	Cum. Vol. Wtr. Content (m)
695	0.15	0.36	165.55	24.83	24.83	0.05	0.05
696	0.10	0.23	187.83	18.78	43.62	0.02	0.08
697	0.10	0.14	138.85	13.89	57.50	0.01	0.09
698	0.10	0.15	114.78	11.48	68.98	0.01	0.11
699	0.10	0.22	116.72	11.67	80.65	0.02	0.13
700	0.10	0.19	83.43	8.34	88.99	0.02	0.15
701	0.10	0.16	55.34	5.53	94.53	0.02	0.16
702	0.10	0.17	101.96	10.20	104.72	0.02	0.18
703	0.36	0.17	105.26	37.89	142.62	0.06	0.24
704	0.46	0.22	110.13	50.66	193.28	0.10	0.34
705	0.30	0.13	68.47	20.54	213.82	0.04	0.38
706	0.61	0.13	84.29	51.41	265.24	0.08	0.46
707	0.61	0.15	86.62	52.84	318.07	0.09	0.55
708	0.76	0.06	87.32	66.36	384.44	0.05	0.60
709	1.68	0.17	44.36	74.53	458.97	0.29	0.88
712	2.29	0.15	34.57	79.16	538.12	0.34	1.23
715	1.37	0.20	69.44	95.13	633.25	0.27	1.50
716	0.30	0.22	63.58	19.07	652.33	0.07	1.57
717	0.61	0.23	46.04	28.08	680.41	0.14	1.71
718	0.61	0.16	62.86	38.35	718.76	0.10	1.80
719	0.30	0.19	81.82	24.55	743.30	0.06	1.86
720	0.61	0.14	81.81	49.91	793.21	0.09	1.95
721	0.61	0.20	73.16	44.63	837.83	0.12	2.07
722	0.46	0.09	67.34	30.98	868.81	0.04	2.11
724	0.76	0.15	58.41	44.39	913.20	0.11	2.22
726	0.61	0.13	78.67	47.99	961.19	0.08	2.30
727	0.30	0.12	92.83	27.85	989.04	0.04	2.34
728	0.76	0.12	94.69	71.97	1061.01	0.09	2.43
731	0.76	0.14	24.41	18.55	1079.56	0.11	2.54
732	0.46	0.04	16.48	7.58	1087.14	0.02	2.56
733	0.61	0.21	53.42	32.58	1119.72	0.13	2.68
735	0.76	0.26	117.28	89.13	1208.86	0.20	2.88
736	0.61	0.22	104.71	63.87	1272.73	0.13	3.02
737	0.30	0.25	107.18	32.15	1304.88	0.07	3.09
738	0.30	0.24	90.73	27.22	1332.10	0.07	3.16
739	0.46	0.10	79.61	36.62	1368.72	0.05	3.21
740	0.46	0.24	105.29	48.43	1417.16	0.11	3.32
741	0.30	0.27	156.05	46.81	1463.97	0.08	3.40
742	0.30	0.07	61.39	18.42	1482.39	0.02	3.42
743	0.46	0.18	98.14	45.15	1527.53	0.08	3.50
744	0.46	0.24	107.80	49.59	1577.12	0.11	3.61
745	0.30	0.19	77.81	23.34	1600.46	0.06	3.67
746	0.30	0.22	88.70	26.61	1627.07	0.07	3.74
747	0.15	0.19	81.34	12.20	1639.28	0.03	3.77

NVII16

Sample No.	Sample Interval Length (m)	Vol. Water Content (cu m/cu m)	Cl in Soil (g/cu m)	Cl in Soil (g/sq m)	Cum. Cl in Soil (g/sq m)	Vol. Water Cont. (m)	Cum. Vol. Wtr. Content (m)
755	0.15	0.46	107.66	16.15	16.15	0.07	0.07
756	0.10	0.29	160.87	16.09	32.24	0.03	0.10
757	0.10	0.22	330.68	33.07	65.30	0.02	0.12
758	0.10	0.12	172.45	17.25	82.55	0.01	0.13
759	0.10	0.11	98.40	9.84	92.39	0.01	0.14
760	0.10	0.08	135.05	13.50	105.89	0.01	0.15
761	0.10	0.05	30.85	3.09	108.98	0.00	0.16
762	0.10	0.08	39.07	3.91	112.89	0.01	0.16
763	0.36	0.12	60.59	21.81	134.70	0.04	0.21
764	0.46	0.11	70.27	32.32	167.02	0.05	0.26
765	0.76	0.25	119.60	90.90	257.92	0.19	0.45
766	0.76	0.20	48.47	36.84	294.76	0.15	0.60
767	0.30	0.25	82.70	24.81	319.57	0.07	0.67
768	0.30	0.22	67.08	20.12	339.69	0.07	0.74
769	0.30	0.17	61.35	18.41	358.10	0.05	0.79
770	0.30	0.22	99.01	29.70	387.80	0.07	0.86
771	0.30	0.24	121.88	36.57	424.37	0.07	0.93
772	0.30	0.25	86.83	26.05	450.42	0.07	1.00
773	0.30	0.23	65.13	19.54	469.96	0.07	1.07
774	0.30	0.32	26.71	8.01	477.97	0.10	1.17
775	0.30	0.25	59.29	17.79	495.76	0.07	1.24
776	0.30	0.25	47.16	14.15	509.91	0.07	1.32
777	0.30	0.15	135.00	40.50	550.40	0.04	1.36
778	4.88	0.12	70.92	346.09	896.49	0.59	1.95
790	5.03	0.10	40.09	201.66	1098.15	0.50	2.45
791	0.46	0.25	40.85	18.79	1116.94	0.11	2.57
792	0.30	0.43	57.10	17.13	1134.07	0.13	2.70
793	0.61	0.23	18.31	11.17	1145.25	0.14	2.84
794	0.61	0.12	32.15	19.61	1164.86	0.07	2.91
795	0.30	0.09	47.36	14.21	1179.06	0.03	2.94
796	0.61	0.15	57.32	34.97	1214.03	0.09	3.03
797	0.61	0.18	109.24	66.63	1280.67	0.11	3.14
798	0.30	0.20	88.49	26.55	1307.21	0.06	3.20
799	0.30	0.09	41.93	12.58	1319.79	0.03	3.23
800	0.46	0.20	91.12	41.91	1361.70	0.09	3.32
801	0.46	0.18	90.10	41.45	1403.15	0.08	3.40
802	0.30	0.16	81.39	24.42	1427.57	0.05	3.45
803	0.15	0.21	93.74	14.06	1441.63	0.03	3.48

NVII17

Sample No.	Sample Interval Length (m)	Vol. Water Content (cu m/cu m)	Cl in Soil (g/cu m)	Cl in Soil (g/sq m)	Cum. Cl in Soil (g/sq m)	Vol. Water Cont. (m)	Cum. Vol. Wtr. Content (m)
804	0.46	0.22	56.70	26.08	26.08	0.10	0.10
805	0.30	0.27	65.07	19.52	45.60	0.08	0.18
806	0.46	0.25	33.35	15.34	60.95	0.11	0.30
807	0.46	0.15	42.31	19.46	80.41	0.07	0.37
808	0.30	0.17	22.90	6.87	87.28	0.05	0.42
809	0.61	0.18	27.29	16.65	103.92	0.11	0.53
810	0.61	0.17	24.00	14.64	118.56	0.10	0.63
811	0.30	0.10	23.40	7.02	125.58	0.03	0.66
812	0.61	0.10	44.12	26.92	152.50	0.06	0.72
813	0.61	0.18	41.67	25.42	177.91	0.11	0.83
814	0.61	0.08	33.96	20.71	198.63	0.05	0.88
815	0.61	0.21	54.49	33.24	231.87	0.13	1.01
816	0.30	0.19	63.23	18.97	250.84	0.06	1.07
817	0.30	0.13	37.29	11.19	262.02	0.04	1.10
818	0.61	0.18	77.28	47.14	309.16	0.11	1.21
819	0.61	0.23	91.91	56.07	365.23	0.14	1.35
820	0.30	0.09	55.87	16.76	381.99	0.03	1.38
821	0.61	0.20	64.45	39.31	421.30	0.12	1.50
822	0.61	0.23	72.45	44.20	465.50	0.14	1.64
823	0.30	0.24	78.23	23.47	488.97	0.07	1.72
824	0.61	0.26	107.39	65.51	554.48	0.16	1.87
825	0.61	0.24	68.63	41.87	596.35	0.15	2.02
826	0.76	0.10	47.02	35.73	632.08	0.08	2.10
827	1.37	0.12	19.95	27.34	659.42	0.16	2.26
828	1.52	0.09	33.66	51.16	710.58	0.14	2.40
829	0.91	0.12	37.12	33.78	744.36	0.11	2.51
830	0.30	0.17	45.83	13.75	758.11	0.05	2.56
831	0.61	0.18	92.95	56.70	814.80	0.11	2.67
832	0.61	0.09	76.65	46.76	861.56	0.05	2.72
833	0.30	0.15	38.71	11.61	873.18	0.04	2.77
834	0.61	0.13	49.52	30.21	903.38	0.08	2.85
835	0.61	0.35	42.85	26.14	929.52	0.21	3.06
836	0.30	0.24	41.46	12.44	941.96	0.07	3.13
837	0.30	0.18	56.82	17.05	959.01	0.05	3.19
838	0.46	0.14	52.44	24.12	983.13	0.06	3.25
839	0.46	0.16	44.23	20.35	1003.48	0.07	3.32
840	0.30	0.09	54.00	16.20	1019.68	0.03	3.35
841	0.61	0.17	59.37	36.21	1055.89	0.10	3.46
842	0.61	0.12	49.75	30.35	1086.24	0.07	3.53
843	0.15	0.13	46.85	7.03	1093.27	0.02	3.55

NVII18

Sample No.	Sample Interval Length (m)	Vol. Water Content (cu m/cu m)	Cl in Soil (g/cu m)	Cl in Soil (g/sq m)	Cum. Cl in Soil (g/sq m)	Vol. Water Cont. (m)	Cum. Vol. Wtr. Content (m)
845	0.15	0.19	86.93	13.04	13.04	0.03	0.03
846	0.10	0.17	80.73	8.07	21.11	0.02	0.05
847	0.10	0.33	45.48	4.55	25.66	0.03	0.08
848	0.10	0.45	64.48	6.45	32.11	0.04	0.12
849	0.10	0.18	38.97	3.90	36.00	0.02	0.14
850	0.51	0.21	25.15	12.83	48.83	0.11	0.25
851	0.76	0.16	96.94	73.68	122.51	0.12	0.37
853	0.76	0.15	27.02	20.54	143.05	0.11	0.48
854	0.61	0.15	37.99	23.17	166.22	0.09	0.58
855	0.30	0.18	37.47	11.24	177.46	0.05	0.63
856	0.61	0.15	123.15	75.12	252.58	0.09	0.72
857	0.61	0.16	45.97	28.04	280.63	0.10	0.82
858	0.30	0.20	44.16	13.25	293.87	0.06	0.88
859	0.61	0.23	83.40	50.87	344.75	0.14	1.02
860	0.61	0.24	67.56	41.21	385.96	0.15	1.17
861	0.30	0.28	104.11	31.23	417.19	0.08	1.25
862	0.61	0.21	40.34	24.61	441.80	0.13	1.38
863	0.61	0.26	41.97	25.60	467.40	0.16	1.54
864	0.30	0.21	84.67	25.40	492.80	0.06	1.60
865	0.61	0.18	43.67	26.64	519.44	0.11	1.71
866	0.61	0.20	68.53	41.80	561.24	0.12	1.83
867	0.30	0.18	49.62	14.89	576.13	0.05	1.88
868	0.61	0.18	43.65	26.63	602.75	0.11	1.99
869	0.61	0.24	61.39	37.45	640.20	0.15	2.14
870	0.30	0.23	69.97	20.99	661.19	0.07	2.21
871	0.61	0.22	75.93	46.32	707.51	0.13	2.34
872	0.61	0.25	94.36	57.56	765.07	0.15	2.50
873	0.30	0.25	102.07	30.62	795.69	0.07	2.57
874	0.61	0.25	127.21	77.60	873.29	0.15	2.72
875	0.61	0.22	248.74	151.73	1025.02	0.13	2.86
876	0.30	0.23	238.68	71.61	1096.62	0.07	2.93
877	0.61	0.15	298.19	181.89	1278.52	0.09	3.02
878	0.61	0.20	326.40	199.10	1477.62	0.12	3.14
879	0.30	0.17	186.12	55.84	1533.46	0.05	3.19
880	0.61	0.18	146.70	89.49	1622.94	0.11	3.30
881	0.61	0.22	161.58	98.57	1721.51	0.13	3.44
882	0.30	0.25	168.57	50.57	1772.08	0.07	3.51
883	0.30	0.25	188.30	56.49	1828.57	0.07	3.59
884	0.30	0.28	172.47	51.74	1880.31	0.08	3.67
885	0.15	0.25	184.42	27.66	1907.98	0.04	3.71

NVII19

Sample No.	Sample Interval Length (m)	Vol. Water Content (cu m/cu m)	Cl in Soil (g/cu m)	Cl in Soil (g/sq m)	Cum. Cl in Soil (g/sq m)	Vol. Water Cont. (m)	Cum. Vol. Wtr. Content (m)
888	0.15	0.31	6.63	0.99	0.99	0.05	0.05
889	0.10	0.32	33.19	3.32	4.31	0.03	0.08
890	0.10	0.29	243.28	24.33	28.64	0.03	0.11
891	0.10	0.18	243.53	24.35	52.99	0.02	0.13
892	0.10	0.17	185.74	18.57	71.57	0.02	0.14
893	0.10	0.16	129.57	12.96	84.53	0.02	0.16
894	0.10	0.16	90.22	9.02	93.55	0.02	0.17
895	0.10	0.14	63.59	6.36	99.91	0.01	0.19
896	0.36	0.17	66.89	24.08	123.99	0.06	0.25
897	0.46	0.27	53.56	24.64	148.62	0.12	0.37
898	0.30	0.22	55.90	16.77	165.40	0.07	0.44
899	0.61	0.25	78.62	47.96	213.36	0.15	0.59
900	0.61	0.08	33.02	20.14	233.50	0.05	0.64
901	0.30	0.27	49.43	14.83	248.33	0.08	0.72
902	0.61	0.21	66.62	40.64	288.97	0.13	0.85
903	0.61	0.23	54.47	33.23	322.19	0.14	0.99
904	0.30	0.22	68.79	20.64	342.83	0.07	1.06
905	0.61	0.18	7.30	4.46	347.29	0.11	1.17
906	0.61	0.14	8.36	5.10	352.39	0.09	1.25
907	0.30	0.12	8.13	2.44	354.83	0.04	1.29
908	0.30	0.26	6.98	2.10	356.92	0.08	1.37
909	0.30	0.13	9.73	2.92	359.84	0.04	1.40
910	0.15	0.13	8.67	1.30	361.14	0.02	1.42

NVII20

Sample No.	Sample Interval Length (m)	Vol. Water Content (cu m/cu m)	Cl in Soil (g/cu m)	Cl in Soil (g/sq m)	Cum. Cl in Soil (g/sq m)	Vol. Water Cont. (m)	Cum. Vol. Wtr. Content (m)
911	0.15	0.10	2.25	0.34	0.34	0.02	0.02
912	0.10	0.16	4.25	0.42	0.76	0.02	0.03
913	0.10	0.10	2.56	0.26	1.02	0.01	0.04
914	0.10	0.13	3.08	0.31	1.33	0.01	0.05
915	0.10	0.13	16.13	1.61	2.94	0.01	0.07
916	0.10	0.14	98.37	9.84	12.78	0.01	0.08
917	0.10	0.06	63.00	6.30	19.08	0.01	0.09
918	0.10	0.08	53.52	5.35	24.43	0.01	0.09
919	0.36	0.07	27.77	10.00	34.43	0.03	0.12
920	0.46	0.07	14.37	6.61	41.04	0.03	0.15
921	0.76	0.07	13.03	9.91	50.94	0.05	0.21
922	0.76	0.18	18.84	14.32	65.26	0.14	0.34
923	0.76	0.15	11.50	8.74	74.00	0.11	0.46
924	0.76	0.17	8.54	6.49	80.49	0.13	0.59
925	0.30	0.18	7.79	2.34	82.83	0.05	0.64
926	0.61	0.11	10.37	6.33	89.16	0.07	0.71
927	0.61	0.09	10.99	6.71	95.86	0.05	0.76
928	0.30	0.14	8.06	2.42	98.28	0.04	0.80
929	0.61	0.09	10.70	6.53	104.81	0.05	0.86
930	0.61	0.12	15.52	9.46	114.27	0.07	0.93
931	0.30	0.20	25.91	7.77	122.04	0.06	0.99
932	0.61	0.07	16.33	9.96	132.00	0.04	1.03
933	0.61	0.06	10.65	6.50	138.50	0.04	1.07
934	0.76	0.08	17.96	13.65	152.14	0.06	1.13
935	0.76	0.07	11.95	9.08	161.23	0.05	1.19
936	0.30	0.12	12.02	3.61	164.83	0.04	1.22
937	0.61	0.09	7.20	4.39	169.22	0.05	1.28
938	0.61	0.04	7.04	4.30	173.52	0.02	1.30
939	0.30	0.10	5.61	1.68	175.20	0.03	1.33
940	0.61	0.15	6.00	3.66	178.86	0.09	1.42
941	0.61	0.18	22.64	13.81	192.68	0.11	1.53
942	0.30	0.06	15.78	4.73	197.41	0.02	1.55
943	0.61	0.06	18.14	11.07	208.48	0.04	1.59
944	0.61	0.05	17.59	10.73	219.21	0.03	1.62
945	0.30	0.06	24.62	7.39	226.59	0.02	1.63
946	0.61	0.07	24.29	14.82	241.41	0.04	1.68
947	0.61	0.07	15.95	9.73	251.14	0.04	1.72
948	0.30	0.16	26.12	7.84	258.98	0.05	1.77
949	0.61	0.07	29.14	17.77	276.75	0.04	1.81
950	0.61	0.10	26.22	15.99	292.74	0.06	1.87
951	0.15	0.05	7.74	1.16	293.90	0.01	1.88

NVII21

Sample No.	Sample Interval Length (m)	Vol. Water Content (cu m/cu m)	Cl in Soil (g/cu m)	Cl in Soil (g/sq m)	Cum. Cl in Soil (g/sq m)	Vol. Water Cont. (m)	Cum. Vol. Wtr. Content (m)
952	0.15	0.37	4.79	0.72	0.72	0.06	0.06
953	0.10	0.26	3.37	0.34	1.06	0.03	0.08
954	0.10	0.38	4.84	0.48	1.54	0.04	0.12
955	0.10	0.22	5.93	0.59	2.13	0.02	0.14
956	0.10	0.28	3.83	0.38	2.51	0.03	0.17
957	0.10	0.33	4.96	0.50	3.01	0.03	0.20
958	0.10	0.33	9.73	0.97	3.98	0.03	0.24
959	0.10	0.32	5.59	0.56	4.54	0.03	0.27
960	0.10	0.36	12.18	1.22	5.76	0.04	0.30
961	0.10	0.30	5.08	0.51	6.27	0.03	0.33
962	0.10	0.28	6.93	0.69	6.96	0.03	0.36
963	0.20	0.26	5.47	1.09	8.06	0.05	0.41
964	0.30	0.22	5.22	1.57	9.62	0.07	0.48
965	0.30	0.35	6.43	1.93	11.55	0.11	0.58
966	0.61	0.36	11.45	6.98	18.53	0.22	0.80
967	0.61	0.40	10.14	6.19	24.72	0.24	1.05
968	0.30	0.39	5.66	1.70	26.42	0.12	1.17
969	0.30	0.31	4.30	1.29	27.71	0.09	1.26
970	0.46	0.29	8.80	4.05	31.76	0.13	1.39
971	1.07	0.27	10.38	11.11	42.86	0.29	1.68
972	0.91	0.34	6.23	5.67	48.54	0.31	1.99
973	0.30	0.29	6.64	1.99	50.53	0.09	2.08
974	0.61	0.31	8.42	5.14	55.66	0.19	2.27
975	0.61	0.25	8.30	5.06	60.73	0.15	2.42
976	0.15	0.33	17.63	2.64	63.37	0.05	2.47

NVII22

Sample No.	Sample Interval Length (m)	Vol. Water Content (cu m/cu m)	Cl in Soil (g/cu m)	Cl in Soil (g/sq m)	Cum. Cl in Soil (g/sq m)	Vol. Water Cont. (m)	Cum. Vol. Wtr. Content (m)
979	0.15	0.07	8.41	1.26	1.26	0.01	0.01
980	0.10	0.15	124.93	12.49	13.75	0.01	0.03
981	0.10	0.25	114.62	11.46	25.22	0.02	0.05
982	0.10	0.23	67.59	6.76	31.98	0.02	0.07
983	0.56	0.22	130.29	72.96	104.94	0.12	0.20
984	0.66	0.37	91.01	60.07	165.00	0.24	0.44
985	0.30	0.46	74.50	22.35	187.35	0.14	0.58
986	0.61	0.32	27.86	17.00	204.35	0.20	0.77
987	0.61	0.24	5.71	3.49	207.84	0.15	0.92
988	0.30	0.34	4.59	1.38	209.21	0.10	1.02
989	0.30	0.26	8.62	2.59	211.80	0.08	1.10
990	0.46	0.21	7.66	3.53	215.33	0.10	1.20
991	0.46	0.30	9.72	4.47	219.80	0.14	1.34
992	0.30	0.12	7.38	2.21	222.01	0.04	1.37
993	0.61	0.14	10.32	6.30	228.31	0.09	1.46
994	0.61	0.38	17.46	10.65	238.96	0.23	1.69
995	0.76	0.23	11.05	8.40	247.36	0.17	1.86
996	0.61	0.19	23.16	14.13	261.48	0.12	1.98

NVII23

Sample No.	Sample Interval Length (m)	Vol. Water Content (cu m/cu m)	Cl in Soil (g/cu m)	Cl in Soil (g/sq m)	Cum. Cl in Soil (g/sq m)	Vol. Water Cont. (m)	Cum. Vol. Wtr. Content (m)
1011	0.19	0.10	3.12	0.59	0.59	0.02	0.02
1012	0.13	0.33	8.29	1.08	1.67	0.04	0.06
1013	0.13	0.37	7.60	0.99	2.66	0.05	0.11
1014	0.13	0.41	15.97	2.08	4.73	0.05	0.16
1015	0.13	0.38	16.40	2.13	6.87	0.05	0.21
1016	0.13	0.33	19.87	2.58	9.45	0.04	0.26
1017	0.13	0.34	29.93	3.89	13.34	0.04	0.30
1018	0.13	0.12	27.23	3.54	16.88	0.02	0.32
1019	0.25	0.31	59.89	14.97	31.85	0.08	0.39
1020	0.34	0.35	80.02	27.21	59.06	0.12	0.51
1021	0.30	0.36	86.11	25.83	84.89	0.11	0.62
1022	0.30	0.31	57.24	17.17	102.07	0.09	0.71
1023	0.46	0.32	70.13	32.26	134.33	0.15	0.86
1024	0.46	0.31	49.55	22.79	157.12	0.14	1.00
1025	0.30	0.31	55.61	16.68	173.80	0.09	1.10
1026	0.61	0.21	53.60	32.69	206.50	0.13	1.22
1027	0.61	0.25	128.95	78.66	285.16	0.15	1.38
1028	0.30	0.15	132.89	39.87	325.02	0.04	1.42
1029	0.15	0.07	20.85	3.13	328.15	0.01	1.43

NVII24

Sample No.	Sample Interval Length (m)	Vol. Water Content (cu m/cu m)	Cl in Soil (g/cu m)	Cl in Soil (g/sq m)	Cum. Cl in Soil (g/sq m)	Vol. Water Cont. (m)	Cum. Vol. Wtr. Content (m)
1032	0.15	0.53	4.41	0.66	0.66	0.08	0.08
1033	0.10	0.38	3.49	0.35	1.01	0.04	0.12
1034	0.10	0.29	6.44	0.64	1.66	0.03	0.15
1035	0.10	0.29	9.19	0.92	2.57	0.03	0.18
1036	0.10	0.35	8.33	0.83	3.41	0.04	0.21
1037	0.10	0.35	9.40	0.94	4.35	0.04	0.25
1038	0.10	0.30	12.38	1.24	5.59	0.03	0.28
1039	0.10	0.35	14.73	1.47	7.06	0.04	0.31
1040	0.10	0.34	15.38	1.54	8.60	0.03	0.34
1041	0.10	0.38	22.26	2.23	10.82	0.04	0.38
1042	0.10	0.34	25.98	2.60	13.42	0.03	0.42
1043	0.20	0.44	17.72	3.54	16.96	0.09	0.50
1044	0.30	0.35	17.51	5.25	22.22	0.11	0.61
1045	0.76	0.38	12.98	9.87	32.08	0.29	0.90
1046	0.76	0.28	9.51	7.22	39.31	0.21	1.11
1047	0.76	0.35	5.26	4.00	43.31	0.27	1.38
1048	0.76	0.28	8.45	6.42	49.73	0.21	1.59
1049	0.76	0.32	8.96	6.81	56.54	0.24	1.83
1050	0.76	0.18	4.14	3.15	59.68	0.14	1.97
1051	0.76	0.15	4.32	3.28	62.97	0.11	2.08
1052	0.76	0.30	10.16	7.72	70.69	0.23	2.31
1053	0.30	0.14	4.86	1.46	72.15	0.04	2.35
1054	0.61	0.21	6.60	4.02	76.17	0.13	2.48
1056	0.61	0.18	5.16	3.15	79.32	0.11	2.59
1057	0.76	0.20	5.36	4.07	83.39	0.15	2.74
1059	0.76	0.28	4.46	3.39	86.79	0.21	2.96
1060	0.76	0.13	26.12	19.85	106.64	0.10	3.06
1061	0.76	0.09	8.90	6.76	113.40	0.07	3.12
1062	0.76	0.27	14.66	11.14	124.54	0.21	3.33
1063	0.76	0.27	4.17	3.17	127.71	0.21	3.53
1064	0.30	0.28	5.01	1.50	129.21	0.08	3.62
1065	0.61	0.22	5.54	3.38	132.59	0.13	3.75
1066	0.61	0.39	19.25	11.74	144.33	0.24	3.99
1067	0.30	0.36	6.29	1.89	146.21	0.11	4.10
1068	0.30	0.43	15.89	4.77	150.98	0.13	4.23
1069	0.46	0.39	25.16	11.57	162.55	0.18	4.41
1070	0.46	0.50	24.38	11.21	173.77	0.23	4.64
1071	0.30	0.50	38.72	11.61	185.38	0.15	4.79
1072	0.30	0.49	70.18	21.05	206.44	0.15	4.93
1073	0.46	0.24	51.70	23.78	230.22	0.11	5.04
1074	0.46	0.16	30.96	14.24	244.46	0.07	5.12
1075	0.76	0.42	63.30	48.11	292.57	0.32	5.44
1076	0.76	0.13	61.37	46.64	339.21	0.10	5.54
1077	1.22	0.13	17.73	21.64	360.85	0.16	5.69
1081	1.37	0.30	15.06	20.64	381.49	0.41	6.11
1083	0.30	0.08	16.83	5.05	386.53	0.02	6.13

NVII25

Sample No.	Sample Interval Length (m)	Vol. Water Content (cu m/cu m)	Cl in Soil (g/cu m)	Cl in Soil (g/sq m)	Cum. Cl in Soil (g/sq m)	Vol. Water Cont. (m)	Cum. Vol. Wtr. Content (m)
1084	0.46	0.33	2.17	1.00	1.00	0.15	0.15
1085	0.30	0.40	2.13	0.64	1.64	0.12	0.27
1086	0.30	0.36	2.59	0.78	2.41	0.11	0.38
1087	0.30	0.39	2.73	0.82	3.23	0.12	0.50
1088	0.30	0.38	3.39	1.02	4.25	0.11	0.61
1089	0.30	0.35	3.72	1.12	5.36	0.11	0.72
1090	0.30	0.16	2.94	0.88	6.25	0.05	0.76
1091	0.46	0.34	5.42	2.49	8.74	0.16	0.92
1092	0.46	0.45	5.30	2.44	11.18	0.21	1.13
1093	0.30	0.36	4.26	1.28	12.45	0.11	1.24
1094	0.30	0.23	45.46	13.64	26.09	0.07	1.30
1095	0.30	0.44	5.38	1.61	27.71	0.13	1.44
1096	0.30	0.31	4.24	1.27	28.98	0.09	1.53
1097	0.30	0.32	5.35	1.61	30.58	0.10	1.63
1098	0.30	0.27	4.92	1.48	32.06	0.08	1.71
1099	0.61	0.23	5.64	3.44	35.50	0.14	1.85
1100	0.61	0.32	5.30	3.23	38.73	0.20	2.04
1101	0.30	0.24	4.82	1.45	40.18	0.07	2.11
1102	0.61	0.21	5.67	3.46	43.64	0.13	2.24
1103	0.61	0.25	5.77	3.52	47.16	0.15	2.39
1104	0.30	0.25	6.05	1.81	48.98	0.07	2.47
1105	0.61	0.22	4.95	3.02	52.00	0.13	2.60
1106	0.61	0.29	4.01	2.45	54.45	0.18	2.78
1107	0.30	0.21	4.50	1.35	55.80	0.06	2.84
1108	0.61	0.32	4.55	2.78	58.58	0.20	3.04
1109	0.61	0.30	7.85	4.79	63.36	0.18	3.22
1110	0.30	0.29	7.30	2.19	65.55	0.09	3.31
1111	0.61	0.30	7.88	4.81	70.36	0.18	3.49
1112	0.61	0.36	8.76	5.35	75.71	0.22	3.71
1113	0.30	0.34	10.68	3.20	78.91	0.10	3.81
1114	0.61	0.31	9.10	5.55	84.46	0.19	4.00
1115	0.61	0.34	10.49	6.40	90.86	0.21	4.21
1116	0.30	0.31	8.21	2.46	93.32	0.09	4.30
1117	0.30	0.31	5.60	1.68	95.00	0.09	4.40
1118	0.46	0.18	4.09	1.88	96.88	0.08	4.48
1119	0.46	0.13	3.46	1.59	98.47	0.06	4.54
1120	0.30	0.21	12.95	3.88	102.36	0.06	4.60
1121	0.30	0.20	31.65	9.49	111.85	0.06	4.66
1122	0.46	0.19	18.23	8.38	120.24	0.09	4.75
1123	0.46	0.15	27.05	12.44	132.68	0.07	4.82
1124	0.30	0.35	157.51	47.25	179.94	0.11	4.92
1125	0.61	0.28	37.63	22.96	202.89	0.17	5.09
1126	0.61	0.19	60.12	36.67	239.56	0.12	5.21
1127	0.30	0.16	54.75	16.42	255.99	0.05	5.26
1128	0.15	0.29	136.09	20.41	276.40	0.04	5.30
1129	0.76	0.22	6.09	4.62	281.03	0.17	5.47
1131	0.91	0.18	5.74	5.23	286.25	0.16	5.63

1132	0.30	0.21	8.00	2.40	288.65	0.06	5.69
1133	0.30	0.22	9.96	2.99	291.64	0.07	5.76
1134	0.61	0.35	10.22	6.24	297.88	0.21	5.97
1137	0.61	0.17	10.54	6.43	304.31	0.10	6.08
1138	0.15	0.12	13.36	2.00	306.31	0.02	6.10

NVII26

Sample No.	Sample Interval Length (m)	Vol. Water Content (cu m/cu m)	Cl in Soil (g/cu m)	Cl in Soil (g/sq m)	Cum. Cl in Soil (g/sq m)	Vol. Water Cont. (m)	Cum. Vol. Wtr. Content (m)
1139	0.15	0.20	1.73	0.26	0.26	0.03	0.03
1140	0.10	0.25	2.84	0.28	0.54	0.02	0.05
1141	0.10	0.34	3.72	0.37	0.92	0.03	0.09
1142	0.10	0.36	31.68	3.17	4.08	0.04	0.13
1143	0.10	0.13	153.59	15.36	19.44	0.01	0.14
1144	0.10	0.08	104.71	10.47	29.91	0.01	0.15
1145	0.10	0.11	78.85	7.88	37.80	0.01	0.16
1146	0.10	0.07	41.86	4.19	41.98	0.01	0.16
1147	0.36	0.09	36.99	13.32	55.30	0.03	0.20
1148	0.46	0.06	12.77	5.87	61.17	0.03	0.22
1149	0.30	0.08	14.96	4.49	65.66	0.02	0.25
1150	0.61	0.06	9.28	5.66	71.32	0.04	0.28
1151	0.61	0.09	4.41	2.69	74.01	0.05	0.34
1152	0.30	0.04	2.98	0.89	74.90	0.01	0.35
1153	0.53	0.10	5.18	2.74	77.65	0.05	0.40
1154	0.46	0.21	7.43	3.42	81.07	0.10	0.50
1155	0.23	0.35	5.15	1.18	82.25	0.08	0.58
1156	0.30	0.29	6.28	1.88	84.13	0.09	0.67
1157	0.61	0.25	9.74	5.94	90.08	0.15	0.82
1158	0.61	0.33	8.58	5.23	95.31	0.20	1.02
1159	0.30	0.29	10.84	3.25	98.56	0.09	1.11
1160	0.30	0.29	10.08	3.02	101.59	0.09	1.20
1161	0.30	0.26	10.00	3.00	104.59	0.08	1.27
1162	0.15	0.26	11.64	1.75	106.34	0.04	1.31

NVII27

Sample No.	Sample Interval Length (m)	Vol. Water Content (cu m/cu m)	Cl in Soil (g/cu m)	Cl in Soil (g/sq m)	Cum. Cl in Soil (g/sq m)	Vol. Water Cont. (m)	Cum. Vol. Wtr. Content (m)
1163	0.30	0.20	12.55	3.76	3.76	0.06	0.06
1164	0.30	0.35	221.83	66.55	70.31	0.11	0.17
1165	0.30	0.46	138.17	41.45	111.77	0.14	0.30
1166	0.30	0.38	56.78	17.03	128.80	0.11	0.42
1167	0.30	0.49	21.37	6.41	135.21	0.15	0.56
1168	0.30	1.08	38.09	11.43	146.64	0.32	0.89
1169	0.61	0.67	21.99	13.41	160.05	0.41	1.30
1170	0.61	0.31	10.47	6.39	166.44	0.19	1.49
1171	0.30	0.23	6.31	1.89	168.33	0.07	1.55
1172	0.38	0.24	8.99	3.42	171.75	0.09	1.65
1173	0.38	0.26	10.05	3.82	175.57	0.10	1.74
1174	0.30	0.26	7.76	2.33	177.90	0.08	1.82
1175	0.30	0.30	7.99	2.40	180.29	0.09	1.91
1176	0.30	0.53	15.21	4.56	184.86	0.16	2.07
1177	0.30	0.50	11.88	3.57	188.42	0.15	2.22
1178	0.30	0.50	13.99	4.20	192.62	0.15	2.37
1179	0.15	0.37	9.85	1.48	194.09	0.06	2.43

NVII28

Sample No.	Sample Interval Length (m)	Vol. Water Content (cu m/cu m)	Cl in Soil (g/cu m)	Cl in Soil (g/sq m)	Cum. Cl in Soil (g/sq m)	Vol. Water Cont. (m)	Cum. Vol. Wtr. Content (m)
1180	0.30	0.49	17.50	5.25	5.25	0.15	0.15
1181	0.30	0.40	35.05	10.51	15.77	0.12	0.27
1182	0.30	0.34	39.26	11.78	27.54	0.10	0.37
1183	0.46	0.41	34.24	15.75	43.29	0.19	0.56
1184	0.46	0.36	22.61	10.40	53.69	0.17	0.72
1185	0.30	0.33	16.26	4.88	58.57	0.10	0.82
1186	0.30	0.32	17.53	5.26	63.83	0.10	0.92
1187	0.30	0.34	21.29	6.39	70.21	0.10	1.02
1188	0.30	0.34	21.36	6.41	76.62	0.10	1.12
1189	0.30	0.35	18.26	5.48	82.10	0.11	1.23
1190	0.38	0.33	16.18	6.15	88.25	0.13	1.35
1191	0.38	0.39	10.86	4.13	92.38	0.15	1.50
1192	0.30	0.37	5.87	1.76	94.14	0.11	1.61
1193	0.30	0.32	5.96	1.79	95.93	0.10	1.71
1194	0.30	0.35	9.53	2.86	98.79	0.11	1.81
1195	0.61	0.29	7.80	4.76	103.54	0.18	1.99
1196	0.61	0.35	3.92	2.39	105.93	0.21	2.20
1197	0.30	0.26	3.44	1.03	106.96	0.08	2.28
1198	0.30	0.38	6.25	1.88	108.84	0.11	2.40
1199	0.15	0.42	6.76	1.01	109.85	0.06	2.46

NVII29

Sample No.	Sample Interval Length (m)	Vol. Water Content (cu m/cu m)	Cl in Soil (g/cu m)	Cl in Soil (g/sq m)	Cum. Cl in Soil (g/sq m)	Vol. Water Cont. (m)	Cum. Vol. Wtr. Content (m)
1200	0.15	0.26	31.08	4.66	4.66	0.04	0.04
1201	0.10	0.24	65.94	6.59	11.26	0.02	0.06
1202	0.10	0.23	58.31	5.83	17.09	0.02	0.09
1203	0.10	0.19	13.28	1.33	18.41	0.02	0.11
1204	0.10	0.21	6.50	0.65	19.06	0.02	0.13
1205	0.10	0.23	14.95	1.49	20.56	0.02	0.15
1206	0.46	0.18	19.61	9.02	29.58	0.08	0.23
1207	0.56	0.21	33.77	18.91	48.49	0.12	0.35
1208	0.76	0.23	71.63	54.44	102.93	0.17	0.52
1210	0.76	0.14	10.54	8.01	110.94	0.11	0.63
1211	0.91	0.17	12.96	11.79	122.73	0.15	0.79
1214	0.91	0.15	33.13	30.14	152.88	0.14	0.92
1215	0.76	0.16	35.47	26.96	179.84	0.12	1.04
1217	1.98	0.15	68.39	135.41	315.24	0.30	1.34
1218	1.52	0.21	7.90	12.01	327.26	0.32	1.66
1219	0.76	0.14	76.68	58.28	385.54	0.11	1.77
1220	0.76	0.16	76.85	58.41	443.94	0.12	1.89
1221	0.30	0.16	78.24	23.47	467.42	0.05	1.94
1222	0.61	0.17	91.36	55.73	523.15	0.10	2.04
1223	0.61	0.16	87.18	53.18	576.33	0.10	2.14
1224	0.30	0.16	129.68	38.91	615.23	0.05	2.18
1225	0.61	0.34	184.09	112.29	727.53	0.21	2.39
1226	0.61	0.44	133.05	81.16	808.69	0.27	2.66
1227	0.30	0.09	186.83	56.05	864.74	0.03	2.69
1228	0.61	0.10	228.81	139.58	1004.31	0.06	2.75
1229	0.61	0.05	145.79	88.93	1093.25	0.03	2.78
1230	0.30	0.06	189.85	56.96	1150.20	0.02	2.80
1231	0.61	0.10	207.50	126.58	1276.78	0.06	2.86
1232	0.61	0.27	179.48	109.48	1386.26	0.16	3.02
1233	0.30	0.08	89.63	26.89	1413.15	0.02	3.05
1234	0.61	0.04	127.82	77.97	1491.12	0.02	3.07
1235	0.61	0.02	90.41	55.15	1546.27	0.01	3.08
1236	0.76	0.11	23.78	18.08	1564.35	0.08	3.17
1237	0.76	0.21	13.04	9.91	1574.26	0.16	3.33
1238	0.30	0.15	11.54	3.46	1577.73	0.04	3.37
1239	0.30	0.13	8.35	2.50	1580.23	0.04	3.41
1240	0.46	0.16	15.52	7.14	1587.37	0.07	3.48
1242	0.46	0.21	17.39	8.00	1595.37	0.10	3.58
1243	0.30	0.20	14.53	4.36	1599.73	0.06	3.64
1244	0.30	0.11	7.70	2.31	1602.04	0.03	3.67
1245	0.30	0.13	10.65	3.19	1605.23	0.04	3.71
1246	0.15	0.09	7.91	1.19	1606.42	0.01	3.73

APPENDIX H

CUMULATIVE CHLORIDE VS CUMULATIVE WATER PLOTS

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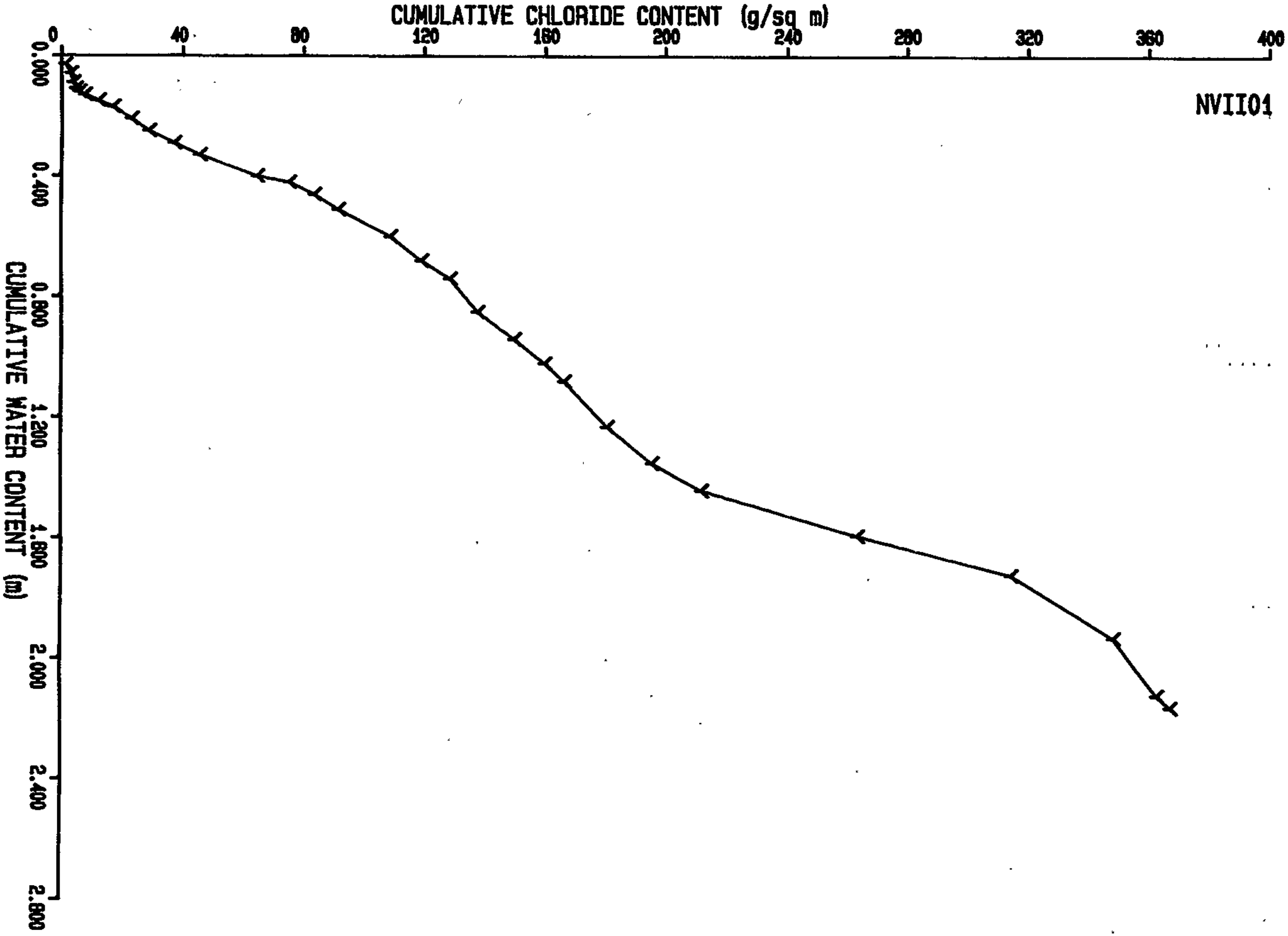

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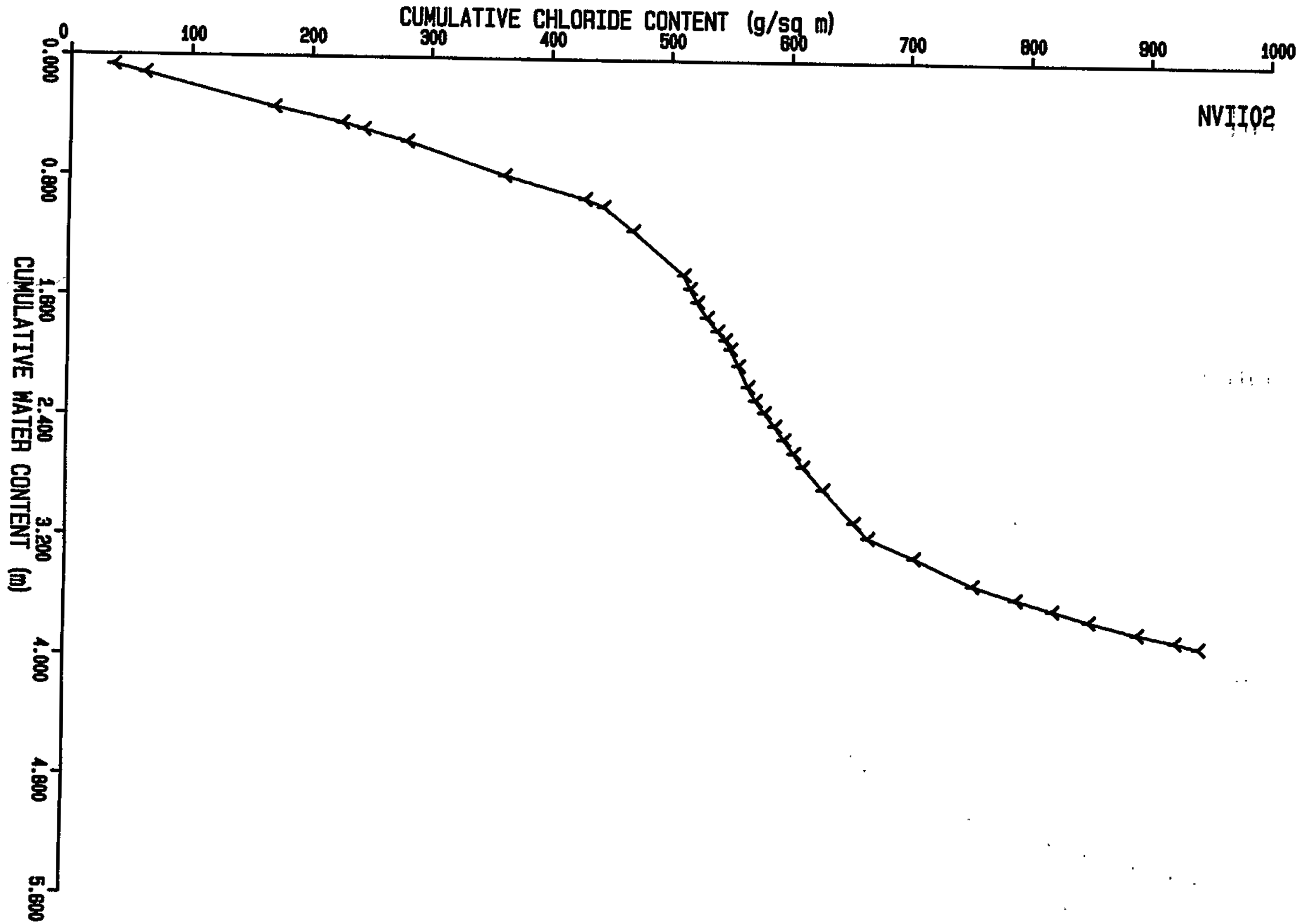

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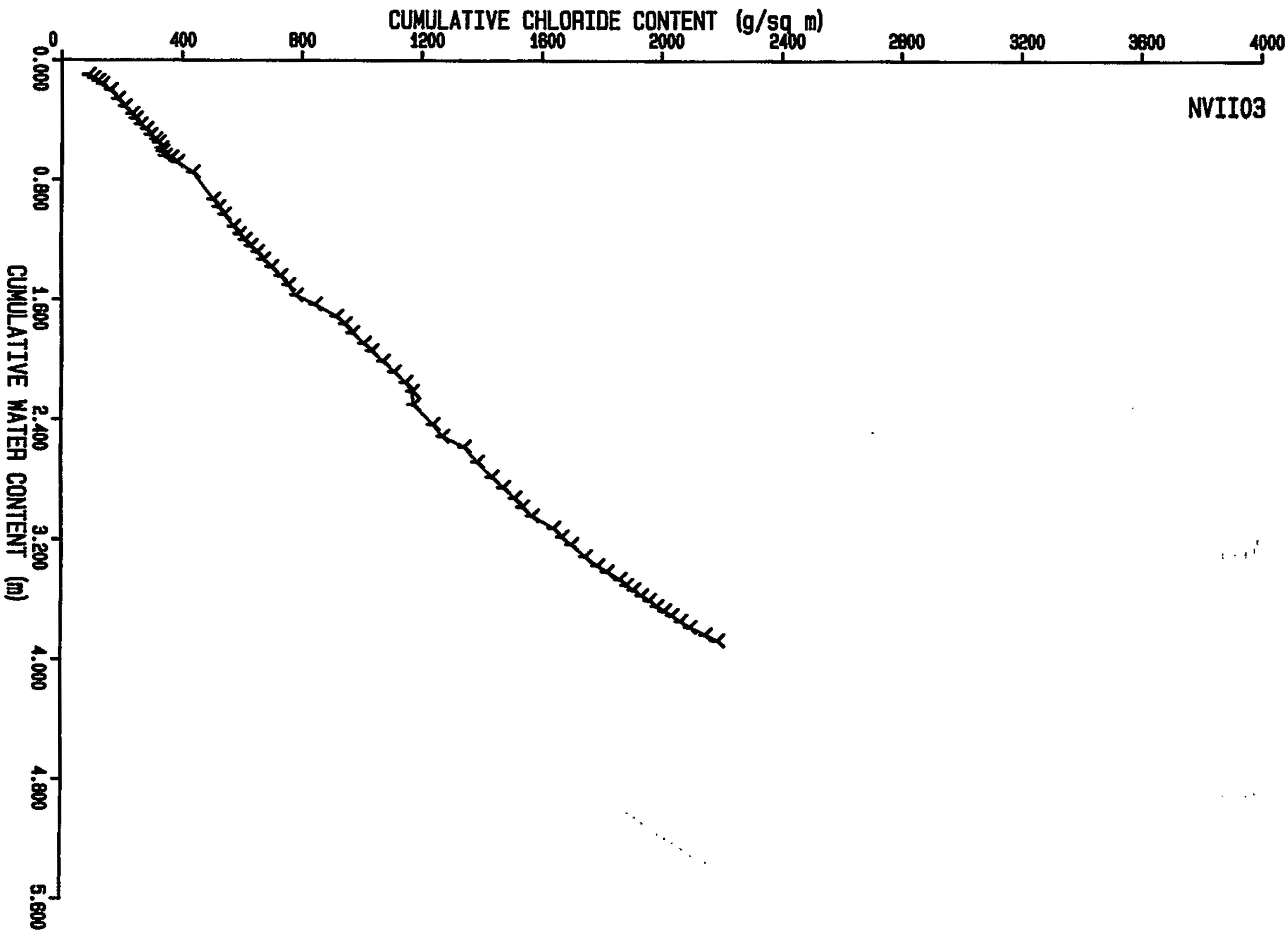

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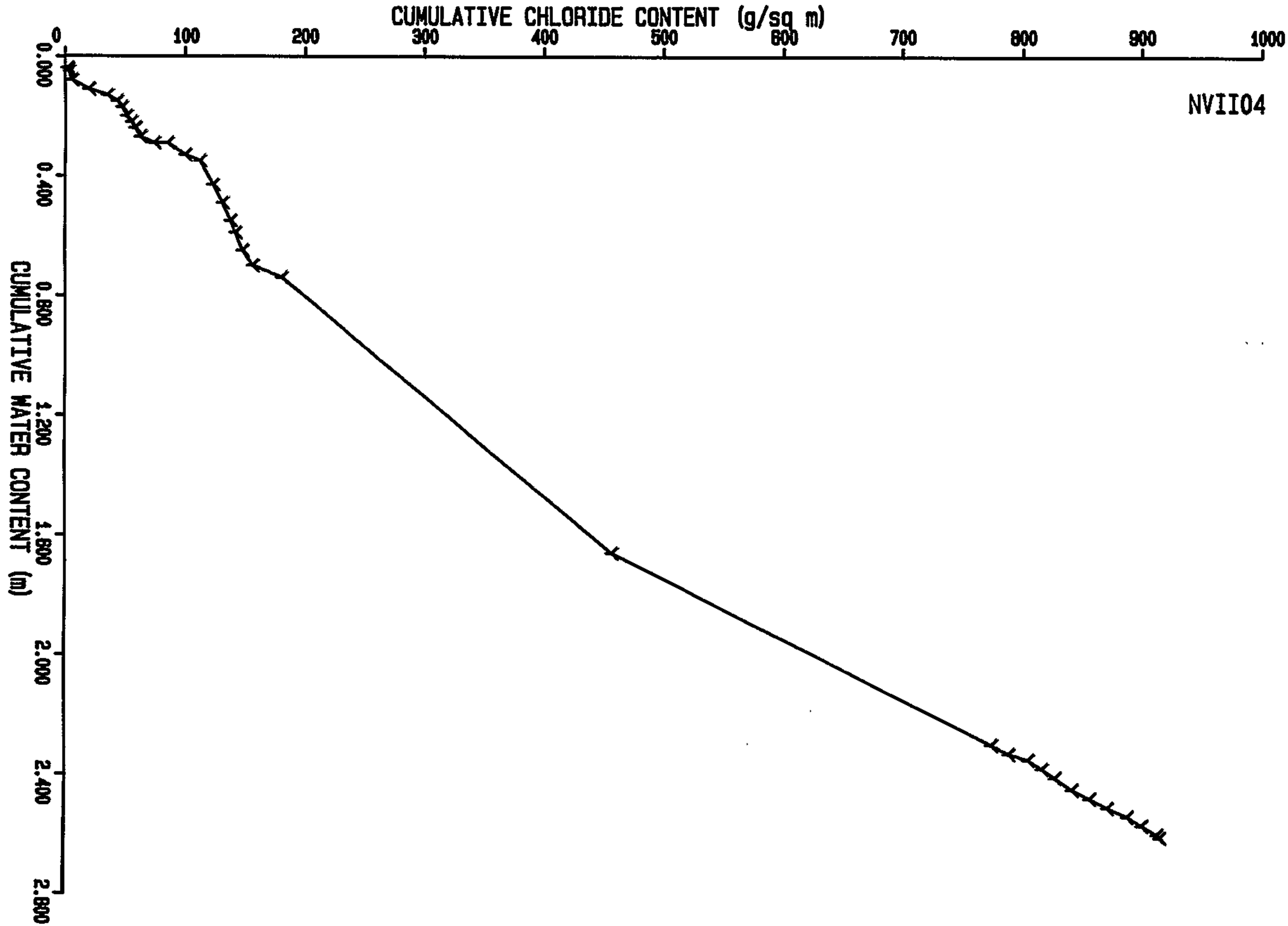

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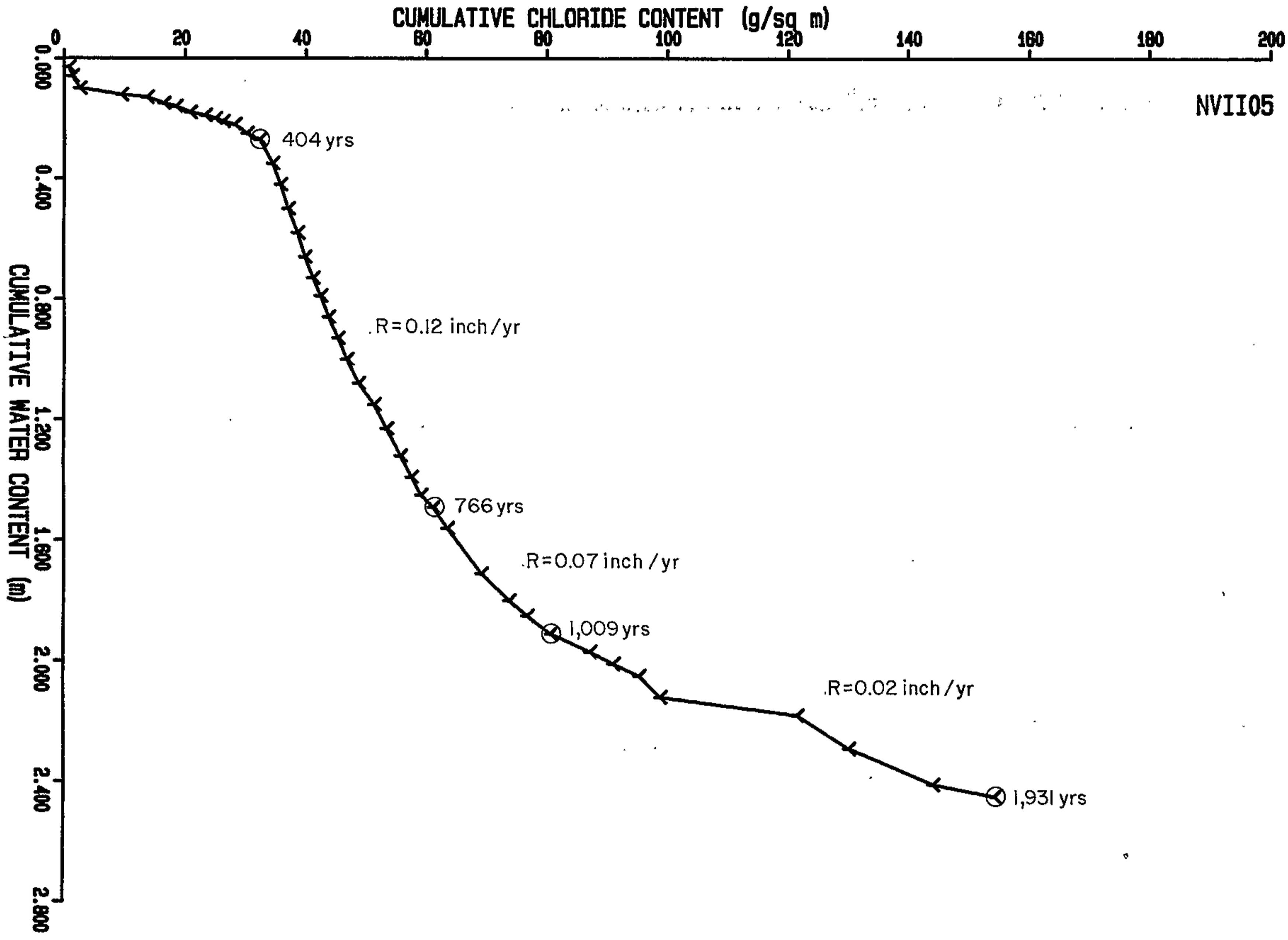

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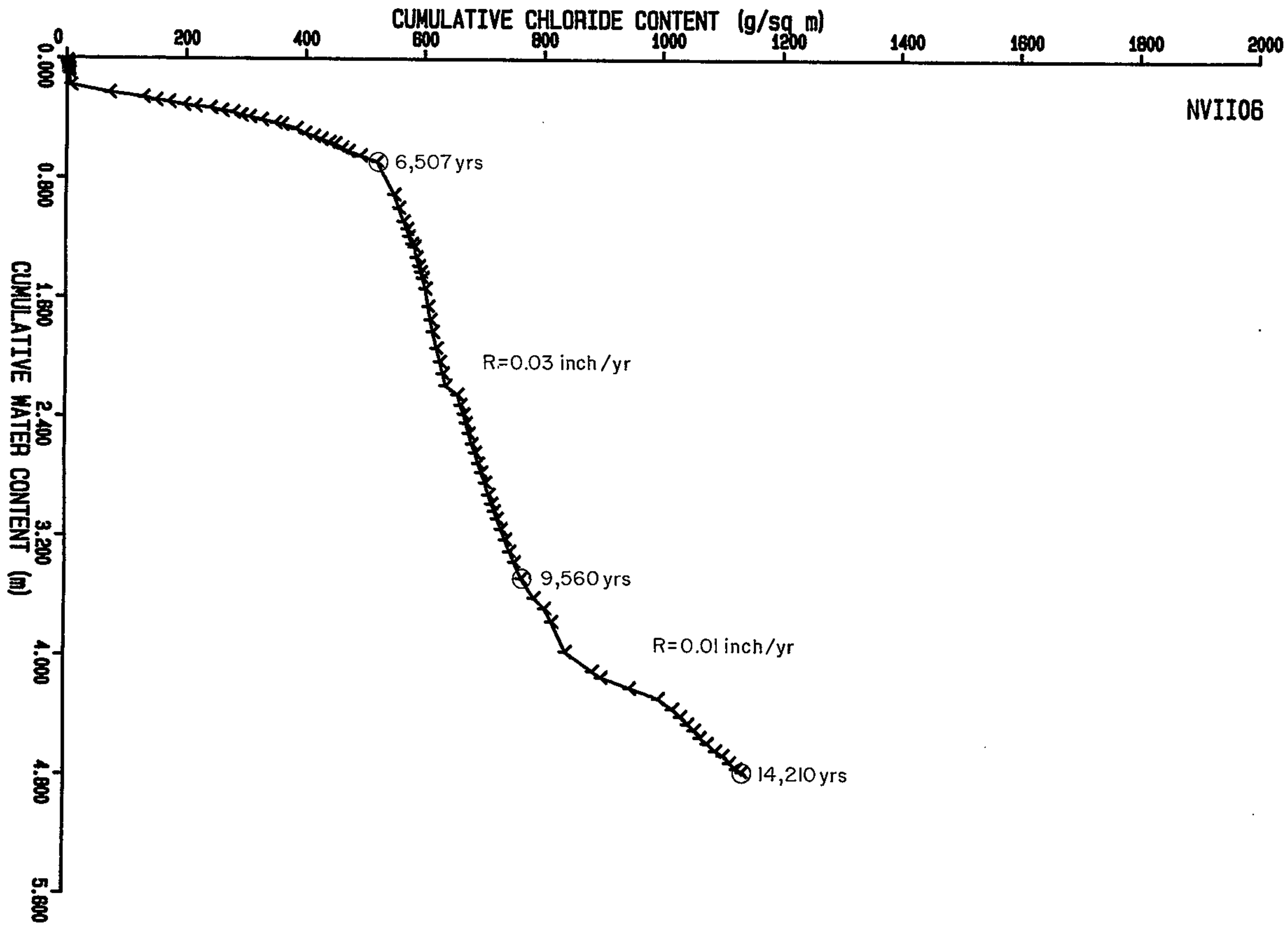

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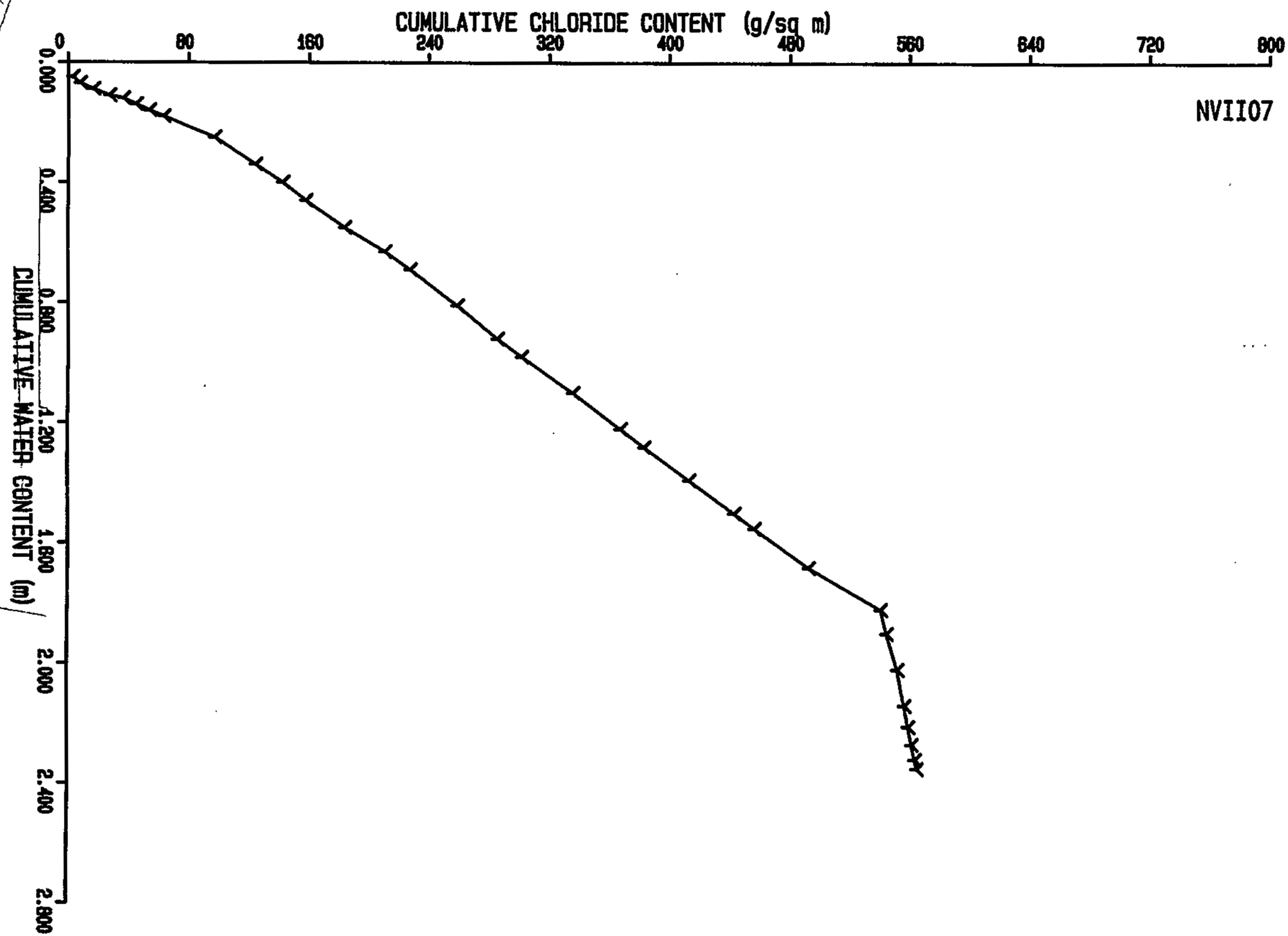

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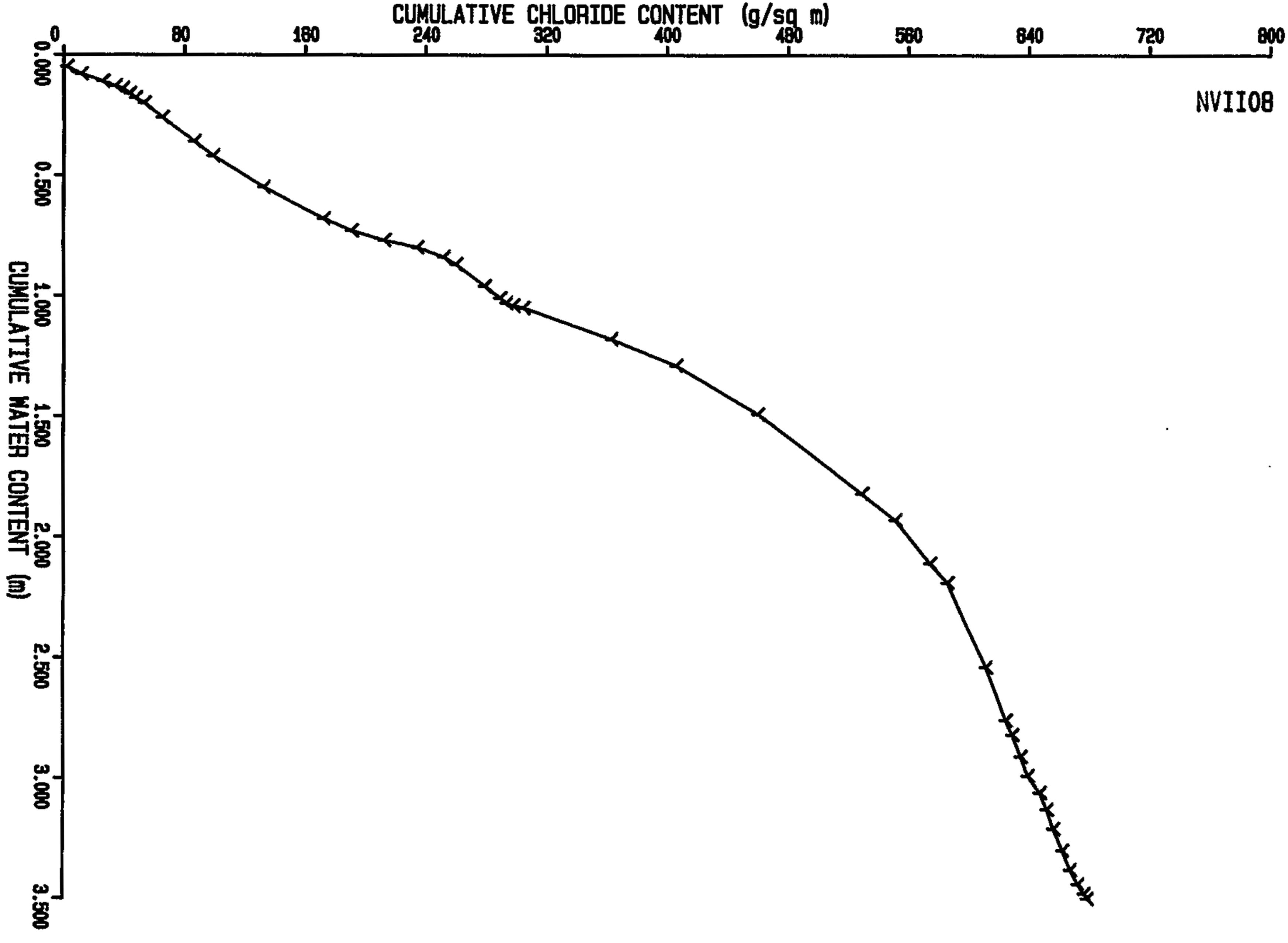

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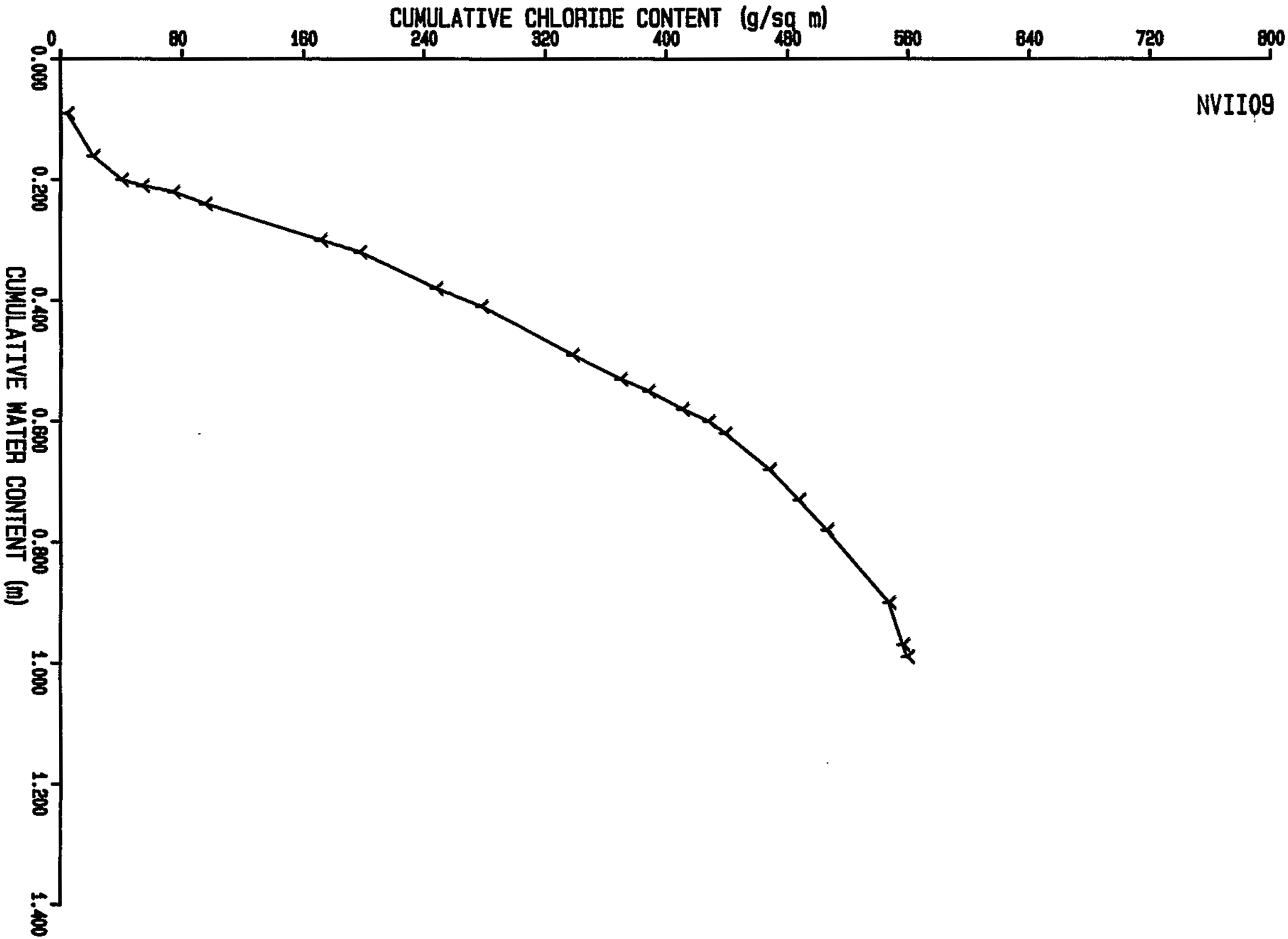

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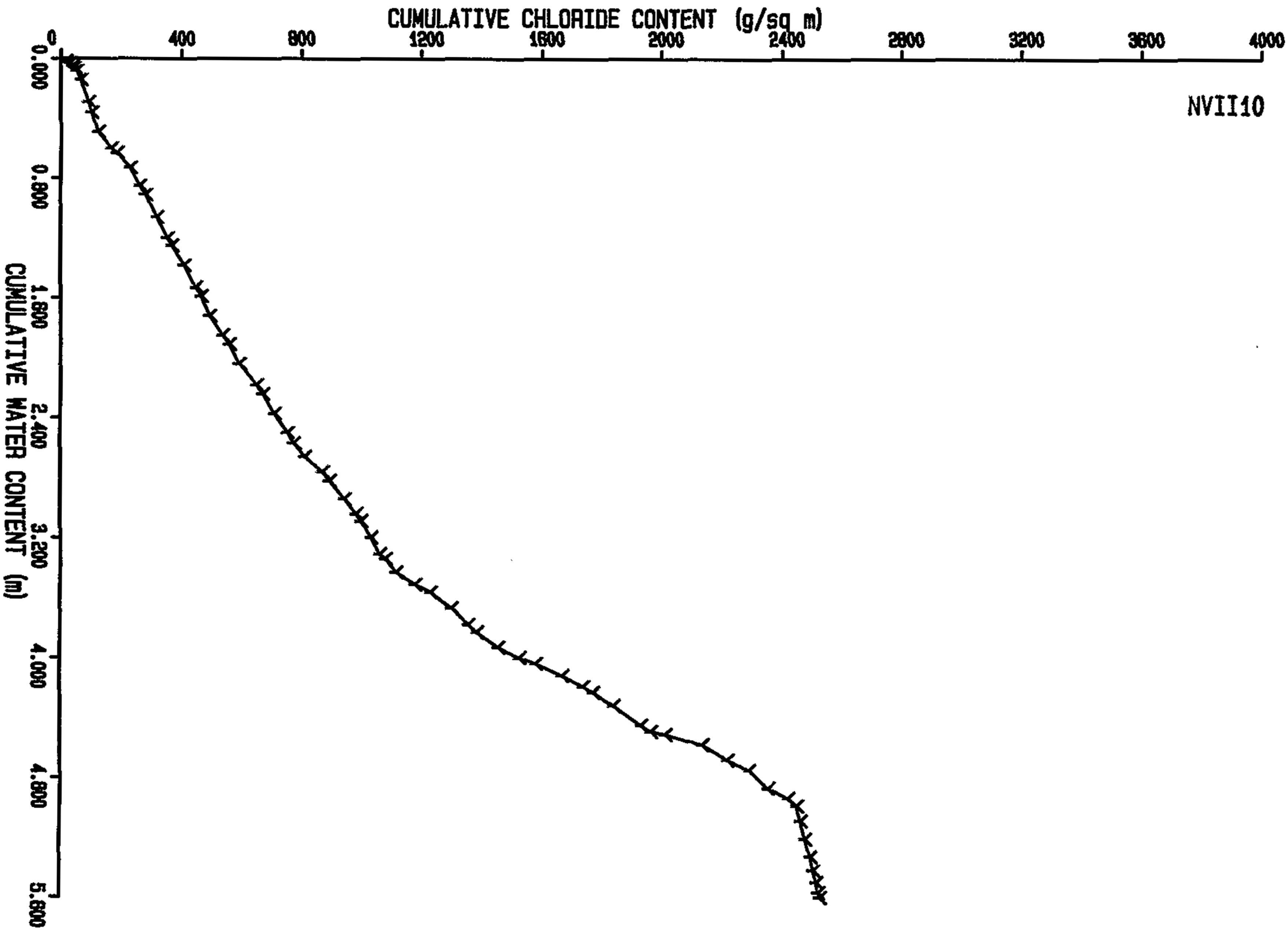

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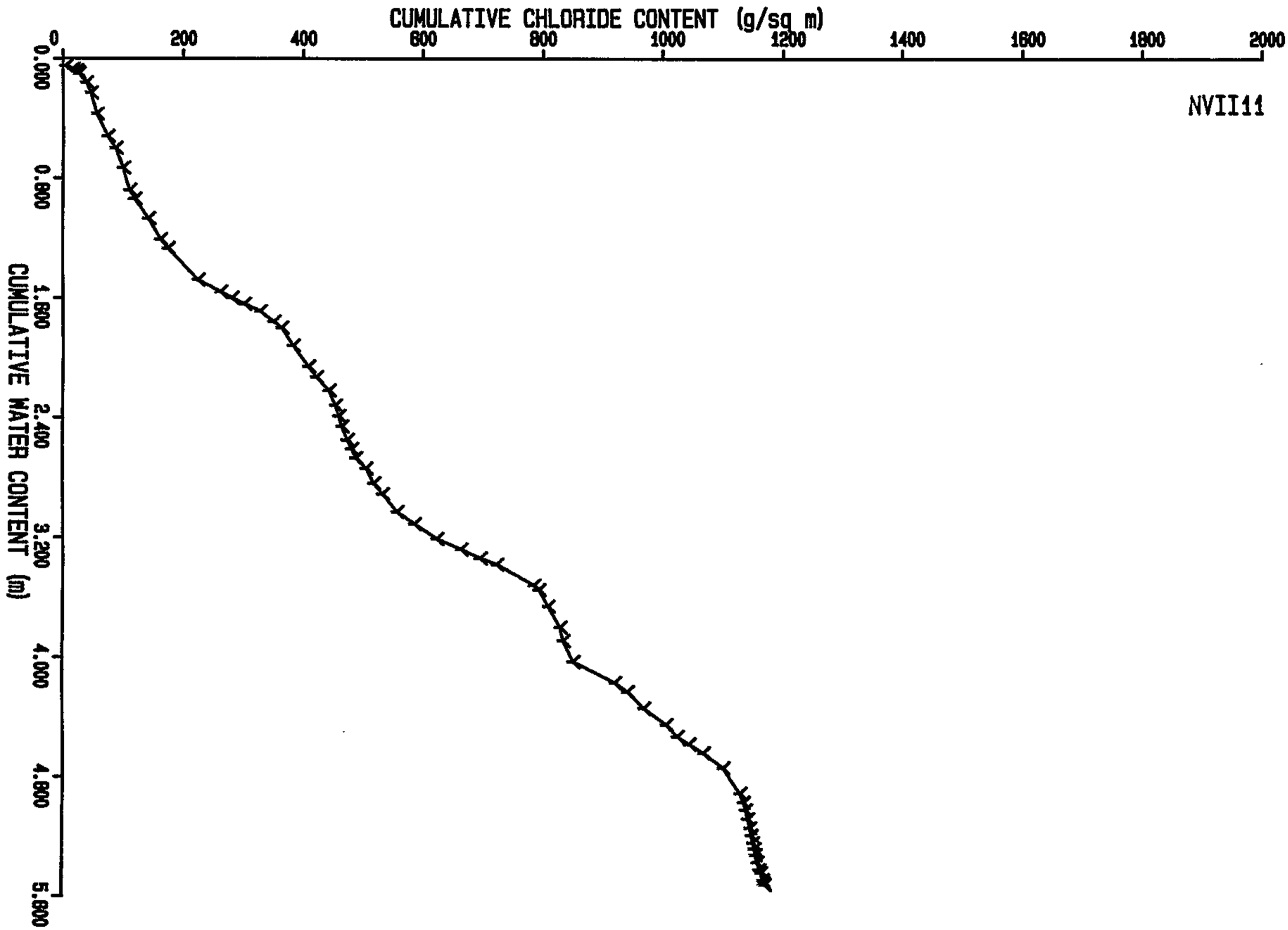

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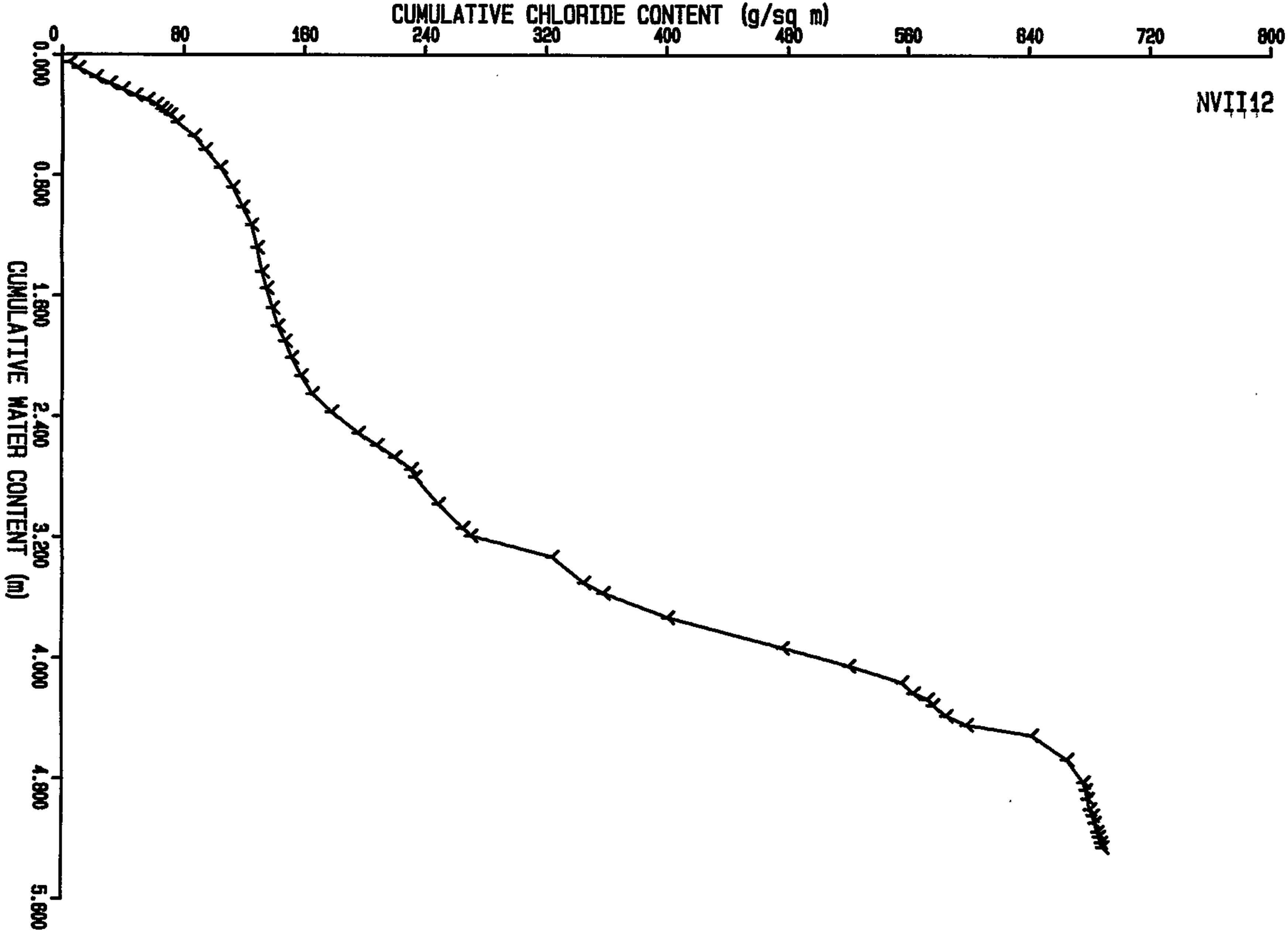

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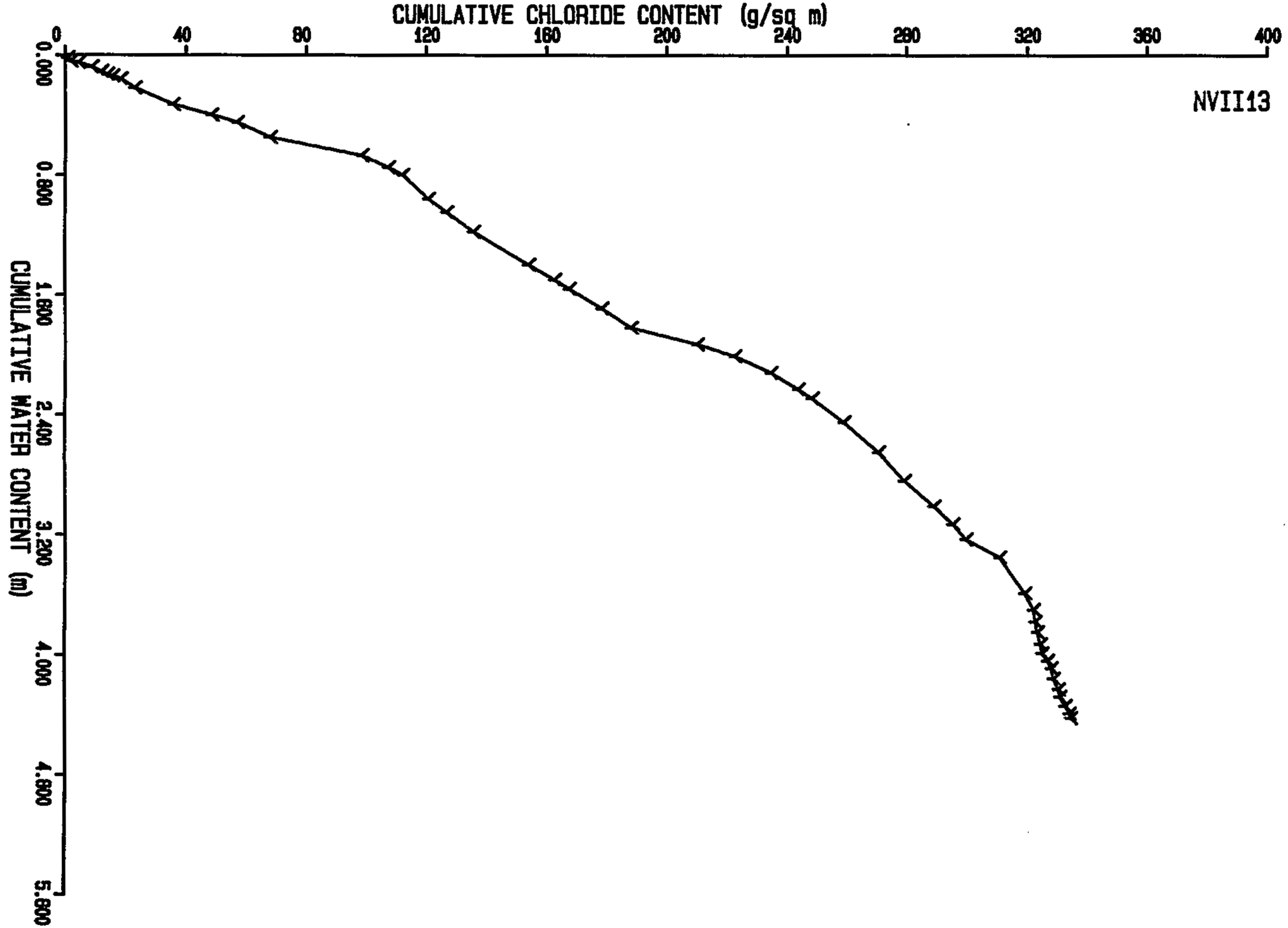

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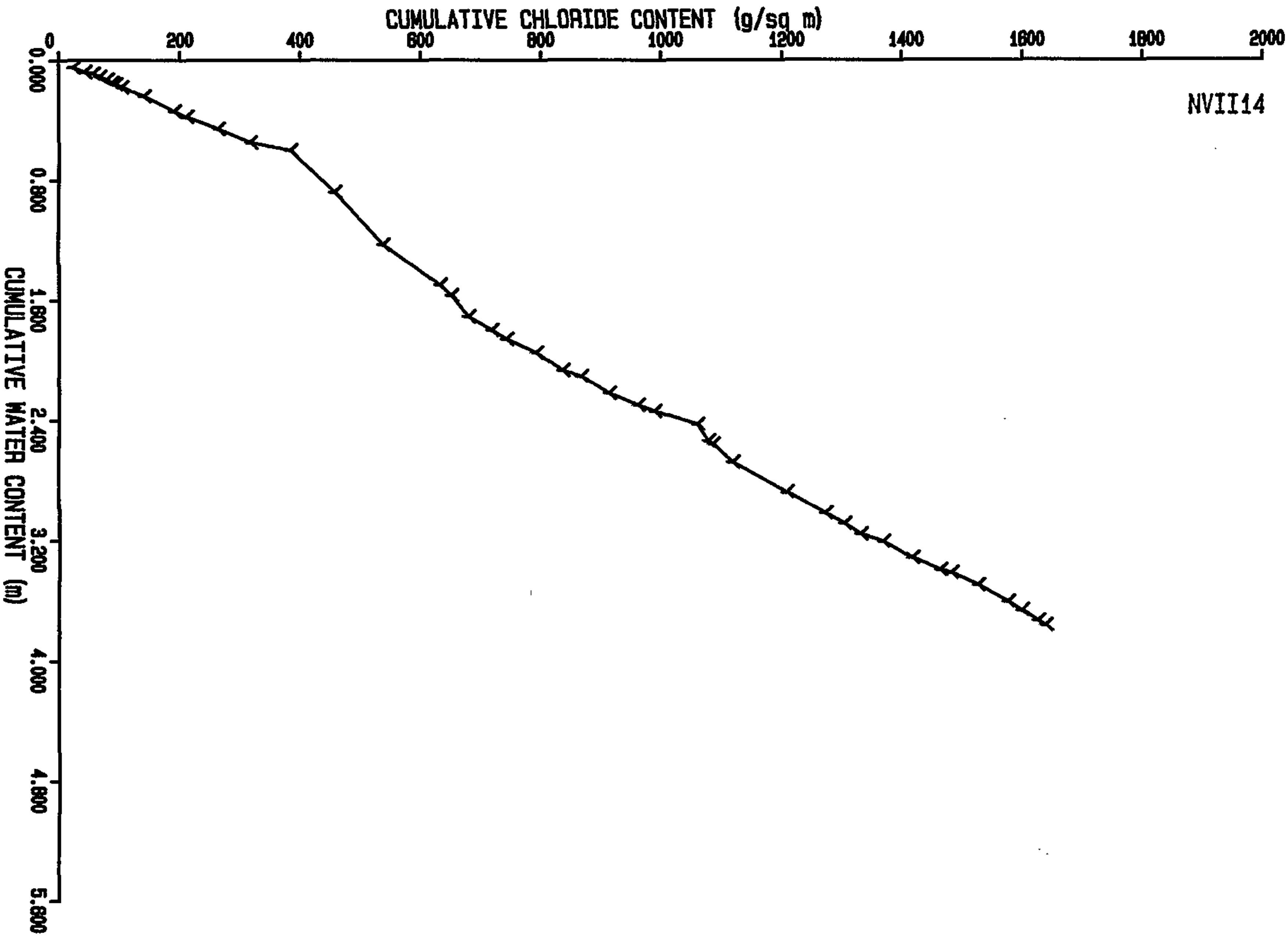

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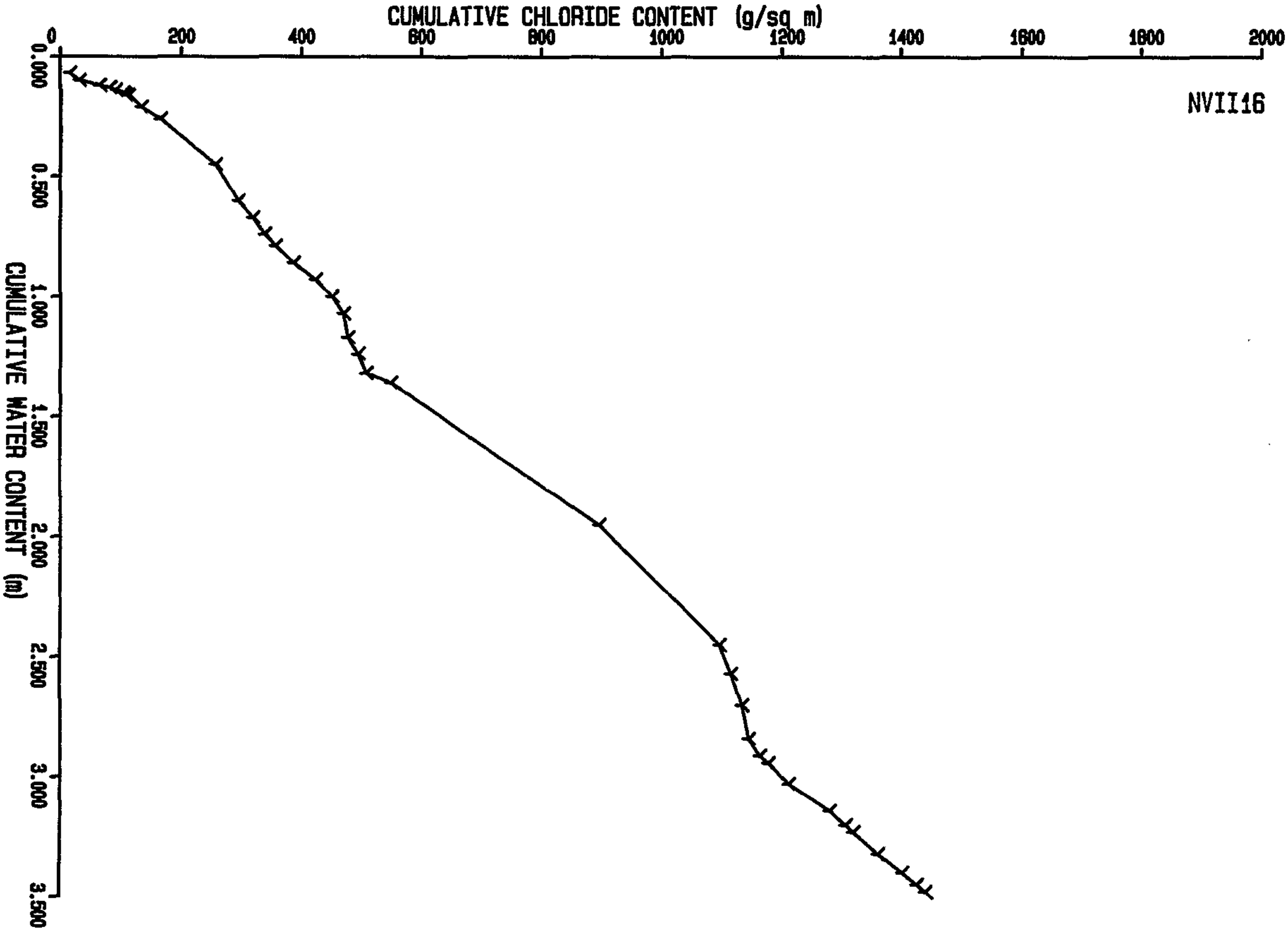

18-Apr-86 14:00:09
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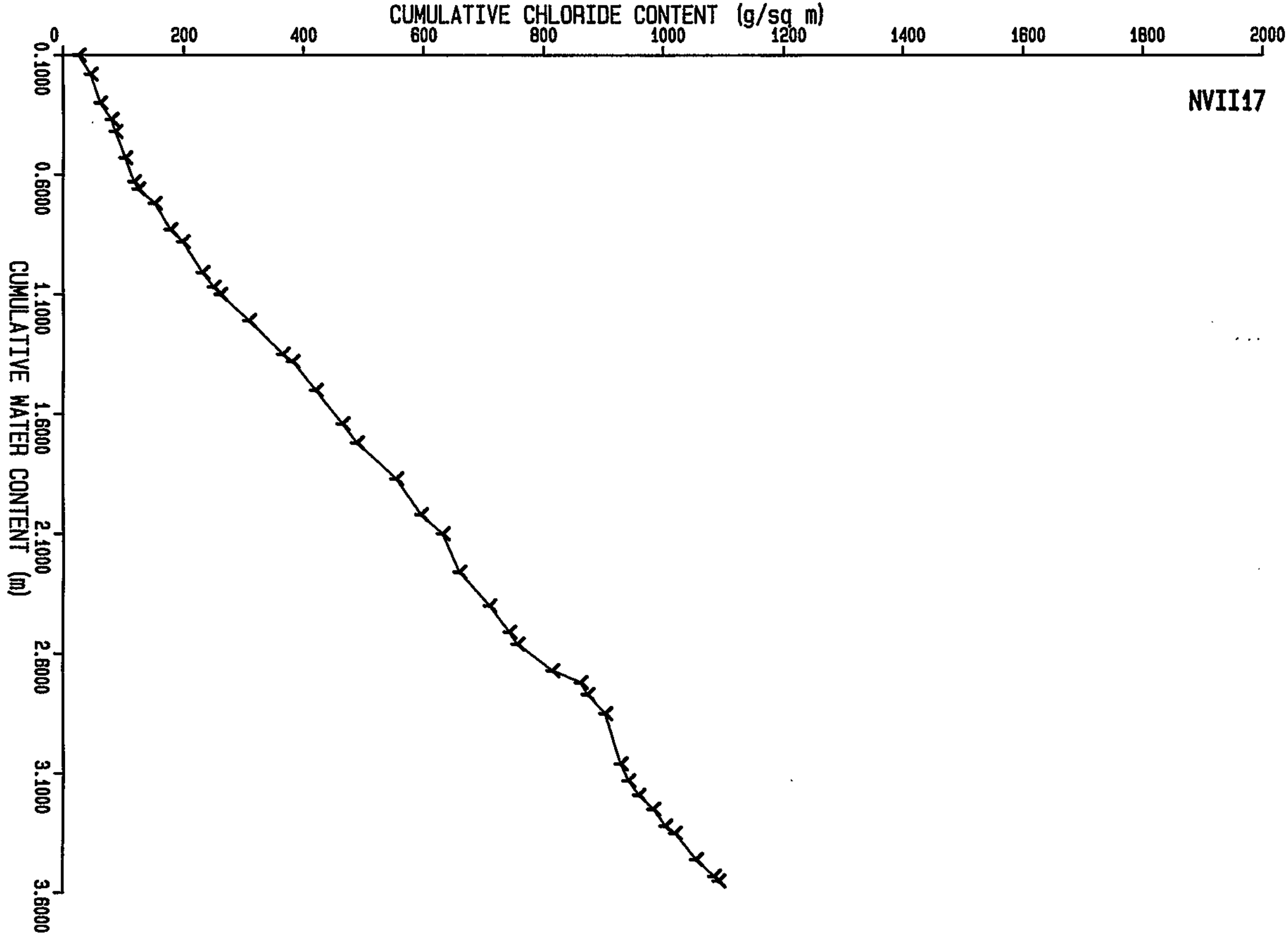

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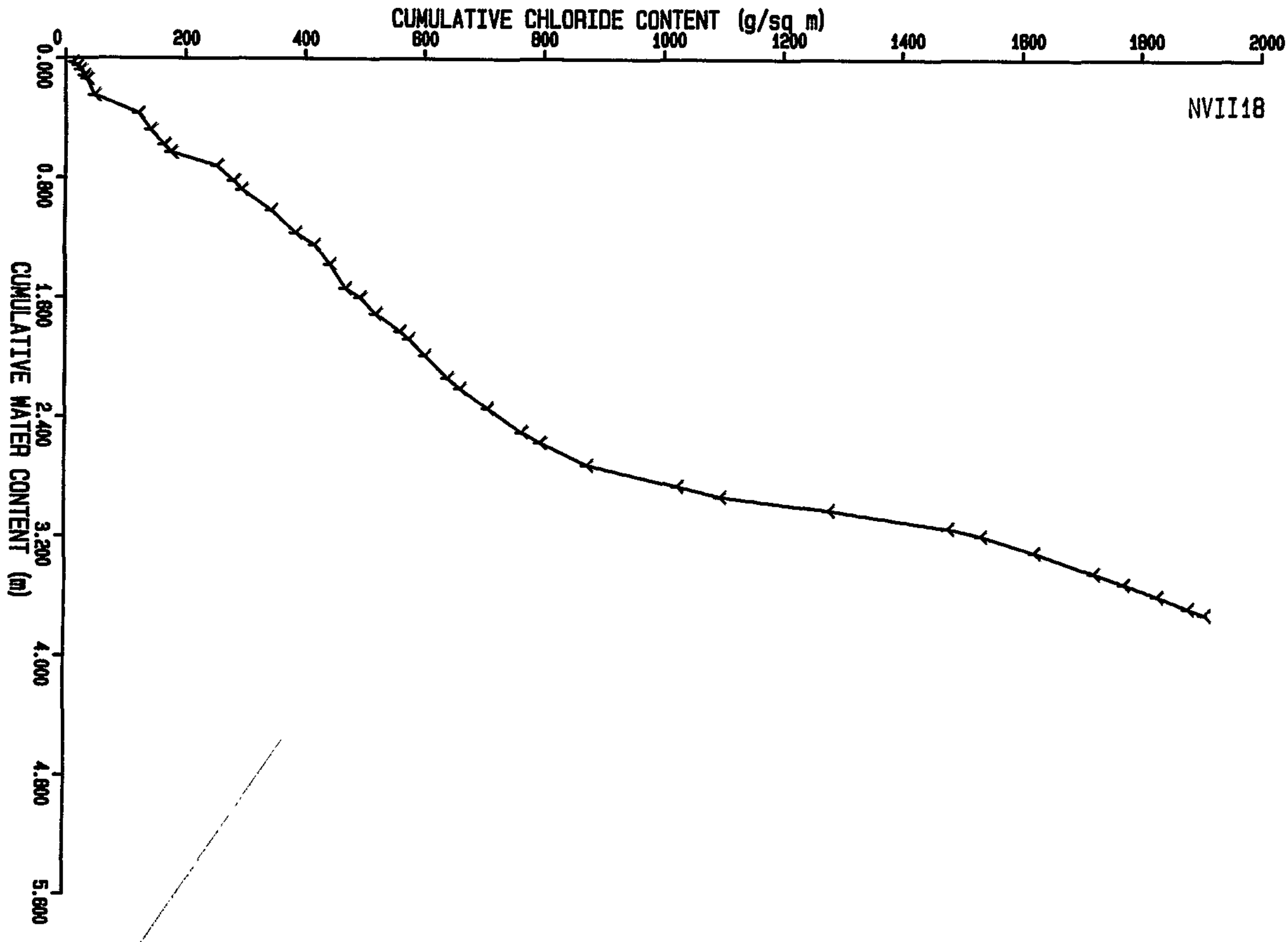

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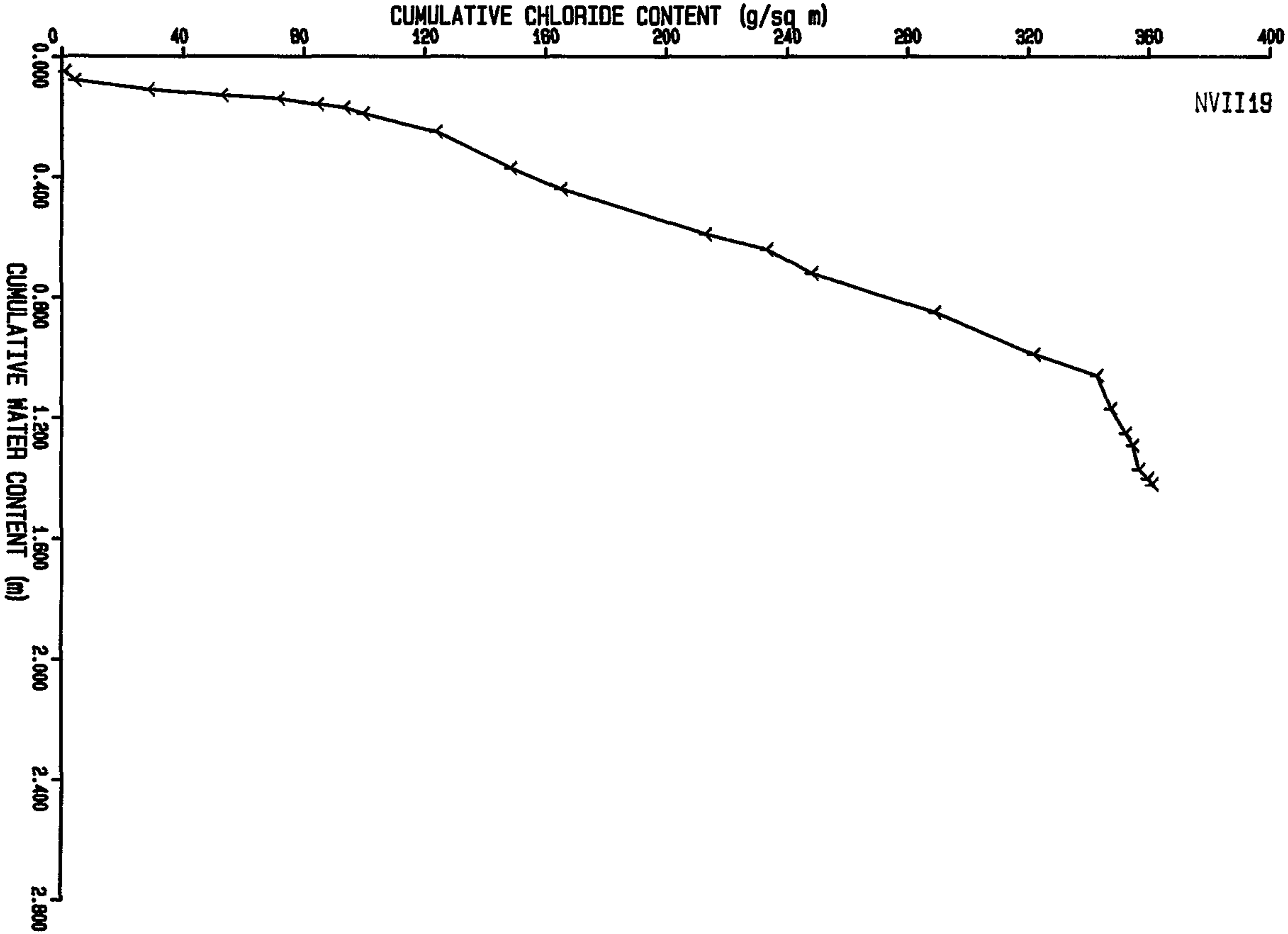

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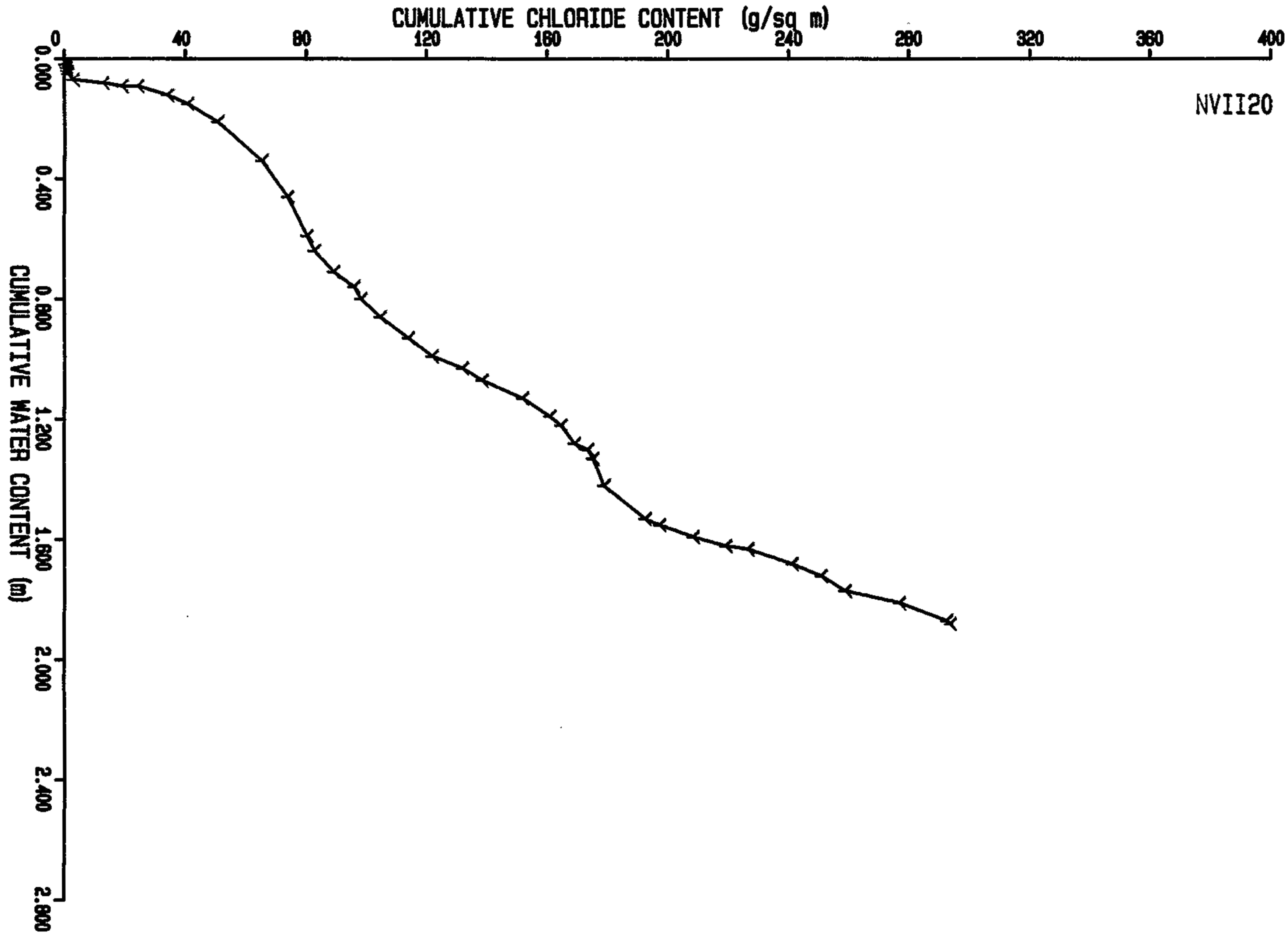

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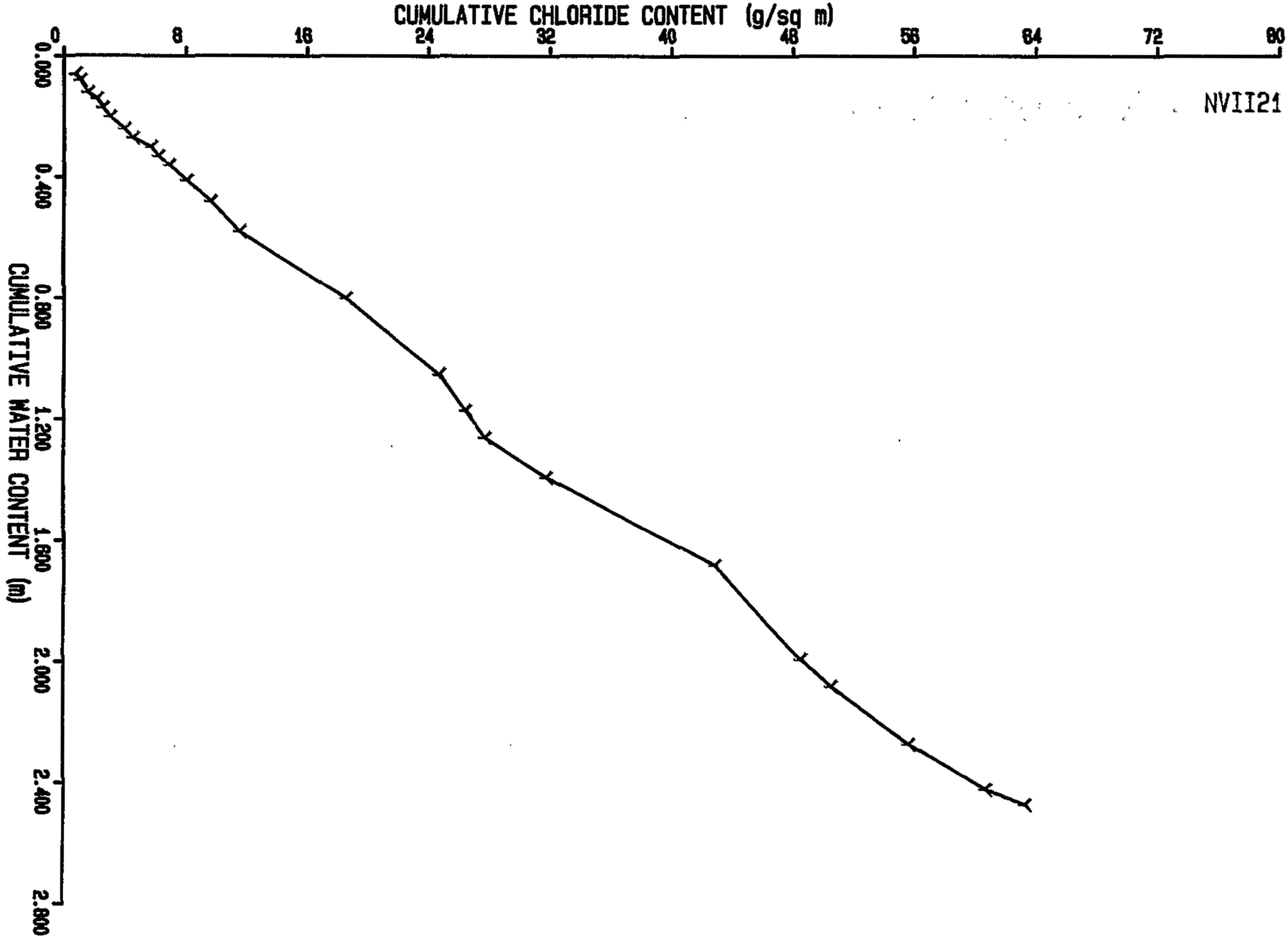

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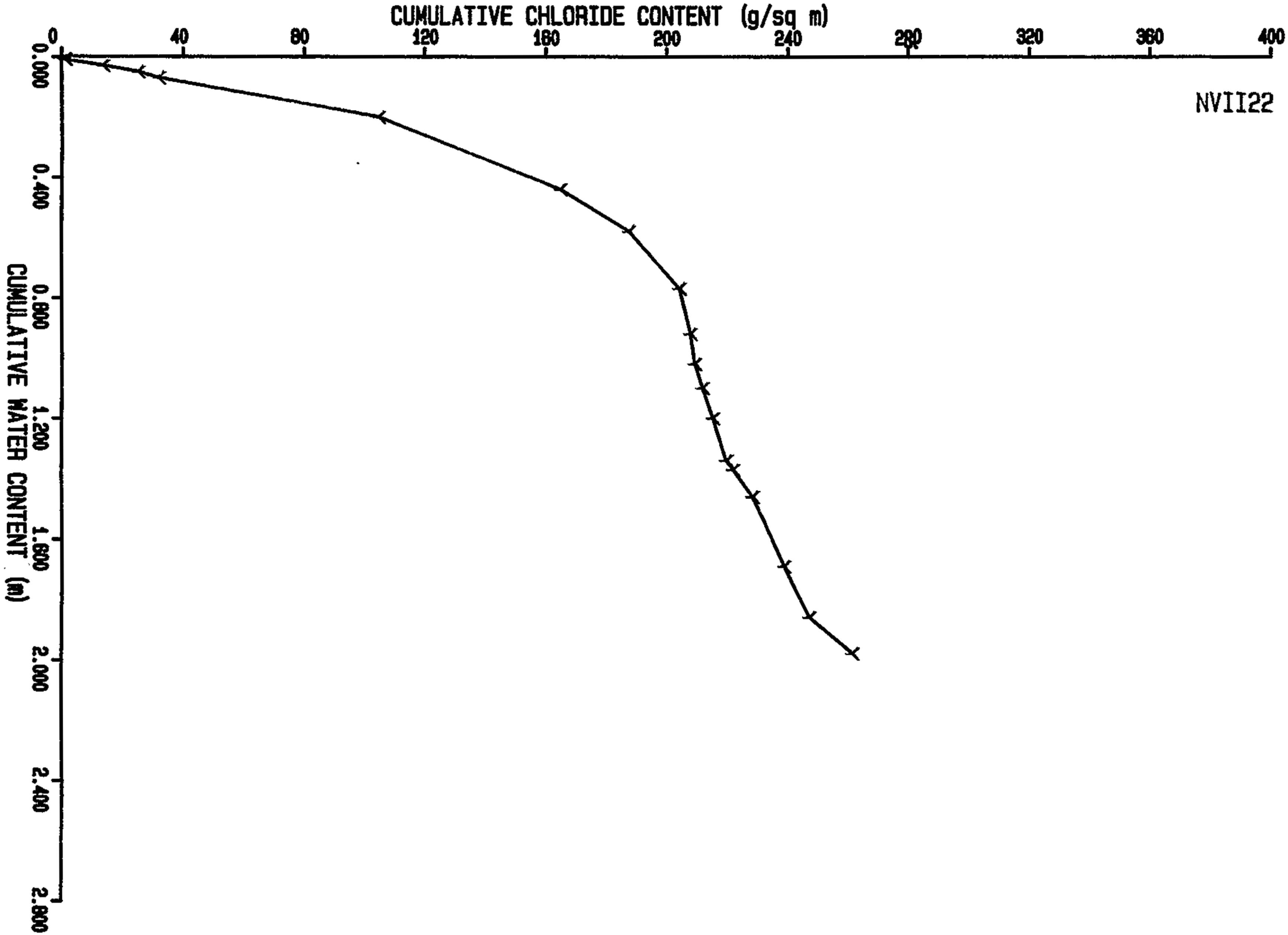

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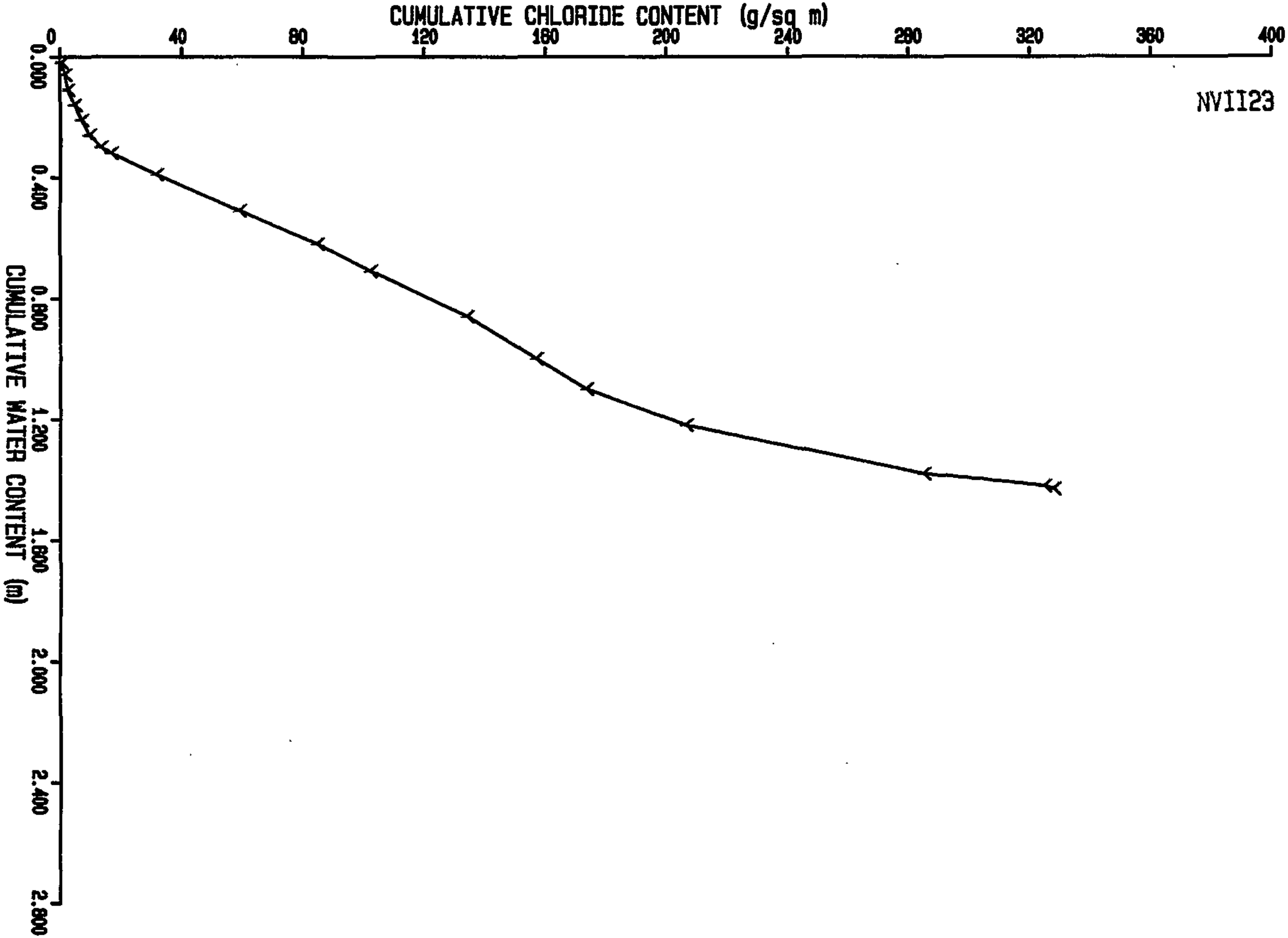

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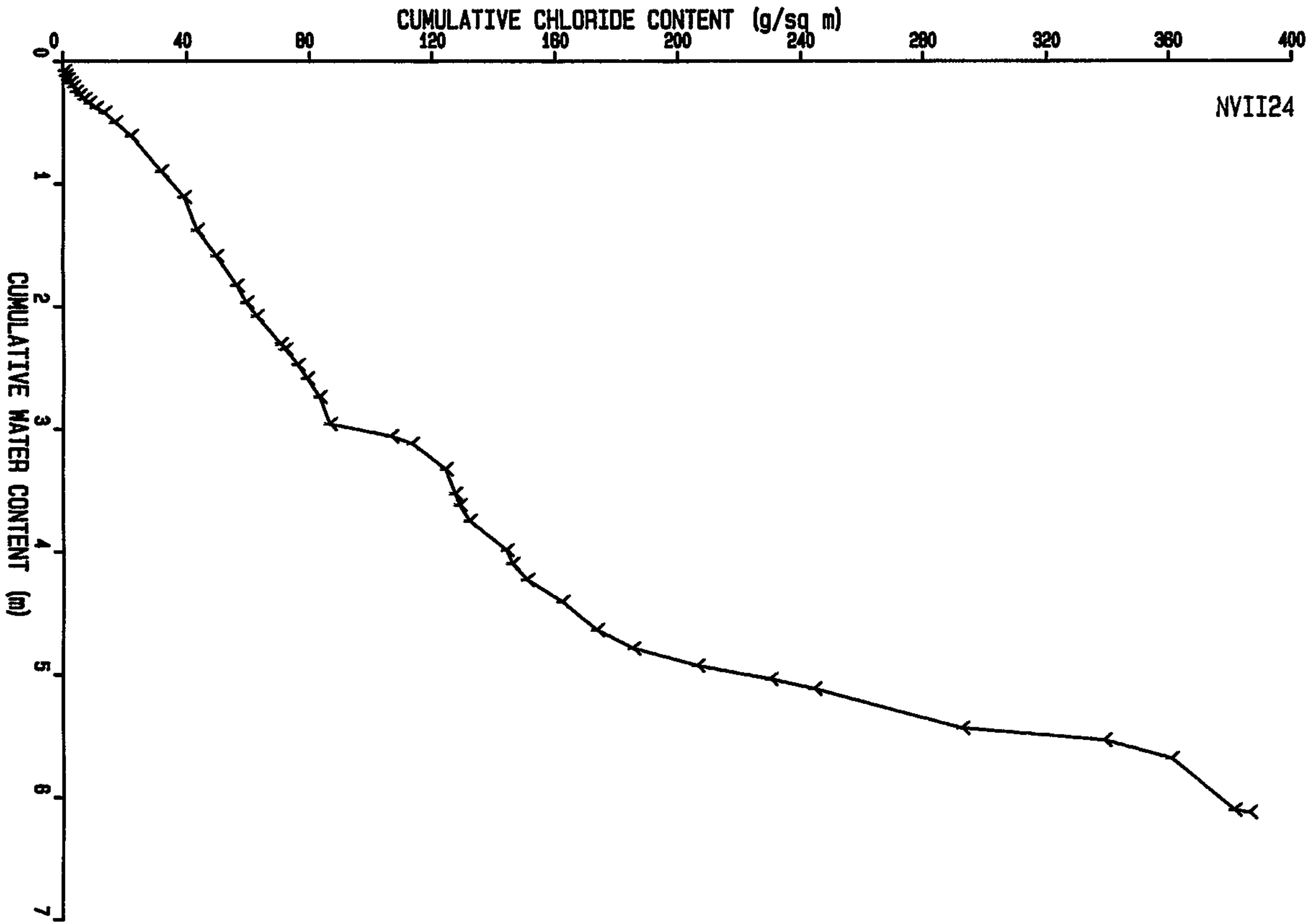

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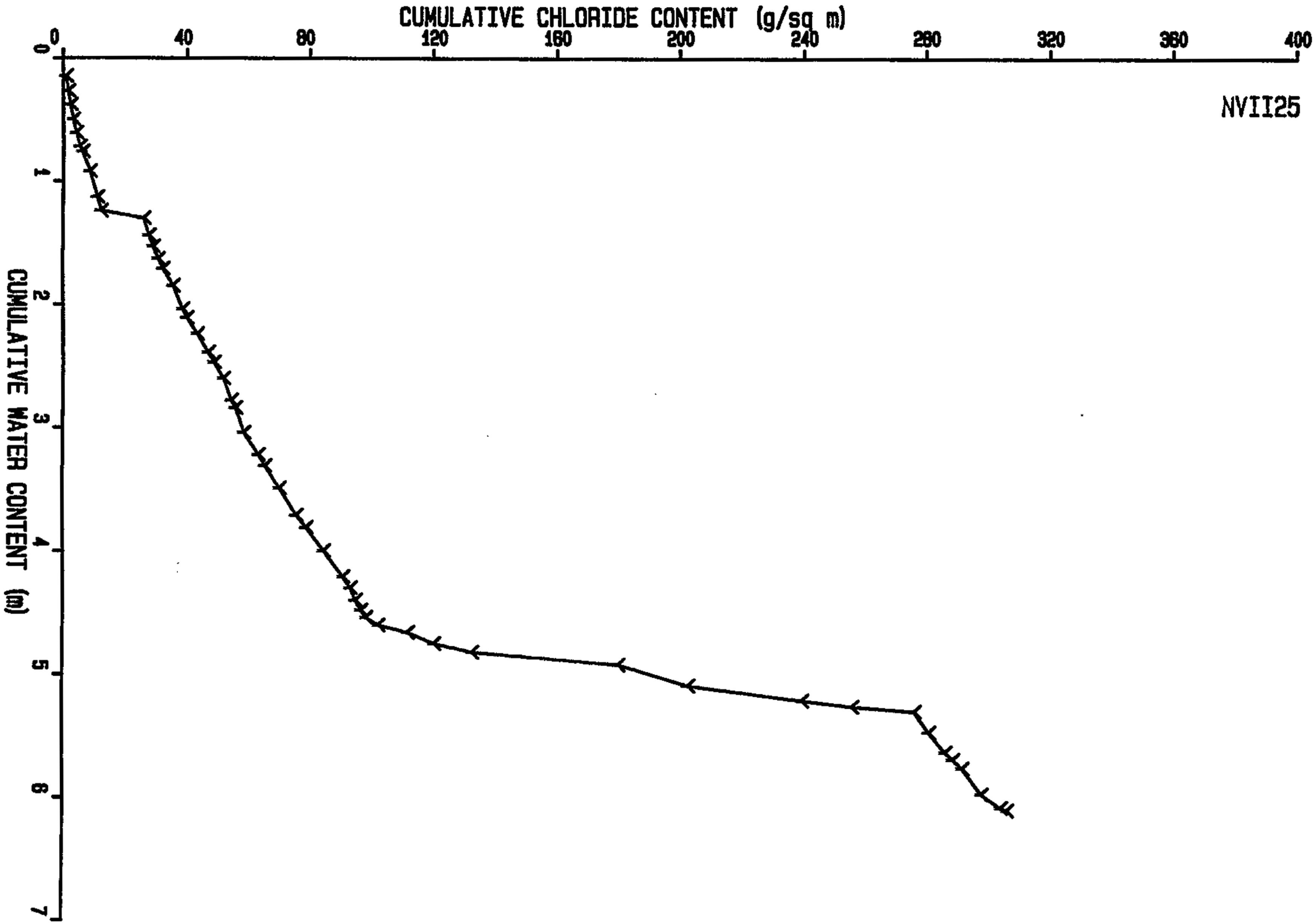

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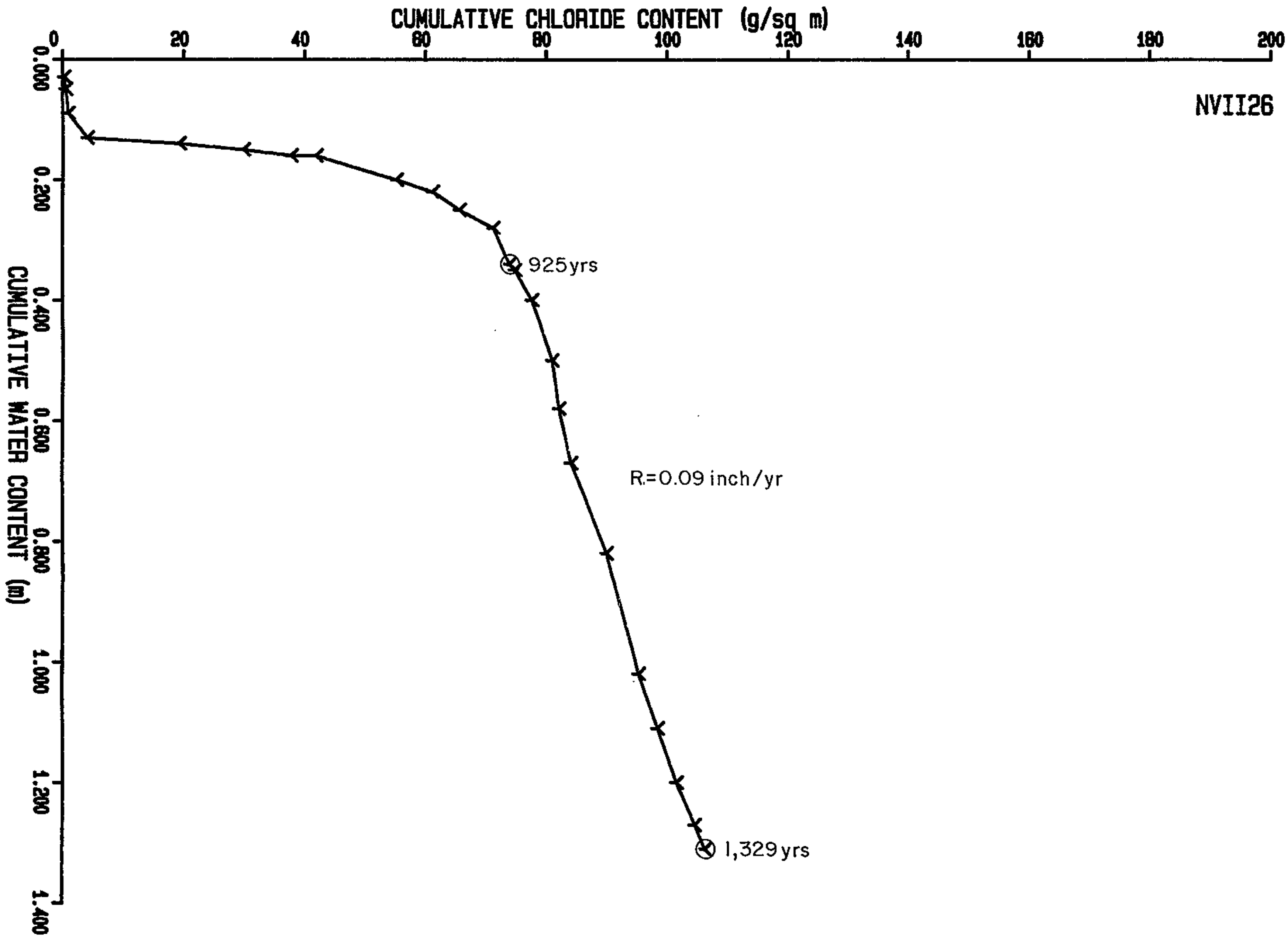

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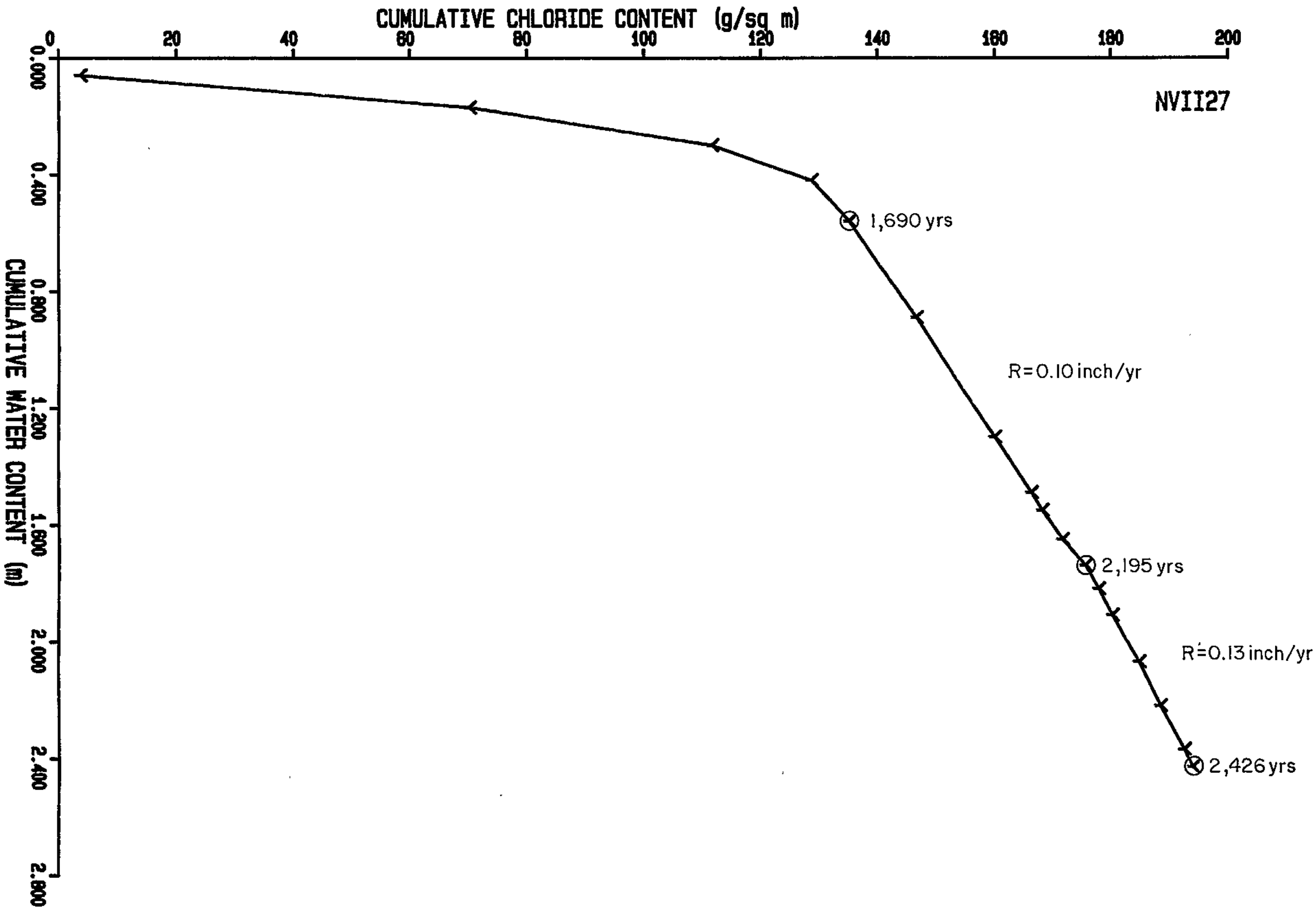

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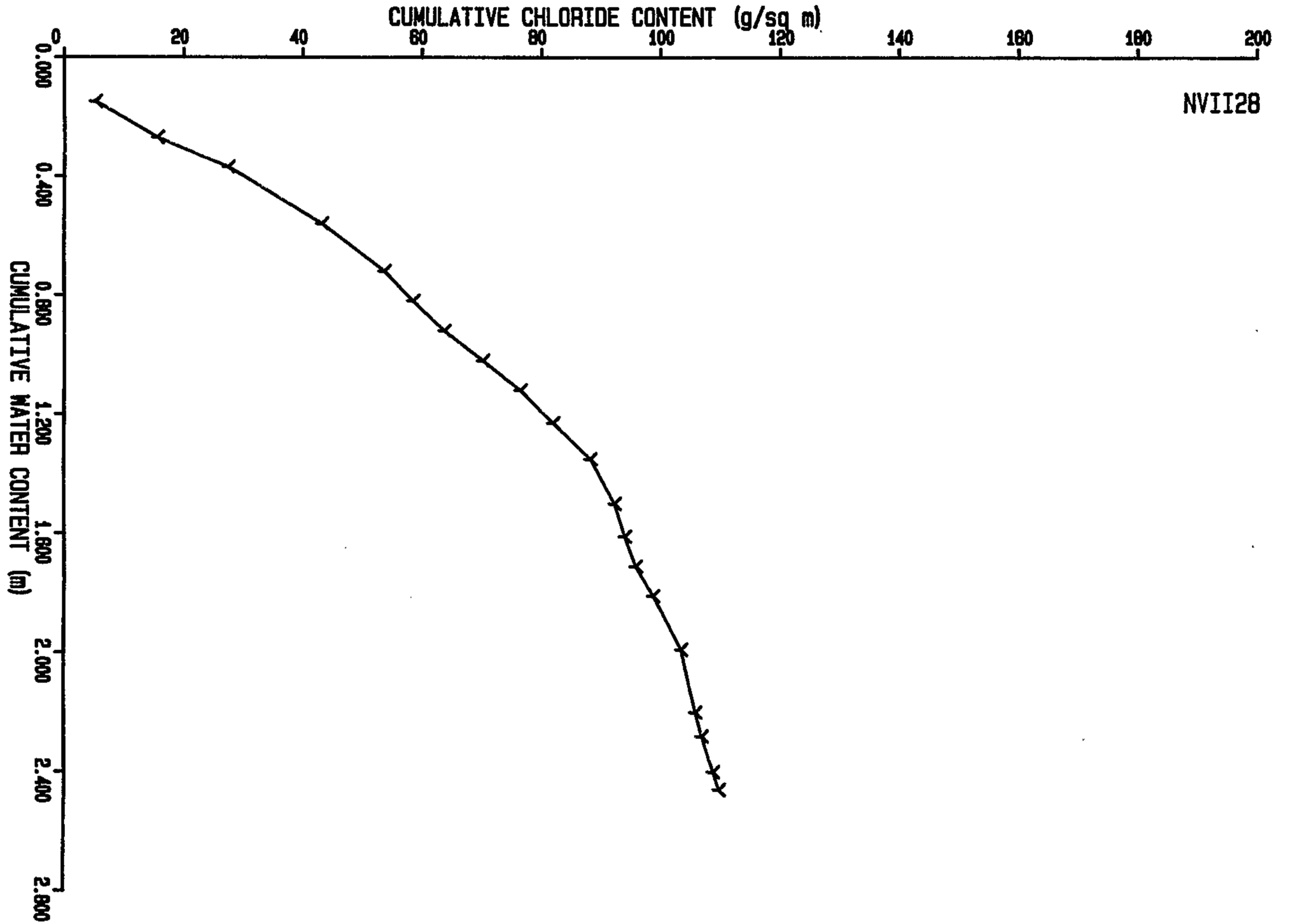

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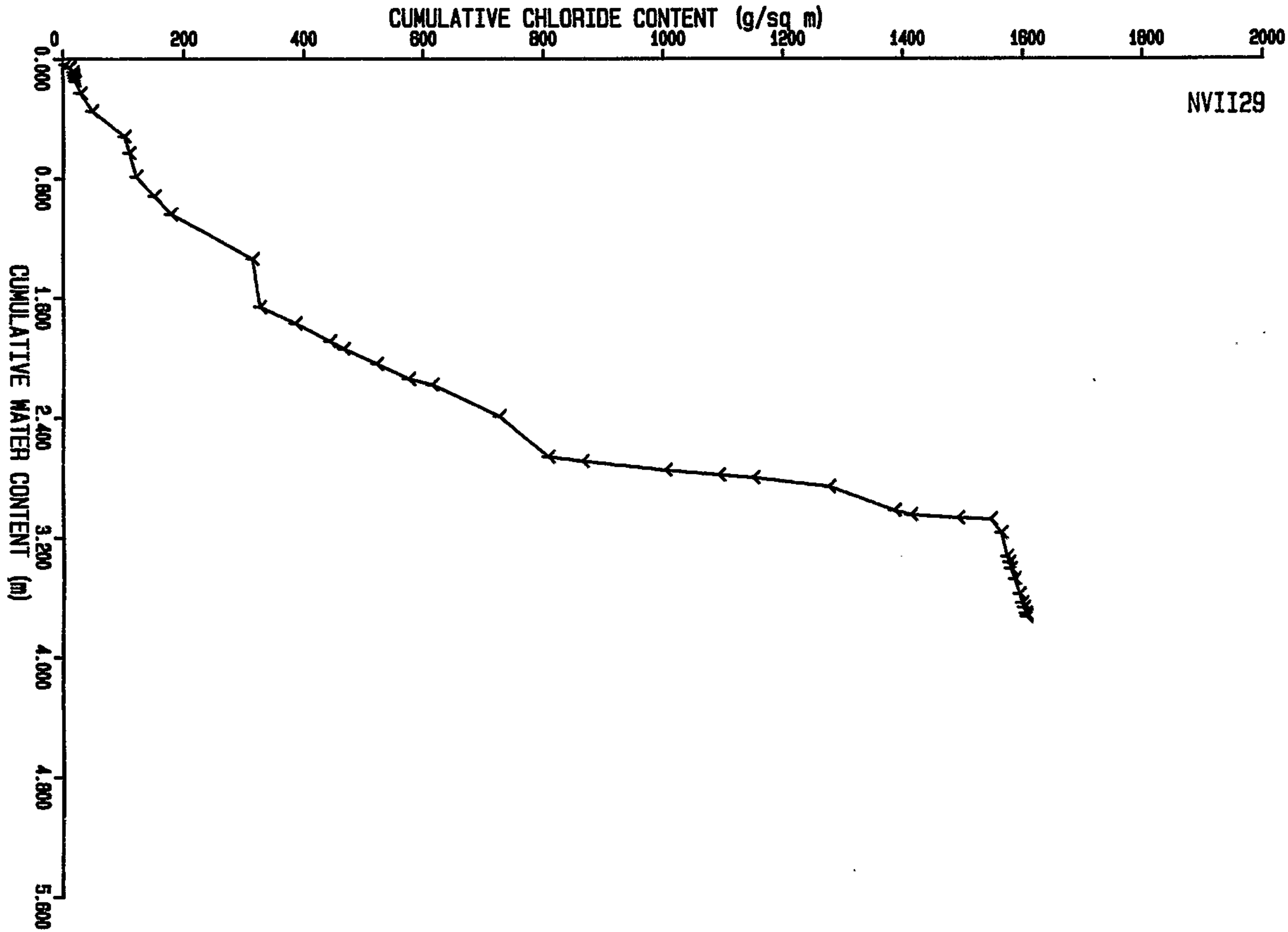


APPENDIX I

ISOTOPE DATA

Table I-1. Isotope data for Hole 27, Area III Upland Flat

Sample	Depth (ft)	Volume (ml)	018 (0/00)	D (0/00)	T (TU)
1	0.5	65	-5.61	-91.3	31
2	1	62	+0.94	-61.8	60
3	2	52	+0.41	-60.7	58
4	3	54	+1.35	-52.2	62
5	4	60	+1.96	-52.4	54
6	5	68	-0.97	-67.4	22
7	6	66	-0.53	-63.5	--
8	7	78	-3.67	---	29
9	10	72	-4.02	-71.7	24
10	11	69	-4.75	-76.3	21
11	12	72	-5.15	-71.4	48

-- = no results reported by lab

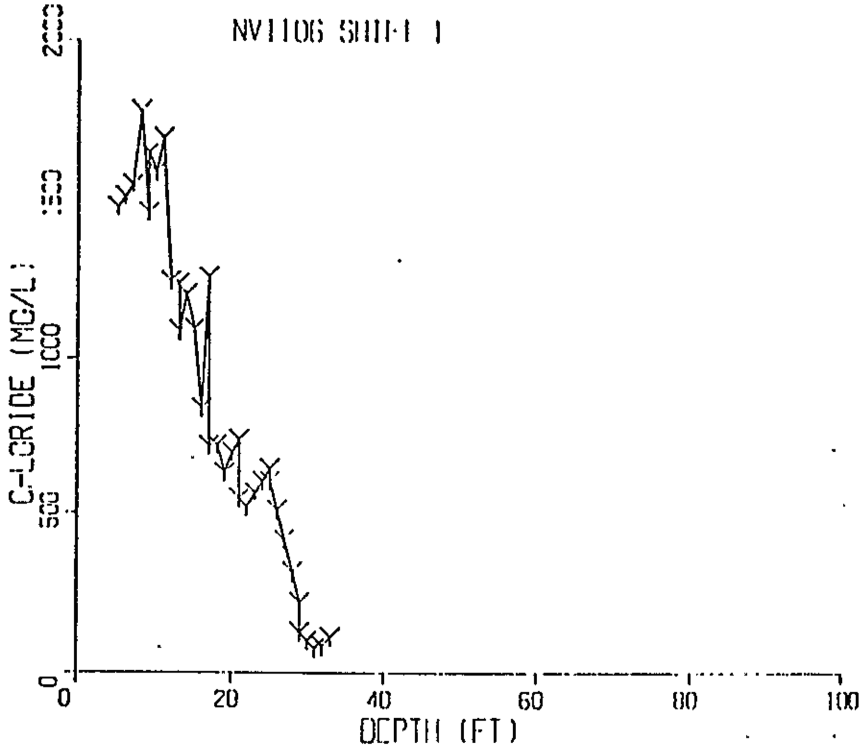
Table I-2. Isotope data for Hole 28, Yazzie Depression.

Sample	Depth (ft)	Volume (ml)	018 (0/00)	D (0/00)	T (TU)
12	0.5	72	-11.36	-95.7	44
13	1	90	-8.03	-68.9	74
14	2	90	-7.78	-73.4	41
15	3	96	-7.42	-73.8	31
16	5	84	-8.84	-83.1	19
17	6	78	-7.85	-87.7	18
18	7	78	-7.52	-87.4	19
19	8	72	-9.02	-94.0	--
20	9	88	-8.53	-88.2	28
21	10	68	-6.93	-83.1	17
22	11	80	-5.83	-81.6	23
23	12	78	-7.00	-80.7	7

-- = no results reported by lab.

APPENDIX J

STATISTICAL CORRELATION OF PROFILES



NVII05 vs NVII06--ORIGINAL DATA
REGULAR=> MAX|CC| = -18419 AT LAG -3 ; MAX2|CC| = -18012 AT LAG -4
DETREND=> NO VALUES

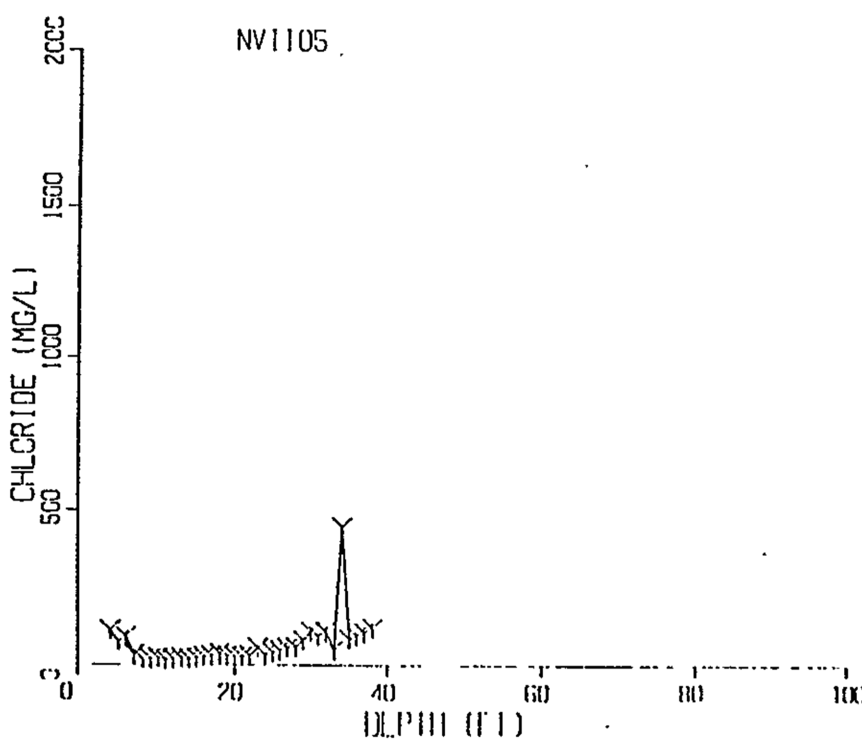
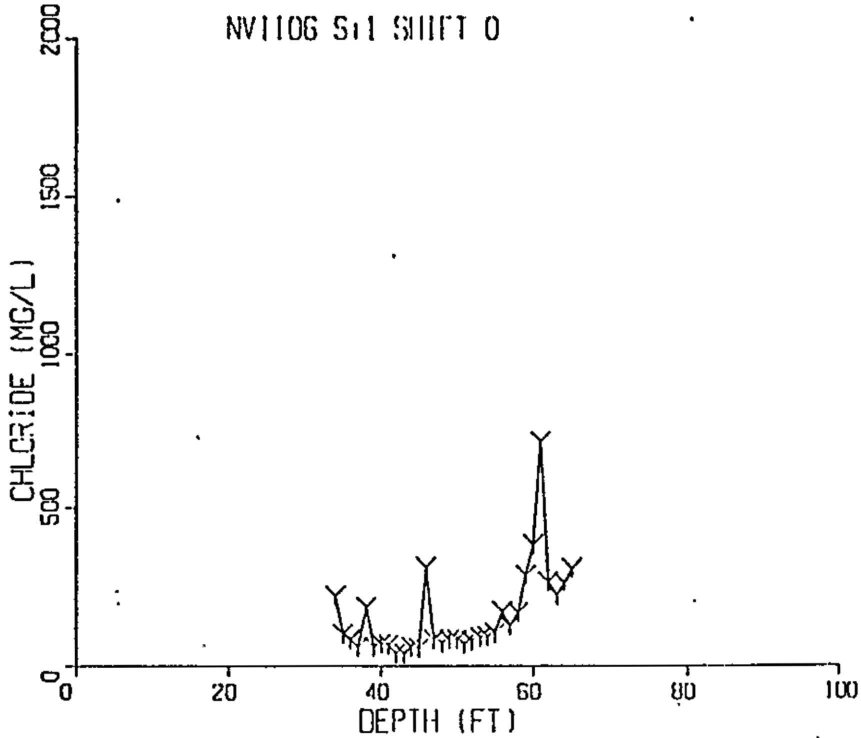


Figure J-1. Profiles do not match, point by point.



NVII05 vs NVII06--S+1 SHIFT DATA
REGULAR=> MAX|CC| = 8559 AT LAG +0 ; MAX2|CC| = 4769 AT LAG +4
DETREND=> NO DATA

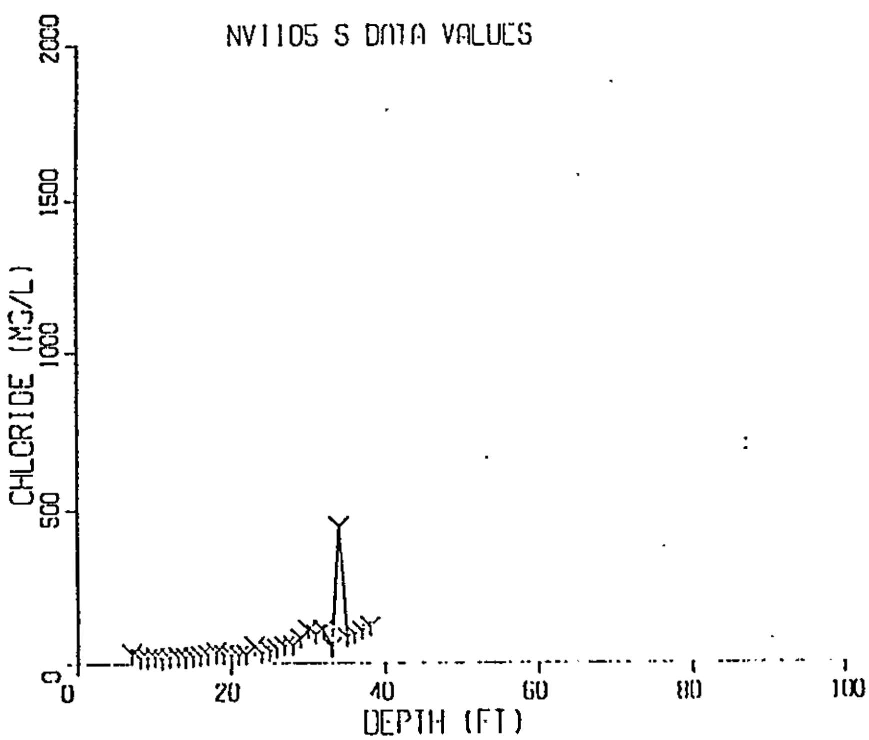


Figure J-2. Profiles do match if lag and shifting allowed.