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March 13, 1979

Mr. Ed Maurer
SOHIO Natural Resources Company
Uranium Operations
Post Office Box 25201
Albuquerque, New Mexico 87125

Dear Mr. Maurer:

American Ground Water Consultants, Inc. has the honor to submit herewith our report entitled: Milestone Report on Monitoring Activities at the SOHIO L-Bar Property, Valencia County, New Mexico.

We regard our interpretations presented in this report as definitive in character.

We appreciate the opportunity to be of service to SOHIO Natural Resources Company in this matter.

Sincerely,

William M. Turner

Dr. William M. Turner
President

WMT:rt

SUMMARY

All water-level, neutron-probe, temperature, and chemical data collected as part of the environmental monitoring program at the SOHIO L-Bar property have been reviewed for evidence of seepage of water from the tailings disposal site. The results of this evaluation contained in this milestone report together with all data suggests that about three gallons per minute of seepage may be taking place from the tailings disposal site and flowing to the west within the first Tres Hermanos Sandstone of the Mancos Formation.

It is likely that there are two major zones of seepage towards which seepage from other areas migrates. Ground-water recovery wells installed in these areas could probably recover a great deal of the seepage which is taking place.

Despite the fact that seepage appears to be taking place at a low rate, there is no concrete chemical evidence for contamination in the vicinity of the tailings disposal site.

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1	GROUND WATER CHEMISTRY FROM THE SOHIO L-BAR MINE AND MILL AREA AND VICINITY
2	NEUTRON LOGGING DATA
3	SOIL TEMPERATURE DATA
4	GROUND-WATER-LEVEL MEASUREMENTS
5	DRILL HOLE DATA FROM WELLS ON THE SOHIO L-BAR SITE
6	CONSTRUCTION DETAILS AND LITHOLOGIC LOGS OF THE NEUTRON-PROBE-ACCESS HOLES AND WATER LEVEL OF MONITORING HOLES
7	DATA FROM THE SLUG WITHDRAWAL TEST

INTRODUCTION

This milestone report presents the results of all seepage-monitoring activities carried out in the vicinity of the tailings disposal area of the SOHIO L-Bar uranium mine and mill project near Seboyeta, New Mexico. Figures 1 and 2 show the location of the area of interest within the State of New Mexico as well as a vicinity map of the tailings-disposal area. This milestone report also is intended to evaluate the results of the monitoring program to date.

The data which is presented in attachments 1 through 4 and analyzed in this report is given in the table below and was collected by the organization indicated.

Table 1. Monitoring data collected in the vicinity of the tailings-disposal area at the SOHIO L-Bar mine, Valencia County, New Mexico.

Type of Data	Collection Begun	Collected By
Ground-water chemistry	1971	SOHIO
Soil moisture	1973	AGW
Soil temperature	1973	AGW
Ground-water levels	1973	SOHIO & AGW

SITE CONDITIONS

The tailings-disposal area, is situated two to three miles east of the village of Seboyeta, New Mexico. The area is part of the semi-arid Colorado Plateau region. The tailings-disposal area was constructed

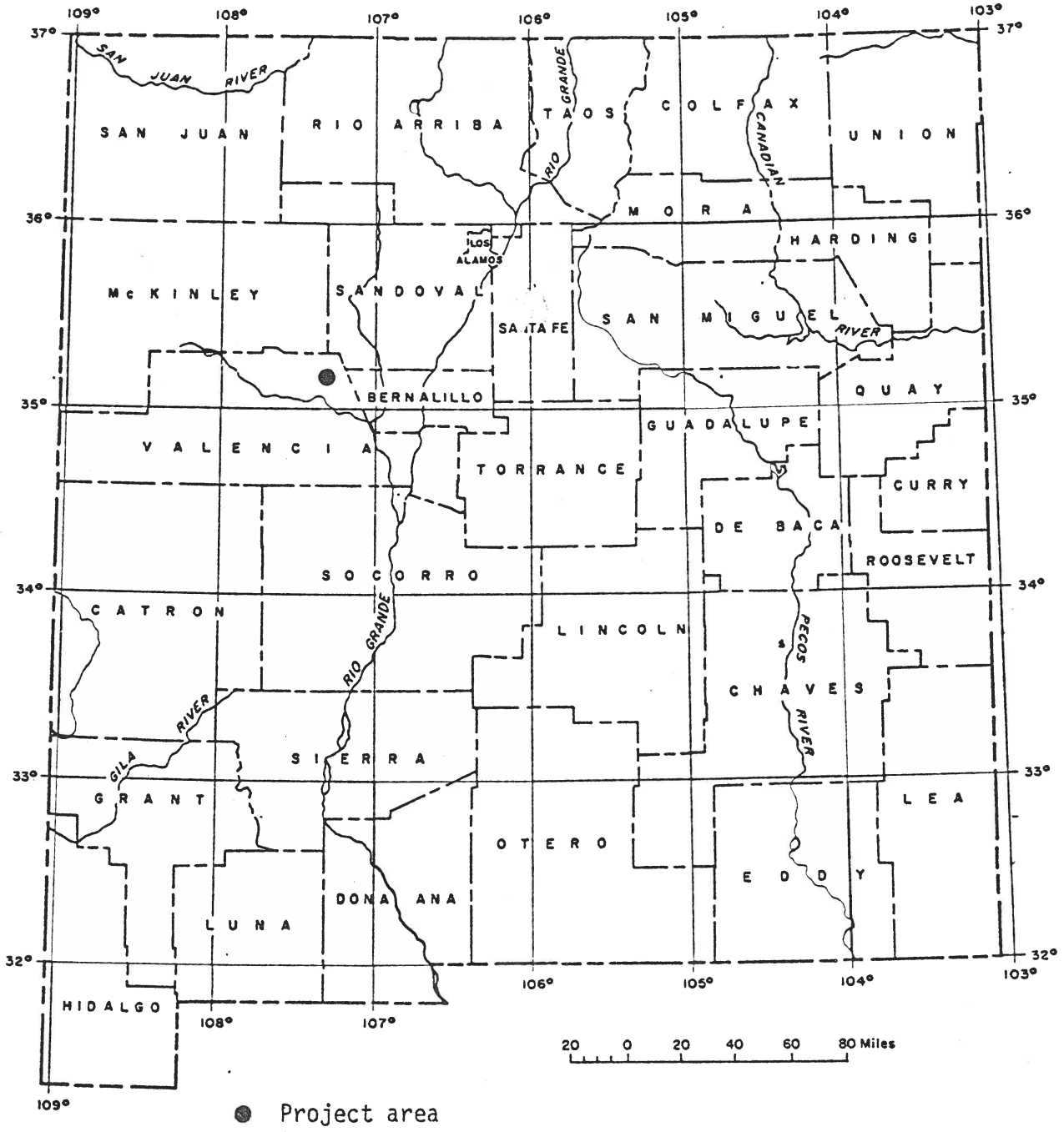

Figure 1. Map of New Mexico showing the location of the project area.

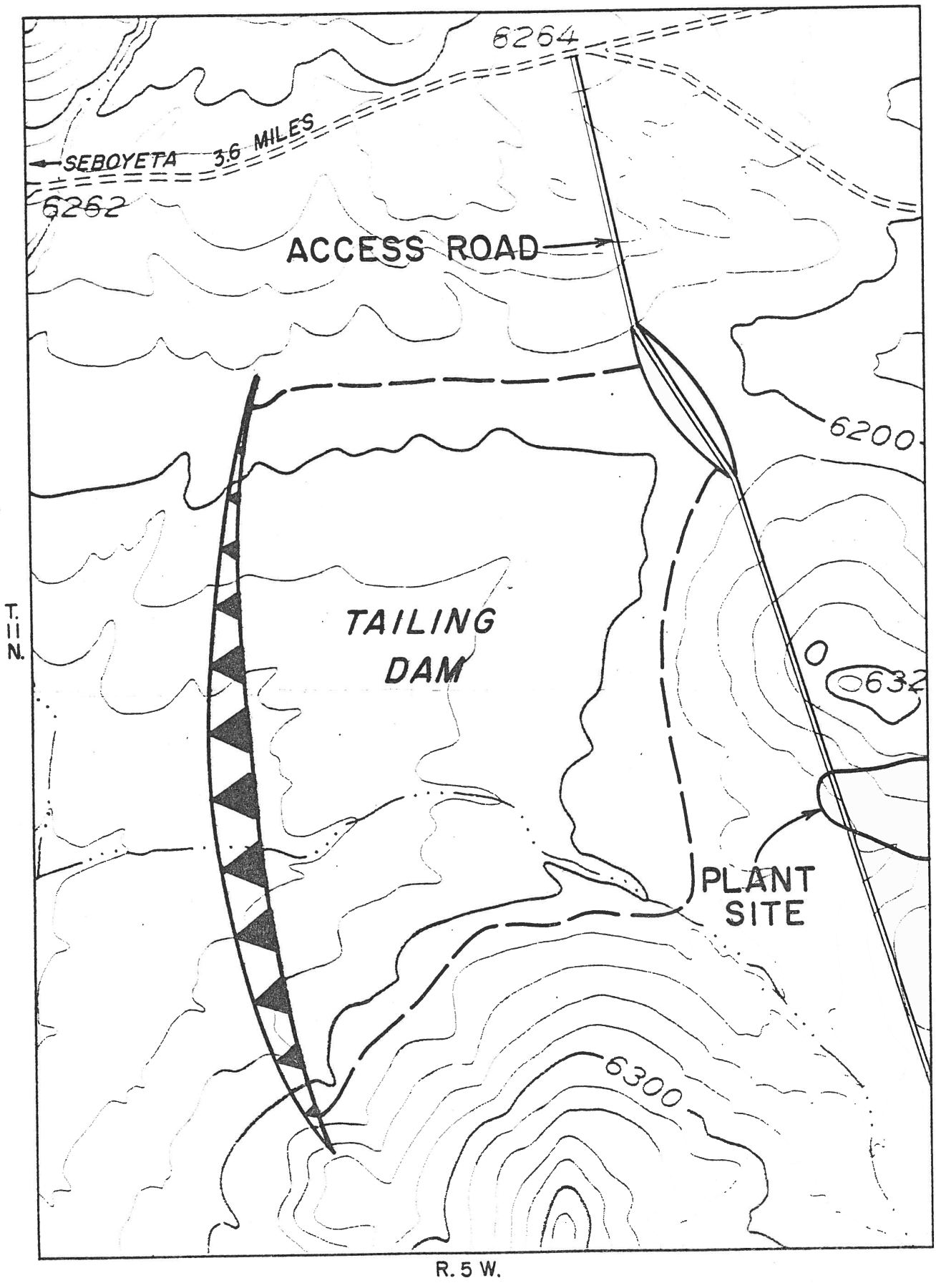

Figure 2. Vicinity map of the SOHIO L-Bar mine and mill.

on a gently rolling land surface which has been incised by shallow southward-draining intermittent stream channels. The major intermittent stream channel of interest is Moquino Arroyo which heads in the vicinity of the tailings area and drains away to the south. The tailings area is an area of grassland with patches of sagebrush and scrub pine. Meyer Arroyo and its tributaries are narrow steep walled channels which have been recently cut into an older surface which was underlain by fine-grained silt deposits.

GEOLOGIC SETTING

The tailings-disposal area is sited on a thick sequence of interbedded marine sandstone and shale of Cretaceous age. These rocks have been invaded locally as at Cerro Negro, near the area of interest, by necks and plugs of basaltic rock. The entire sedimentary sequence is overlain by a thin cover of fine-grained alluvial material of Quaternary age.

The Mancos Formation constitutes the uppermost unit of Cretaceous age in the area. It is about 400 feet thick at the site of the tailings disposal area and it is underlain in descending order by the Dakota Sandstone, the Morrison Formation, Bluff Sandstone, Summerville Formation, Todilto Limestone, Entrada Sandstone, Chinle Formation, the San Andres Limestone, and the Glorieta Sandstone. Of prime interest in this report is the Mancos Formation which, at the tailings-disposal site, is comprised of shale interbedded with three main sandstone beds known at the Tres Hermanos sandstone beds. The Tres Hermanos sandstone

beds control the local topography because they are quite resistant to erosion and form high, steep-walled cliffs.

The Mancos shale is predominantly clayey-moderately hard, mainly thin-bedded to fissile, commonly sandy, and locally bentonitic. The Tres Hermanos sandstone is mostly fine-to-medium grained, moderately to well cemented, in part shaley variable thin to massively jointed with joints spaced several tens of feet apart.

The uppermost of the Tres Hermanos sandstone beds underlies the tailings-disposal area at a depth of about 50 feet and is exposed in a small cliff to the southwest of the tailings area. Figures 3 and 4 show the shallow subsurface geology in the vicinity of the tailings area. Figures 3 and 4 are structure-contour maps drawn on the top and the bottom of the first Tres Hermanos sandstone respectively. Attachment 5 contains the data upon which figures 3 and 4 were prepared. Figure 3 shows that the sandstone has been apparently downwarped along an east-west trend which passes through the neutron-probe-access holes NP-11, 12, and monitoring hole 3A. The structure-contour map of the bottom of this sandstone does not reflect the same amount of downwarping. This may be due to the lack of control in the area where the downwarping occurs. If this is not the case, then it must be assumed that the first Tres Hermanos sand is of variable thickness. The variability in its thickness may be attributable to depositional processes as would occur if the sandstone were formerly a sequence of offshore sand bars. The coincidence of the depression in

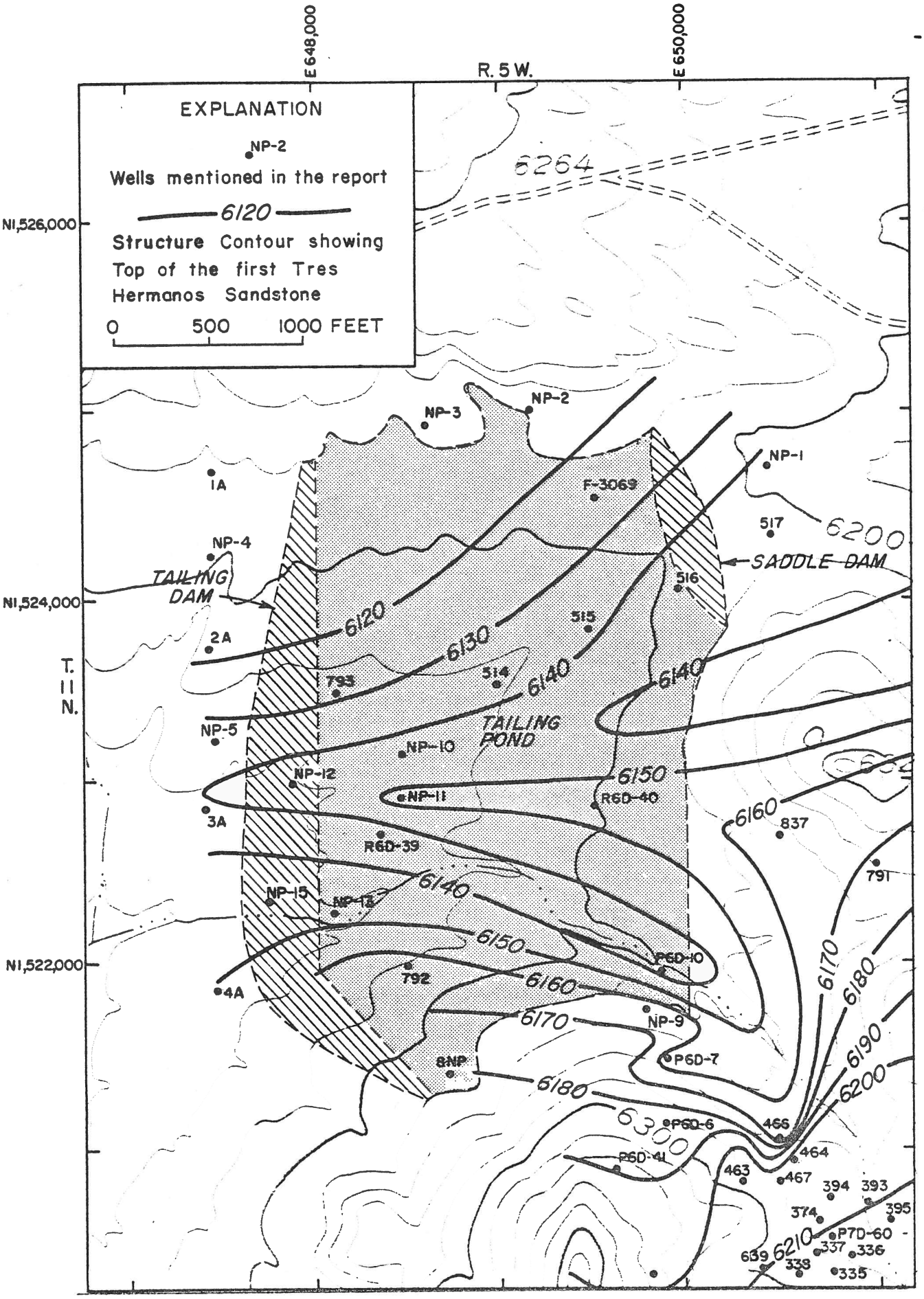

Figure 3. Structure-contour map of the top of the first Tres Hermanos sandstone of the Mancos Shale.

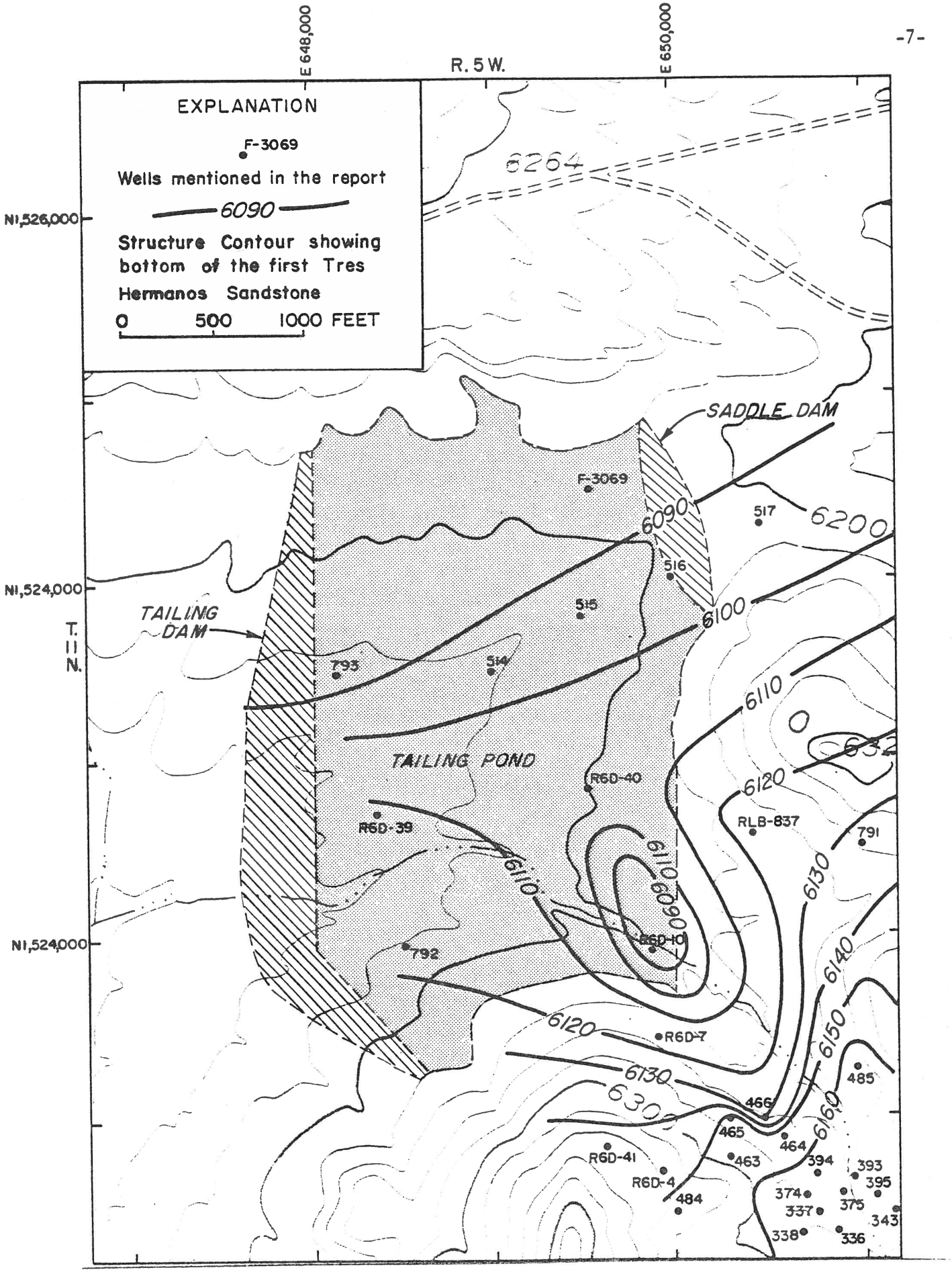

Figure 4. Structure-contour map of the bottom of the first Tres Hermanos sandstone of the Mancos Shale.

the upper surface of the Tres Hermanos sandstone with a tributary to Moquino Arroyo suggests that the zone may be an erosional depression in the sandstone created prior to deposition of the overlying shale cover.

If it is an erosional depression, it may be filled with coarser and better sorted sands than adjacent alluvium, and it is likely to play a role in the transfer of water away from the tailings area should seepage occur. Because it is likely to be a zone of greater transmissivity than nearby areas and will tend to act as a major subdrain for water in the tailings area.

The second Tres Hermanos sandstone is about 25 to 20-feet thick and occurs about 100 to 150 feet beneath the first sandstone. The third Tres Hermanos sandstone is separated by about 50 feet of clayey shale from the second Tres Hermanos sandstone and is about 20-feet thick. The lower two Tres Hermanos sandstone units and deeper rock units are of little importance in the context of seepage.

TAILINGS DISPOSAL FACILITY

Introduction

In 1974, Woodward-Clyde Consultants prepared a report entitled: Engineering and Geologic Investigation and Consultation for Tailings Dam, SOHIO L-Bar Project, Near Moquino, New Mexico. The section of their report dealing with the tailings disposal facilities is reproduced here, except that references to figures referred to in their report are not included in this report.

Site Conditions

"The tailings disposal facilities will be located in a gently sloping, wide, flat drainage area located generally downhill and west of the plant site. A dry arroyo cuts through the bottom of the tailing disposal area, exposing sandy clays in the steep banks. The upper, or northeast end, of the tailing area is marked by a natural saddle. Natural ground drops down to the northeast beyond the saddle.

Construction

"The tailing dam, designed for a 10-year life, will provide an ultimate storage capacity of 7 million cubic yards over an area of about 180 acres. Initial disposal will be confined by a starter dam about 2000 feet long and 25 feet high maximum at crest elevation 6180. We understand a 5- feet high confining dam will be carried beyond the limits of the starter dam, up the abutments to the ultimate crest level, to assist in confining and directing tailing flow as the dam "grows" above the starter dam. The ultimate tailing dam, raised in increments by constructing a series of small dikes along the crest utilizing sandier tailing, will top out at crest elevation 6220 and will be about 3800 feet long. At levels above elevation 6190 the tailing dam level will rise above a natural saddle located at the northeast corner. A saddle dam, which will carry a roadway, is planned here to confine the tailing to enable raising the ultimate level to elevation 6220.

"As currently planned, tailing will be transported to the dam by pipeline in the form of a water-tailing slurry. We understand the tailing, thickened at the plant to about 38% solids, will be a "coarse" grind with about 20% fines (passing the No. 200 sieve), and will be deposited using conventional "spigoting" procedures.

"Planned tailing deposition will be about 368 gpm (298 gpm water and 70 gpm solids) for the first 3 years and will double for the remainder of the life of the dam. We understand evaporation losses are estimated at 60 inches per year ("pan" evaporation) and the tailing water content should be about 30%. These factors have been considered in underseepage estimates discussed below.

"Experience indicates that a sand beach, consisting of the coarser sand fraction of the tailing, will form next to the starter dam and subsequently the outer slope of the raised dam, forcing the normal "water pond" further and further upstream. The finer "slimes" fractions of the tailing will be deposited upstream of the beach.

"Current planning includes decanting of water from the tailing dam using a barge-mounted pump located in the upper reaches of the "pond". We understand that water will be recirculated back to the plant for reuse and that water losses from the tailing disposal facilities must be minimized.

Starter and Saddle Dams

"Foundation. Our test holes and test pits beneath the starter dam show thin, clayey sands over 2 to as much as 29 feet of stiff, porous,

sandy clays and medium dense to dense clayey sands and clayey gravels with some cobble, underlain by claystone and sandstone bedrock. Laboratory tests and visual examination of the porous sandy clays indicates they are generally lower in density than the overburden clays found in the shaft and plant sites and will collapse under load when wetted. The underlying bedrock is firm to medium hard in the upper reaches, with occasional hard lenses, becomes very hard with depth and is thin-bedded, fractured and gypsiferous, with the gypsum content generally higher in the upper, firm to medium hard, phases of the claystone.

"Permeability tests in the upper clays, sands and gravels, as well as packer tests in the underlying bedrock indicate that the upper clays are "semi-impervious", with calculated permeability values ranging from 8 to as much as 81 feet per year. While the bedrock is "impervious" to "pervious" with calculated permeabilities ranging from negligible to in excess of 5,000 feet per year in some of the fractured phases of the bedrock. Our past experience indicates that natural soils and rock are highly variable and actual permeabilities could be an order of magnitude higher or lower than indicated by the calculated values.

"We found overburden clays underlain by similar bedrock beneath the saddle dam at the upstream end of the tailing disposal area but the overburdened soils were substantially thinner than those found beneath the tailing starter dam.

"We believe that the overburden clays, sands and gravels and the underlying claystone bedrock are capable of supporting a properly designed starter dam and saddle dam, as well as the ultimate tailing

dam. In our opinion, foundation preparation need only include removal of vegetation and near-surface (probably less than 6 inches) wet or loose material, particularly in arroyo bottoms. We believe that the starter dam and saddle dam should be constructed with the clayey soils from the borrow area, as discussed below, placed at optimum moisture content or above, in order to achieve as much plasticity as possible in the dam and thus minimize the risk of cracking and subsequent piping when settlements of the porous overlying sandy clays occur as the dam foundation soils become wet.

"Embankments. We recommend the starter dam be essentially a homogenous dam with 2-1/2:1 upstream and downstream slopes and a 15-foot minimum crest width. We have included an "embankment drain" as well as a "chimney drain" in the downstream part of the starter dam. These drains should achieve a low phreatic line in the starter dam and can be connected to the "sand beach" to minimize seepage emergence on the outer slope above the starter dam when the tailing raises above that level.

"We recommend a similar homogenous embankment for the saddle dam, but incorporating flatter slopes, recommended 3:1, since this dam will function essentially as a water containing dam. We recommend a minimum crest width of 15 feet. We believe a 5-foot cutoff trench into bedrock should be constructed beneath the dam and a drain provided beneath the downstream part of the dam.

"Borrow. We drilled 15 test holes and excavated 5 test pits within the proposed tailing dam area to evaluate borrow materials available

for construction of the tailing starter dam and the saddle dam. Our investigations for borrow were confined to the limits of the proposed tailing disposal area.

"Our test holes and test pits show the soils available are predominantly sandy clays. Bedrock was found at shallow to moderate depth in all test holes and in all but one test pit. We estimate that more than 900,000 cubic yards of material are available within the disposal area (about 170 cubic yards required for construction of the starter and saddle dams) with the majority of the borrow coming from the lower, central reaches of the tailing disposal area. Our studies indicate that the amount of materials available is much greater than that needed. We recommend that the borrow excavation be limited to the upper sandy clays in the areas where these clays are thickest.

"Our analyses of moisture contents of the borrow soils show that the sandy clays are generally below optimum moisture content for compaction. Moisture contents from test pit and test hole samples average 13.3%, ranging from 10.3% to 18.4%, compared to optimum moisture content of 20.6%.

"Representative samples of the clays have been selected and laboratory tests performed to provide data on their engineering performance characteristics. These test results indicate that the compacted clayey soils found within the borrow area have laboratory permeability values on the order of 0.01 feet per year when compacted to 100% density (ASTM D698).

Recommended Tailing Dam Section

"Our recommended tailing dam section incorporates a starter dam, described above, and an overall exterior slope of 3:1 to the proposed ultimate crest level of elevation 6220. We envision that the ultimate tailing dam would be constructed in a series of "raises" followed by subsequent deposition of tailing on the interior of the dam. The magnitude of each raise will likely be defined by the equipment used for dam construction. Our past experience indicates that individual raises are commonly 5 to 15 feet high and normally constructed with draglines and dozers using the "sand beach" material. In some areas materials are imported for raises, but this would likely be an unnecessary expense here. In our opinion, conventional "spigoting" of the tailing should result in sufficient separation to achieve a wide "sand beach" adjacent to the outer dam slope since the tailing will be a "coarse" grind with 80% sand sizes, i.e., plus No. 200 mesh. Separation by "cycloning" or similar methods should not be necessary.

"We recommend that a "sand beach" a minimum of 150 feet wide be maintained and that the "pond" on the tailing dam be maintained as far upstream of the outer dam slope as possible, at least 500 feet from the outer dam slope, and preferably against natural ground near the plant. We understand that your design incorporates these concepts. Our past experience indicates that the deposited tailing will assume a "beach" slope on the order of 1% to 2%. The cleaner and more permeable "sand beach" is essential to the stability of the overall tailing dam as it enables maintaining generally lower phreatic lines within the tailing dam.

Underseepage

"Seepage will occur from the tailing disposal area, as from any reservoir. Seepage through the starter dam should be minimal as the available clay soils will be essentially "impervious" when compacted in accordance with our recommendations. Such seepage as does occur will emerge from the embankment drain at the toe of the starter dam where it can be collected. As discussed above, the clays beneath the starter dam and over the tailing disposal area are "semi-impervious" and the upper part of the underlying bedrock ranges from "impervious" to "pervious". Some seepage will probably occur through the overburden soils beneath the starter dam but the quantity should be small. Water seeping through the surface clays that form a natural blanket in the tailing disposal area will seep away through the bedrock relatively rapidly because the upper bedrock is highly fractured. This seepage will form a "mound" of subsurface water. Even though the bedrock dips gently, 2 to 3 degrees, down to the north, we believe nearly all of the seepage will move downhill to the west beneath the tailing dam and negligible amounts will flow radially out from the disposal area to the north, following the dip of the bedrock. Estimated top of bedrock contours define a "bowl" in the bedrock surface that should have the major influence in directing seepage.

"We believe every effort should be made to preserve the natural clay blanket that now covers the tailing disposal area, in order to minimize seepage losses. This can be done and still enable borrow of starter and saddle dam materials, by limiting the borrow excavations to locations where the clays are the thickest. We have considered

this in choosing the borrow area. In view of the desire to minimize seepage losses, we believe additional test holes and/or test pits should be drilled or excavated in the borrow area and in the peripheral, upstream and left (south) sides of the tailing disposal area to provide more data on the thickness of the "clay blanket". This could be accomplished when the Phase II - Design Investigations are undertaken in the plant site, since similar drill rigs and/or excavation equipment would be involved.

"We have estimated the magnitude of seepage loss that could be experienced from the tailing disposal area. At best, these estimates can only provide guidelines to judgment decisions since the estimates are based on many simplifying assumptions and involve use of permeability values which in themselves are of questionable accuracy. Theoretical estimates of underseepage are based on several assumptions, including: (1) the tailing area will be dry at the start of deposition; (2) there will be no significant classification of tailing below elevation 6165±; (3) hydraulic classification of tailing will occur above elevation 6155± resulting in a sand beach and water pond; (4) evaporation from the surface of the water pond and from the wet surface of the tailing between the discharge point and the water pond, and water retained in the tailing will be of the order of 5 gpm per acre; and (5) seepage losses could exceed 50% of the available water in the early stages of development. Theoretical estimates indicate that seepage losses from the tailing disposal area, assuming a 5-foot thick natural clay blanket, could be as high as 0.5 cfs (cubic feet

per second) or 225 gpm. We believe that this is a conservative estimate since it does not reflect any "sealing" due to deposition of the finer, "slimes" fraction of the tailings, does not reflect the reduction in permeability of the natural clays that will occur as these materials consolidate under load and due to wetting, and does not include the effect of bank storage (filling voids in natural soils). In our opinion, there is only a 2 in 5 chance that the seepage will exceed 0.3 cfs.

"We have considered several measures of reducing the seepage losses, including: (1) a cutoff trench excavated through the soils beneath the starter dam and into the bedrock and backfilled with impervious soils; (2) constructing an impervious barrier in the upper, more pervious bedrock beneath the starter dam by some means such as grouting, driven sheetpile, slurry trench or excavated and backfilled cutoff trench; and (3) construction of a compacted clay blanket over the disposal area. We do not believe a cutoff trench through the overburden soils beneath the starter dam would be a good investment since it would bottom on or just into the underlying, more pervious bedrock and the quantity of seepage through the clay soils should be minimal. Construction of an impervious barrier in the upper part of the bedrock would involve an estimated average depth of 30 feet. A slurry trench as well as driven sheetpiling would, in our opinion, be impractical in the relatively hard bedrock. Grouting would likely be ineffective and would probably contribute to more seepage by opening up the bedding planes in the bedrock. In our opinion, the only practical method would be to construct a compacted clay blanket to supplement the natural clay blanket.

This, too, would be expensive and, in our opinion, a dubious investment, except possibly in the peripheral upstream and left (south) sides of the disposal area where our investigations indicate the natural clay blanket is less than 5 feet thick. We believe that additional investigations of the thickness of natural clays in these areas, as discussed above, would be a good investment.

"Several methods are available to recover seepage losses should this become desirable including: (1) subsurface drainage systems extending into bedrock beyond the toe of the tailing and/or saddle dams, and (2) "relief" wells drilled into the bedrock to enable pumping seepage water back into the system. Sufficient area is available between the toe of the tailing dam and the nearby property line and northeast of the saddle dam for installation of such facilities, should this become desirable. We believe design of seepage recovery facilities, if needed, should await data from the monitoring wells."

MONITORING

Baseline information on ground-water quality was determined by SOHIO personnel well before the construction of the mine, mill and tailings facilities was begun. The baseline ground-water-quality information was reported in the environmental report on the project submitted by SOHIO in August 1974. These results are also included in this report together with ground-water-quality information obtained since the construction of the tailings area both from wells in the vicinity and from specially constructed monitoring wells.

NEUTRON LOGGING

In August 1975, SOHIO constructed 16 neutron-probe access holes within and adjacent to the planned tailings disposal area. These holes are designated as NP-1 through NP-16 in figure 5. Four sets of soil-moisture measurements were collected from these holes prior to the winter of 1976. By the winter of 1976, tailings from the processing of uranium ore had already been introduced into the disposal area. During the winter, sheets of ice formed on the standing water in the pond and, as the ice moved about in response to wind over the pond, the ice sheared off the PVC casing of NP holes 10, 11, 12, and 13. Consequently, there is no data from these holes following the winter of 1976. Because the bottoms of the PVC tubes were sealed with caps, this adversity does not present a contamination problem.

Lithologic logs and construction details for each of the neutron-probe-access holes are given in attachment 6. The holes were constructed by drilling a 5-1/4 inch diameter hole by air rotary methods to total depth and inserting 2-inch diameter PVC casing which was capped at the bottom end into the holes and then backfilling the holes with a mixture of bentonite and dry cuttings. Attachment 2 contains all soil-moisture measurements obtained as of the date of this milestone report. Figures 6 through 21 are composite graphical presentations of the soil-moisture profiles for each neutron-probe-access hole. The composite diagrams were assembled to portray graphically the changes in soil-moisture which have occurred.

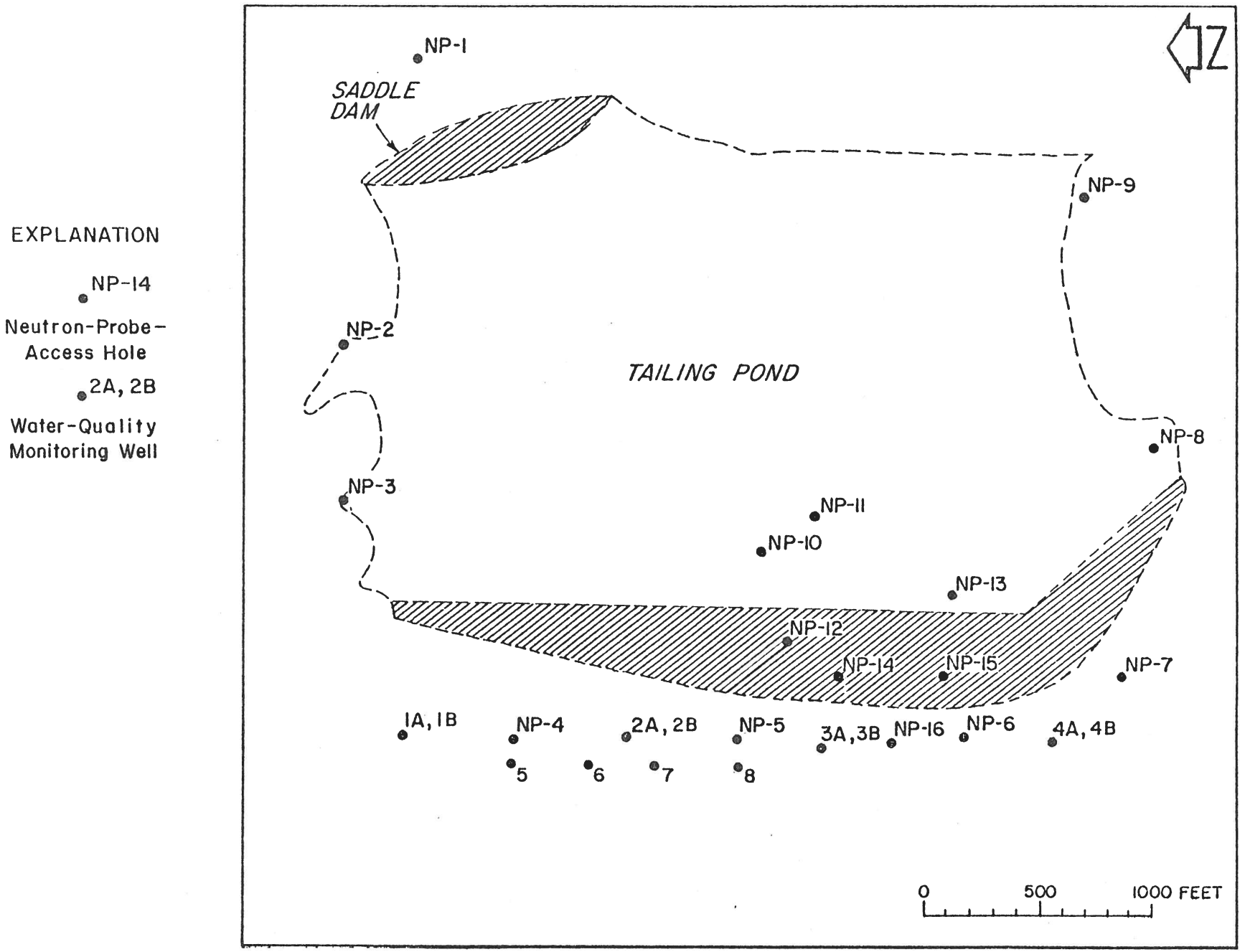

Figure 5. Vicinity map of the tailings disposal area showing the location of all neutron-probe-access-holes and the old as well as the new ground-water-monitoring holes.

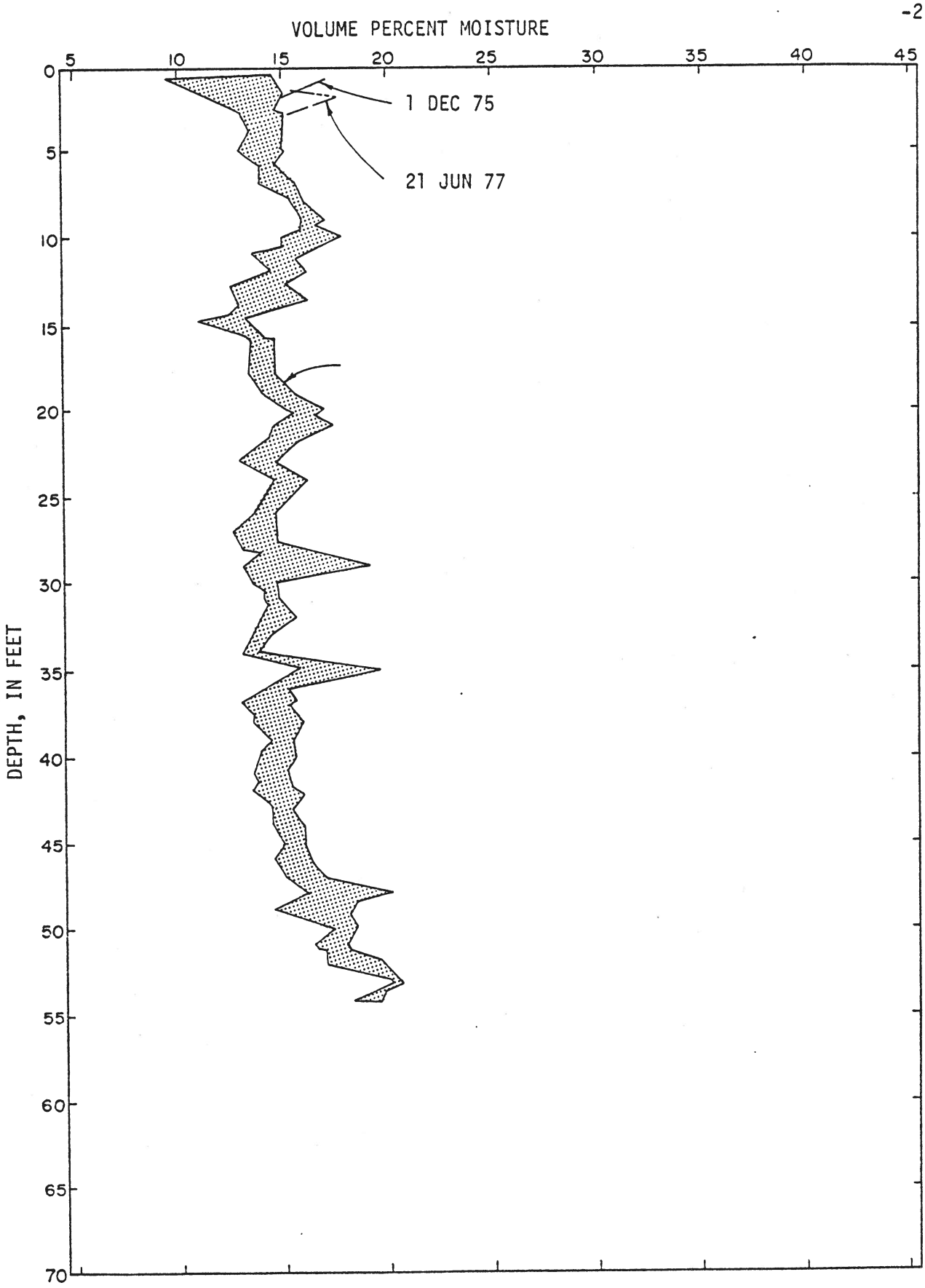

Figure 6. Composite representation of soil moisture profiles in NP hole 1.

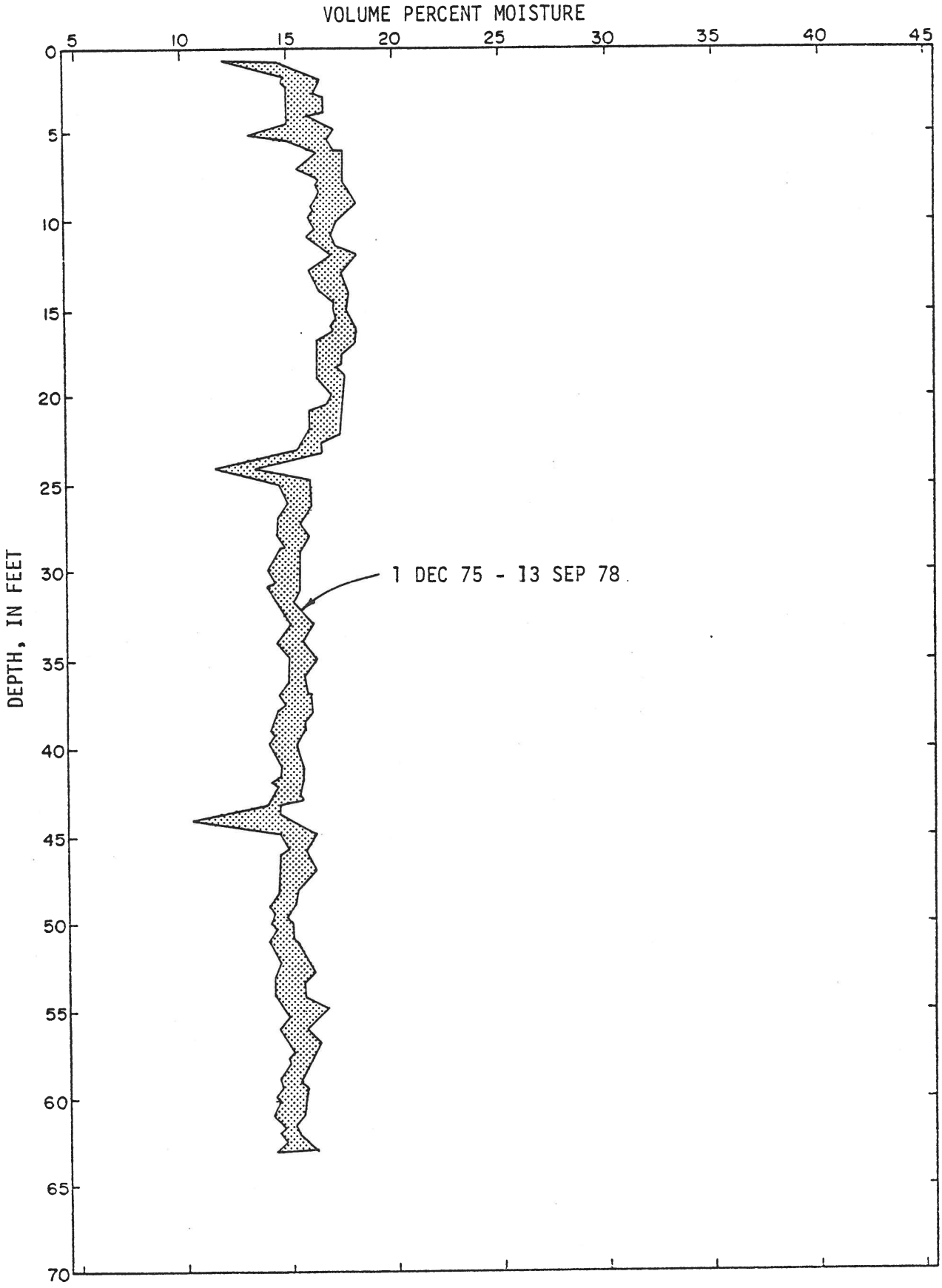

Figure 7. Composite representation of soil moisture profiles in NP hole 2.

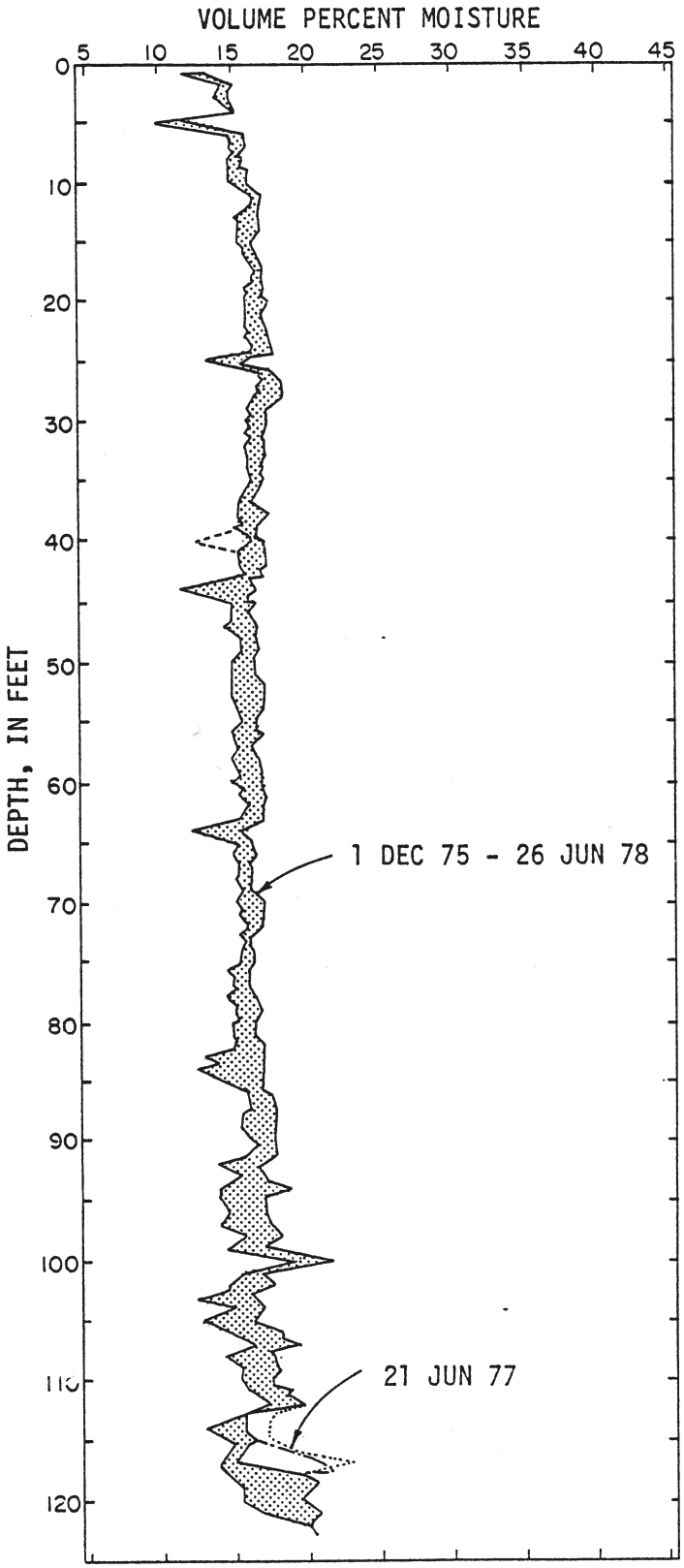

Figure 8. Composite representation of soil moisture profiles in NP hole 3.

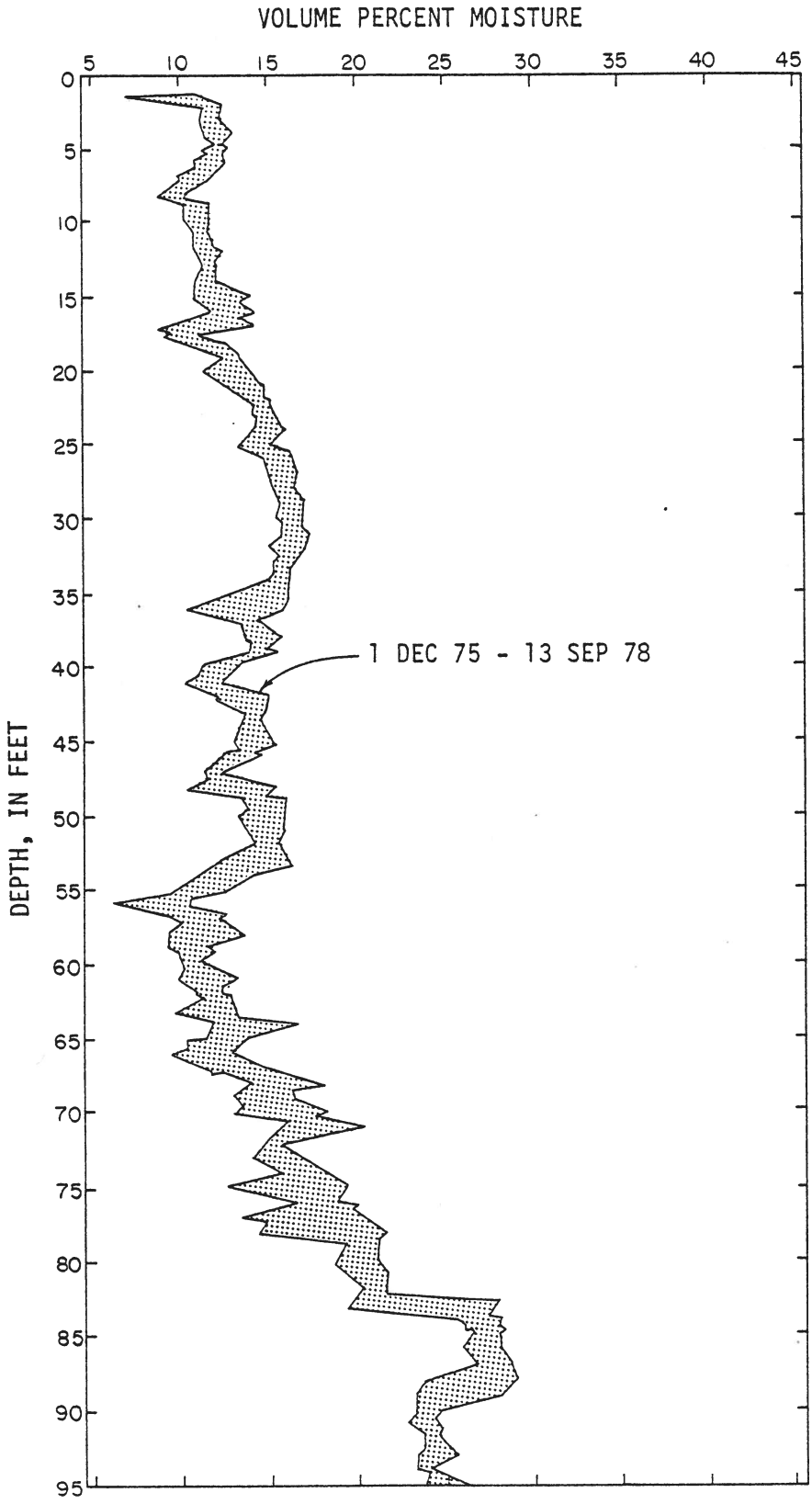

Figure 9. Composite representation of soil-moisture profiles in NP hole 4.

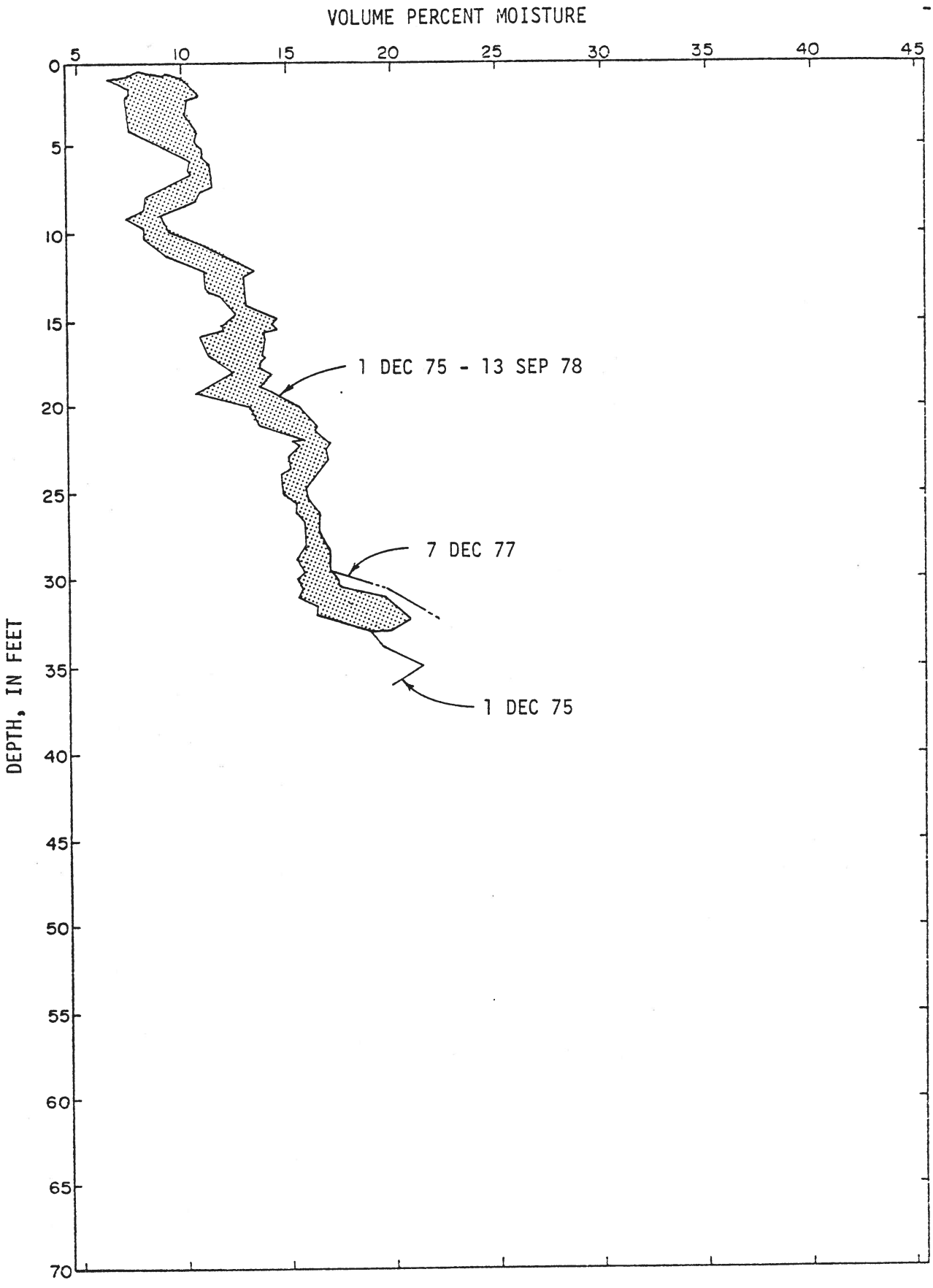

Figure 10. Composite representation of soil-moisture profiles in NP hole 5.

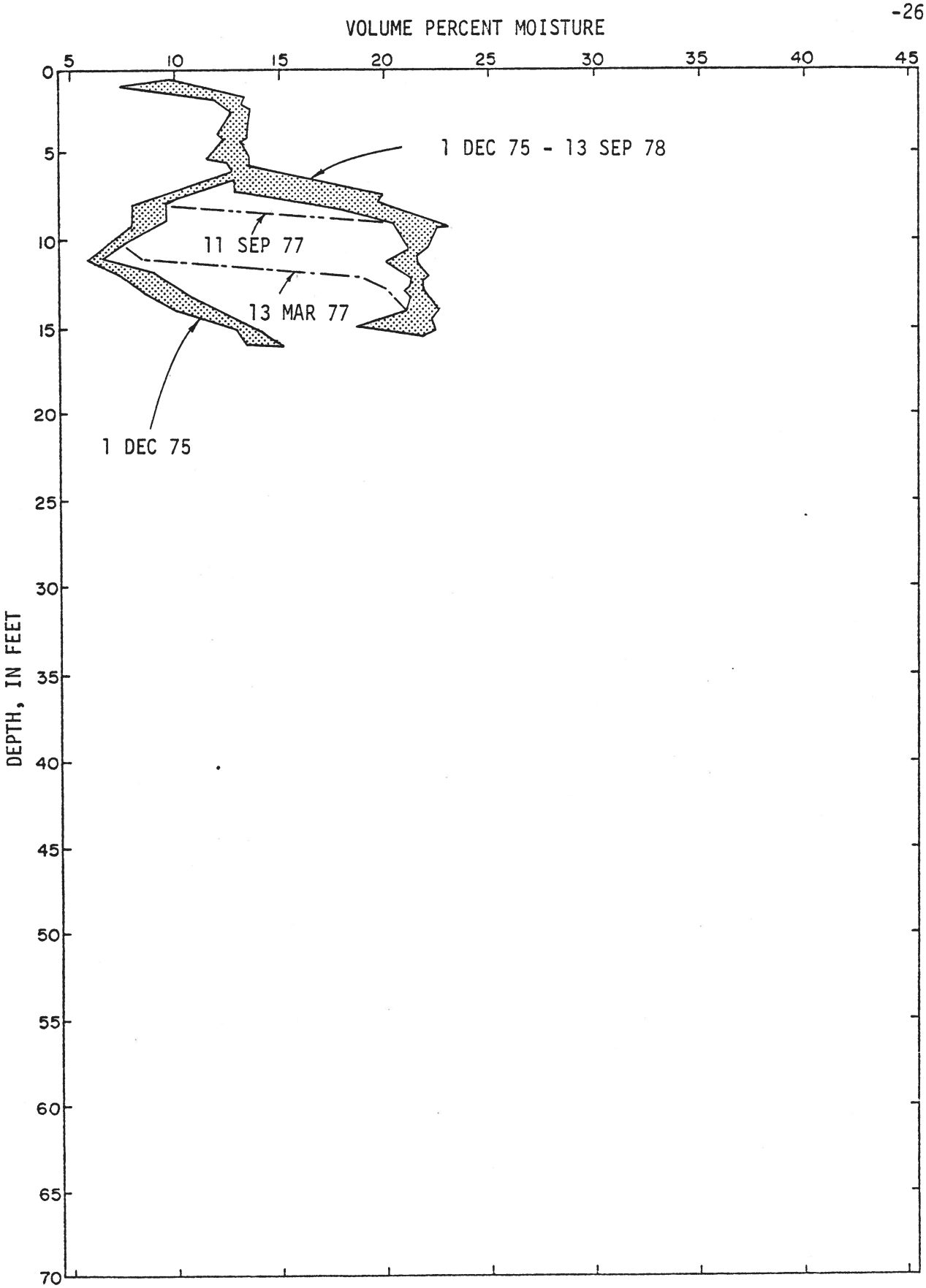

Figure 11. Composite representation of soil-moisture profiles in NP hole 6.

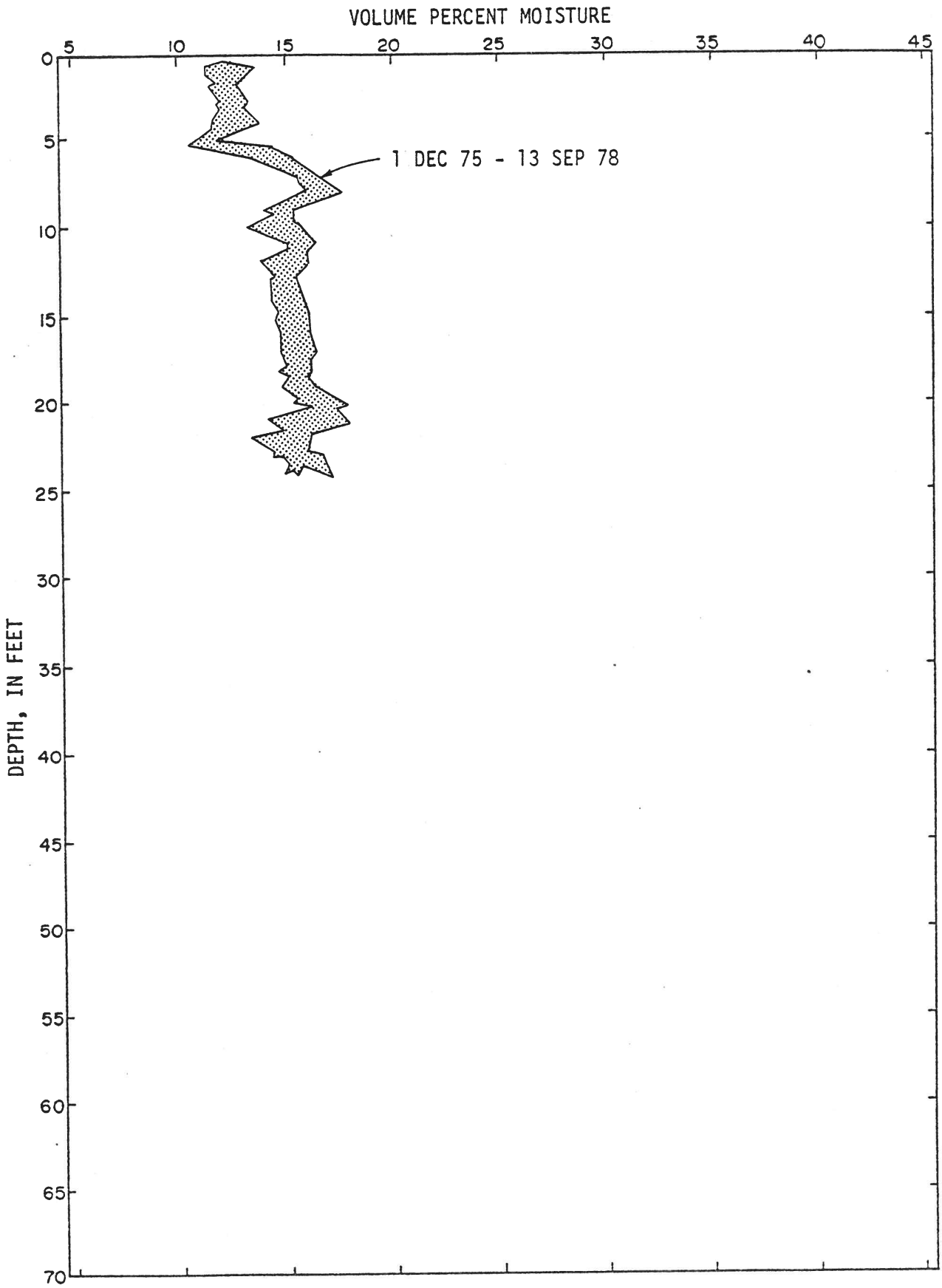

Figure 12. Composite representation of soil-moisture profiles in NP hole 7.

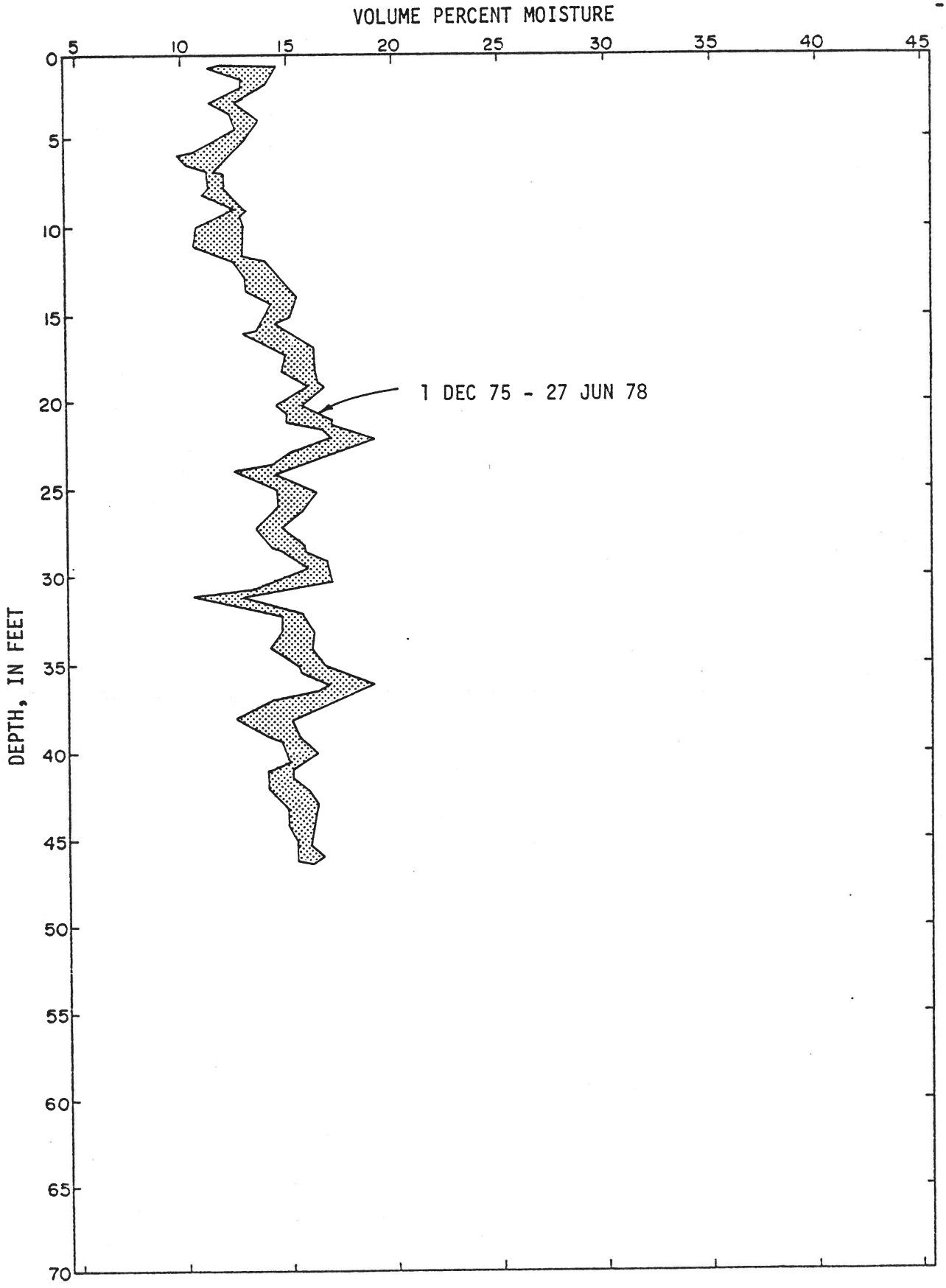

Figure 13. Composite representation of soil-moisture profiles in NP hole 8.

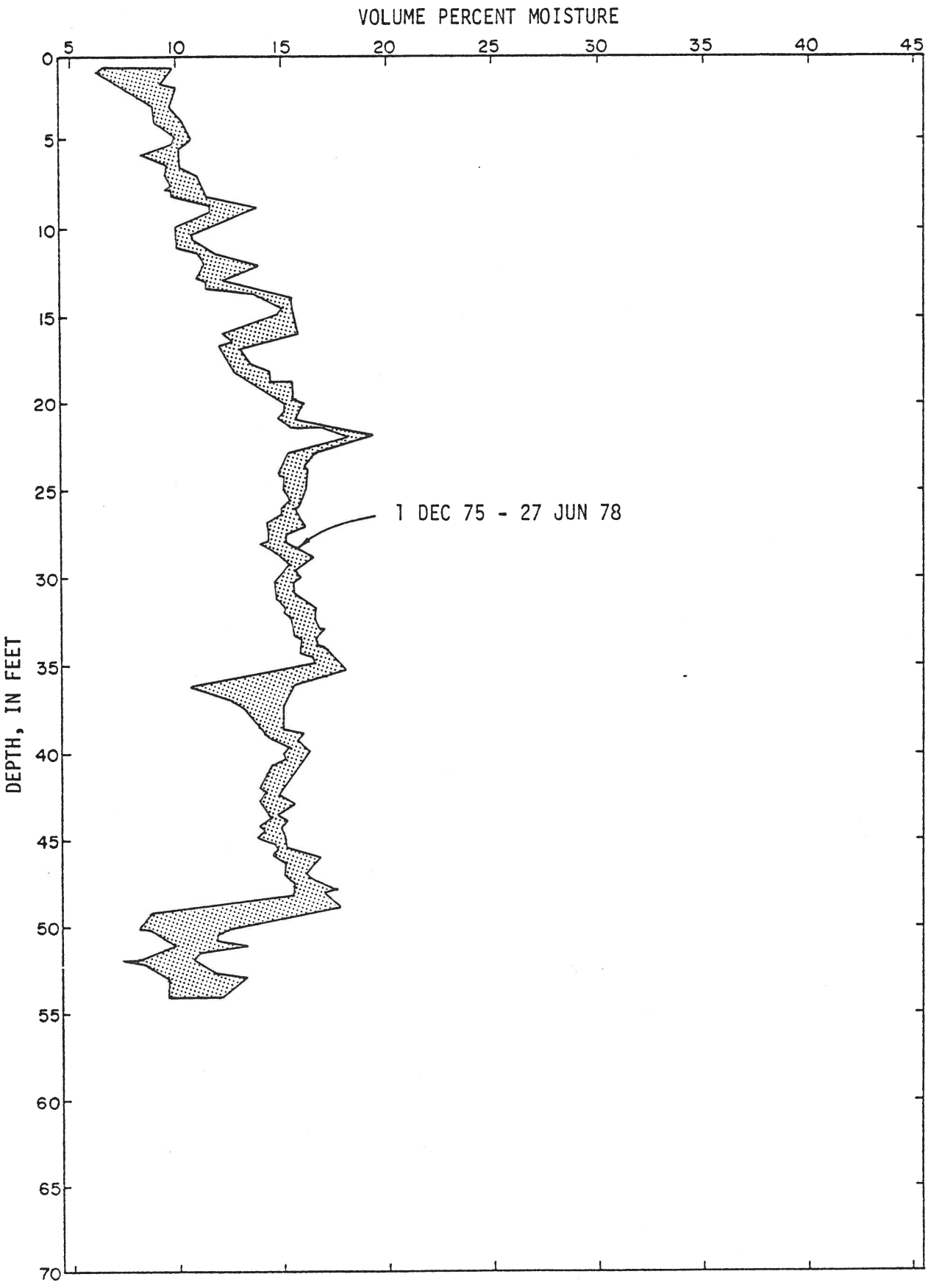

Figure 14. Composite representation of soil-moisture profiles in NP hole 9.

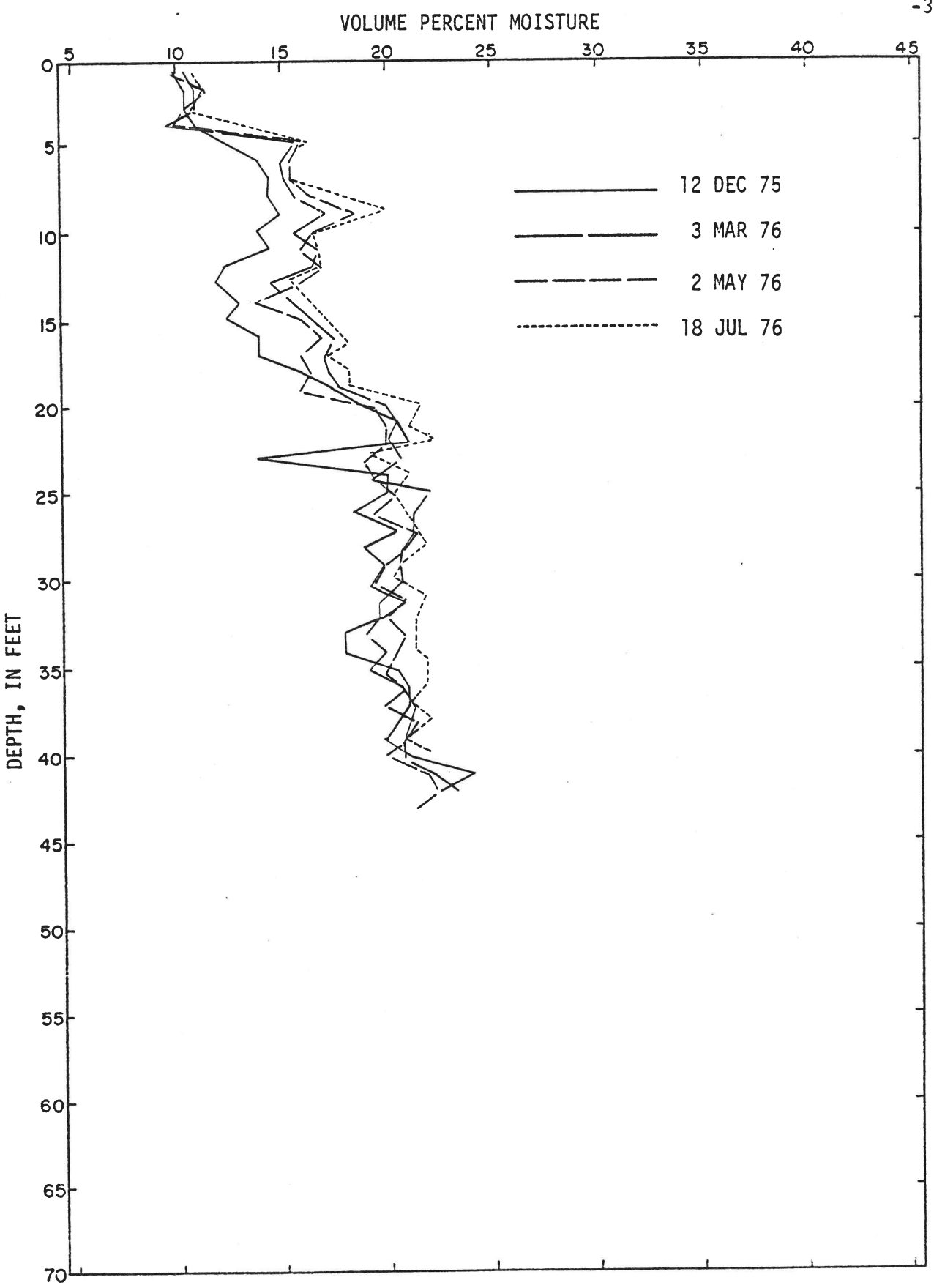

Figure 15. Composite representation of soil-moisture profiles in NP hole 10.

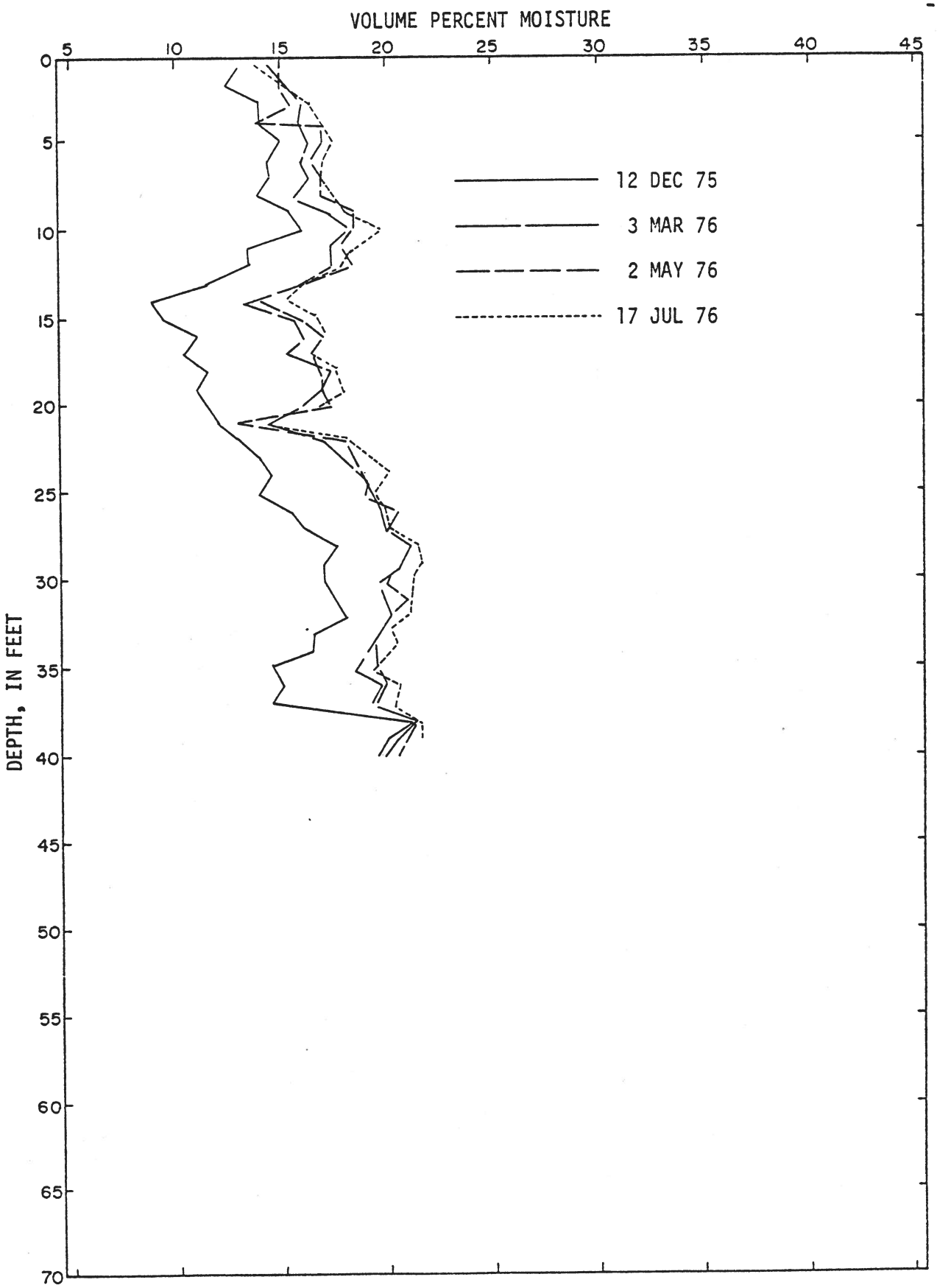

Figure 16. Composite representation of soil-moisture profiles in NP hole 11.

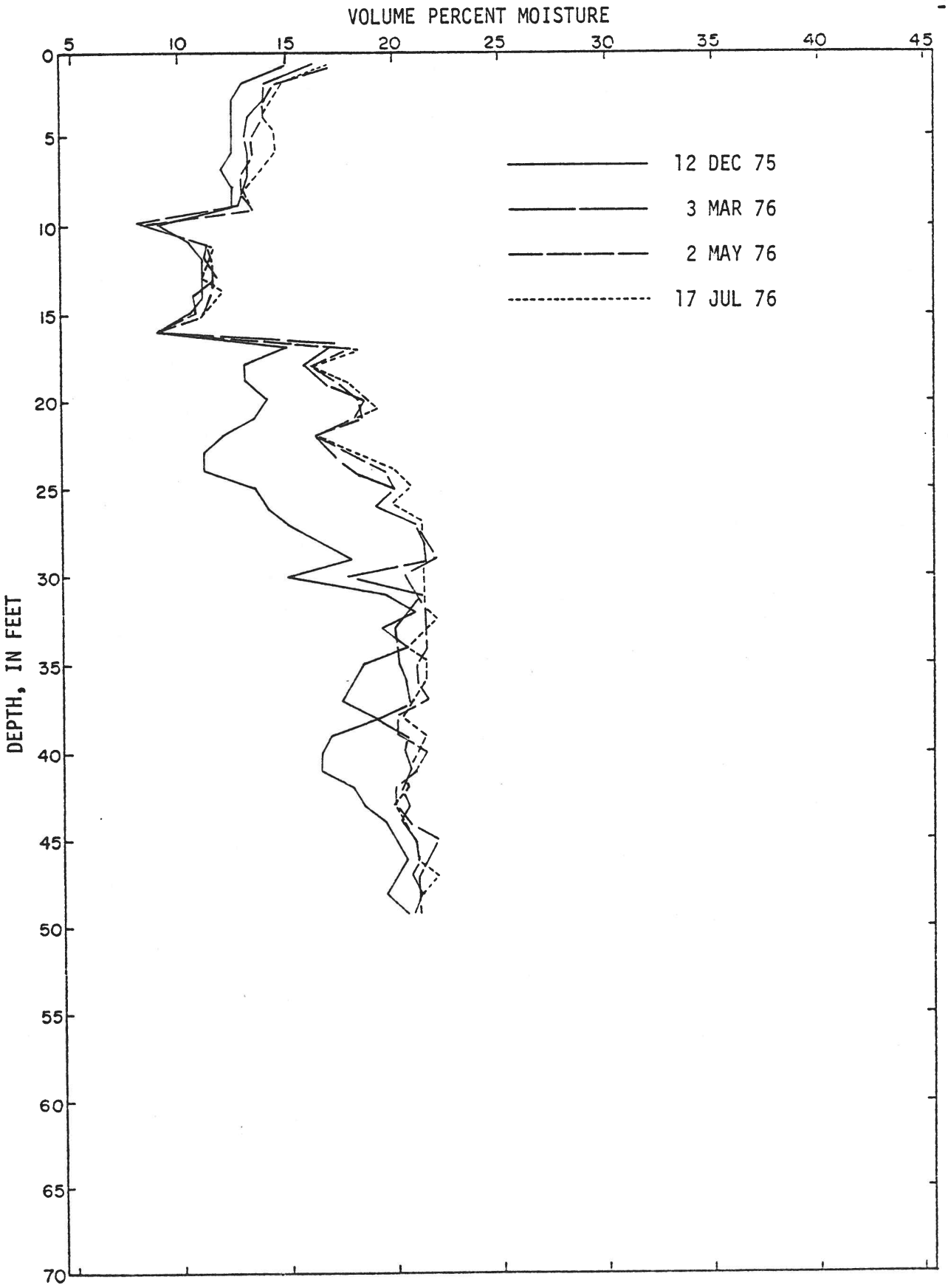

Figure 17. Composite representation of soil-moisture profiles in NP hole 12.

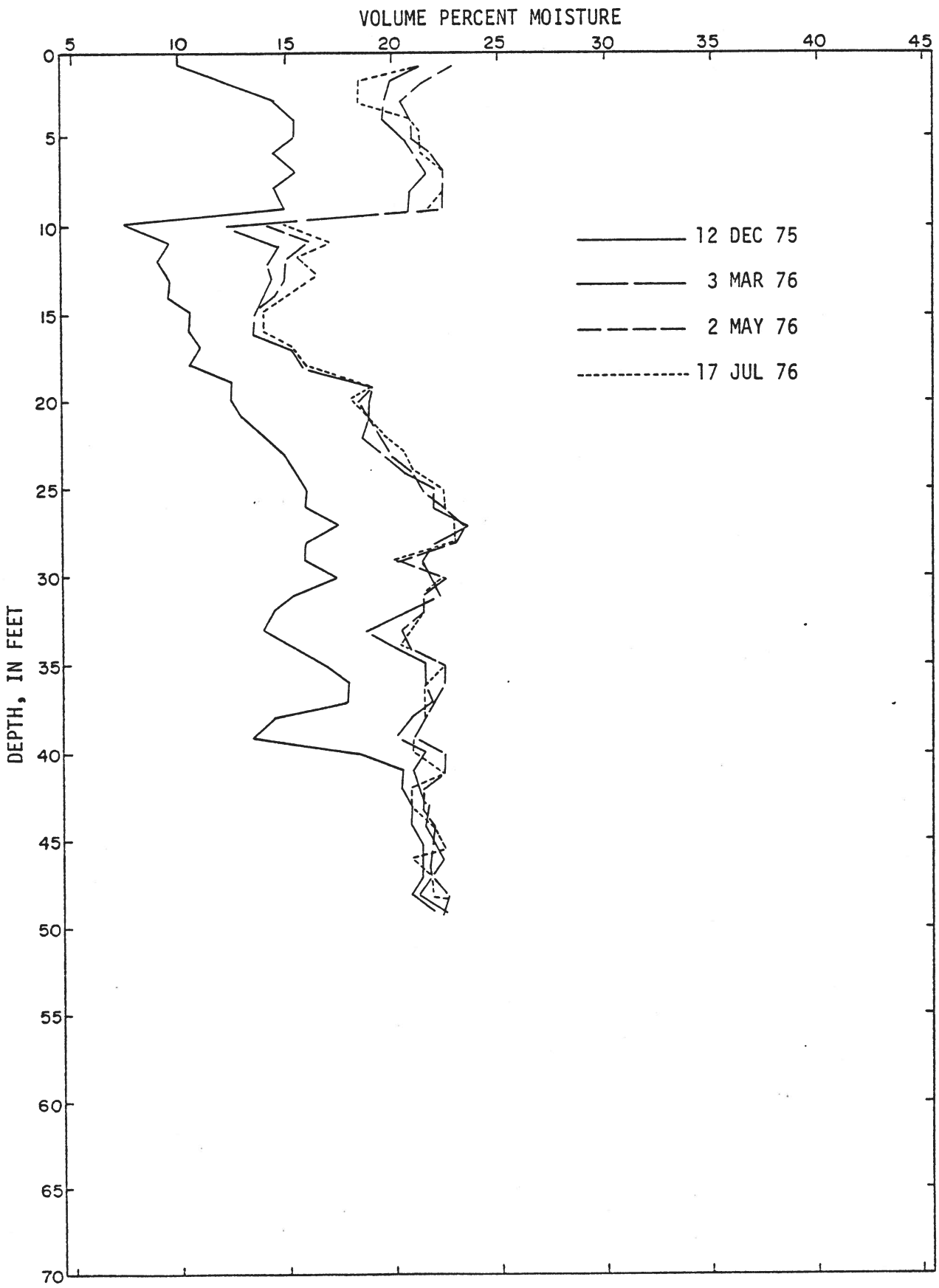

Figure 18. Composite representation of soil-moisture profiles in NP hole 13.

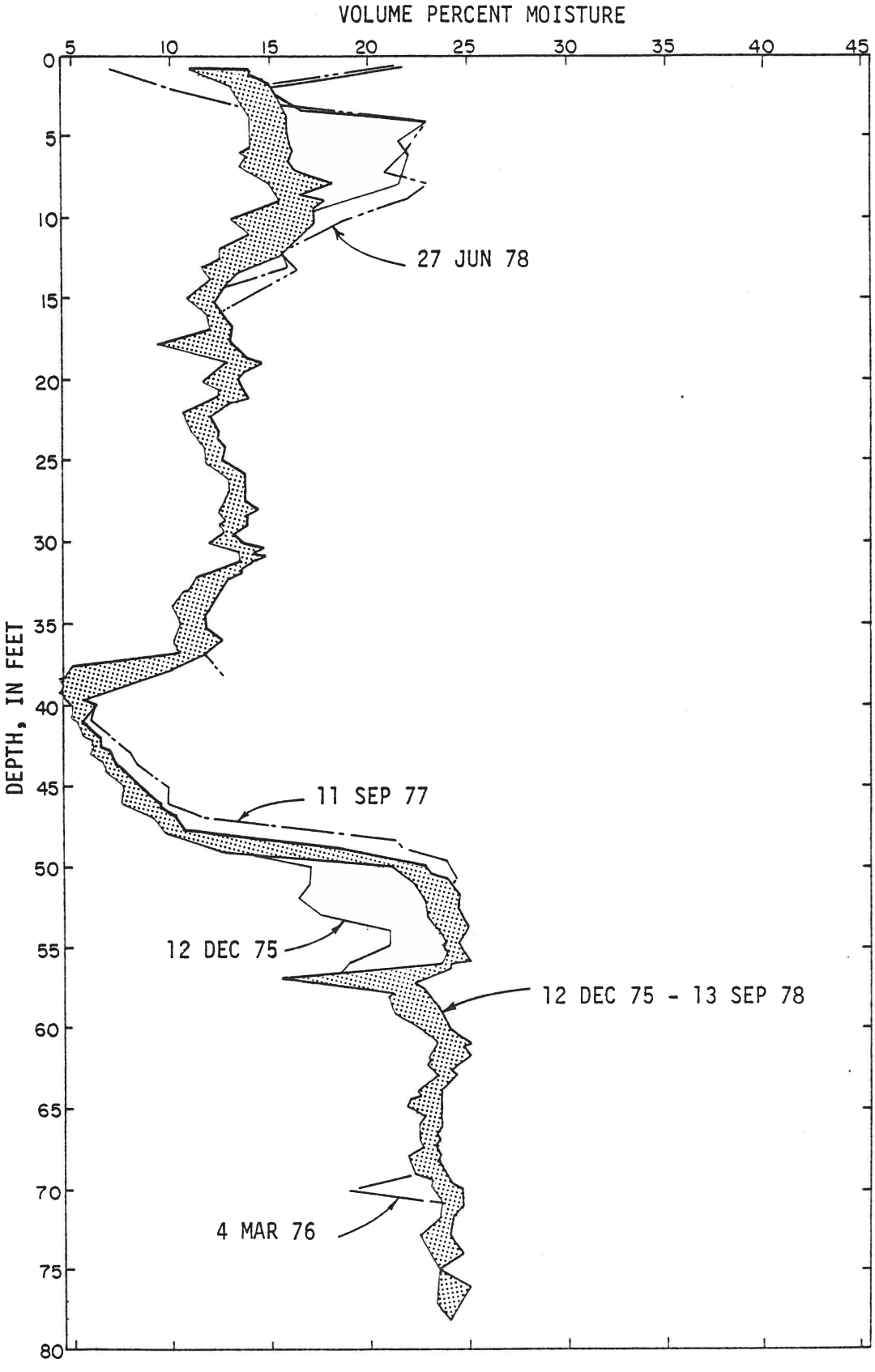

Figure 19. Composite representation of soil-moisture in NP hole 14.

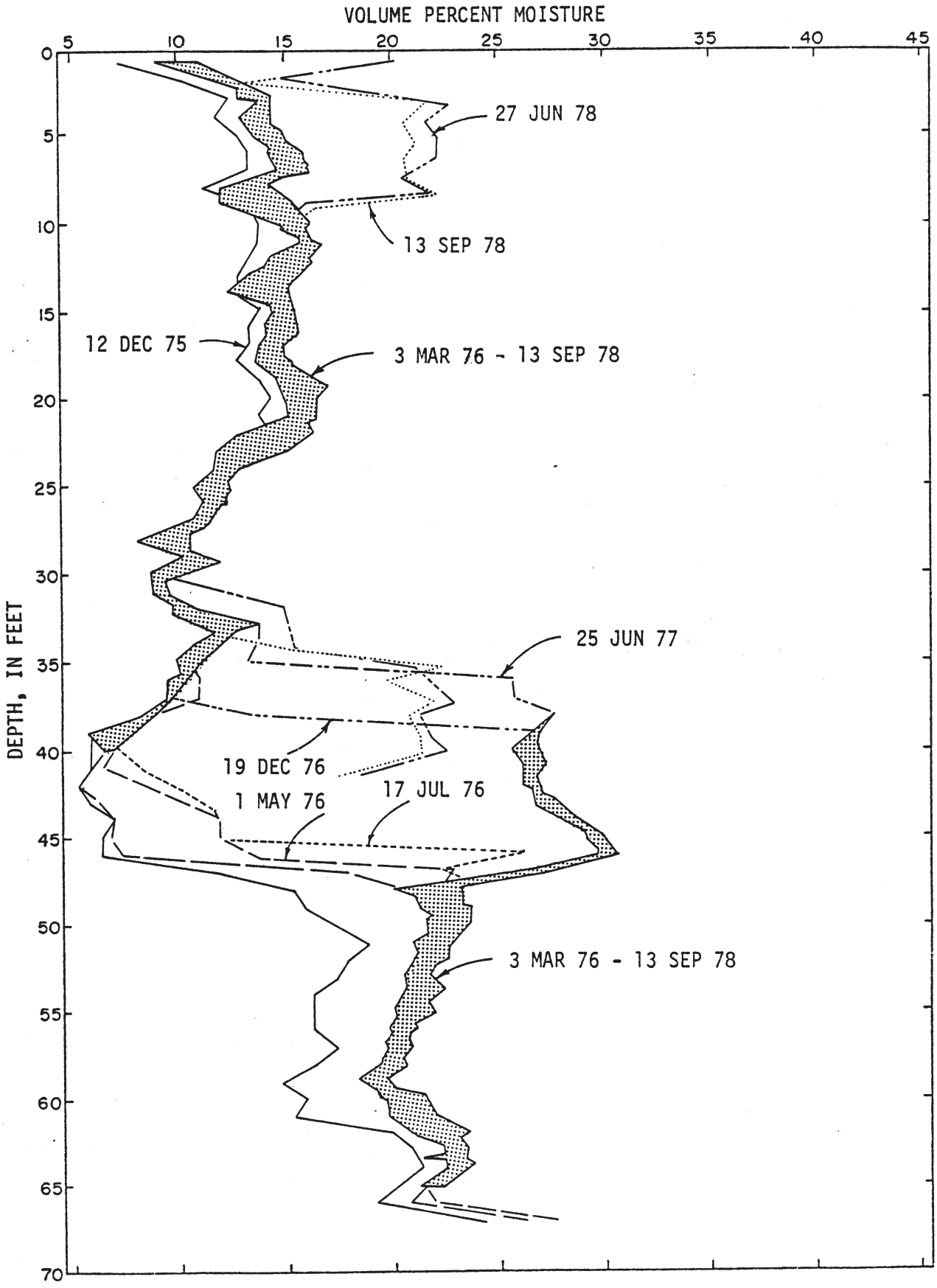

Figure 20. Composite representation of soil-moisture profiles in NP hole 15.

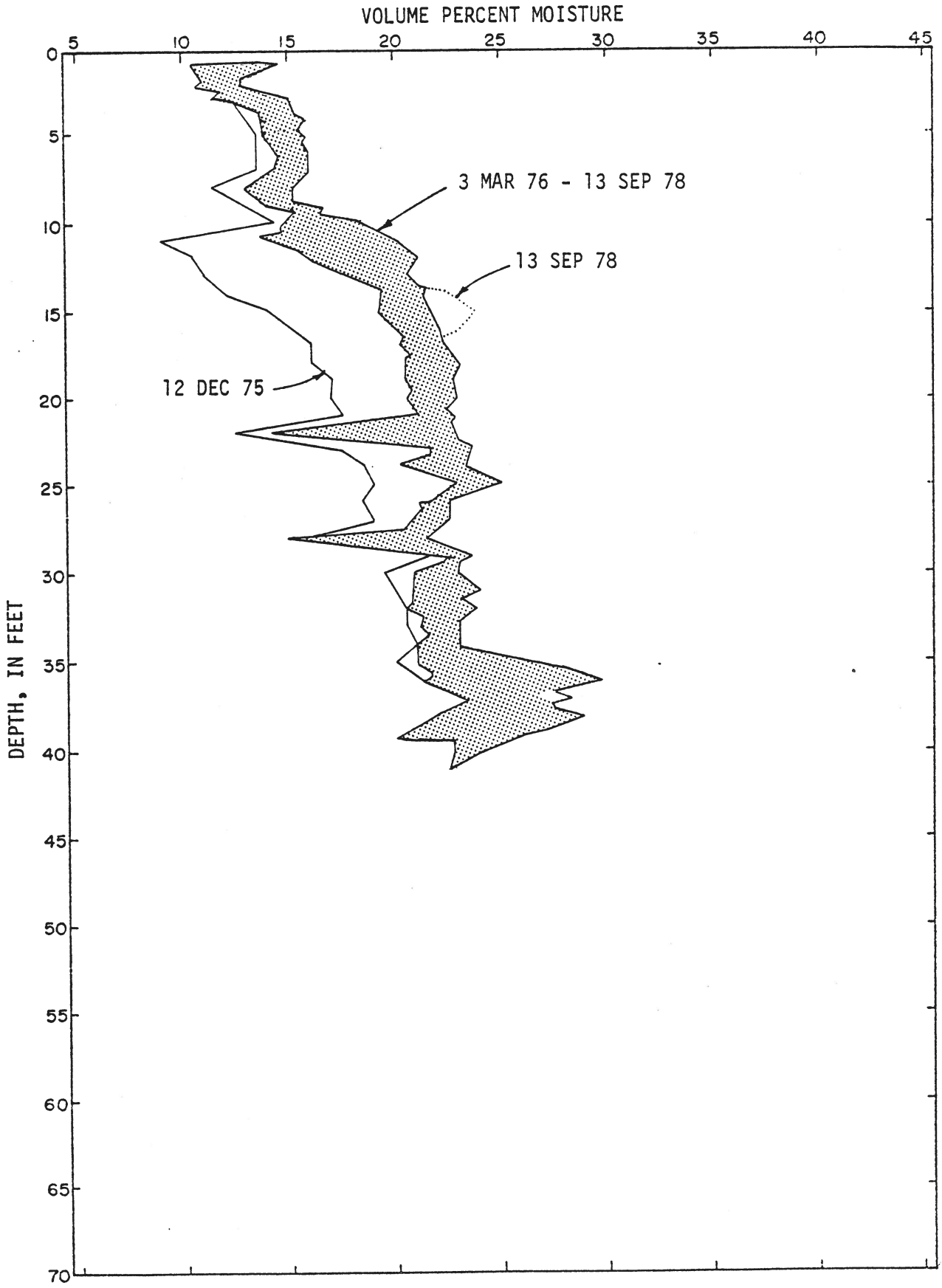

Figure 21. Composite representation of soil-moisture profiles in NP hole 16.

Neutron-probe holes 1, 2, 3, 4, 7, 8, and 9 show the soils to have a moisture content of about 15 volume percent and show no increase in soil moisture since the beginning of monitoring. These are the holes that are located farthest from the area of wetting. Neutron-probe holes 5, 6, 10, 11, 12, 13, 14, 15, and 16 all show increases in soil moisture. The soil-moisture profiles for neutron-probe holes 10, 11, 12, 13, 14, 15, and 16 all show an increase in soil moisture of up to five volume percent between December 12, 1975 and March 3, 1976. The higher moisture contents of the soils persisted in neutron-probe holes 10, 11, 12, and 13 until the last set of measurements in these holes on July 17, 1976 and continue to persist in neutron-probe holes 14, 15, and 16. It is likely that from 22 to 25 volume percent of moisture represents saturation in the soils encountered by the neutron-probe holes. As a result, much of the soil penetrated by the neutron-probe holes suddenly became saturated.

The increase in moisture content of the neutron-probe holes within the tailings-pond area has been attributed by SOHIO personnel to the diversion of fresh water by a contractor into the tailings pond area before the facility had been completed. This inundation occurred in a more or less circular area about 1,000-feet in diameter enclosing the four holes NP-10, 11, 12, and 13. If the moisture content increased about five volume percent over a depth of about 30 feet, then the total amount of water which was added to the storage as a result of the mistaken diversion would be about 8.8 million gallons. The period of time which this inundation lasted is not known so that it is not possible to estimate gross foundation permeability. The results of the neutron

logging were sufficiently concrete to cause SOHIO to modify the construction suggestions made in the Woodward-Clyde report. To retard future seepage still further, sodium chloride rock salt was harrowed into the clays of the reservoir foundation and compacted. The rationale was that the sodium ion would prevent the clays from floculating thereby reducing the permeability of the soil.

The data from the neutron-probe holes within and peripheral to the area of inundation have been used in a general way to prepare figure 22 which shows an increase in the elevation of the water table in the area. This is the type of ground-water mound which the Woodward-Clyde report mentions will develop when seepage takes place. Bearing in mind the structural valley which occurs within the sandstone beneath the spill area, the data suggests that ground-water began to move to the west towards water-level-monitoring hole 3A. Data used to prepare figure 22 are given in table 2.

Table 2. Approximate depth to the zone of saturation in neutron-probe access holes in the flooded area.

Hole No.	Surface elevation of measuring point (ft)	Approximate depth to saturated zone (ft)	Altitude of water table (ft)
10	6165.8	23	6132
11	6164.4	22	6142
12	6165.1	24	6121
13	6167.3	0	6167
14	6185.4	50	6135
15	6185.5	47	6138
16	6151.0	13	6138

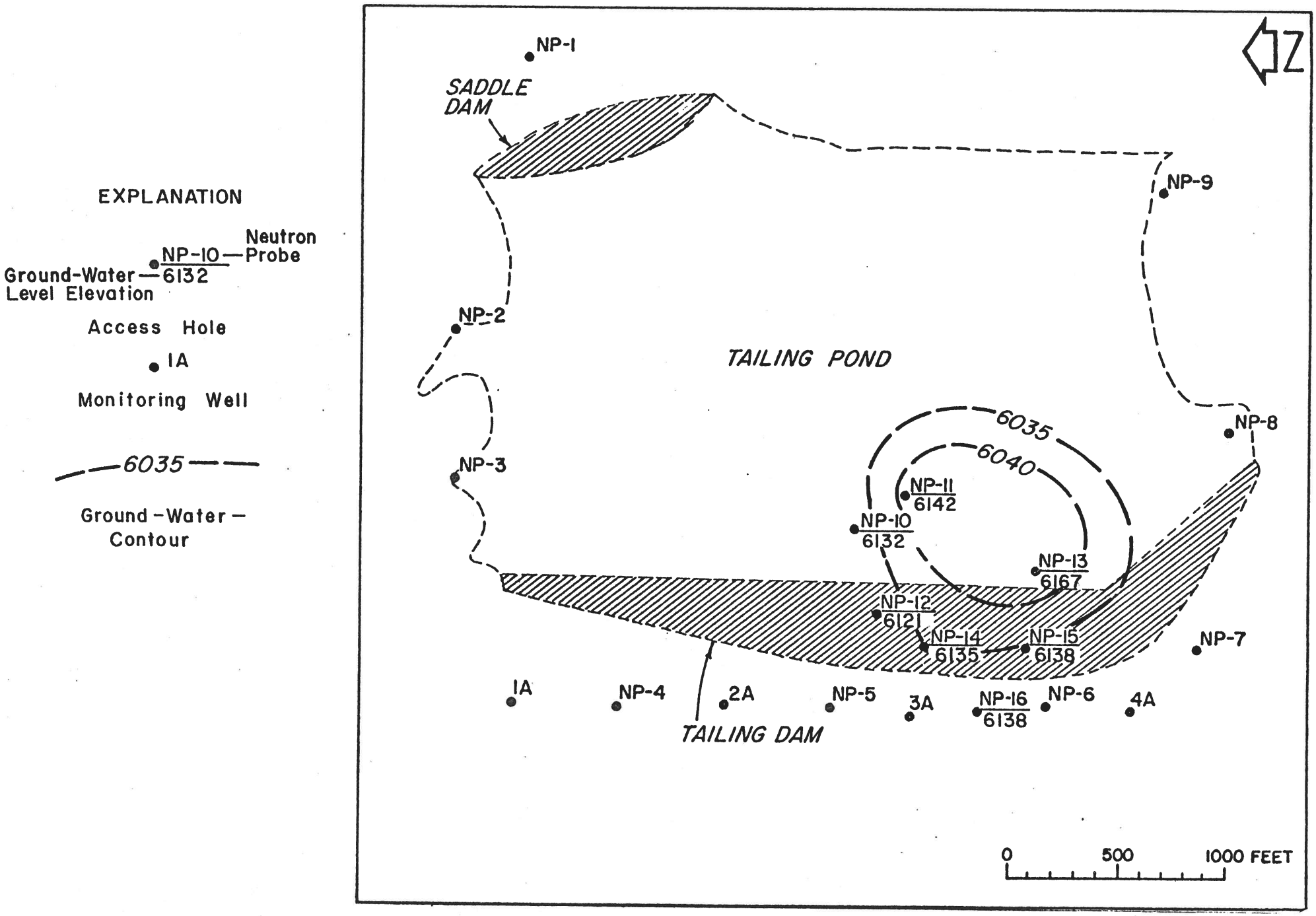

Figure 22. Map showing the increase in the ground-water level beneath the SOHIO L-Bar tailings disposal facility prior to completion.

Since July 1976, the water levels have remained fairly constant in neutron-probe holes 14 and 16 whereas the water levels in neutron-probe holes 6 and 15 have continued to rise. The latest set of soil-moisture data available was measured on September 13, 1978. On this date the water-level altitude in neutron-probe holes 6, 14 and 15 are approximately as given in table 3.

Table 3. Water-level altitudes in neutron-probe holes 6, 14, and 15 for September 13, 1978.

Hole No.	Measuring point altitude (ft)	Depth to water (ft)	Water-table altitude (ft)
6	6152.7	7	6145
14	6185.4	> 38	> 6148
15	6185.5	32	6153

These data will be utilized later to determine the shape of the phreatic surface within the dam and in the subsurface downstream of the starter dam.

Examination of the soil-moisture profiles for neutron-probe holes 14 and 15 indicate an increase in soil-moisture for the upper 10 feet of the embankment beginning with the June 27, 1978 set of measurements. This increase was caused by the removal of a large amount of original soil from the vicinity of the access tube and its replacement by material with a considerably higher moisture content. During the backfilling operation, the holes were actually covered with about ten

feet of tailings. The holes were relocated and exhumed. Subsequent logging of the holes indicates that the bottom parts of the holes were filled with slimes during the backfilling operation. It is likely that this material can be either blown or jetted from the access tubes.

Based upon soil moisture information collected to date, it is apparent that neutron-probe holes 1, 2, 3, 4, 8, and 9 are not providing a significant amount of new information from measurement to measurement. Holes 5, 6, 14, 15, and 16 appear to bear close watching as the soil moisture profiles change visibly from measurement to measurement. Consequently, it is recommended that measurements be taken in neutron-probe holes 5, 6, 14, 15, and 16 quarterly and that all other accessible holes be monitored annually.

WATER LEVELS

Immediately west of the starter-dam embankment, SOHIO constructed four sets of two ground-water-monitoring wells. Each set consisted of a shallow monitoring well to observe water levels within the shallow alluvium and a deeper well to observe water levels in the first Tres Hermanos sandstone. These wells are also used to obtain water samples from these two rock units. Attachment 6 contains the lithologic logs of the holes as well as general construction details for each well.

Water-level measurements in these holes were begun in 1975 and continue to date. The measurements, until recently, were generally

made by SOHIO personnel. In recent months, AGW personnel have carried out water-level measurements as well. All water level measurement data collected to date is reported in attachment 4. This data is shown graphically in figures 23 through 26. Variations in water levels reported and shown diagrammatically since June, 1978 are probably due to different water-level-measurement practices. SOHIO personnel generally use an etched steel surveyors chain to which has been attached a small cup-like device. This is then lowered into the well until a plopping sound is heard. The depth is then read on the tape at the upper lip of the well casing. In carrying out measurements using this technique on September 1, 1978, AGW obtained some results which were similar to the results obtained by AGW personnel on September 13, 1978. The AGW results, however, differed from the October water-level measurements made by SOHIO personnel more than they differed from each other. The difference is believed due to the fact that the SOHIO data has not been corrected for the distance from the bottom of the cup-like device to the lower end of the surveyors chain.

AGW personnel have always measured water levels by lowering an etched steel surveyors tape into the water in each of the monitoring wells. The tape is lowered until a foot marker on the tape came even with the measuring point on the lip of the casing. The tape is withdrawn from the well and the depth of tape which passed beneath the water level is determined and subtracted from the length of tape held at the measuring point. This method of measurement is accurate to 0.01-foot.

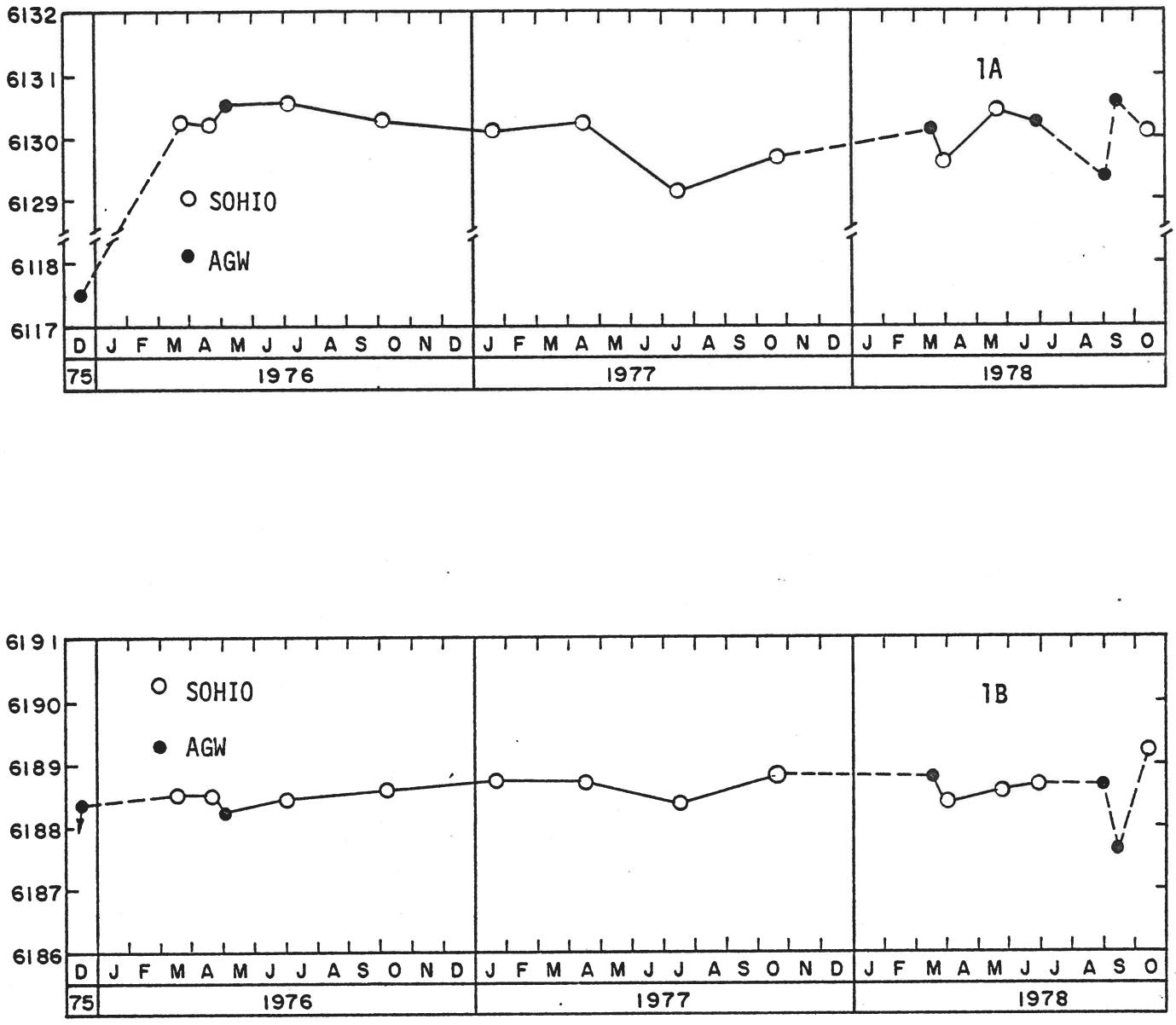

Figure 23. Hydrographs of water levels in ground-water-monitoring wells 1A and 1B.

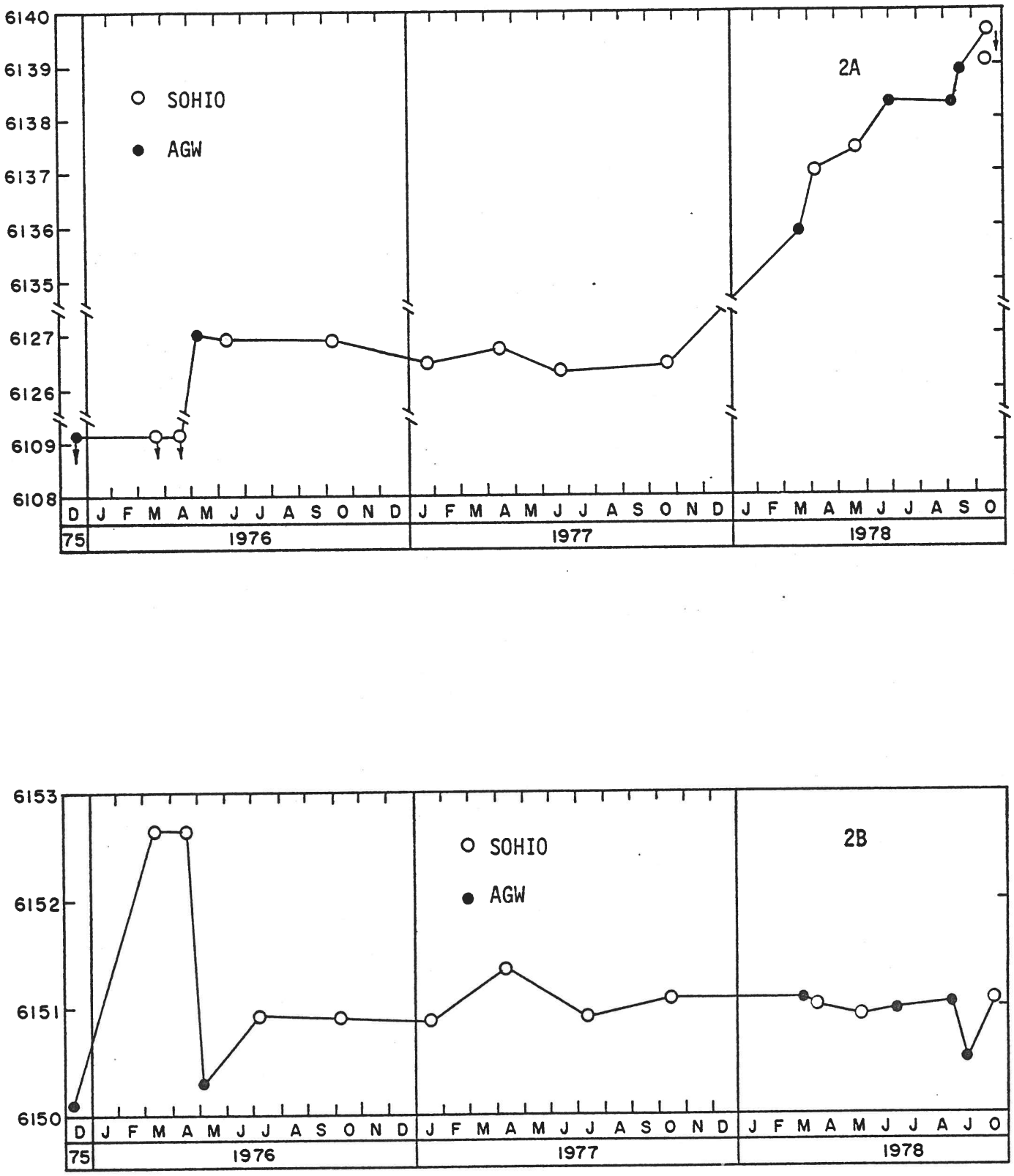

Figure 24. Hydrographs of water levels in ground-water-monitoring wells 2A and 2B.

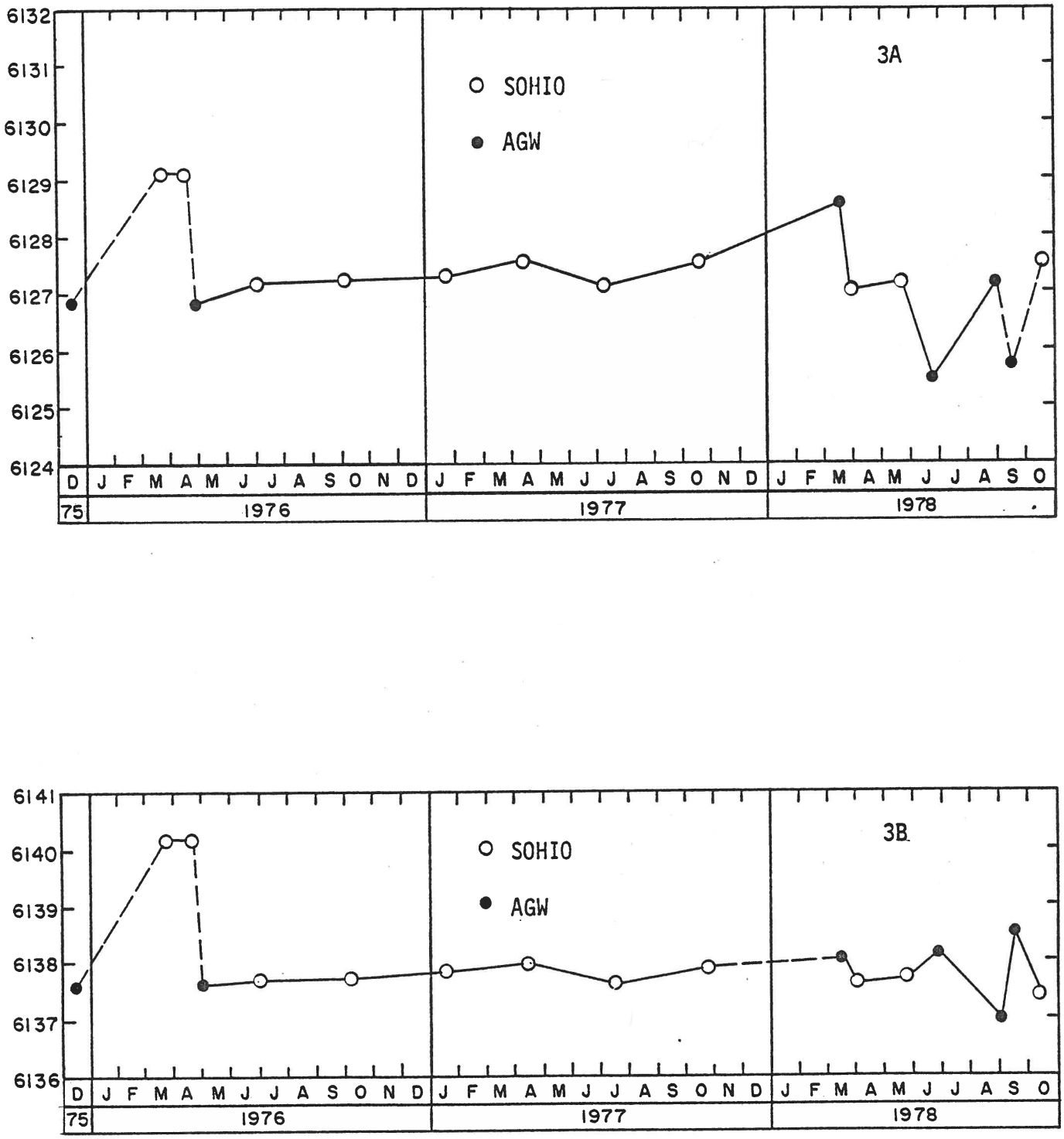

Figure 25. Hydrographs of water levels in ground-water-monitoring wells 3A and 3B.

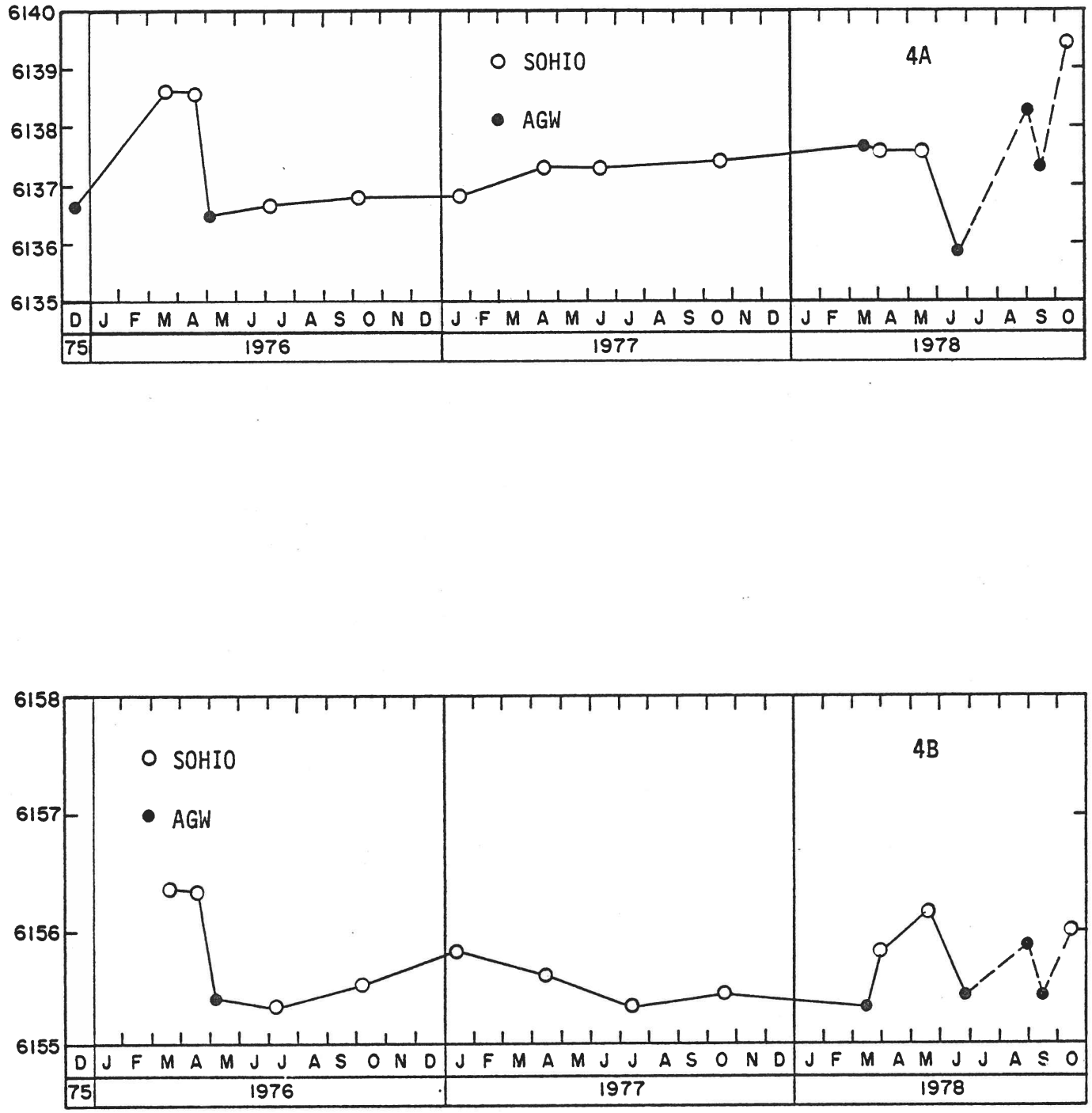

Figure 26. Hydrographs of water levels in ground-water-monitoring wells 4A and 4B.

The SOHIO data generally agrees quite well with itself, but not especially well with AGW data. For interpretive purposes, at this point, more reliance will be placed on the SOHIO data. For the future, however, it is recommended that the method of measurement used by AGW be adopted by SOHIO personnel. This will provide more accurate data for analysis in the future.

Between December of 1975 and February of 1976, the water level in all of the deeper monitoring holes with the exception of monitoring well 2A rose about two feet. The rise in water level in well 2A occurred in early May, 1977. In addition, the water level in shallow ground-water-level-monitoring wells 2B and 3B rose. This increase in water level is believed attributed to the same event which caused the increase in soil moisture measured in neutron-probe holes 10, 11, 12, 13, 14, 15, and 16. In all cases, the March, 1976 water levels are exactly the same as the April, 1976 water levels which suggests that the water levels were not remeasured in April, 1976. It almost never happens that water levels made in two different months are precisely the same.

Following drainage of the unplanned inundation of the tailings pond area, the water levels in all of the monitoring wells fell back to their pre-inundation level.

Examination of the water-level hydrographs indicates that the ground-water levels have remained fairly constant since the completion of the tailings area and the initiation of tailings disposal in August, 1976. The single exception to this is monitoring well 2A in which the

water level has risen about 30 feet since the construction of the tailings disposal area. All of this rise occurred since October, 1977 and this increase has been cause for concern.

It was initially thought that the rapid rise in water level in monitoring well 2A was caused by poor communication of the well with the first Tres Hermanos sandstone and that the rise was simply caused by a long time lag between an increase in the hydrostatic head in the first Tres Hermanos sandstone and the rise in the water level in the well. To evaluate this supposition, AGW requested that SOHIO personnel carry out a slug or single pulse withdrawal test.

The slug withdrawal test was carried out by inserting an air hose to the bottom of the well and blowing the standing column of water from the hole essentially instantaneously. The depth to water was measured before the water was blown from the hole and at timed intervals thereafter. The data for this test is given in attachment 7. The data are plotted graphically in figure 27. Analysis of figure 27 indicates that although the Tres Hermanos sandstone apparently has a moderately high transmissivity of about 1137 gallons per day per foot, and although it is a slightly inefficient well, the response of the well to changes in water level in the aquifer is quite rapid. This rules out the supposition that monitoring well 2A does not adequately represent hydraulic head conditions within the first Tres Hermanos sandstone.

As a result of the rapid rise in water level in monitoring well 2A, SOHIO decided to construct four more observation wells due east of the line of observation holes formed by 1A through 4A. The location of

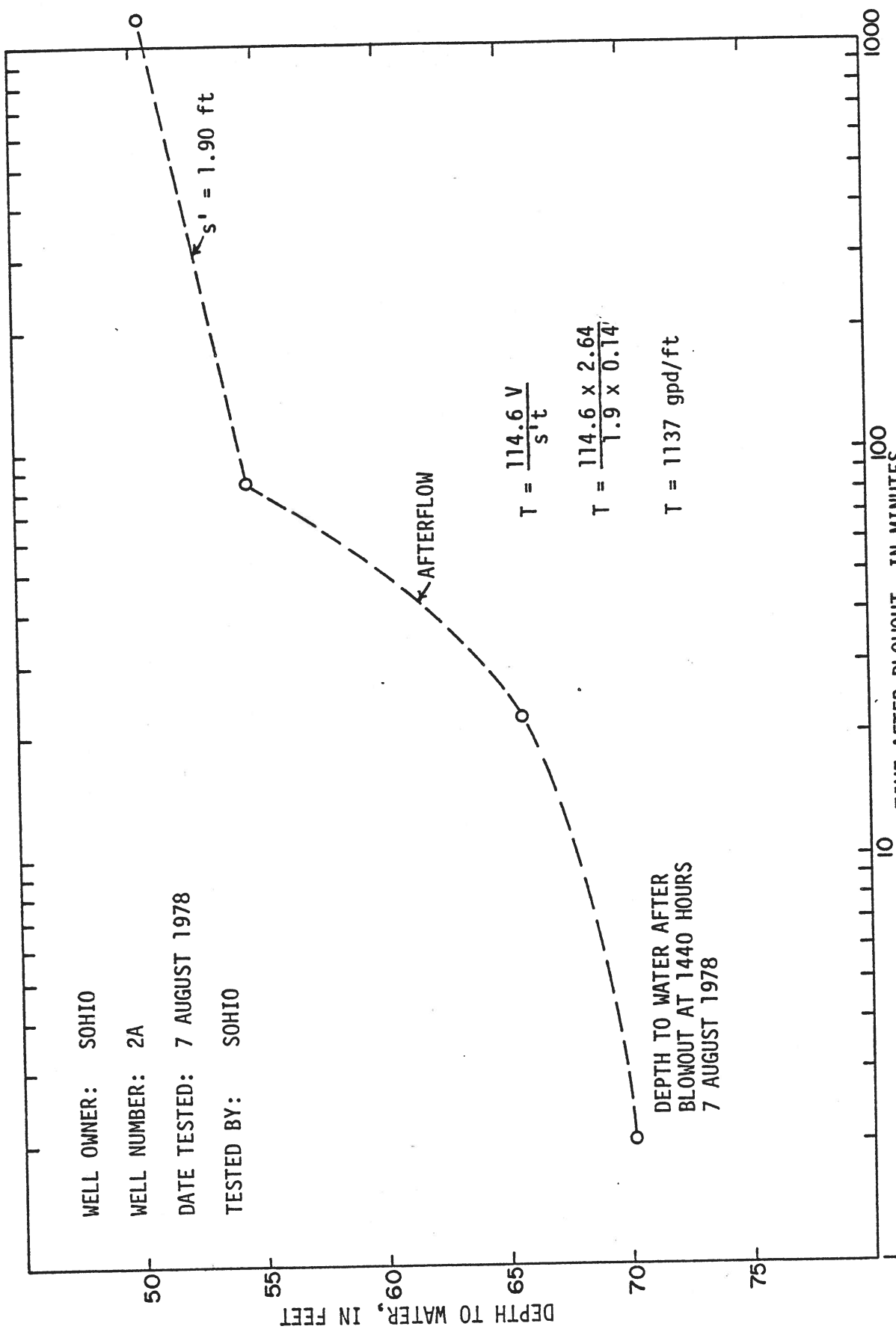

Figure 27. Graphical plot of recovery data measured during the slug-withdrawal test of well 2A.

these monitoring wells is shown in figure 5. The lithologic logs and construction details from these holes are given in attachment 6. Attachment 4 presents the water level data collected from new monitoring wells 5 through 8.

Water-level data from monitoring holes 1A through 4A were used to construct figure 28 which shows the water table along the north-south line due west of the starter dam in relation to the top of the first Tres Hermanos sandstone at three different periods. Although the water level in well 2A has risen rapidly since October 1977, the altitude of the water table at 2A is not greater than it is south of well 3A. The water table at well 2A is above the first Tres Hermanos sandstone, and its rise is indicative of greater hydraulic head within the sandstone.

Water-level information from all sources was used to assemble the ground-water-level contour maps which are shown in figures 29 through 32. These are in the vicinity of monitoring wells 3A and 5. The ground-water-level contour map indicates that these areas are ground-water sinks into which water from surrounding areas is flowing. Ground-water sink- are commonly areas of higher aquifer permeability. The ground-water sink associated with monitoring hole 3A is apparently the stronger sink and the location of the greatest amount of seepage. It is interesting to note that monitoring well 3A is situated in very close proximity to the valley noted in the structural-contour map of the first Tres Hermanos sandstone bed.

The ground-water level rises about 11 feet from monitoring hole 3A to monitoring well 4A. That is, as monitoring well 4A is approached from monitoring well 3A, the ground-water level rises. If the

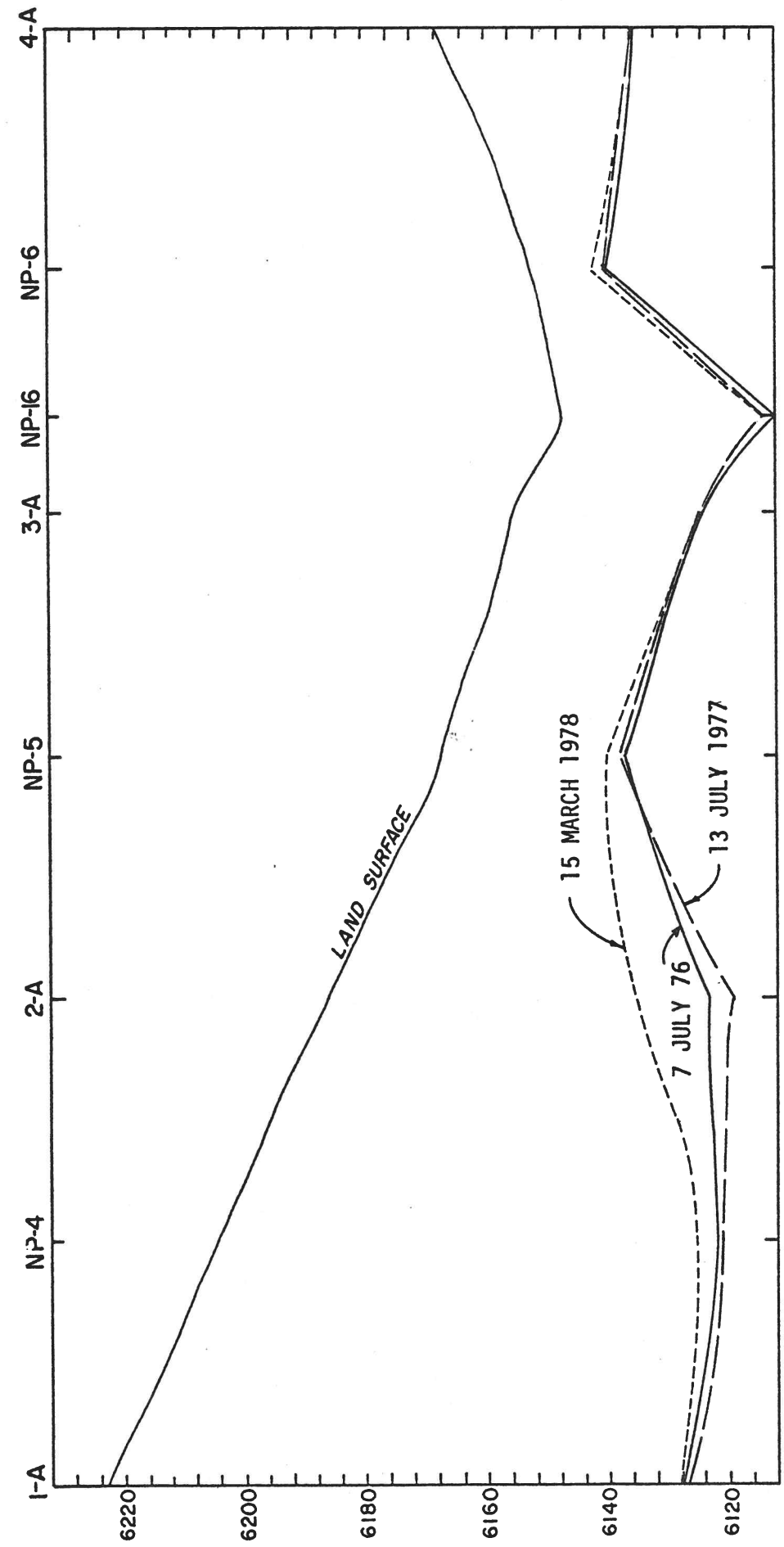

Figure 28. North to south panel diagram directly west of the starter dam showing the ground-water levels on three different dates,

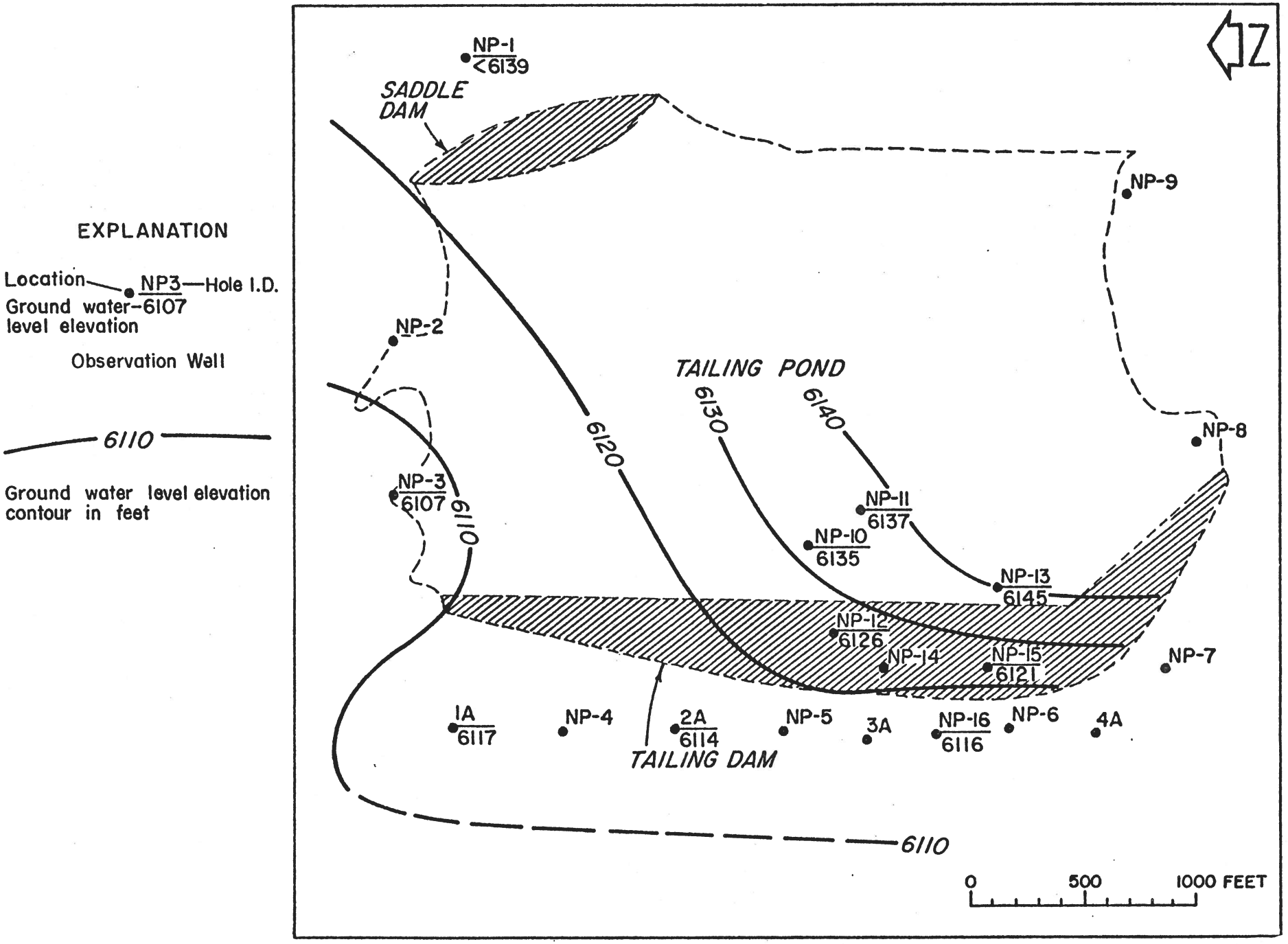

Figure 29. Ground-water-level-contour map of the L-Bar tailings disposal area for 14 December 1975.

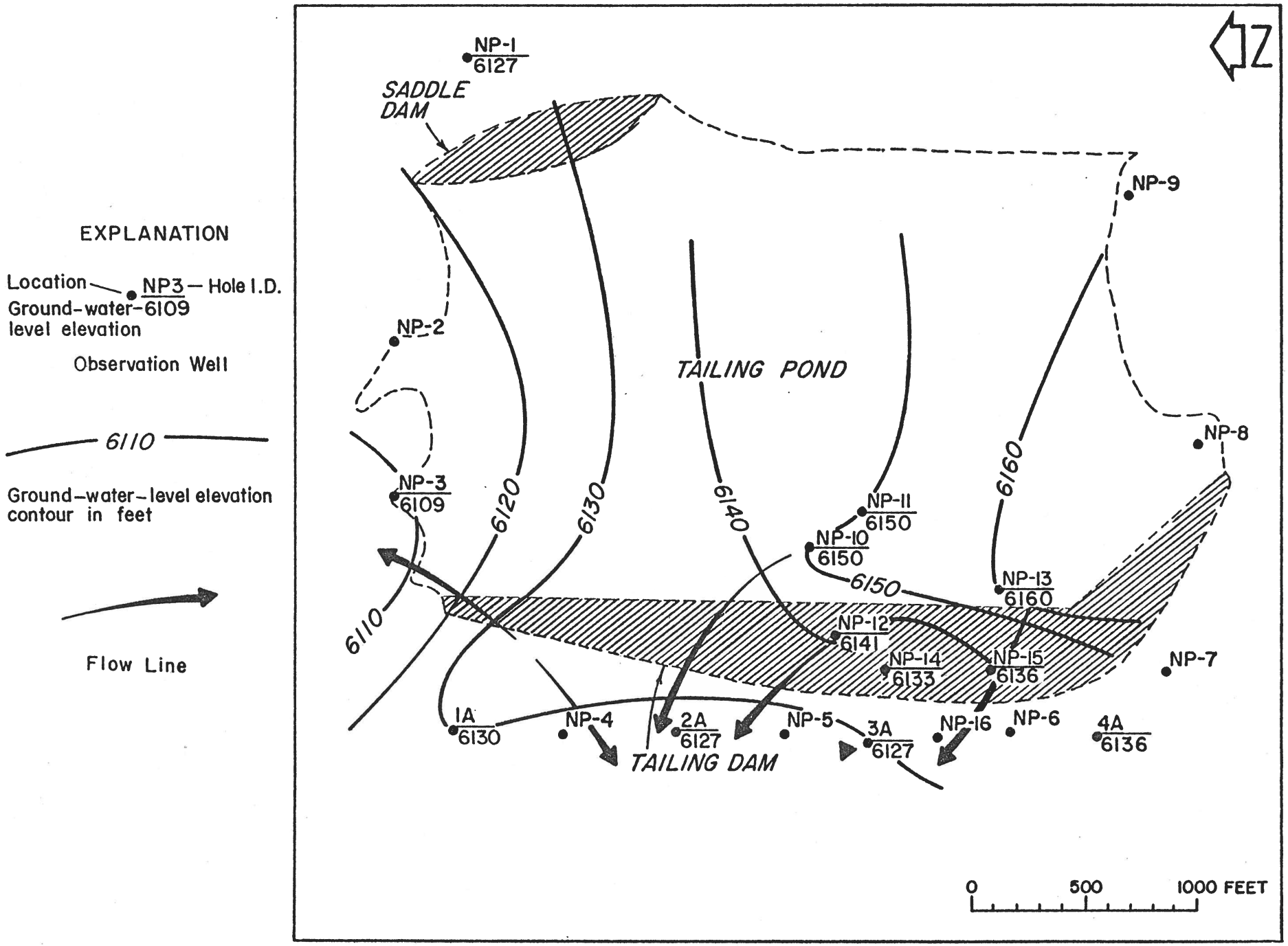

Figure 30. Ground-water-level-contour map of the L-Bar tailings disposal area for 2 May 1976.

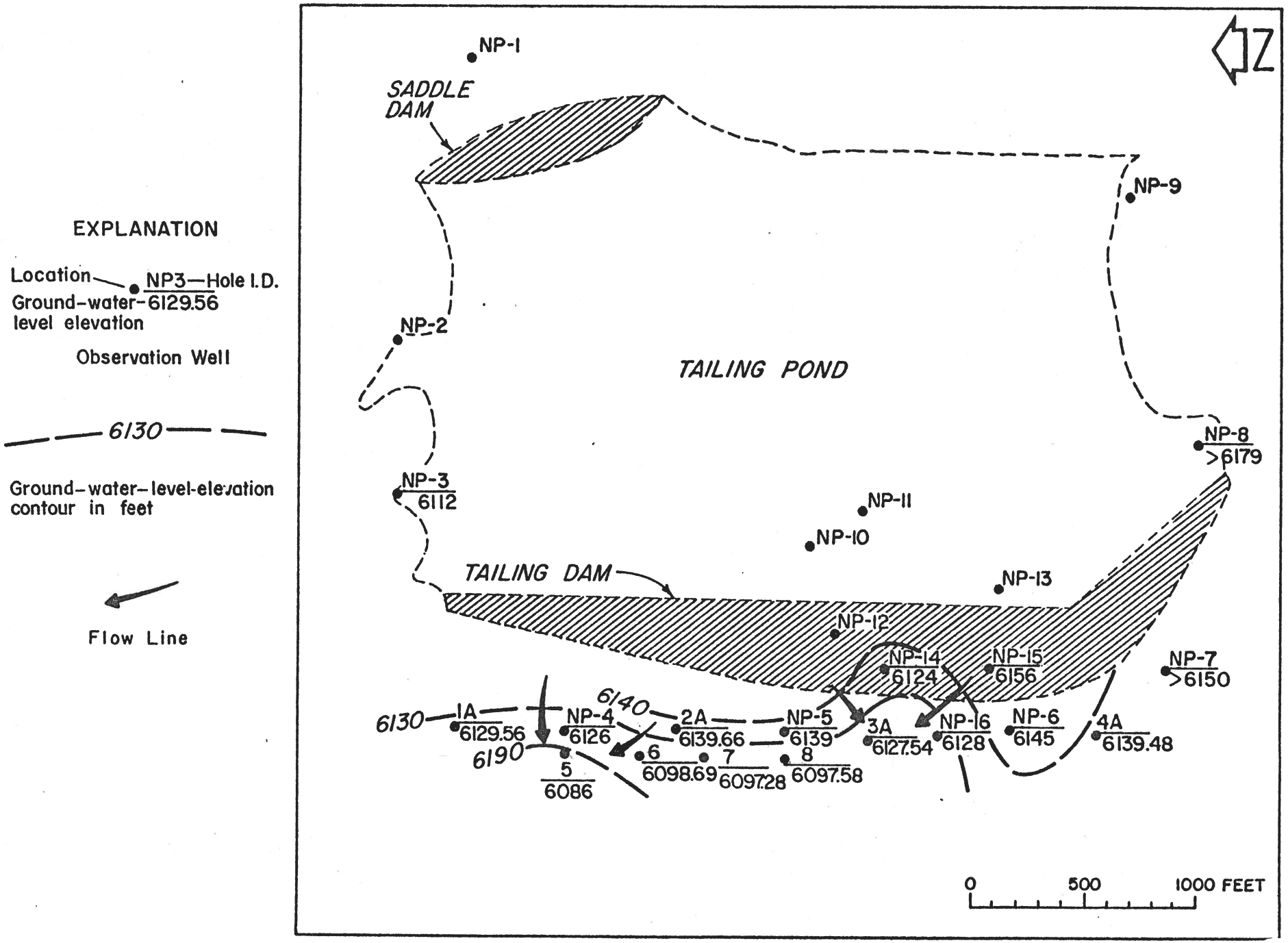

Figure 31. Ground-water-level-contour map west of the starter dam for September 1978.

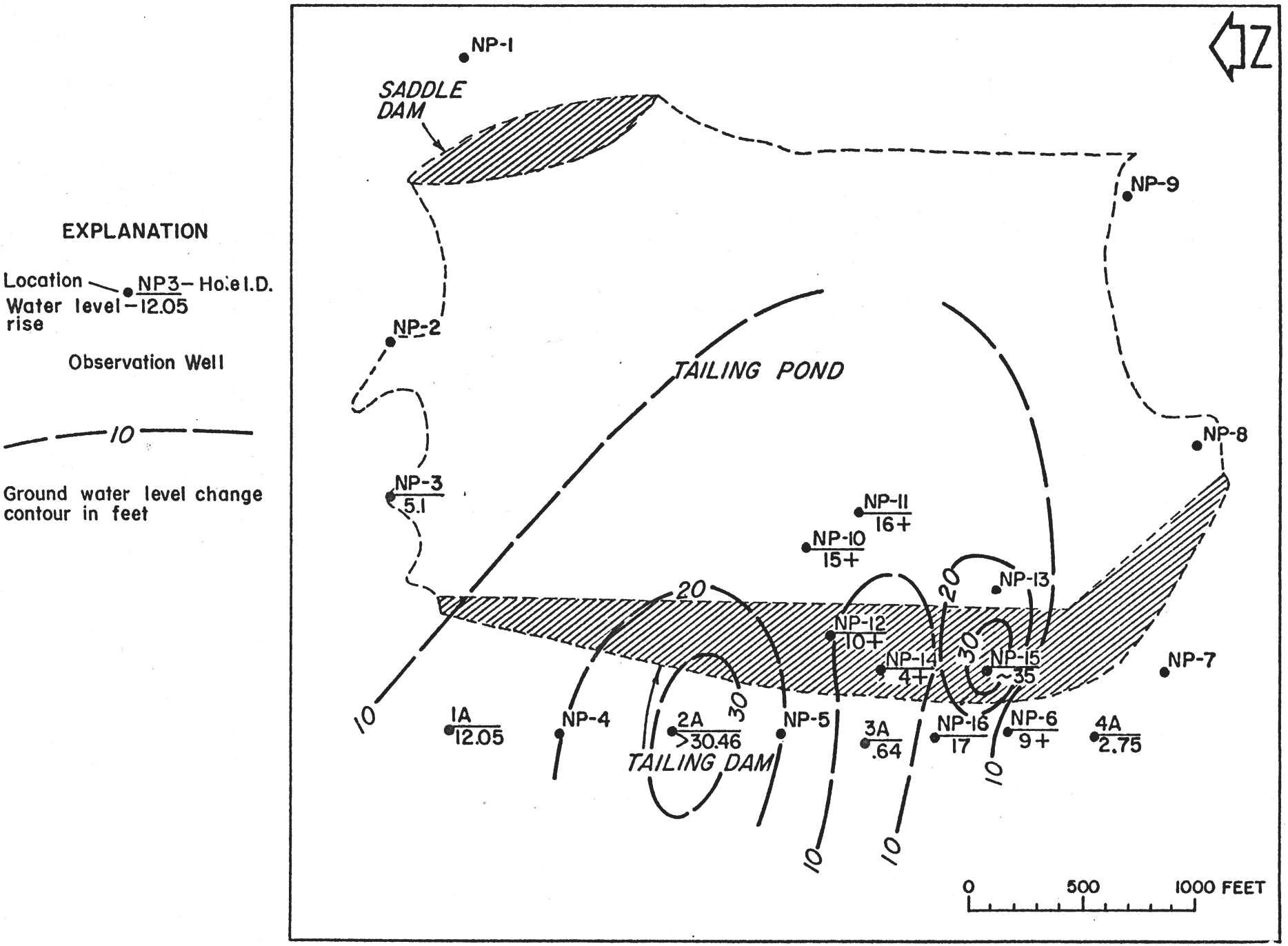

Figure 32. Map showing ground-water-level rise for the period December 1975 to September 1978.

elevation of the ground-water level should ever exceed the level of the surface, then a seep would be seen on the surface. A seep is,

Figures 29 through 31 show the change in shape of the water table from December 1975 until September 1978. Figure 32 shows the change in ground-water level over the same period. Figure 32 shows that there are two primary areas of ground-water-level rise, one centered around monitoring well 2A and the other around NP hole 15. Figure 31 shows that at the present time there are apparently two areas of above normal ground-water flow.

If the transmissivity of the first Tres Hermanos sandstone is about 1137 gallons per day per foot, then the amount of outflow through this sandstone bed can be calculated by Darcy's Law and flow net analysis. Darcy's Law states

$$Q = TIW$$

where:

T = aquifer transmissivity, gallons per day per foot

I = gradient of the water table, dimensionless

W = width of the ground-water-flow section, feet

For the present case the following values have been used:

T = 1137 gallons per day per foot

I = 0.2

W = 3,000 feet

This yields a ground-water-flow rate of about 473 gallons per minute, which seems rather high. The estimate is based entirely upon the estimate of the transmissivity of the first Tres Hermanos sandstone from the slug-withdrawal test. Because slug-withdrawal tests are only strictly applicable to artesian aquifers, it is probable that the transmissivity determined from the slug-withdrawal test of well 2A is in error because the first Tres Hermanos sandstone is under phreatic or water table conditions at well 2A.

The transmissivity of the first Tres Hermanos sandstone can be estimated if it is assumed that it is similar in permeability to the Jackpile sandstone for which the transmissivity has been evaluated from full-scale aquifer-performance tests. Where the Dakota Sandstone, which is similar lithologically to the first Tres Hermanos sandstone, is exposed overlying the Jackpile sandstone near the village of Paguate, New Mexico, it would seem from visual inspection that the Jackpile sandstone has a higher permeability. Therefore, any estimate of the permeability and transmissivity of the first Tres Hermanos sandstone based upon a comparison with the permeability of the Jackpile sandstone is likely to be on the low side.

Aquifer-performance tests carried out using wells in the SOHIO water-well field indicate the Jackpile sandstone may have a transmissivity of about 150 gallons per day per foot. Because the Jackpile sandstone is about 150 feet thick, its permeability is about one gallon per day. Examination of the lithologic logs for the new monitoring wells 5 through 8 west of the starter dam suggests that the minimum thickness of the first Tres Hermanos sandstone is about 21 feet. This would yield a transmissivity

of about 21 gallons per day per foot. If this value of transmissivity is used in the above computations, the amount of seepage is about nine gallons per minute.

The high ground-water-level elevation in the vicinity of the monitoring well 4 is caused by low permeability materials in this area. It is likely that the rising water table at monitoring hole 2A is representative of low permeability also. The actual locii of above normal seepage are in the vicinity of neutron-probe hole 4 and monitoring well 5, and in the vicinity of monitoring well 3A.

It is concluded from an examination that there is a small amount of seepage from the tailings disposal area and that the rate of seepage away from the tailings dam varies from location to location.

TEMPERATURE

Since December 1975, temperature profiles have been measured in each of the accessible neutron-probe holes. Table 4 indicates the dates on which temperature measurements were made in each of the neutron-probe holes.

In some cases, steady state, subsurface temperature data may be used to estimate the velocity of vertical ground-water flow. This is accomplished by analysing the amount of distortion of the exponential envelope

Table 4 . Dates on which temperature measurements were made in the neutron-probe-access holes at the SOHIO L-Bar property

Hole No.	14 DEC. 75	2 MAY 76	18 JUNE 76	25 JUNE 77	27 JUNE 78
1	x	x	x	x	x
2	x	x	x		
3	x	x		x	x
4	x	x		x	x
5	x	x		x	x
6	x	x		x	x
7	x	x		x	x
8	x	x		x	x
9	x	x		x	x
10	x	x			
11	x	x			
12	x	x			
13	x	x			
14	x	x		x	
15	x	x		x	x
16	x	x		x	x

which contains all subsurface temperature fluctuations caused by the sinusoidal input of heat at the land surface. The greater the velocity of vertically moving water, the greater will be the distortion of the exponential envelope.

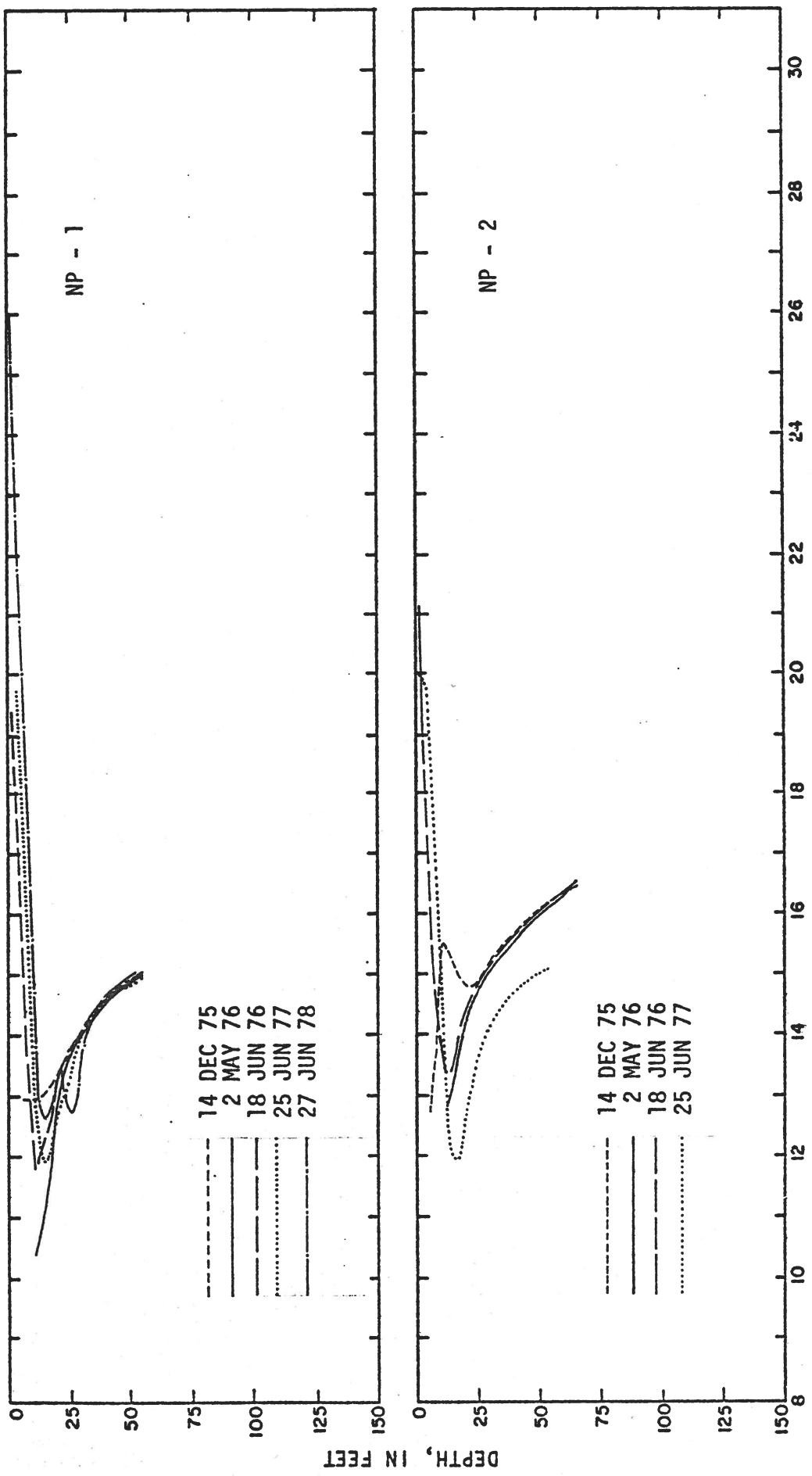

Figure 33. Temperature profiles in NP holes 1 and 2 at the SOHIO L-Bar property.

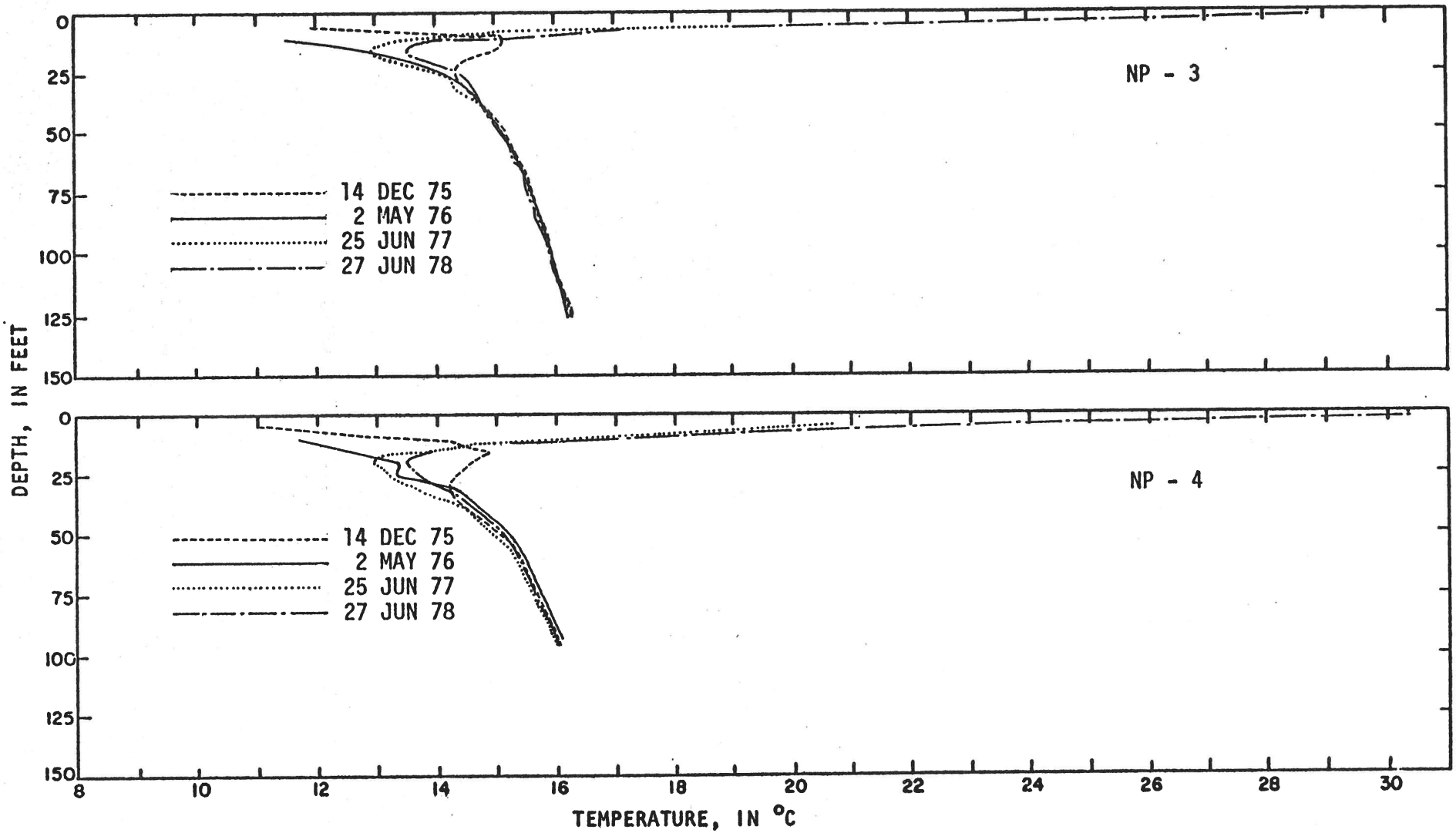

Figure 34. Temperature profiles of NP holes 3 and 4 at the SOHIO L-Bar property.

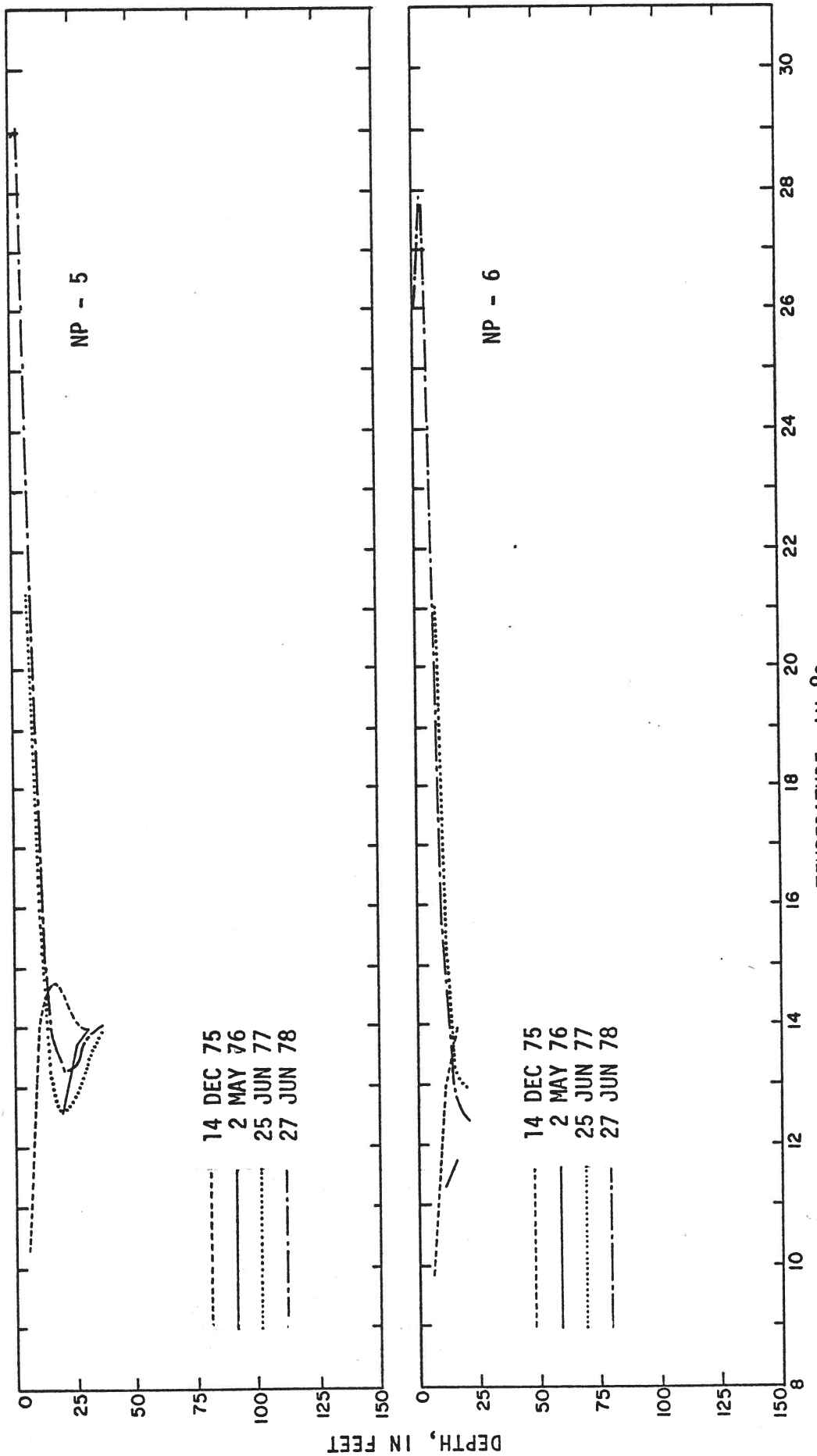

Figure 35. Temperature profiles of NP holes 5 and 6 at the SOHIO L-Bar property.

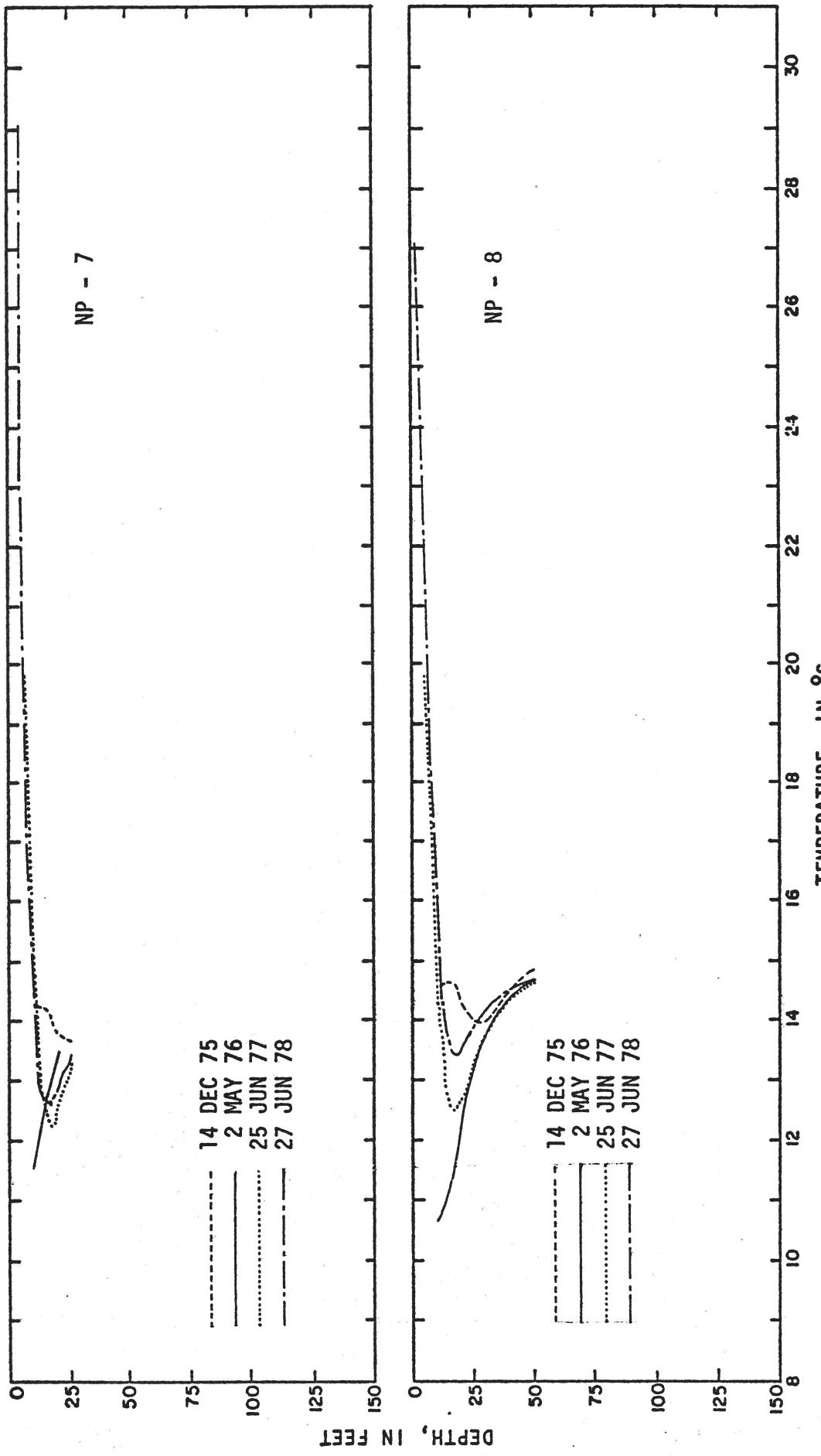

Figure 36. Temperature profiles of NP holes 7 and 8 at the SOHIO L-Bar property.

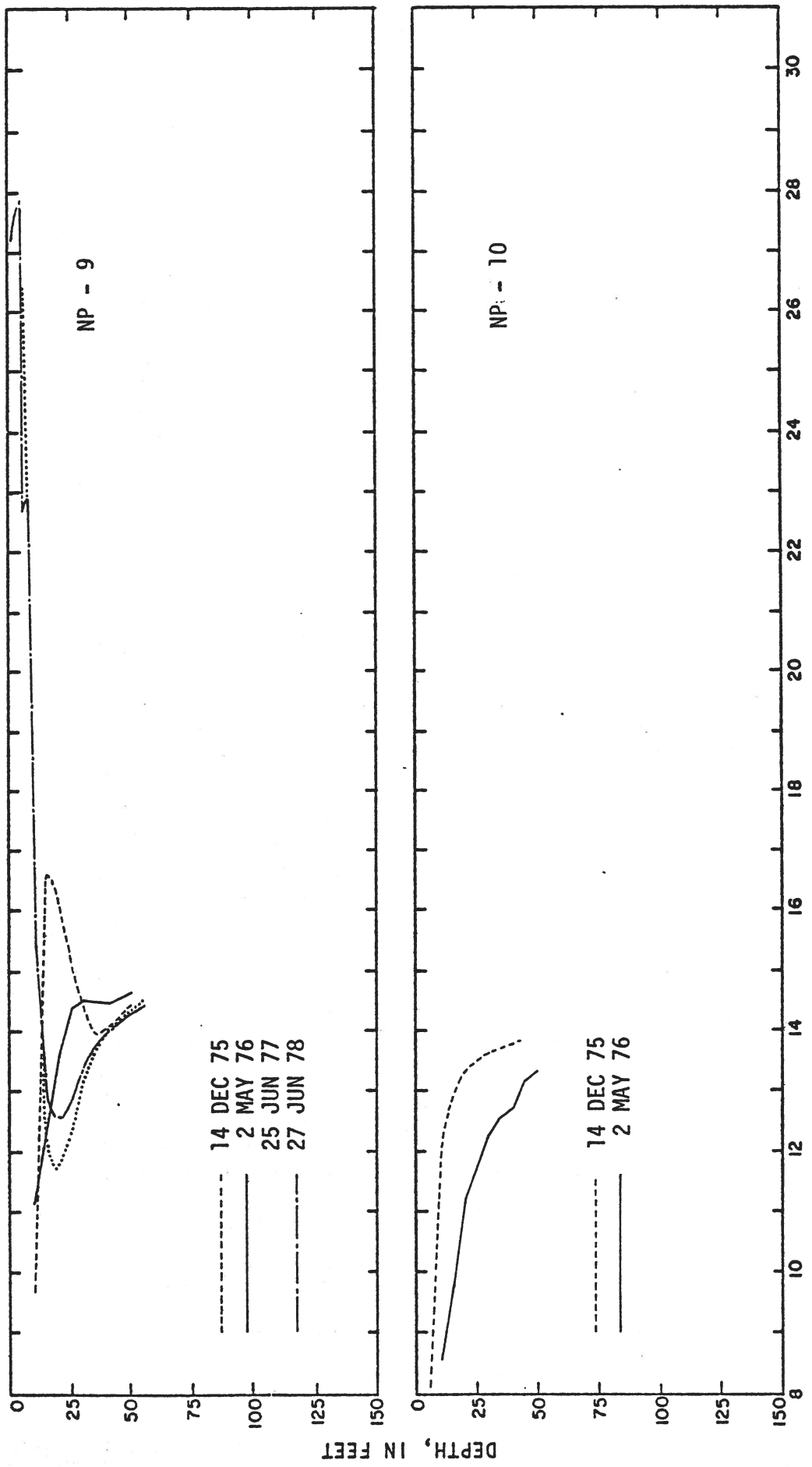

Figure 37. Temperature profiles of NP holes 9 and 10 at the SOHIO L-Bar property.

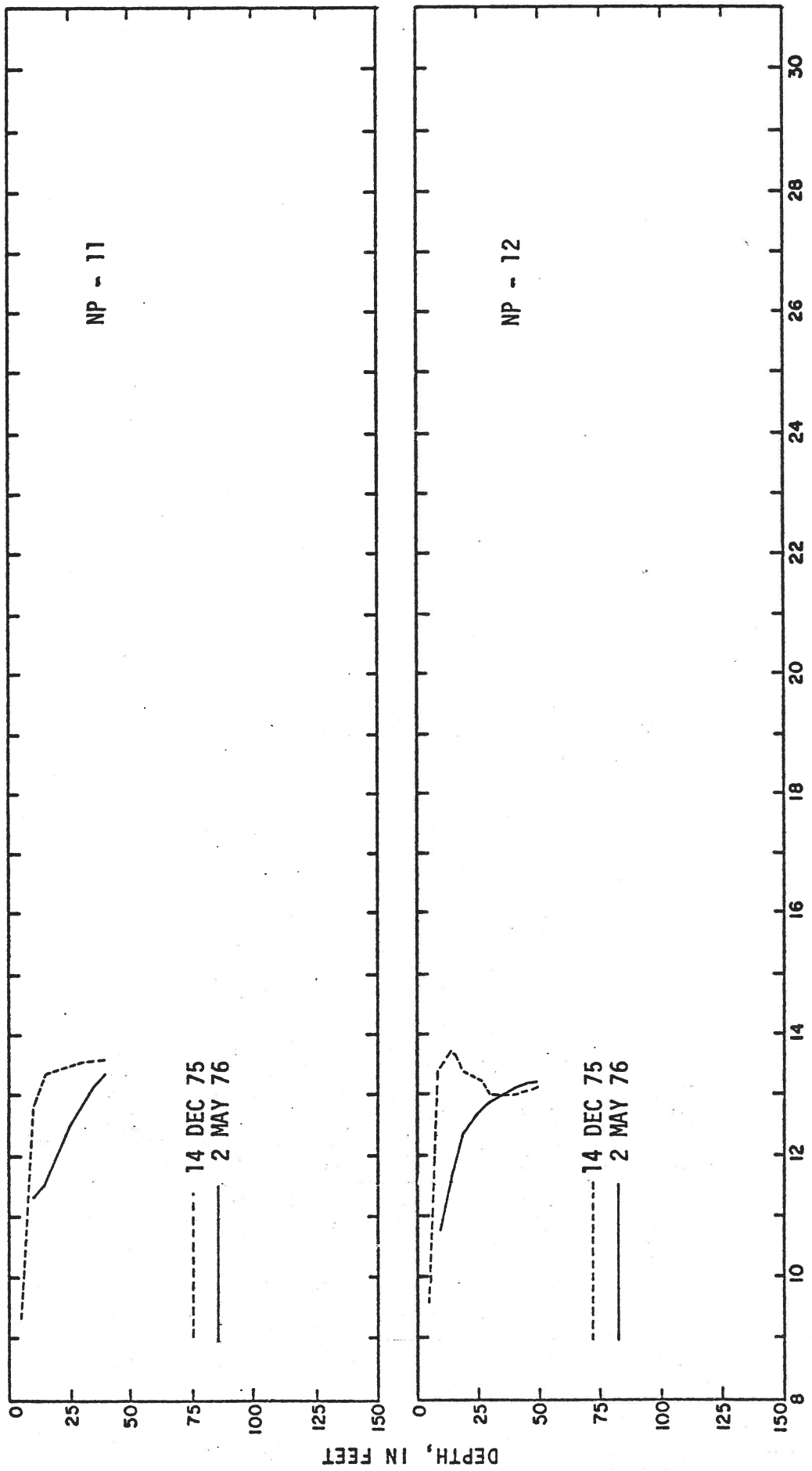

Figure 38. Temperature profiles of NP holes 11 and 12 at the SOHIO L-Bar property.

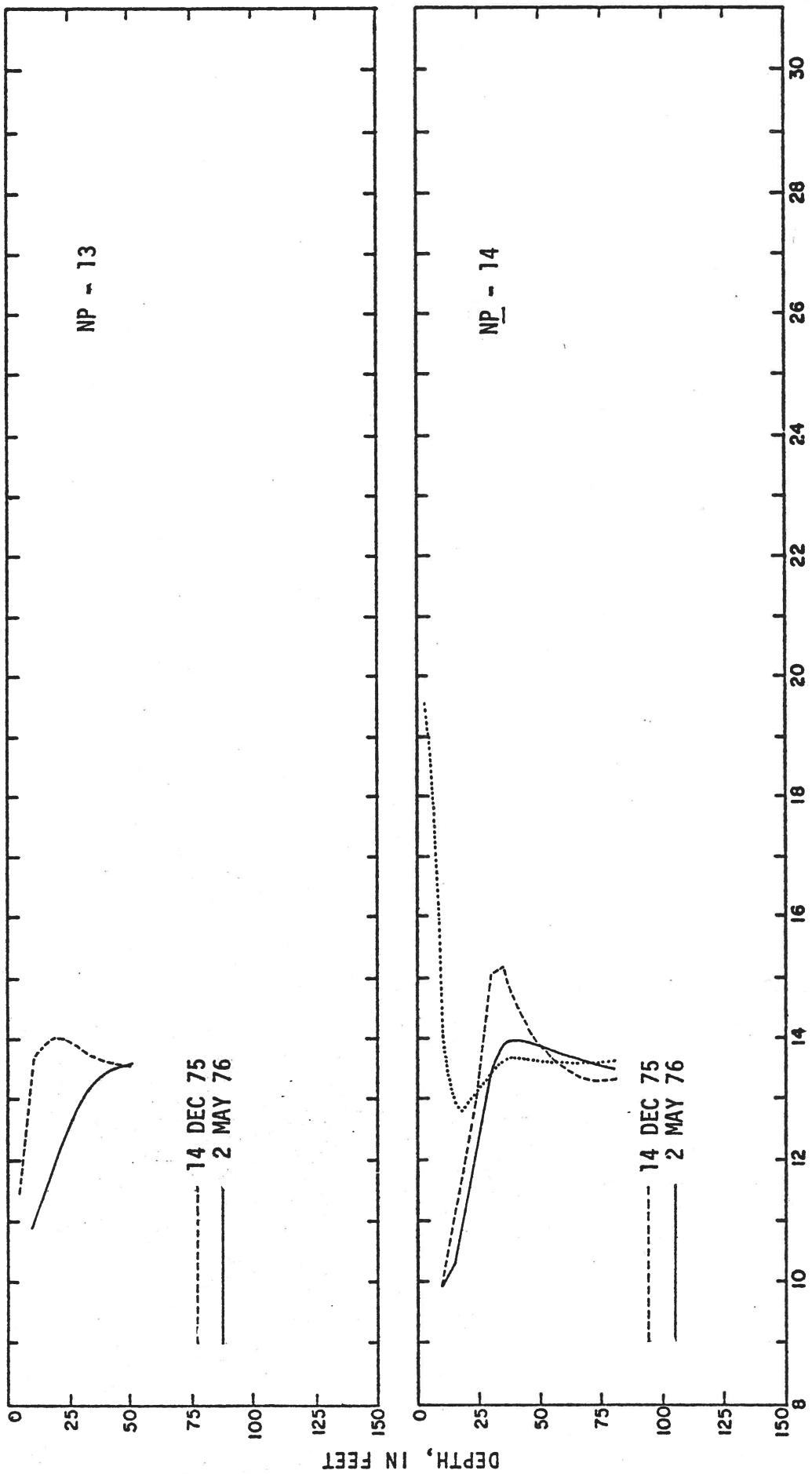

Figure 39. Temperature profiles of NP holes 13 and 14 at the SOHIO L-Bar property.

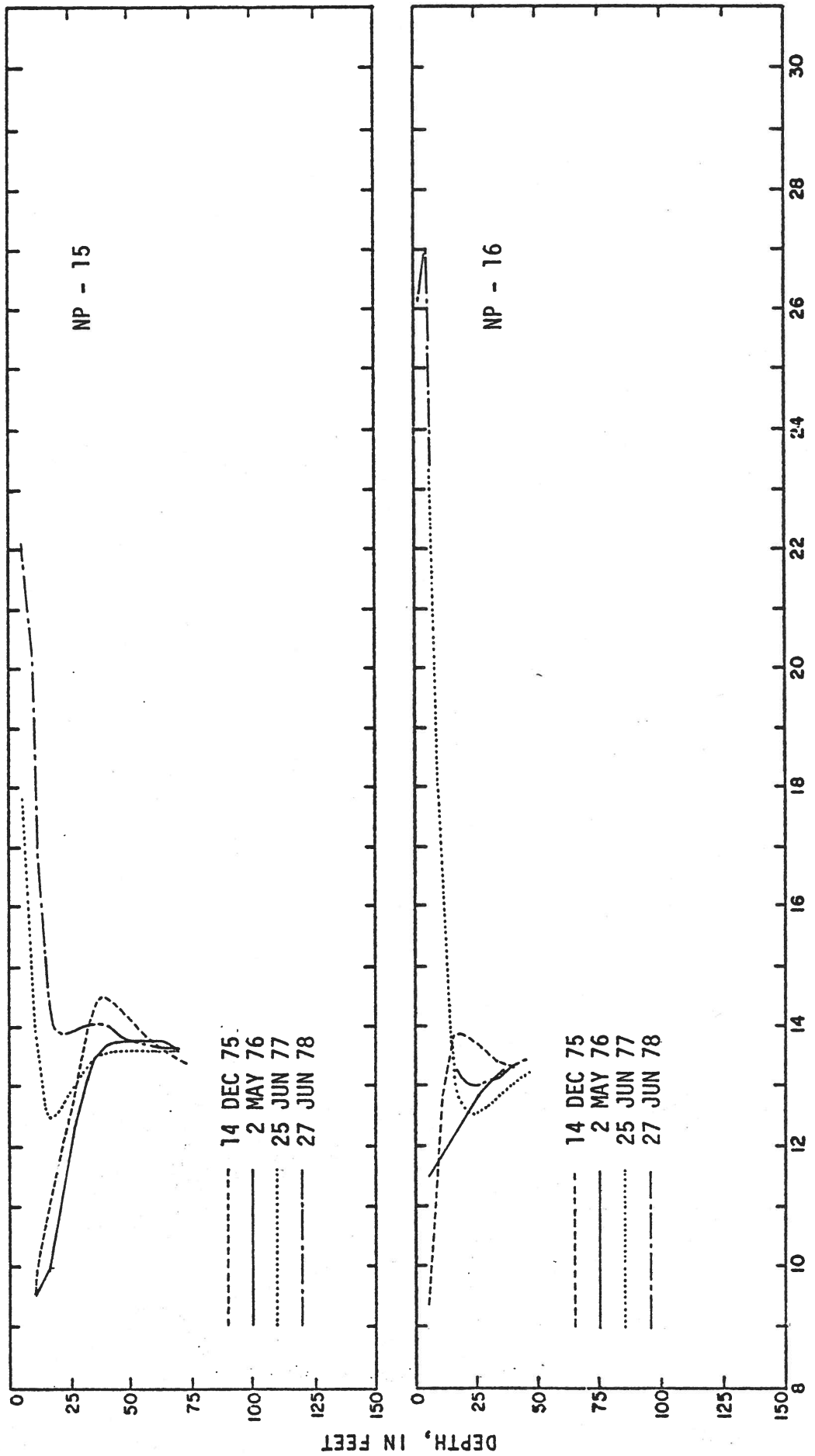

Figure 40. Temperature profiles of NP holes 15 and 16 at the SOHIO L-Bar property.

Table 5. Pertinent information for determination of vertical flow of water in the vicinity of the neutron-probe-access holes.

Hole No.	T_z (^oC)	z (ft)	a (ft^{-1})	b (ft^{-1})	v_z (cm d^{-1})
1	1.05	15	+0.155	0.180-	2
4	0.10	19	+0.246	.142	-11
5	0.57	20	+0.147	.135	- 2
9	0.95	20	+0.121	.135	2

$A = 10.71\ ^oC$; $t_i = 157$ days; $\tau = 365$ days; $K_{ws} = 4 \times 10^{-3}$ cal cm^{-1} sec^{-1} ^oC; v_z is positive downward.

is upward. This is contrary to what might be expected from the location of the holes. NP holes 1 and 9 are further removed from the tailings disposal area than NP holes 4 and 5 and, furthermore, they would be uphill from the tailings disposal site. That is, the unsaturated zones within each hole are at a higher elevation than the pond level in the tailings disposal area. Furthermore, calculations using the deeper temperature data from NP hole 4 using the method of Bredehoeft and Papadopoulos (1965), indicates an upward flow of ground water of up to 0.02 cm/day, which is contrary to the direction and quantity of vertical flow using the method of Stallman on the shallower temperature data.

There are several probable causes for the results obtained. Both methods require that steady state conditions for fluid flow and heat flow must exist. Steady state conditions probably exist in the deeper parts of most holes and in those holes that are distant from the tailings disposal area. For holes which are close to the tailings disposal area, it is unlikely that steady state fluid flow conditions exist in the upper parts of the holes. This is indicated by the changing depth to water in the hydrographs.

The approach velocity of ground-water flow v_z, is given by:

$$v_z = (b^2 - a^2) K_{ws}/c_{pw} \rho_w$$

where:

$a = \ln (A/T_z)/z$

$b = 2\pi t_1/\tau z$

T_z = amplitude of the temperature wave at depth z

A = amplitude of the seasonal air temperature wave

z = depth of the point on the seasonal heat wave at which the amplitude is measured, crest at a depth of about five feet

t_1 = the time lag for the temperature cycle at depth z with respect to the temperature cycle at the land surface

τ = period of the seasonal heat wave

The solution of this relationship is only valid when the transfer of heat by conduction and convection is through a medium which is homogeneous for fluid flow and heat flow. In actual fact, if earthen materials encountered by the neutron-probe holes are not homogeneous for fluid flow, they may approach homogeneity for heat flow, however.

Figures 33 through 40 are the temperature profiles used in each of the neutron-probe holes. These profiles have been analyzed for vertical seepage using data from June 27, 1978. Table 5 contains the results of those profiles for which sufficient data was available for analysis.

An examination of the results in table 5 indicates that small amounts of flow apparently occur both vertically upward and downward in the four NP holes for which the temperature data was analyzed. The ground-water flow in NP holes 1 and 9 is apparently downward whereas in NP holes 4 and 5 it

The temperature profile in neutron-probe hole 15 shows no significant temperature wave. This situation is commonly encountered when fluid is definitely moving past the observation hole. The direction of flow is primarily horizontal and, as such, the velocity of flow cannot be determined from the theory given above and there is insufficient additional data to evaluate the velocity of fluid flow within the tailings dam based on temperature.

It is concluded from all of the temperature data acquired to date that temperature measurements must be made in June and December of each year to define accurately the amplitude of the seasonal heat wave so that the vertical component of ground water flow can be estimated. When this information is available, it can be checked with estimates of vertical ground water flow determined from the deeper temperature data. This analysis has not been carried out here

GROUND WATER CHEMISTRY

As early as 1971, SOHIO began a program of collecting ground-water samples from wells in the vicinity of their L-Bar uranium deposit. As time progressed, this program became more encompassing. More sample points were added and samples were collected more frequently. In 1976, the monitoring wells west of the tailings-disposal

area were completed and the collection of ground-water samples from these wells and their analysis was added to the pre-existing program. The ground-water samples are commonly analyzed for their ordinary dissolved cations and anions as well as trace elements, and radioactivity. The results of analyses carried out to date are presented in tables 1-1 and 1-3.

It is the purpose of this section of the milestone report to determine whether any ground-water contamination has occurred as a result of seepage of poor quality water from the tailings-disposal area into the local ground-water system. Before this question can be answered, it is necessary to evaluate the reliability of the data and its adequacy.

ORDINARY CHEMISTRY

A review of the ordinary chemical analyses carried out to date by various laboratories and reported in tables 1-1 and 1-3 reveals that for the most part the analyses are incomplete.

The most basic test than can be applied to the results of chemical analyses is to compare the sums of the anion and cation concentrations in the water, expressed as milliequivalents. The ratio of these two quantities should not vary by more than five percent from unity for the analysis to be considered reliable. This rule may be slightly relaxed if the concentration of total dissolved solids is in excess of several thousand parts per million. For the purposes of this analysis, any analysis where the cation/anion ratio deviates less than ten percent from unity will be accepted.

Examination of the ordinary chemical analyses presented in tables 1-1 and 1-3 shows that of the 62 analyses presented, cation/anion ratios could only be calculated for 20 analyses because of incomplete information. Of the 20 analyses which were complete enough for the determination of the cation/anion ratio, it is suspected that two analyses are simply a copy of earlier analyses so that they are of no value. Of the remaining 18 analyses for which cation/anion ratios were determined, only seven were judged reliable for further use. Of the seven reliable analyses, only two sample points have more than one reliable analysis: the Southern Windmill, and monitoring well 1A.

A second less reliable check on the accuracy of some of the analyses was made by calculating the total dissolved solids from the raw analyses and comparing the results with the measured value of total dissolved solids. In general, the agreement between the calculated and the measured values was good. In some cases, the measured concentration of total dissolved solids is clearly in error.

Where the results of an analysis are considered reliable, the ionic strength of the water has been calculated. The ionic strength is an extremely useful generalization for comparing solutions of diverse composition because the specific electrical effects of the variously charged interacting ions are taken into consideration. Therefore, if two analyses from the same well made at different times are considered reliable and if the ionic strength has changed, then it may be reliably concluded that the quality of the water has indeed altered. The ionic strength is, therefore, a useful parameter upon which to carry out statistical tests to determine whether suspected ground-water contamination is real or not.

So, for example, in those two wells which had two reliable analyses each, it appears that the quality of water in the Southern Windmill is deteriorating slightly over the period of December, 1974 to February, 1975 because of an increase in the ionic strength. An examination of the analyses indicates an increase in all major cations and an increase in sulfate. Whether this is a real increase or due to an analytical aberrations cannot be reliably determined from only two analyses.

In the case of monitoring well 1A, the ionic strength for the reliable analyses is essentially unchanged over the period of April to October, 1976.

In addition to the ionic strength, once an analysis has been determined as reliable, statistical operations may be carried out on the concentrations of the various solutes and on the concentration of the sum of the cations and anions expressed as milliequivalents. Unfortunately none of this was possible with the ordinary analyses made to date.

TRACE-ELEMENT CHEMISTRY

Inasmuch as the reliability of the more easily determined ordinary analyses is in doubt, it might be suspected that the results of the trace-element analyses carried out by the same laboratories may be no better. Tables 1-2 and 1-4 present the results of the trace-element analyses together with the standards set by the New Mexico Water Quality Control Commission (NMWQCC). For the most part, the laboratories which carried out the analyses only determined whether there was any of the sought

cation at a predetermined concentration. If there was none, the sample is reported as containing less than the amount analyzed for. There is, however, some inconsistency in the practice of the laboratories. Whereas one laboratory may only analyze for a preset concentration, another laboratory will actually determine the concentration below the limit set by another laboratory or the NMWQCC.

Regarding the reliability of the results, this may be evaluated in a qualitative manner from examining tables 1-3 and 1-4. The concentration of arsenic in monitoring well 2A is occasionally given as an excess of 0.1 mg/l, whereas it is usually indicated as below 0.01 mg/l. Barium concentrations in excess of 0.01 mg/l are given for wells 2A and 3A. Well 2A had additional analyses which suggest that it is actually less than 0.01 mg/l. For well 3A, there is no other data against which to compare the results of the single analysis. Well 2A also shows concentrations of lead in excess of 0.05 mg/l. However, most of the analyses show concentrations of lead below 0.01 mg/l. High total mercury concentrations are seen in wells 1B and 4A, but, there is no information against which to compare the results. Selenium is reported in excess of 0.05 mg/l in the Southern Windmill and in monitoring wells 1A and 1B. For the Southern Windmill and monitoring well 1A, additional information suggests the actual concentration is below 0.05 mg/l. For well 1B, there is no additional information against which to compare the results.

Of all of the wells from which ground-water samples have been collected and analyzed, only the Northern Windmill appears to have water

which may exceed the standards established by the NMWQCC. Water from this well exceeds the standards for cadmium, lead, and mercury. However, the high values for these constitutents appear in three of nine analyses made on ground water from this well and in recent analyses, the higher concentrations are not reported thereby casting doubt on the significance of the earlier results.

Because of the inconsistent and commonly conflicting results of the trace-element analyses, they cannot be treated easily statistically to evaluate the occurrence of ground-water contamination. Generally, the more analyses that are made on the water from a given sample point, the greater the reliability which can be attached to the results. Should a result depart significantly from the norm, it should be immediately suspect and reanalysis made. If, upon reanalysis a similar result is obtained, then contamination may be suspected.

In general, the analyses of the trace elements is probably not worth the effort or expense because there are no simple tests which can be applied to the data to evaluate immediately its reliability, as can be accomplished with results of ordinary chemical analyses. It is recommended that trace-element analysis be carried out annually.

RADIOCHEMICAL ANALYSES

The NMWQCC standards for water quality indicate that combined radioactivity of radium 226 and radium 228 shall not exceed 30 pCi/l. Radioassay carried out by SOHIO includes gross alpha, betta, and gamma activity as well as activity for radium 226 and thorium 230.

Radium 226 is one of sixteen decay products of uranium 238. It is the immediate daughter product of thorium 230 with a half life of 8.0×10^4 years which decays into radium 226 by the emission of a 4.68 mev alpha particle. The half lives of the decay products of the uranium series between uranium 238 and radium 226 are either very long or very short. The products of the decay of radium 226, with a half life of 1620 years, leading finally to lead 206, have short half lives. Decay of uranium 238 and its daughter products is accomplished through either alpha or beta decay processes and in the cases of polonium 218 and bismuth 214 branching may occur and decay by either process may occur. Radium 226 decays into radon 222 by the emission of an alpha particle with an energy of 5.486 Mev.

Because of the either very long or very short half-lives of uranium 238 and its daughter products before the creation of thorium 230 and radium 226, much of the gross alpha activity is attributable to the decay of radium 226 and thorium 230.

Radium 228 is the immediate product of the decay of long-lived thorium 232, and like radium 226 all of the following decay products have extremely short half-lives. Radium 228 with a half life of 6.7 years decays by the emission of a 0.04 Mev beta particle into actinium 228. The only other relatively long-lived element which decays by beta particle emission is lead 210 with a half life of 22 years. Lead 210 emits a less energetic beta particle than radium 228 however. The actinium series of radioactive decay which begins with uranium 235 also has its share of alpha emitters. The most important of which is probably palladium 231 with a half life of 3.43×10^4 years. Palladium 231 emits a 5.042 mev alpha particle and decays into actinium 227.

The most important alpha emitters from the uranium, actinium and thorium radioactive decay series are, therefore, uranium 234, thorium 230, radium 226, and palladium 231. The most important beta emitter is radium 228.

Gamma radiation is emitted during the process of decay by either alpha or beta emmission because the alpha and beta particles are actually emitted with a range of energy. If the daughter nucleus remains above the ground state in terms of its energy, then it eliminates the energy in falling to its ground state by the emission of gamma rays.

The gross alpha results may be rapidly checked for reliability because it must include all of the alpha activity associated with the decay of radium 226. Hence, the gross alpha radioactivity must be at least as great as the radioactivity of the radium 226 and thorium 230 combined. This is not the case for at least seven of the analyses. Three analyses for the Northern Windmill and two of the analyses for the Jackpile Cattle Pond should be rejected. One analysis for each the Western Cattle Pond and monitoring well 2A should also be rejected.

Examination of the gross alpha activity shows wide variations in both the measured amount and the 2σ limits of error. This is apparently caused by suspended solids in the samples when submitted for analysis. Discussions with Controls for Environmental Pollution, which carried out the analyses, indicates that the SOHIO samples were unfiltered prior to measurement of the gross alpha, beta, and gamma activity. As a result, varying amounts of turbidity have apparently led to the widely

different results because the suspended solids in the samples commonly contain clay minerals which may have concentrated cations of the radionuclides through ion exchange.

Examination of the radioassay results in tables 1-2 and 1-4 indicates differences in the method of reporting by different laboratories. The analyses carried out by Eberline do not provide the 2σ limits for the analyses. The 2σ limit are the limits on either side of the measured activity within which 95 percent of measurements will fall.

The activity values determined for radium 226 and thorium 230 are more consistent than the gross alpha, beta, and gamma results, because the analytical procedure involves the chemical precipitation of radium with barium sulphate and the radioassay of this precipitate. Therefore, in the analyses for radium as well as for thorium, which is plated onto a metal disc, there is no contribution to alpha activity from cations of the radionuclides which may be absorbed onto suspended clay particles.

In conclusion, the character of the samples submitted for radioassay was not uniform and the results tend to vary widely so that it is not possible to evaluate this data in terms of ground-water contamination.

Uniform sampling and reporting procedures are recommended.

ATTACHMENT 1

GROUND WATER CHEMISTRY FROM THE SOHIO L-BAR MINE AND MILL AREA AND VICINITY

ORDINARY CHEMICAL ANALYSES OF WATER FROM MONITOR WELLS AT THE L-BAR SITE, T. 11 N., R. 5 W., OF THE SEBOYETA GRANT

Location: Location of monitor wells 1A through 4B is given by the New Mexico State Coordinate System. The X coordinate is designated by Easting and the Y coordinate by Northing. Location of sample points numbered W-1a through W-4 is given according to the New Mexico State Engineer Location System. Numbered sections were projected into the L-Bar Ranch.

Lab: 1, Eberline Lab, Albuquerque, New Mexico, for radionuclide analyses. 2, Wilson Lab, Kansas City, Missouri, for stable element analyses. 3, CEP Lab, Santa Fe, New Mexico, for radionuclide analysis and stable element analyses.

Date of Collection: Date on which the sample was reported to have been collected. Two one gallon bottles of water were collected from each well or pond. One gallon was acidified with 3 ml/liter concentrated nitric acid.

Stratigraphic Units: Qal, alluvial overburden; Jmj, Jackpile member of the Morrison Formation; Km, Mancos Shale; Kmt, Tres Hermanos member of the Mancos Shale.

Cations or Anions: Sum of the cations or anions expressed as milliequivalents.

Ionic Strength: $\mu = 1/2\Sigma cz^2$
where:
c = molal concentration of each ionic species.
z = electrical charge of each ionic species.

TRACE ELEMENT AND RADIONUCLIDE ANALYSES OF WATER FROM MONITOR WELLS
AT THE L-BAR SITE, T. 11 N., R. 5 W., OF THE SEBOYETA GRANT

Location: Location of monitor wells 1A through 4B is given by the New Mexico State Coordinate System. The X coordinate is designated by Easting and the Y coordinate by Northing. Location of sample points numbered W-1a through W-4 is given according to the New Mexico State Engineer Location System. Numbered sections were projected into the L-Bar Ranch.

Lab: 1, Eberline Lab, Albuquerque, New Mexico, for radionuclide analyses. 2, Wilson Lab, Kansas City, Missouri, for stable element analyses. 3, CEP Lab, Santa Fe, New Mexico, for radionuclide analysis and stable element analyses.

Date of Collection: Date on which the sample was reported to have been collected. Two one gallon bottles of water were collected from each well or pond. One gallon was acidified with 3 ml/liter concentrated nitric acid.

Stratigraphic Units: Qal, alluvial overburden; Jmj, Jackpile member of the Morrison Formation; Km, Mancos Shale; Kmt, Tres Hermanos member of the Mancos Shale.

ATTACHMENT 2

NEUTRON LOGGING DATA

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REMARKS= SOHIO NP01

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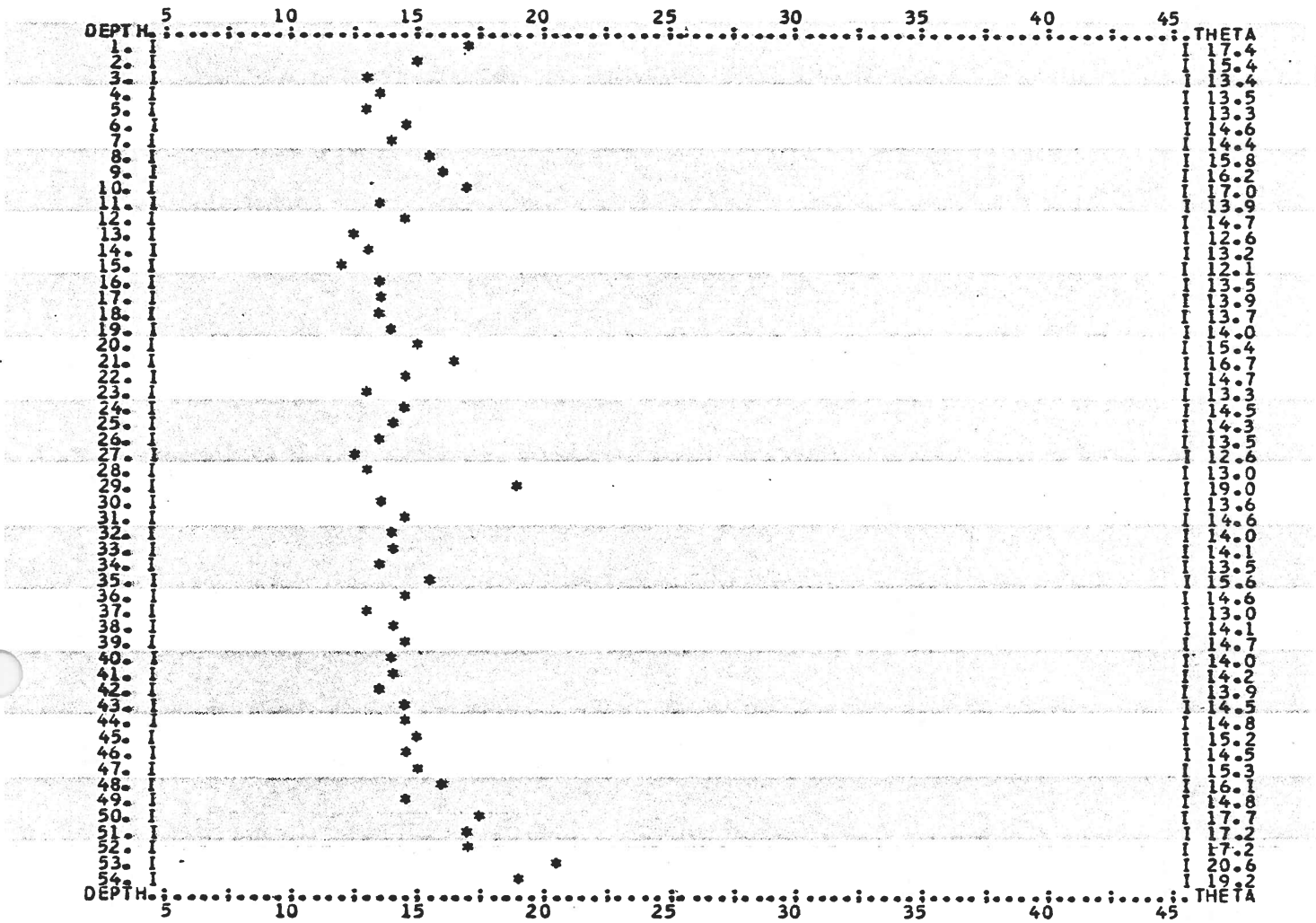
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



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REMARKS= SOHIO NP02

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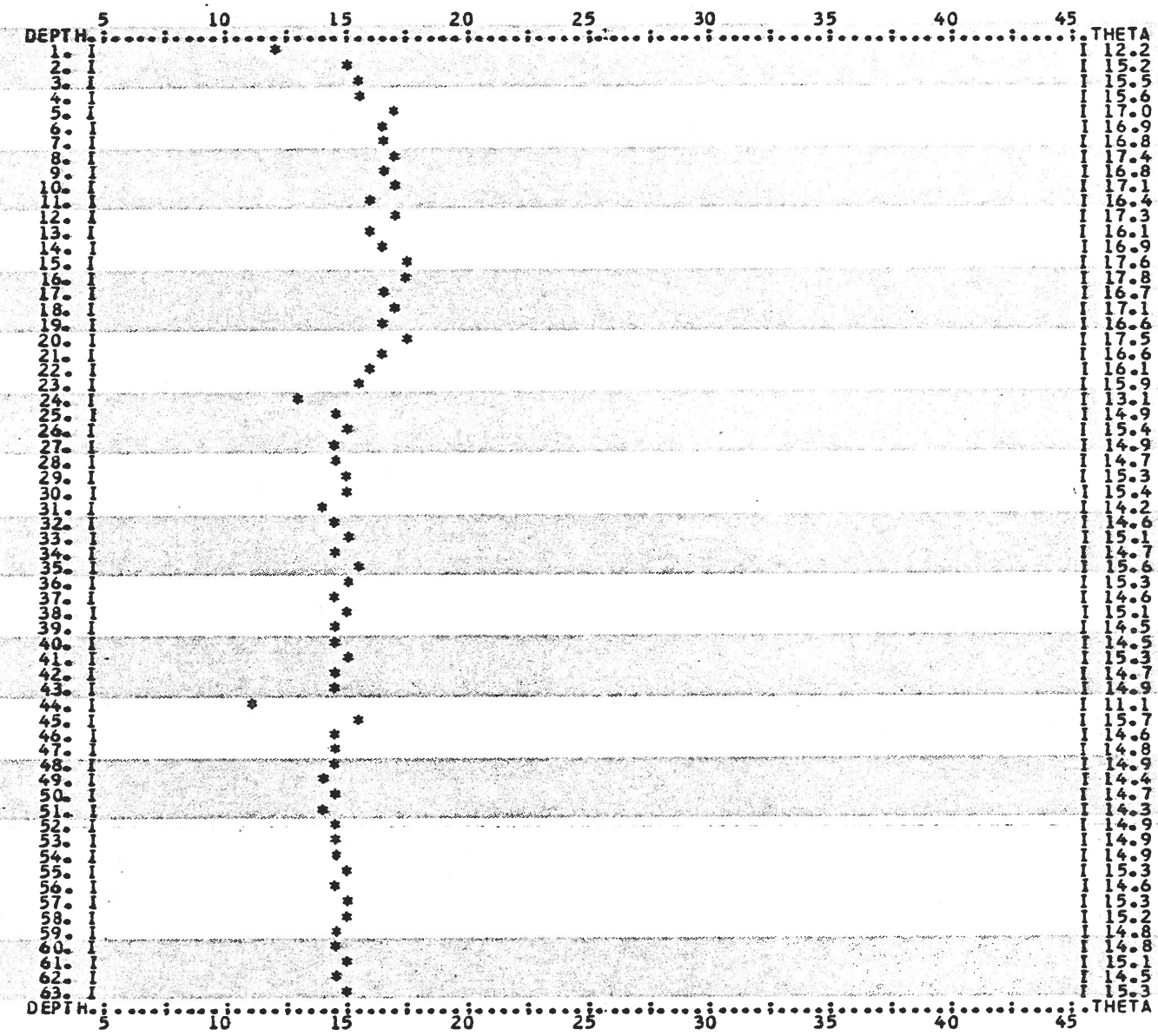
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



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REMARKS= SOHIO NP03

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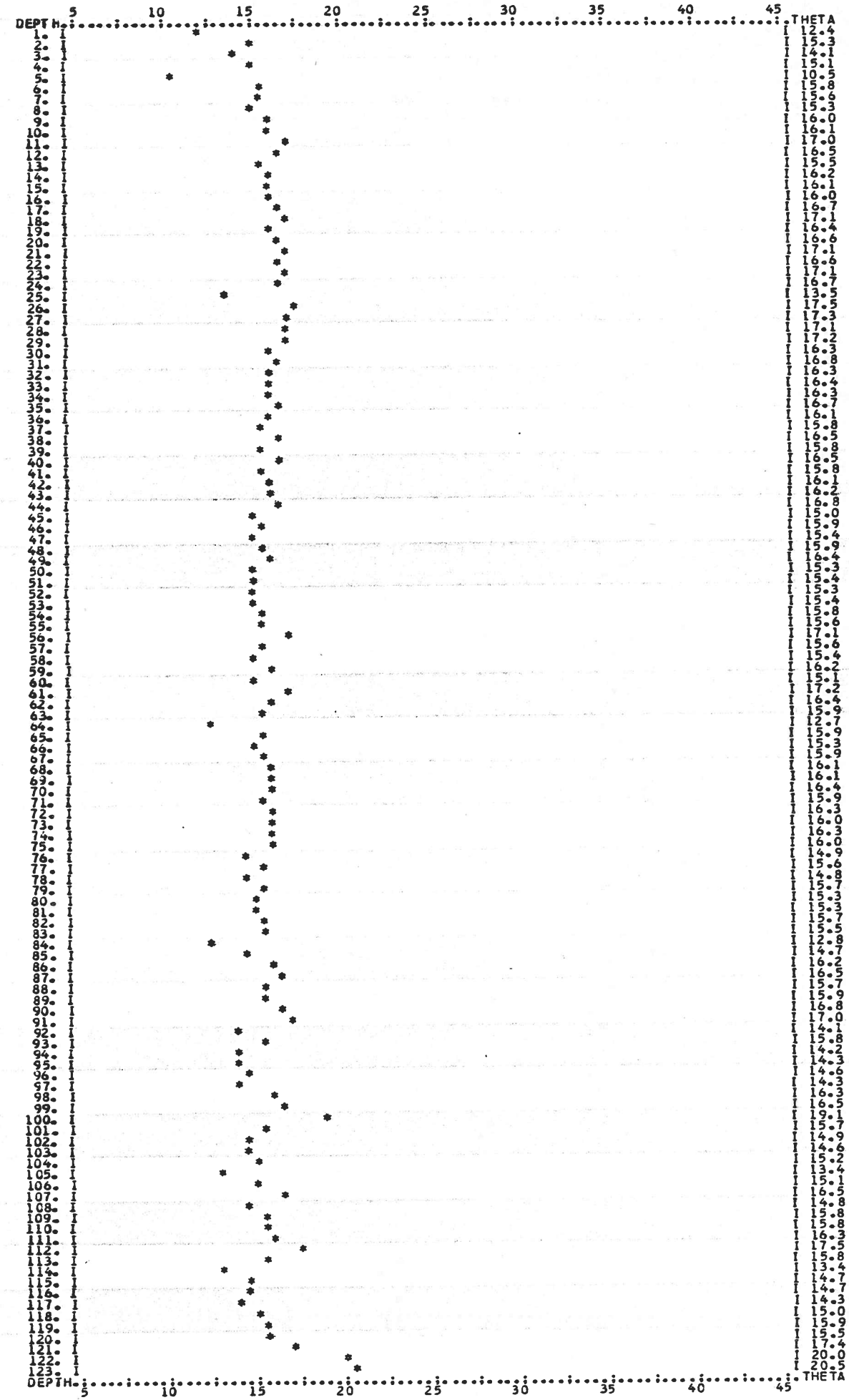
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



DEPTH	THETA
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4.	15.1
5.	10.5
6.	15.8
7.	15.6
8.	15.3
9.	16.0
10.	16.1
11.	17.0
12.	16.5
13.	15.5
14.	16.2
15.	16.1
16.	16.0
17.	16.7
18.	17.1
19.	16.4
20.	16.6
21.	17.1
22.	16.6
23.	17.1
24.	16.7
25.	13.5
26.	17.5
27.	17.3
28.	17.1
29.	17.2
30.	16.3
31.	16.8
32.	16.3
33.	16.4
34.	16.3
35.	16.7
36.	16.1
37.	15.8
38.	16.5
39.	15.8
40.	16.5
41.	15.8
42.	16.1
43.	16.2
44.	16.8
45.	15.0
46.	15.9
47.	15.4
48.	15.9
49.	16.4
50.	15.3
51.	15.4
52.	15.3
53.	15.4
54.	15.8
55.	15.6
56.	17.1
57.	15.6
58.	15.4
59.	16.2
60.	15.1
61.	17.2
62.	16.4
63.	15.9
64.	12.7
65.	15.9
66.	15.3
67.	15.9
68.	16.1
69.	16.1
70.	16.4
71.	15.9
72.	16.3
73.	16.0
74.	16.3
75.	16.0
76.	14.9
77.	15.6
78.	14.8
79.	15.7
80.	15.3
81.	15.3
82.	15.7
83.	15.5
84.	12.8
85.	14.7
86.	16.2
87.	16.5
88.	15.7
89.	15.9
90.	16.8
91.	17.0
92.	14.1
93.	15.8
94.	14.2
95.	14.3
96.	14.6
97.	14.3
98.	16.3
99.	16.5
100.	19.1
101.	15.7
102.	14.9
103.	14.6
104.	15.2
105.	13.4
106.	15.1
107.	16.5
108.	14.8
109.	15.8
110.	15.8
111.	16.3
112.	17.5
113.	15.8
114.	13.4
115.	14.7
116.	14.7
117.	14.3
118.	15.0
119.	15.9
120.	15.5
121.	17.4
122.	20.0
123.	20.5

AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
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REMARKS= SOHIO NP04

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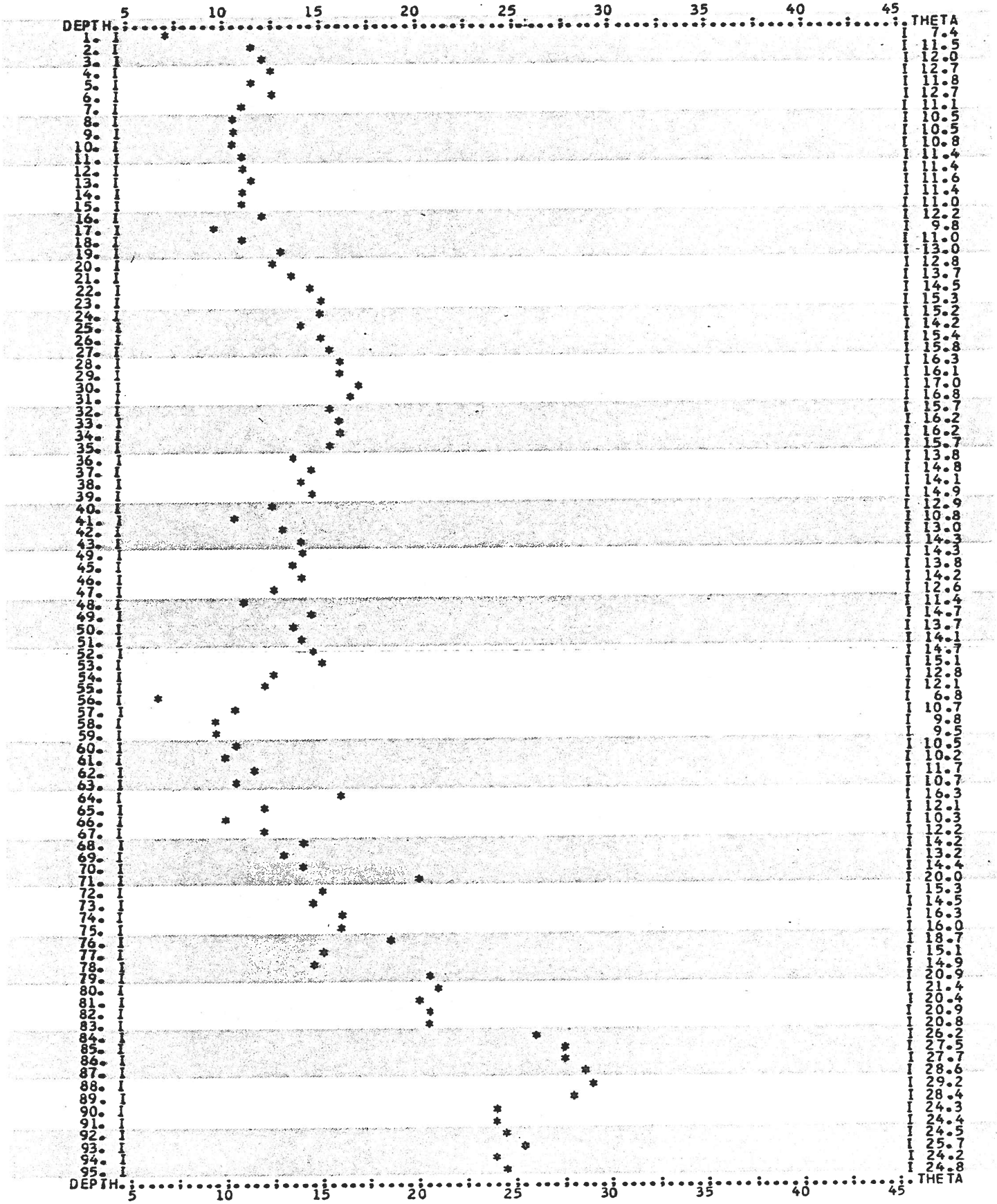
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



DEPTH.	THETA
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8.	10.5
9.	10.5
10.	10.8
11.	11.4
12.	11.4
13.	11.6
14.	11.4
15.	11.0
16.	12.2
17.	9.8
18.	11.0
19.	13.0
20.	12.8
21.	13.7
22.	14.5
23.	15.3
24.	15.2
25.	14.2
26.	15.4
27.	15.8
28.	16.3
29.	16.1
30.	17.0
31.	16.8
32.	15.7
33.	16.2
34.	16.2
35.	15.7
36.	13.8
37.	14.8
38.	14.1
39.	14.9
40.	12.9
41.	10.8
42.	13.0
43.	14.3
49.	14.3
45.	13.8
46.	14.2
47.	12.6
48.	11.4
49.	14.7
50.	13.7
51.	14.1
52.	14.7
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57.	10.7
58.	9.8
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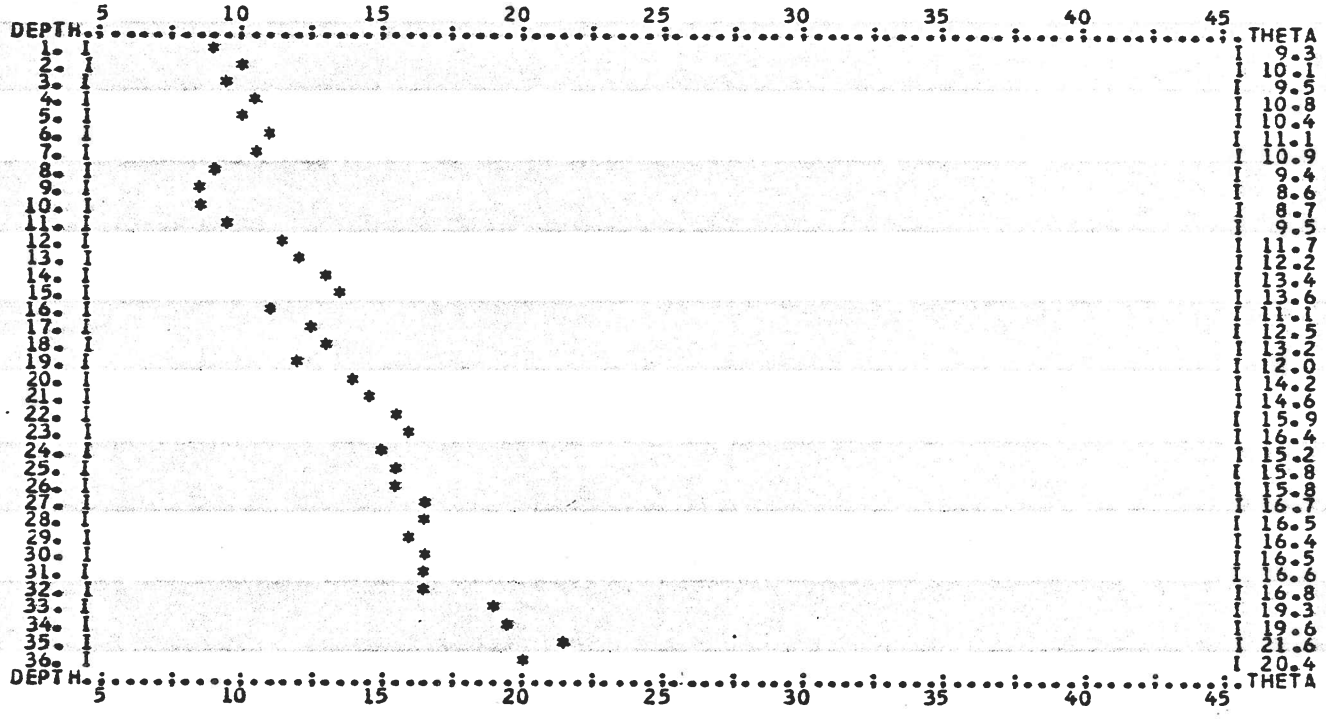
60.	10.5
61.	10.2
62.	11.7
63.	10.7
64.	16.3
65.	12.1
66.	10.3
67.	12.2
68.	14.2
69.	13.2
70.	14.4
71.	20.0
72.	15.3
73.	14.5
74.	16.3
75.	16.0
76.	18.7
77.	15.1
78.	14.9
79.	20.9
80.	21.4
81.	20.4
82.	20.9
83.	20.8
84.	26.2
85.	27.5
86.	27.7
87.	28.6
88.	29.2
89.	28.4
90.	24.3
91.	24.4
92.	24.5
93.	25.7
94.	24.2
95.	24.8

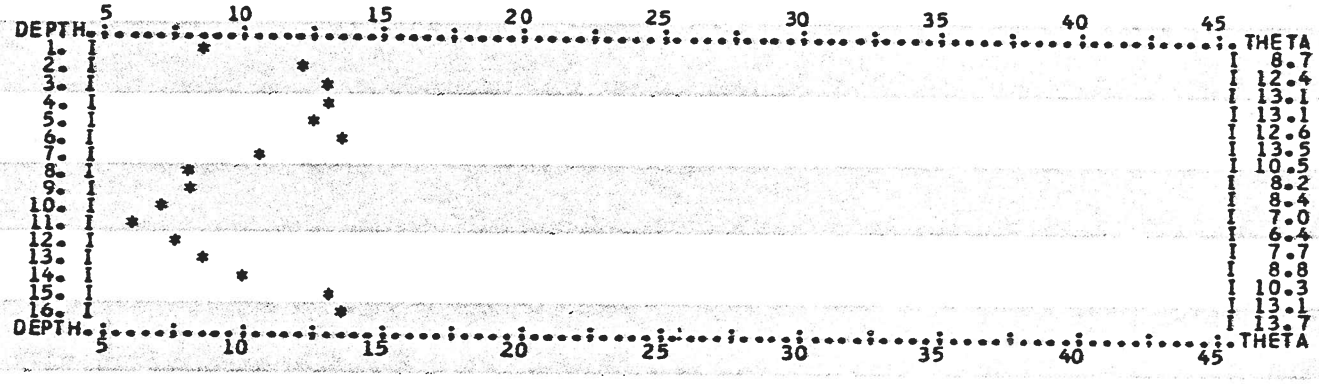
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO NP05 HOLE ID= BM= 0.0
DATE=12-15 6171.2 01 DTIME=EC 7 PROBE NO=5 15 WL=[redacted]
REMARKS= SOHIO NP05

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



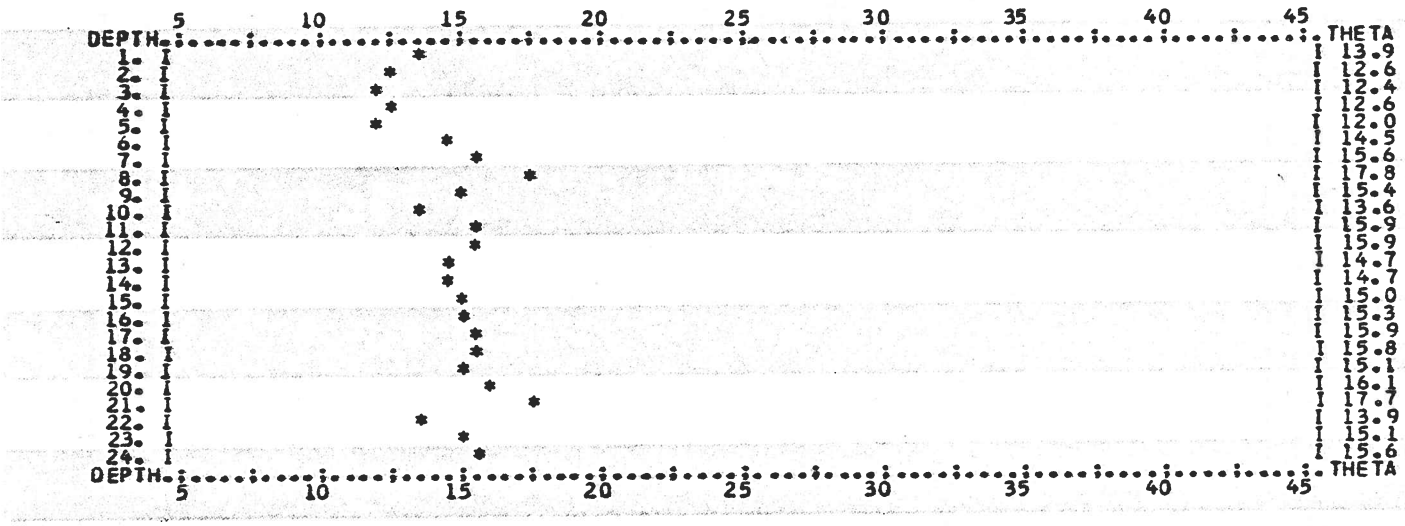
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO NP06 HOLE ID= BM= 0.0
DATE=12-15 6152.7 01 DTIME=EC 7 PROBE NO=5 16 WL=[redacted]
REMARKS= SOHIO NP06

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



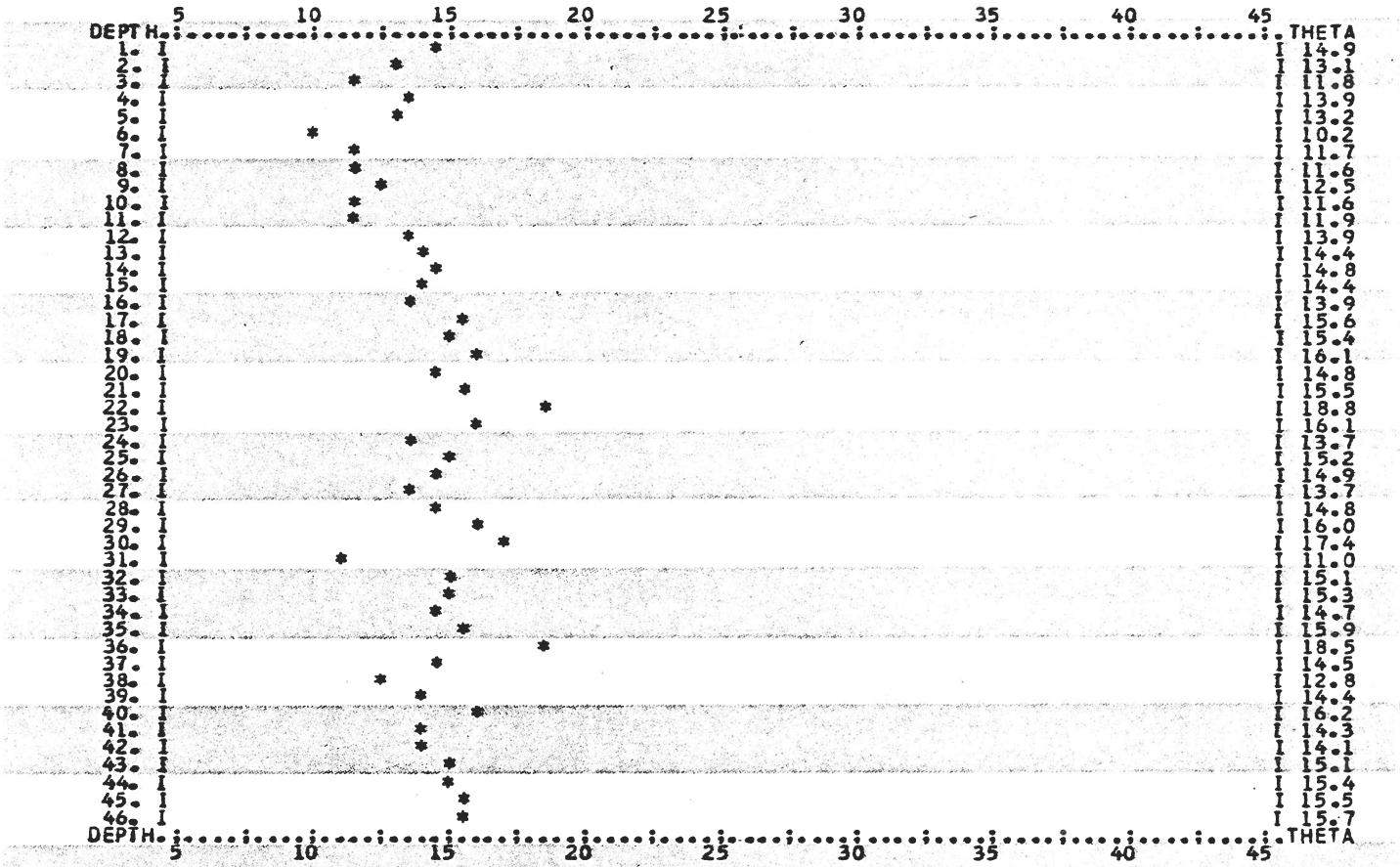
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO NP07 HOLE ID= BM= 0.0
DATE=12-75 6176.2 01 OTIME=EC 7 PROBE NO=5162 WL=
REMARKS= SOHIO NP07

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



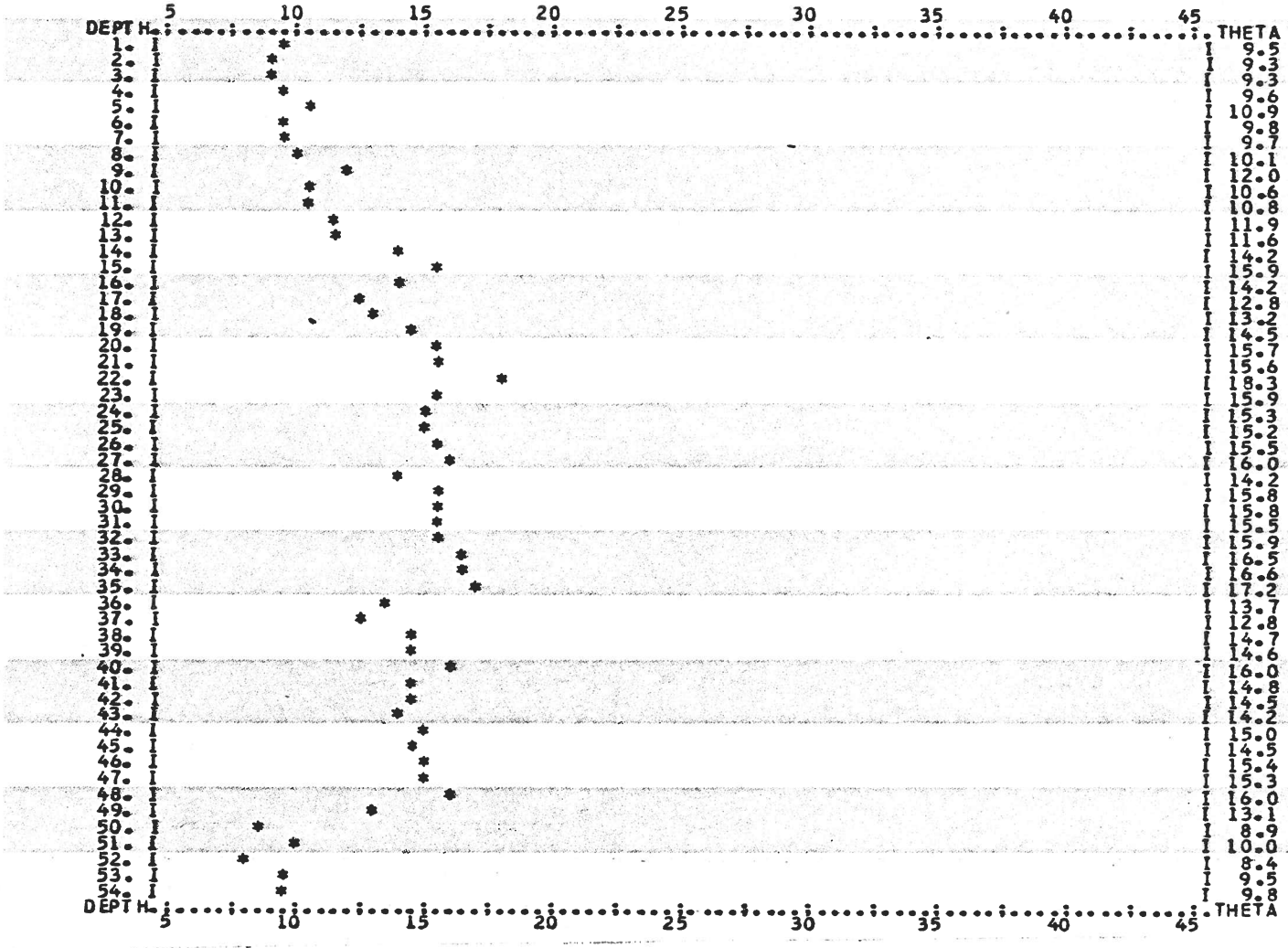
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO NP08 HOLE ID= BM= 0.0
DATE=12-75 6227.4 01 DTIME=EC 7 PROBE NO=5 16 WL=[redacted]
REMARKS= SOHIO NP08

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



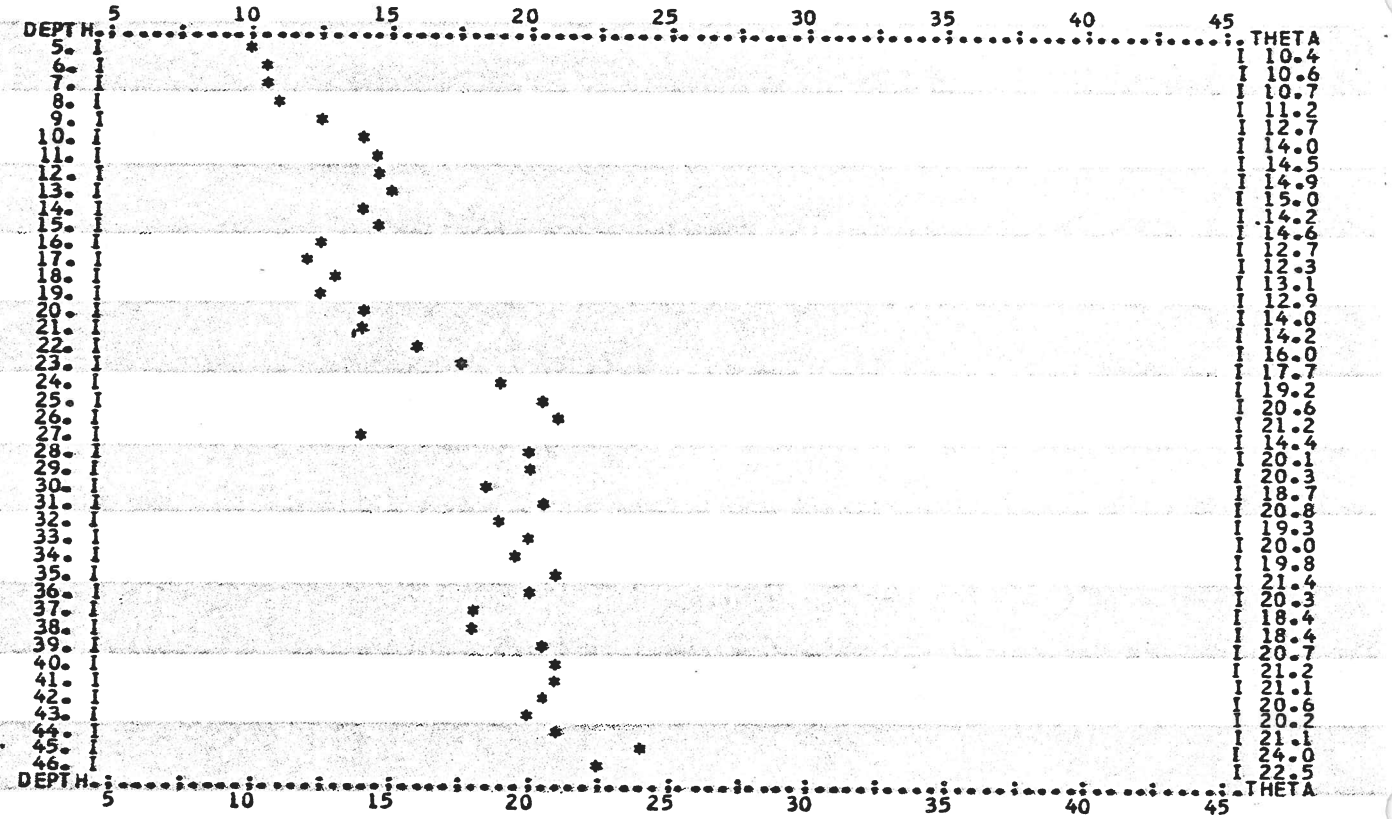
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO NP09 HOLE ID= BM= 0.0
DATE=12-75 6230.2 01 DTIME=EC 7 PROBE NO=5 17 WL=[redacted]
REMARKS= SOHIO NP09

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



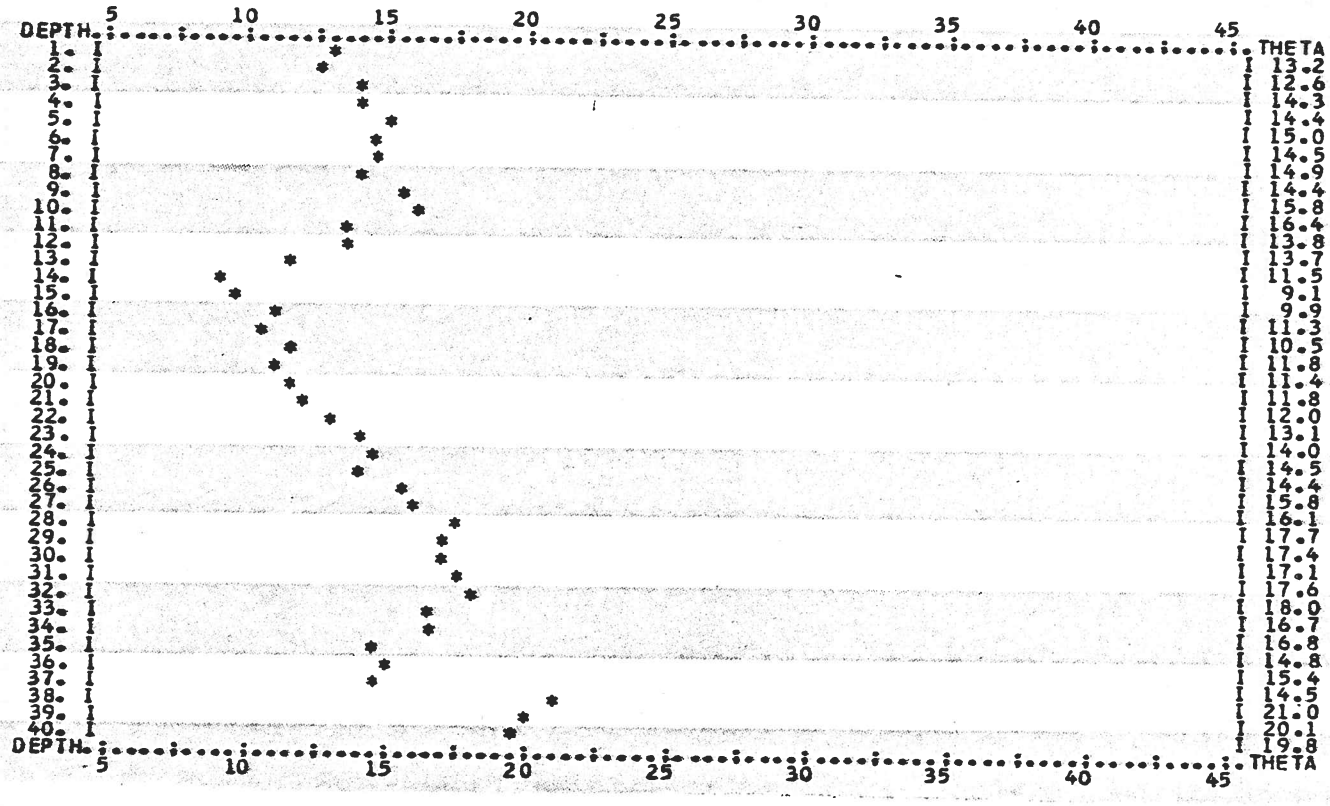
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO NP10 HOLE ID= BM= 0.0
DATE=12-75 6165.8 12 DTIME=EC 7 PROBE NO=5 WL=
REMARKS= SOHIO NP10 DEPTH CORRECTED FOR SOIL FILL IN BORROW PIT.

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



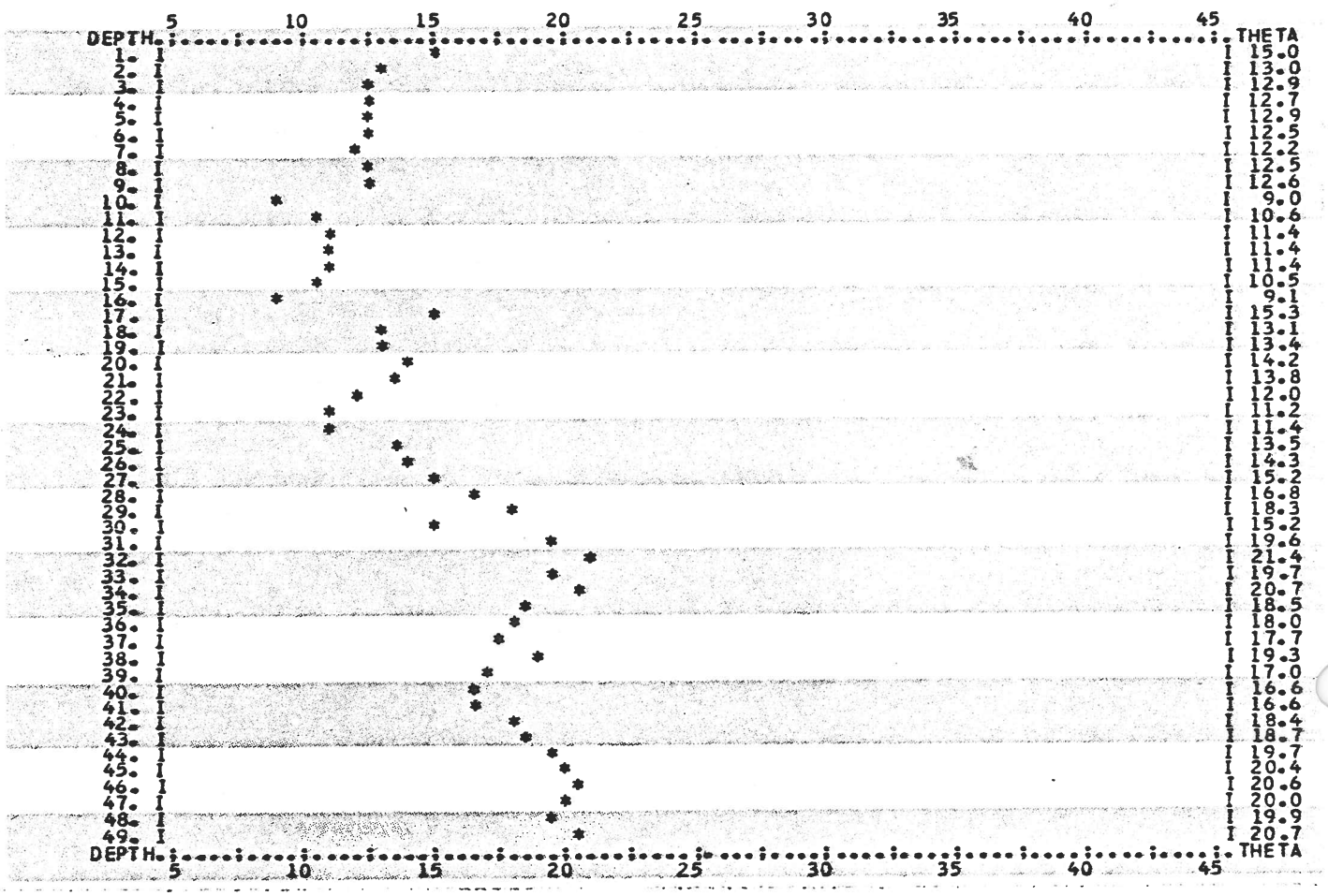
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO NP11 HOLE ID= BM= 0.0
DATE= 12-75 6164.4 12 DTIME=EC 7 PROBE NO=5 WL=
REMARKS= SOHIO NP11

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO NP12 RHOLE ID=T FR BM= 0.0
12-15 DATE=[redacted] 6165.1 12 DTIME=EC75 PROBE NO= WL=
REMARKS= SOHIO NP12

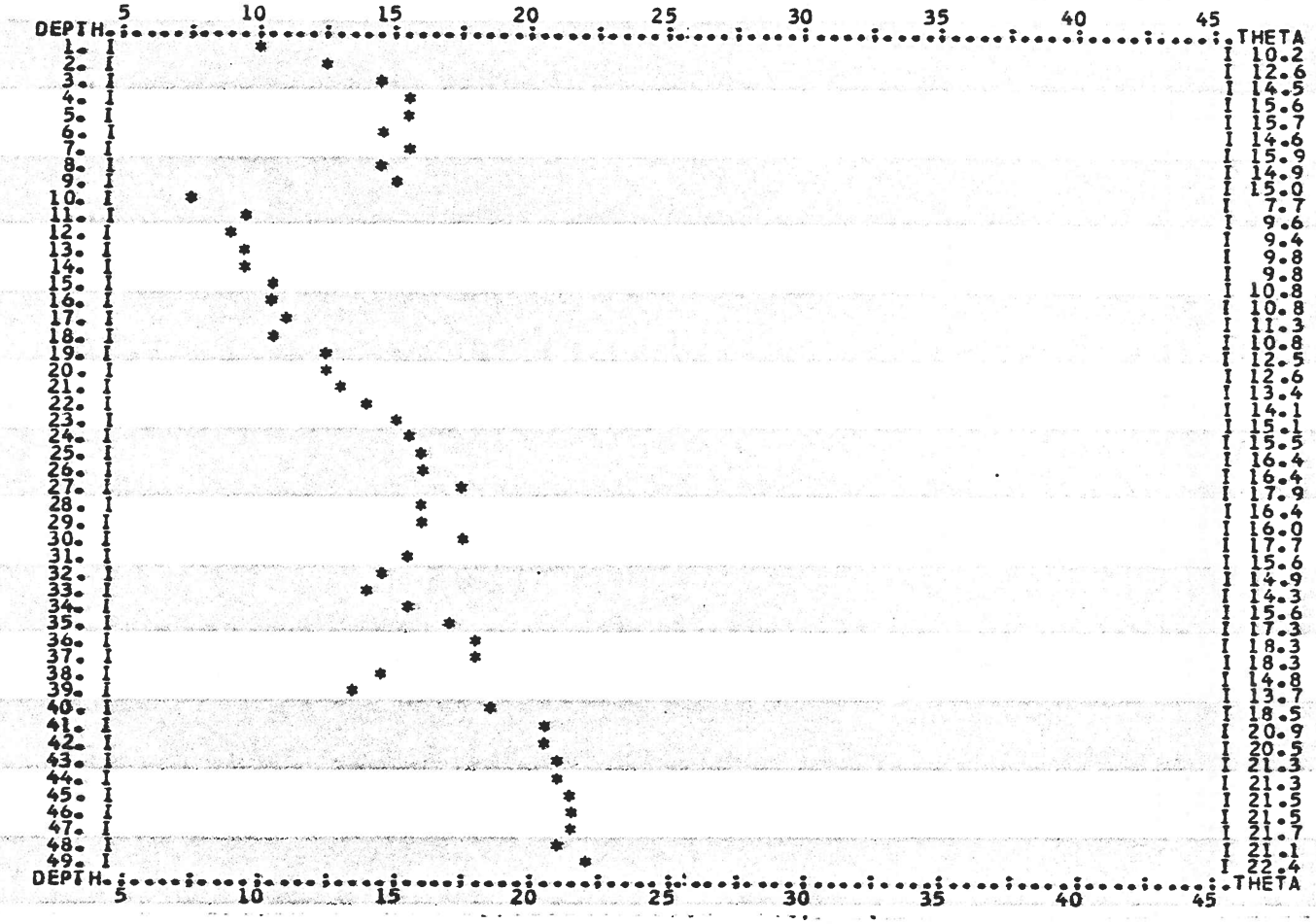
PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



(c) DATA DOCUMENTS/INC. SS 342

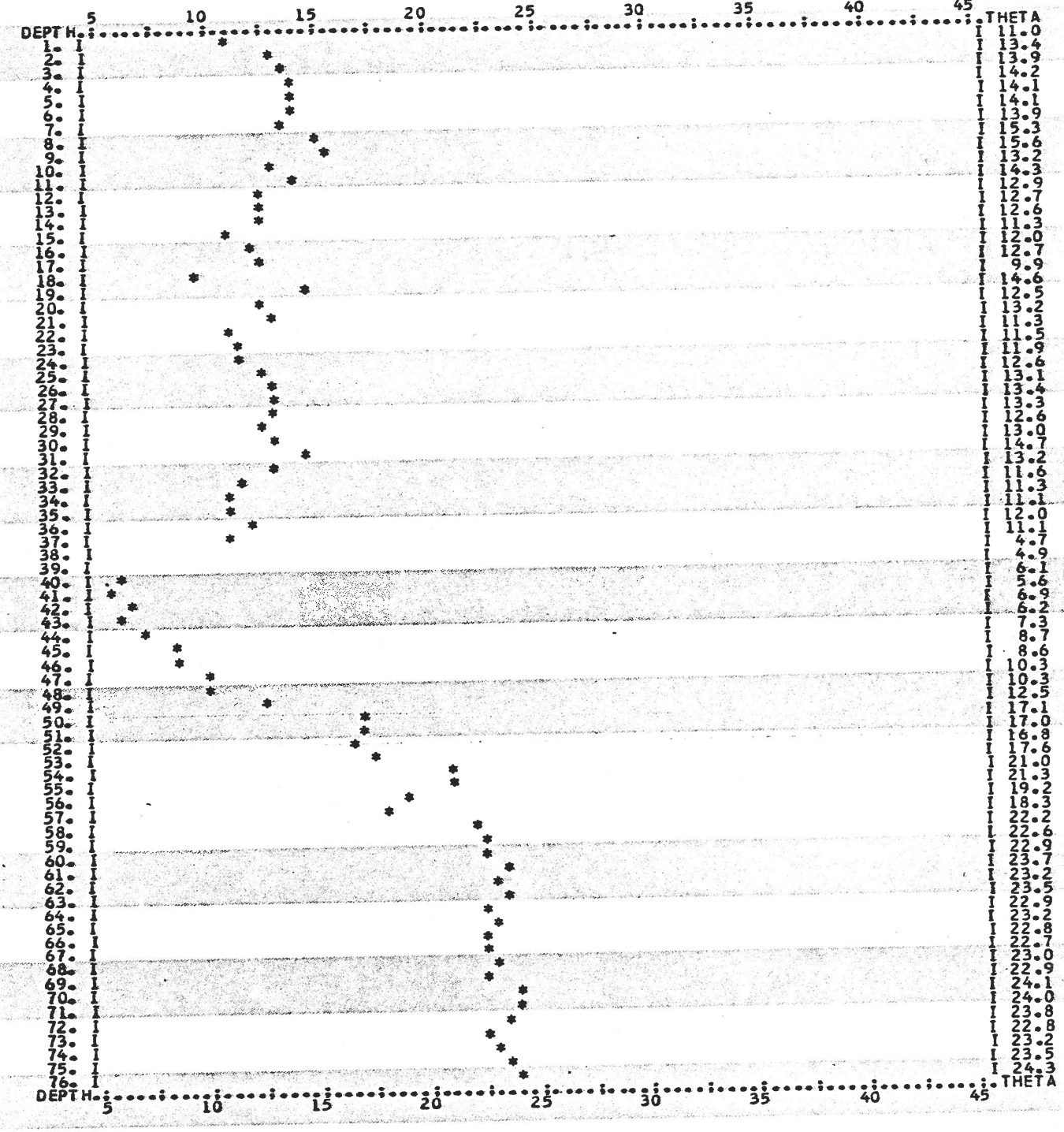
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO NP13L EHOLE ID=FT F BM= 0.0
12-75 DATE=[redacted]6167.3 12 DTIME=EC75 PROBE NO= WL=
REMARKS= SOHIO NP13

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO NP14RTHOLE ID= SID BM= 0.0
12-75 DATE=[redacted] 6185.4 12 DTIME=EC75 PROBE NO= WL=
REMARKS= SOHIO NP14

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.

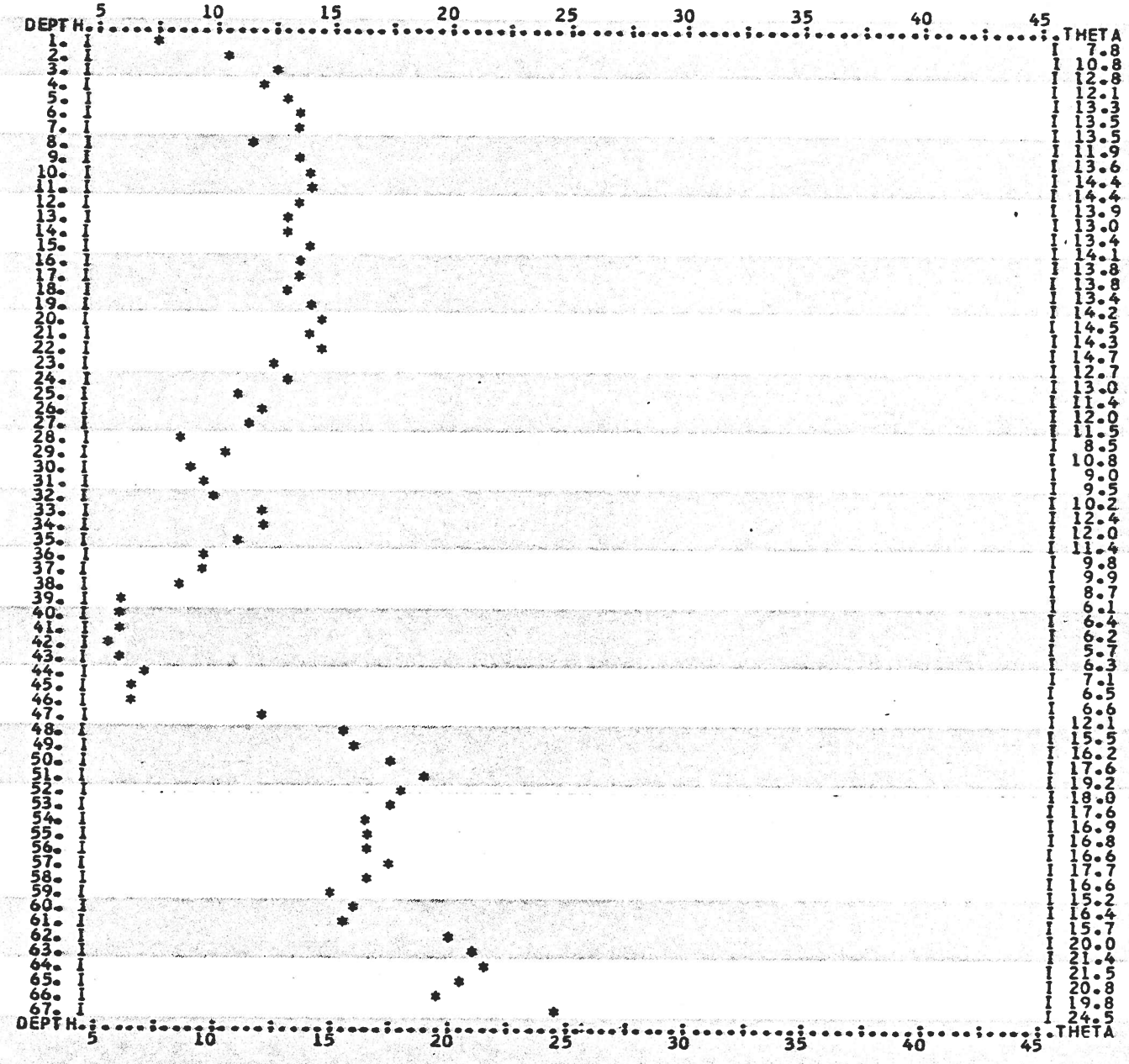


DEPTH	THETA
1.	11.0
2.	13.4
3.	13.9
4.	14.2
5.	14.1
6.	14.1
7.	13.9
8.	15.3
9.	15.6
10.	13.2
11.	14.3
12.	12.9
13.	12.7
14.	12.6
15.	11.3
16.	12.0
17.	12.7
18.	9.9
19.	14.6
20.	12.5
21.	13.2
22.	11.3
23.	11.5
24.	11.9
25.	12.6
26.	13.1
27.	13.4
28.	13.3
29.	12.6
30.	13.0
31.	14.7
32.	13.2
33.	11.6
34.	11.3
35.	11.1
36.	12.0
37.	11.1
38.	4.7
39.	4.9
40.	6.1
41.	5.6
42.	6.9
43.	6.2
44.	7.3
45.	8.7
46.	8.6
47.	10.3
48.	10.3
49.	12.5
50.	17.1
51.	17.0
52.	16.8
53.	17.6
54.	21.0
55.	21.3
56.	19.2
57.	18.3
58.	22.2
59.	22.6
60.	22.9
61.	23.7
62.	23.2
63.	23.5
64.	22.9
65.	23.2
66.	22.8
67.	22.7
68.	23.0
69.	22.9
70.	24.1
71.	24.0
72.	23.8
73.	22.8
74.	23.2
75.	23.5
76.	24.3

(S) DATA DOCUMENTS, INC. 55 342
(S) DATA DOCUMENTS, INC. 55 342

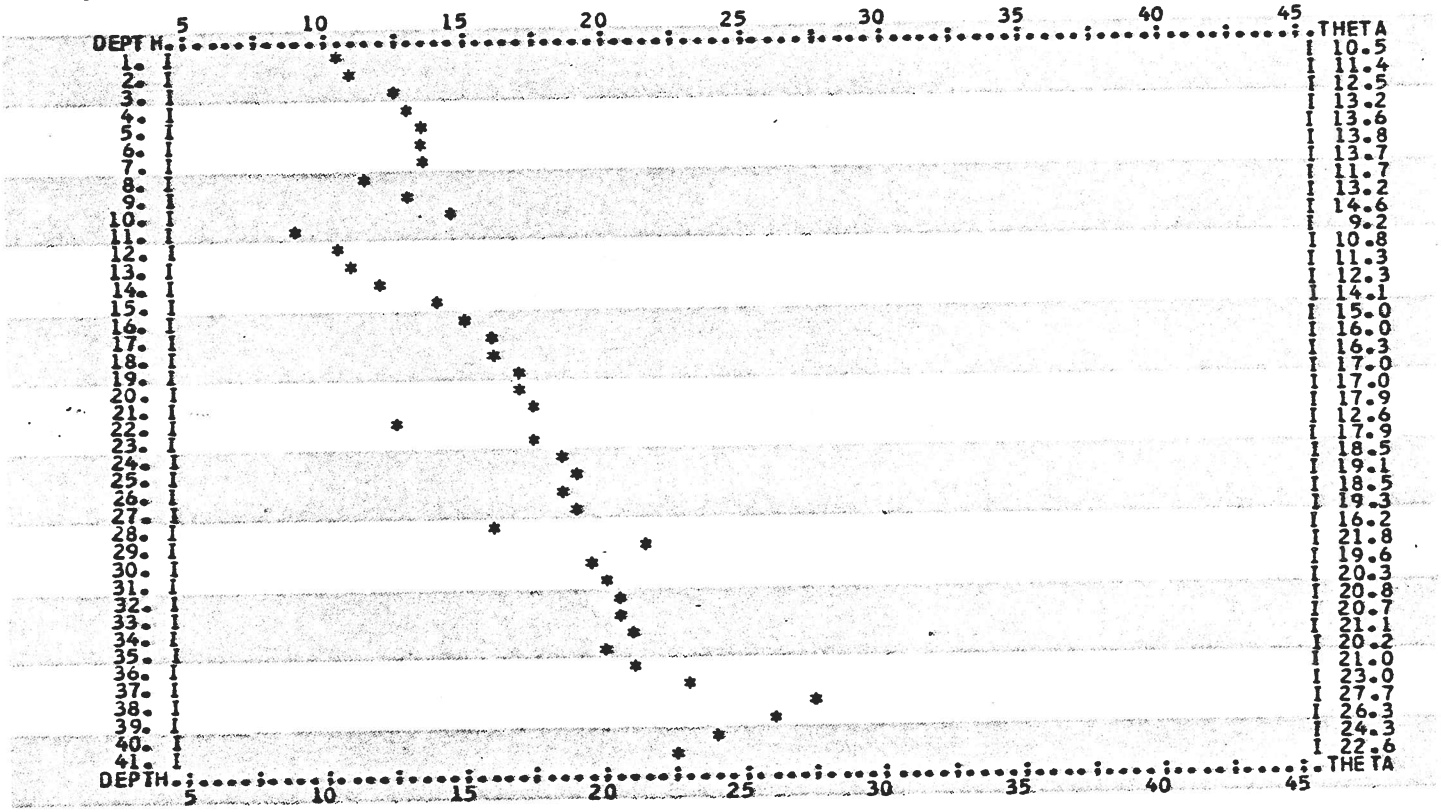
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO NP15LEHOLE ID=FT S BM= 0.0
75 DATE=[redacted]6185.5 12 OTIME=EC75 PROBE NO= WL=
REMARKS= SOHIO NP15

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



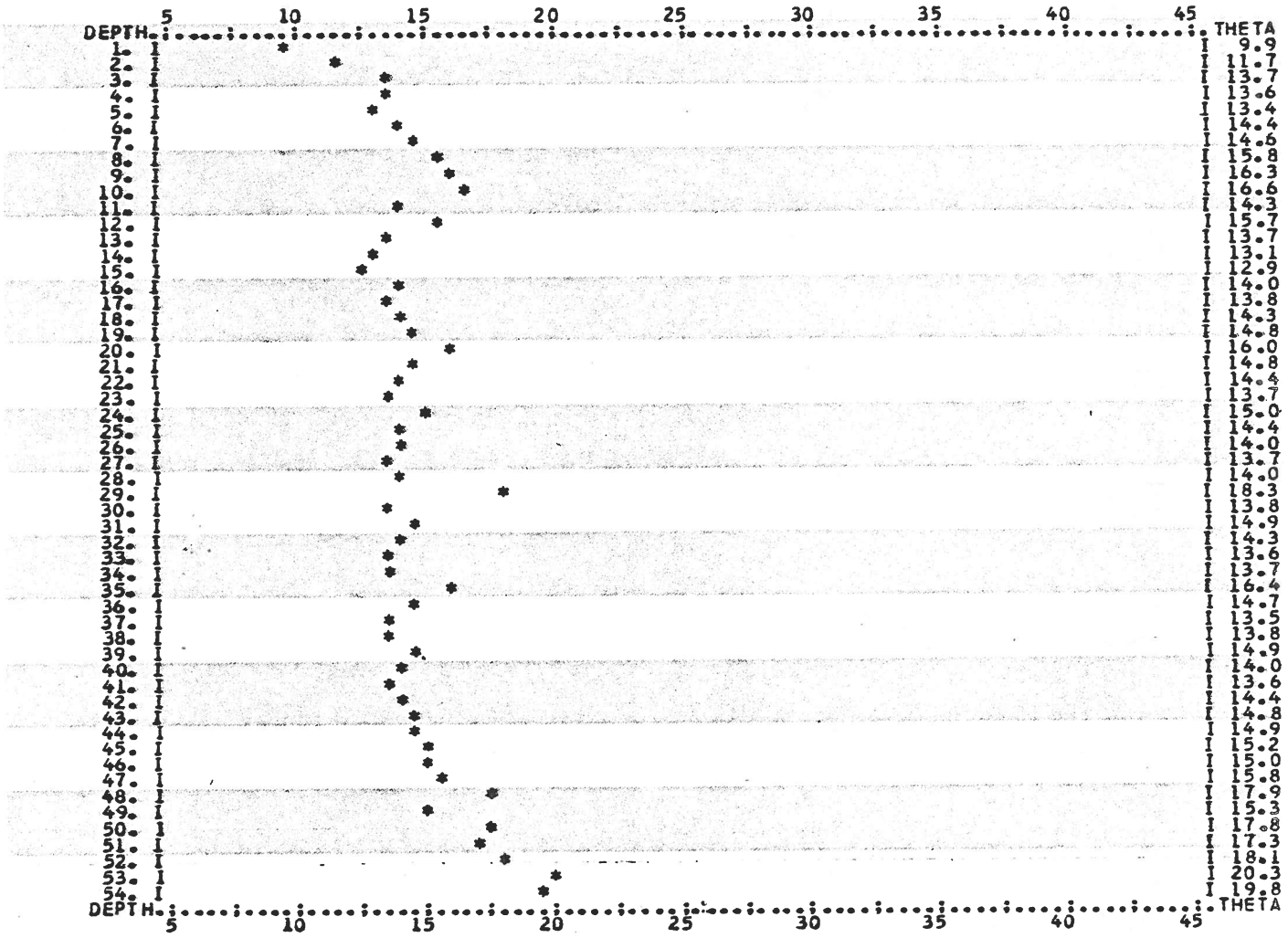
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO NP16 HOLE ID= BM= 0.0
DATE=12-75 6151.0 12 DTIME=EC 7 PROBE NO=5 WL=
REMARKS= SOHIO NP16

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO NP01 HOLE ID= BM= 0.0
DATE= 3-76 6192.0 04 MTIME=AR 7 PROBE NO=6 14 WL=[redacted]
REMARKS= SOHIO NP01 WET IN BOTTOM OF TUBE

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



DEPTH	THETA
1.	9.9
2.	11.7
3.	13.7
4.	13.6
5.	13.4
6.	14.4
7.	14.6
8.	15.8
9.	16.3
10.	16.6
11.	14.3
12.	15.7
13.	13.7
14.	13.1
15.	12.9
16.	14.0
17.	13.8
18.	14.3
19.	14.8
20.	16.0
21.	14.8
22.	14.4
23.	13.7
24.	15.0
25.	14.4
26.	14.0
27.	13.7
28.	14.0
29.	18.3
30.	13.8
31.	14.9
32.	14.3
33.	13.6
34.	13.7
35.	16.4
36.	14.7
37.	13.5
38.	13.8
39.	14.9
40.	14.0
41.	13.6
42.	14.4
43.	14.8
44.	14.9
45.	15.2
46.	15.0
47.	15.8
48.	17.9
49.	15.3
50.	17.8
51.	17.3
52.	18.1
53.	20.3
54.	19.8

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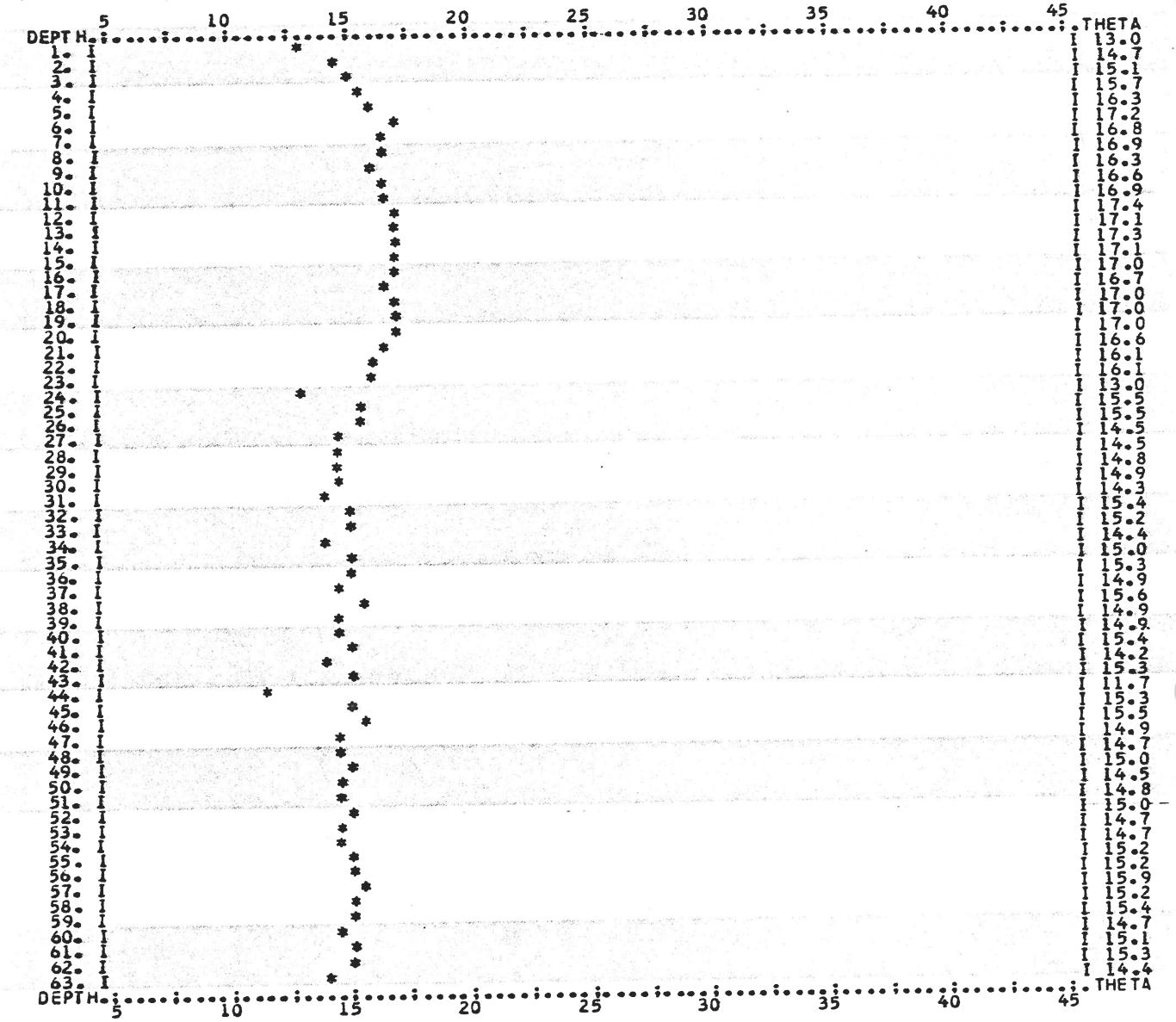
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO NP02 HOLE ID= BM= 0.0
DATE=3-76 6220.2 03 MTIME=AR 7 PROBE NO=6 10 WL=[redacted]
REMARKS= SOHIO NP02WET IN BOTTOM OF TUBE. CORRECTION MADE.

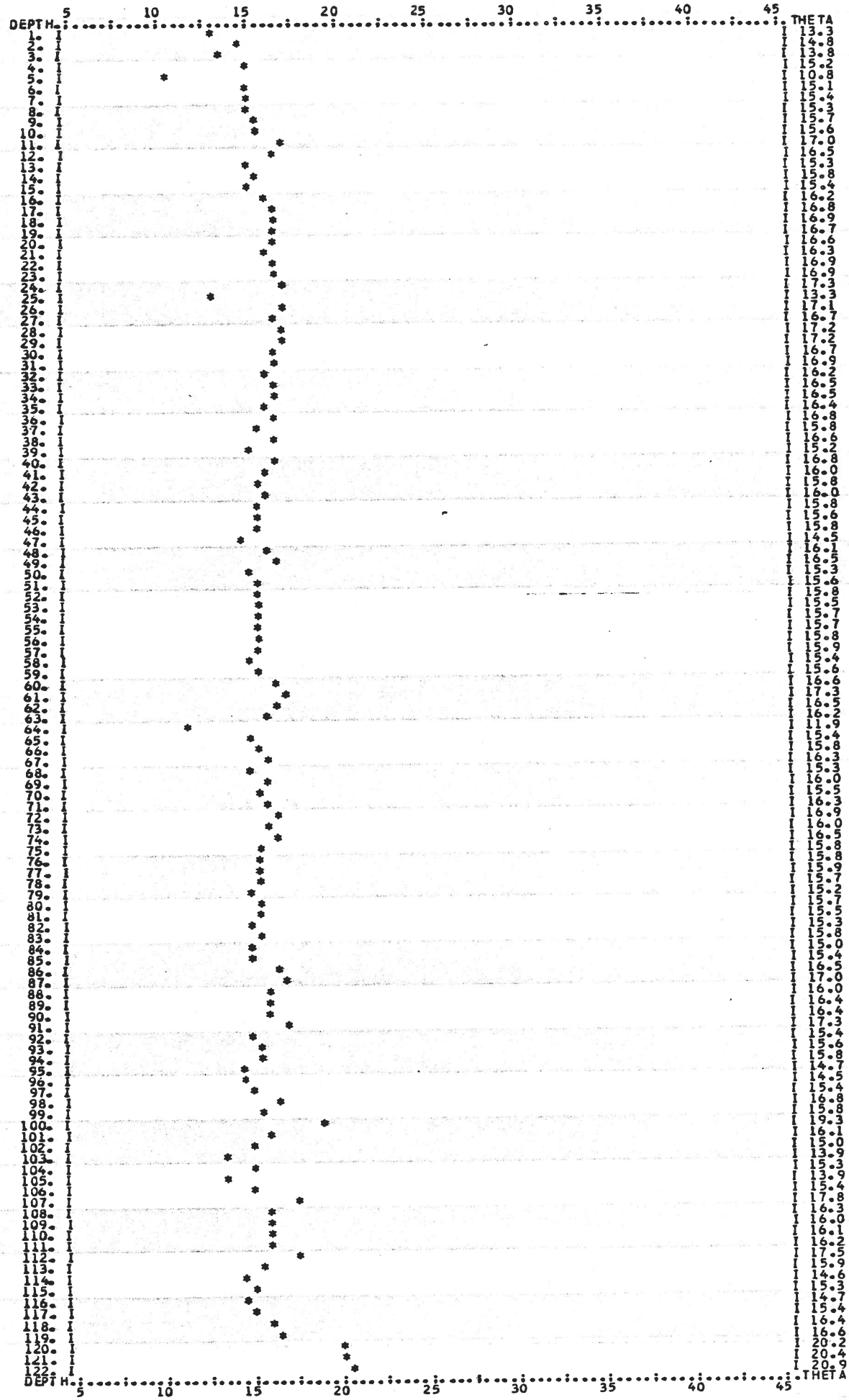
PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



(g) DATA MODULE INTS/INL 35 342
(g) DATA MODULE INTS/INL 35 342

AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO NP03 HOLE ID= BM= 0.0
DATE= 3-76 6231.1 03 MTIME=AR 7 PROBE NO=6 10 WL=[redacted]
REMARKS= SCHIO NP03 WATER IN BOTTOM OF TUBE. CORRECTION MADE.

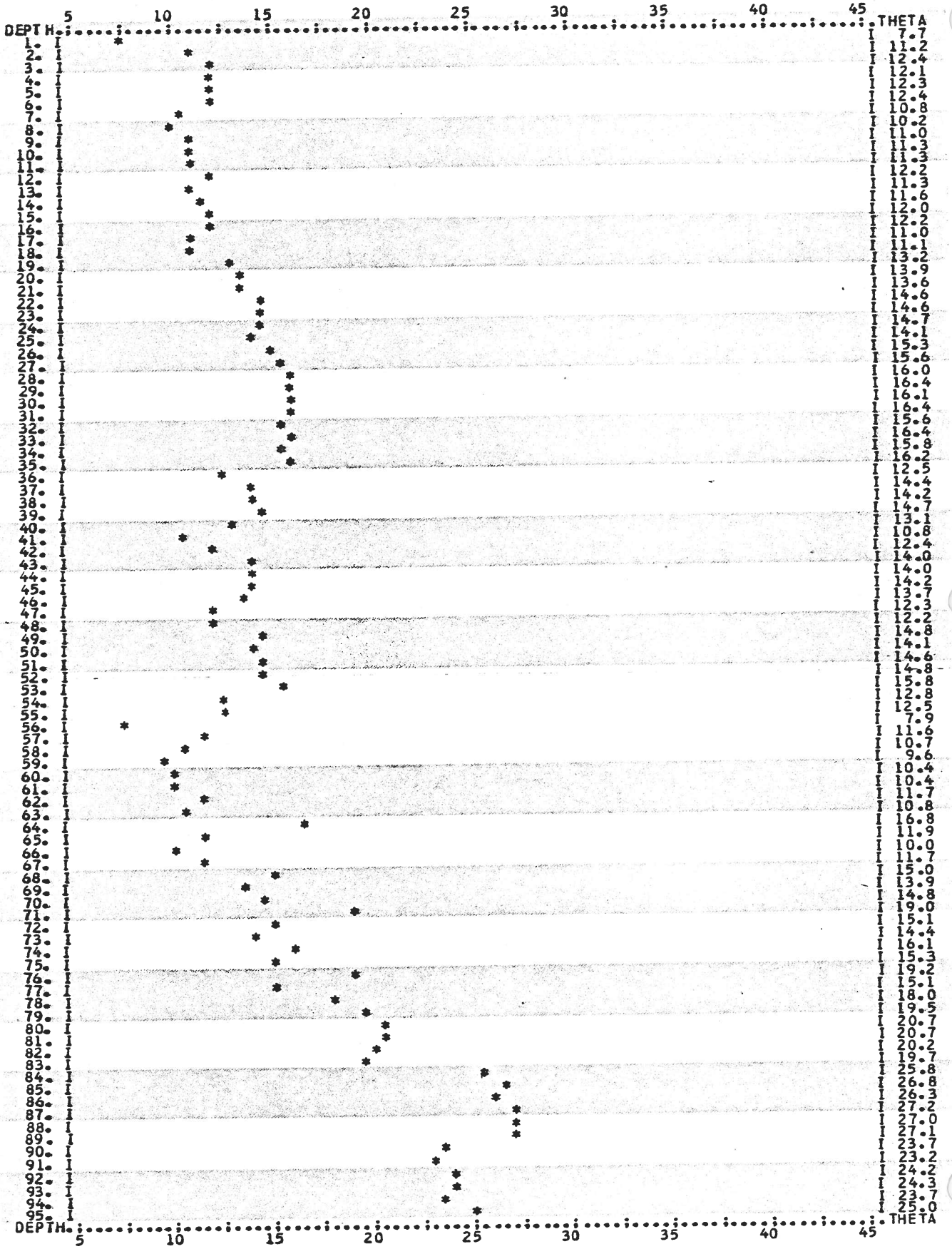
PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



DEPTH	THETA
1.	13.3
2.	14.8
3.	13.8
4.	15.2
5.	10.8
6.	15.1
7.	15.4
8.	15.3
9.	15.7
10.	15.6
11.	17.0
12.	16.5
13.	15.3
14.	15.8
15.	15.4
16.	16.2
17.	16.8
18.	16.9
19.	16.7
20.	16.6
21.	16.3
22.	16.9
23.	16.9
24.	17.3
25.	13.3
26.	17.1
27.	16.7
28.	17.2
29.	17.2
30.	16.7
31.	16.9
32.	16.2
33.	16.5
34.	16.5
35.	16.4
36.	16.8
37.	15.8
38.	16.6
39.	15.2
40.	16.8
41.	16.0
42.	15.8
43.	16.0
44.	15.8
45.	15.6
46.	15.8
47.	14.5
48.	16.1
49.	16.5
50.	15.3
51.	15.6
52.	15.8
53.	15.5
54.	15.7
55.	15.7
56.	15.8
57.	15.9
58.	15.4
59.	15.6
60.	16.6
61.	17.3
62.	16.5
63.	16.2
64.	11.9
65.	15.4
66.	15.8
67.	16.3
68.	15.3
69.	16.0
70.	15.5
71.	16.3
72.	16.9
73.	16.0
74.	16.5
75.	15.8
76.	15.8
77.	15.9
78.	15.7
79.	15.2
80.	15.7
81.	15.5
82.	15.3
83.	15.8
84.	15.0
85.	15.4
86.	16.5
87.	17.0
88.	16.0
89.	16.4
90.	16.4
91.	17.3
92.	15.4
93.	15.6
94.	15.8
95.	14.7
96.	14.5
97.	15.4
98.	16.8
99.	15.8
100.	19.3
101.	16.1
102.	15.0
103.	13.9
104.	15.3
105.	13.9
106.	15.4
107.	17.8
108.	16.3
109.	16.0
110.	16.1
111.	16.2
112.	17.5
113.	15.9
114.	14.6
115.	15.3
116.	14.7
117.	15.4
118.	16.4
119.	16.6
120.	20.2
121.	20.4
122.	20.9

AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO NP04 HOLE ID= BM= 0.0
DATE= 3-[redacted] 6206.8 03 MTIME=AR 7 PROBE NO=6 11 WL=[redacted]
REMARKS= SOHIO NP04 WATER IN BOTTOM OF HOLE. CORRECTION MADE.

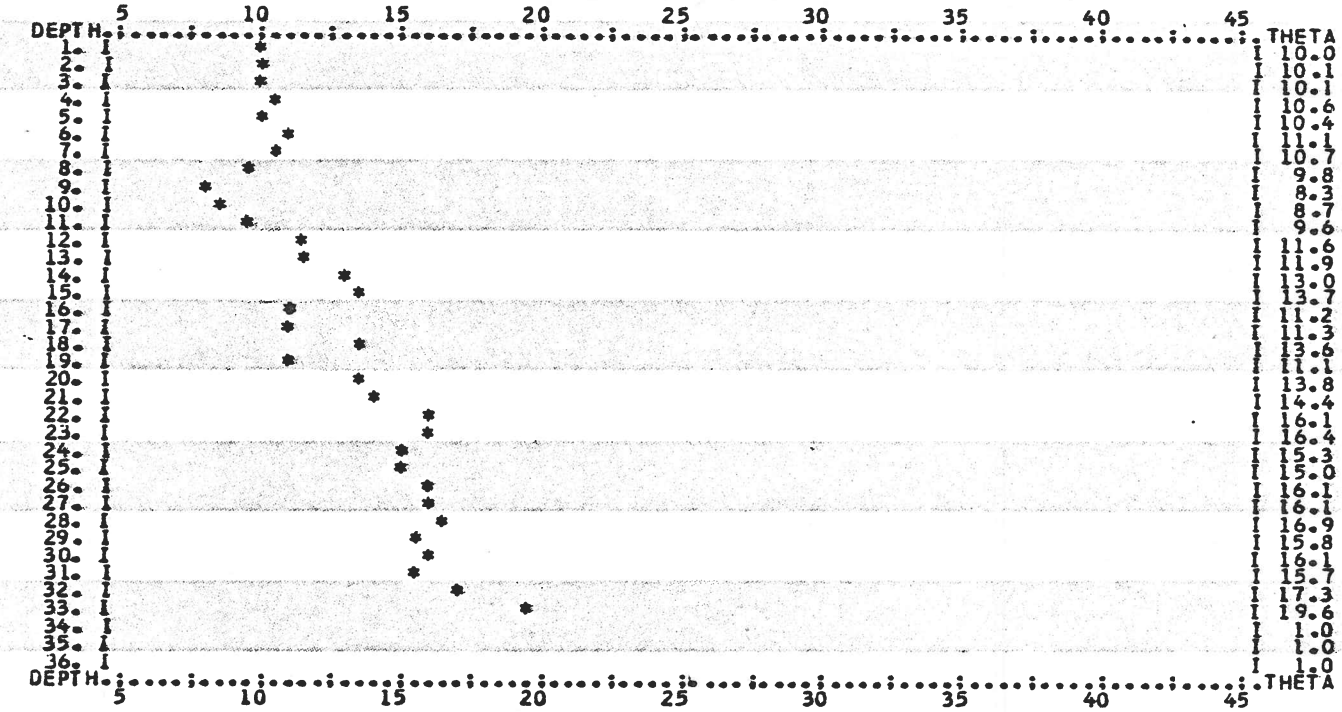
PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



DEPTH	THETA	DEPTH	THETA	DEPTH	THETA
1.	7.7	33.	15.8	65.	10.0
2.	11.2	34.	16.2	66.	11.7
3.	12.4	35.	12.5	67.	15.0
4.	12.1	36.	14.4	68.	13.9
5.	12.3	37.	14.2	69.	14.8
6.	12.4	38.	14.7	70.	19.0
7.	10.8	39.	13.1	71.	15.1
8.	10.2	40.	10.8	72.	14.4
9.	11.0	41.	12.4	73.	16.1
10.	11.3	42.	14.0	74.	15.3
11.	11.3	43.	14.0	75.	19.2
12.	12.2	44.	14.2	76.	15.1
13.	11.3	45.	13.7	77.	18.0
14.	11.6	46.	12.3	78.	19.5
15.	12.0	47.	12.2	79.	20.7
16.	12.2	48.	14.8	80.	20.7
17.	11.0	49.	14.1	81.	20.2
18.	11.1	50.	14.6	82.	19.7
19.	13.2	51.	14.8	83.	25.8
20.	13.9	52.	15.8	84.	26.8
21.	13.6	53.	12.8	85.	26.3
22.	14.6	54.	12.5	86.	27.2
23.	14.6	55.	7.9	87.	27.0
24.	14.7	56.	11.6	88.	27.1
25.	14.1	57.	10.7	89.	23.7
26.	15.3	58.	9.6	90.	23.2
27.	15.6	59.	10.4	91.	24.2
28.	16.0	60.	10.4	92.	24.3
29.	16.4	61.	11.7	93.	23.7
30.	16.1	62.	10.8	94.	25.0
31.	16.4	63.	16.8	95.	
32.	15.6	64.	11.9		

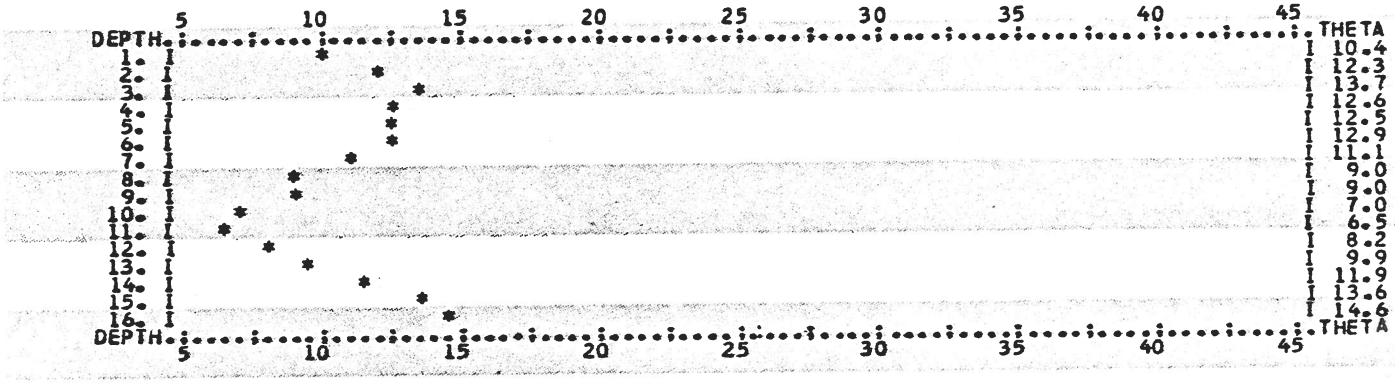
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO NP05 HOLE ID= BM= 0.0
DATE=3-76 6171.2 03 MTIME=AR 7 PROBE NO=6 12 WL=[redacted]
REMARKS= SOHIO NP05

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO NP06 HOLE ID= BM= 0.0
DATE= 3-76 6152.7 03 MTIME=AR 7 PROBE NO=6 13 WL=[redacted]
REMARKS= SOHIO NP06 LITTLE BIT OF WATER IN BOTTOM OF HOLE

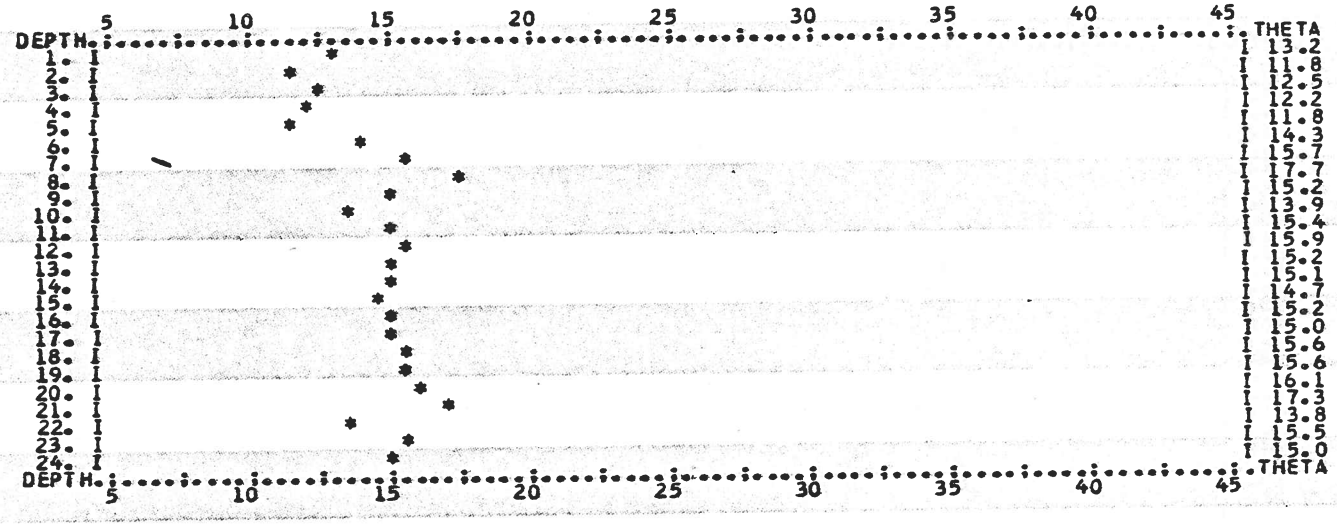
PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



(3) DATA DOCUMENTS/ZML SS 342

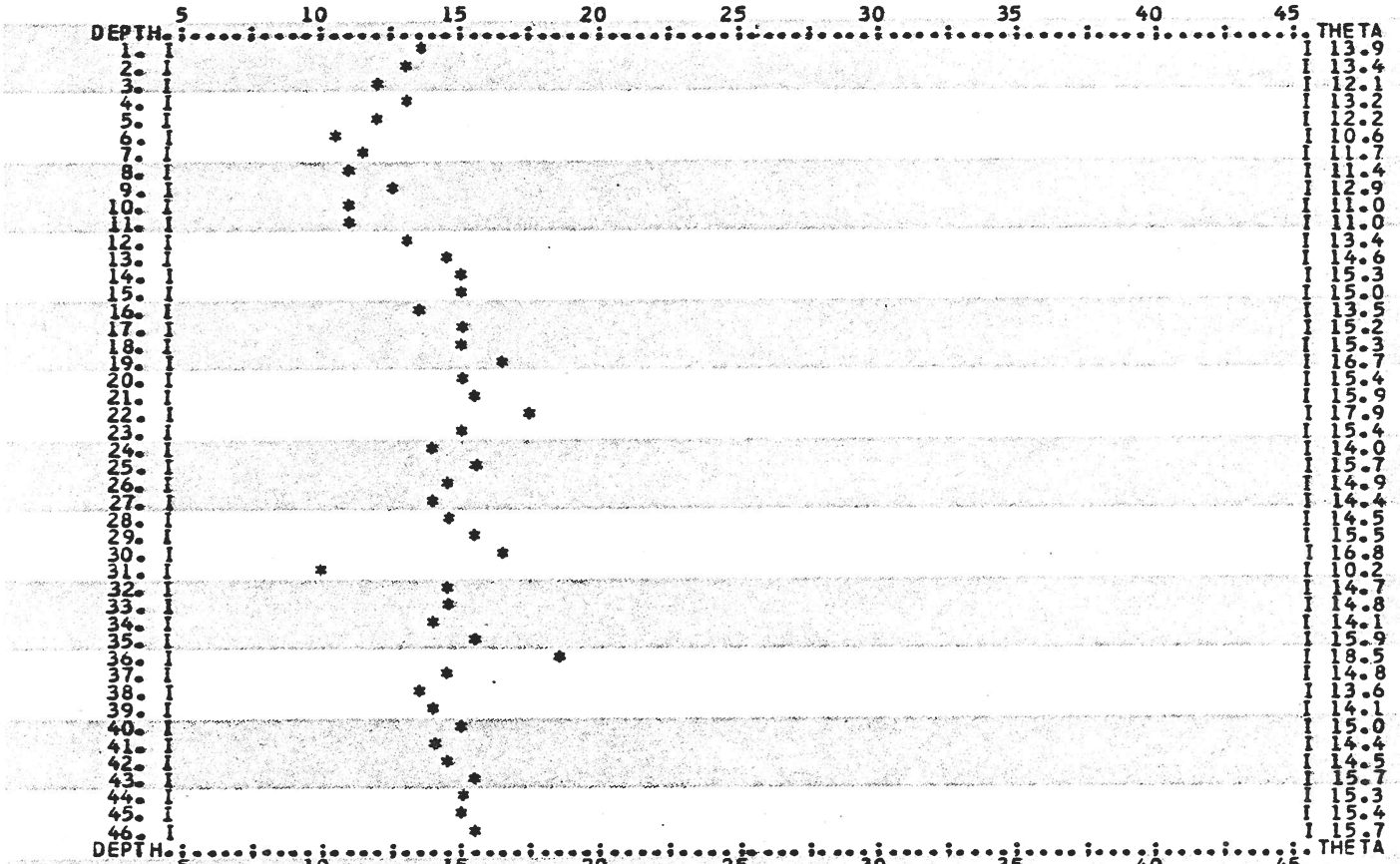
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO NP07 HOLE ID= BM= 0.0
DATE=3/16 6176.2 03 MTIME=AR 7 PROBE NO=6 13 WL=[redacted]
REMARKS= SOHIO NP07

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



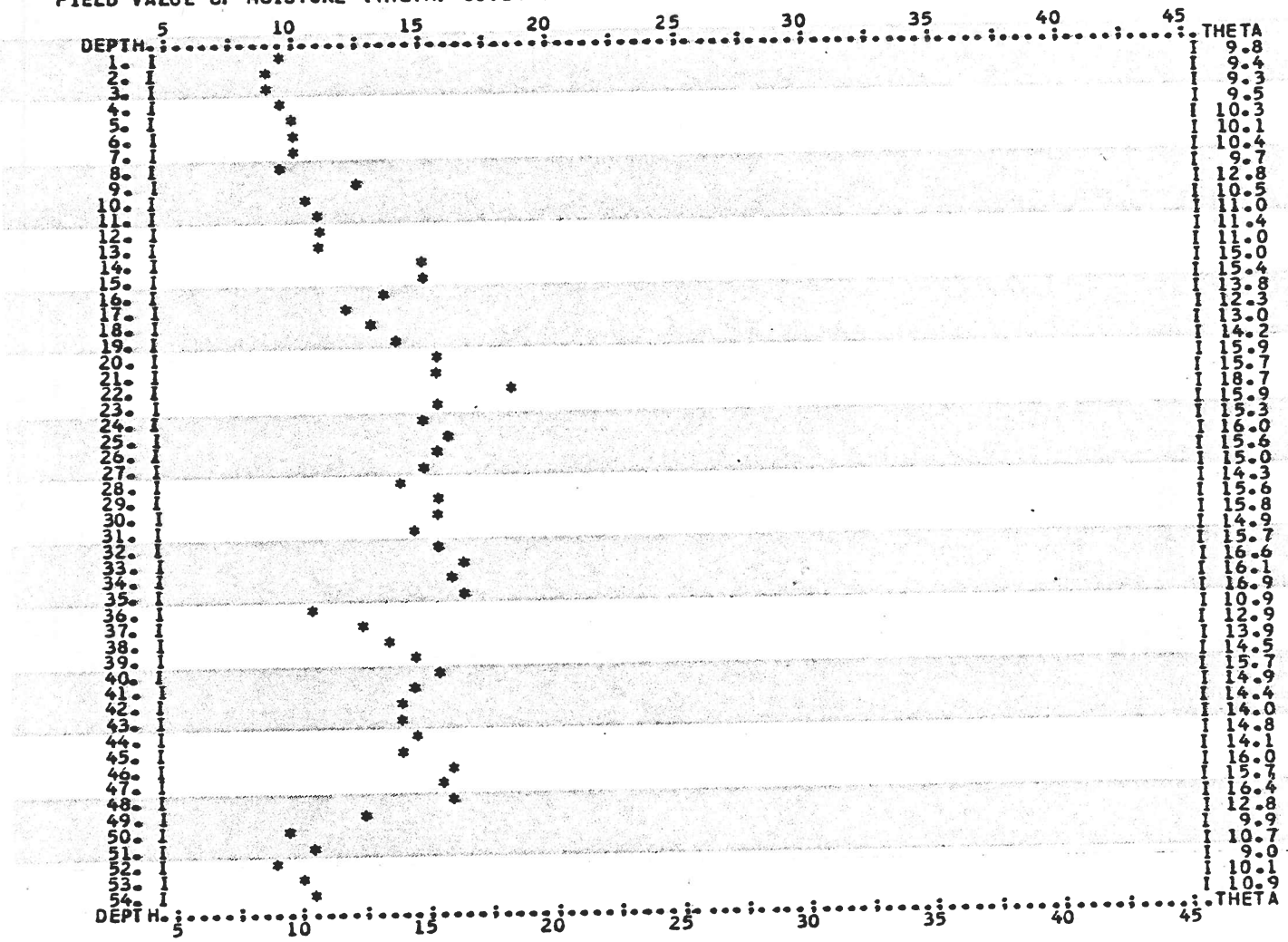
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO NP08 HOLE ID= BM= 0.0
DATE=3-76 6227.4 03 MTIME=AR 7 PROBE NO=6 13 WL=[redacted]
REMARKS= SOHIO NP08

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



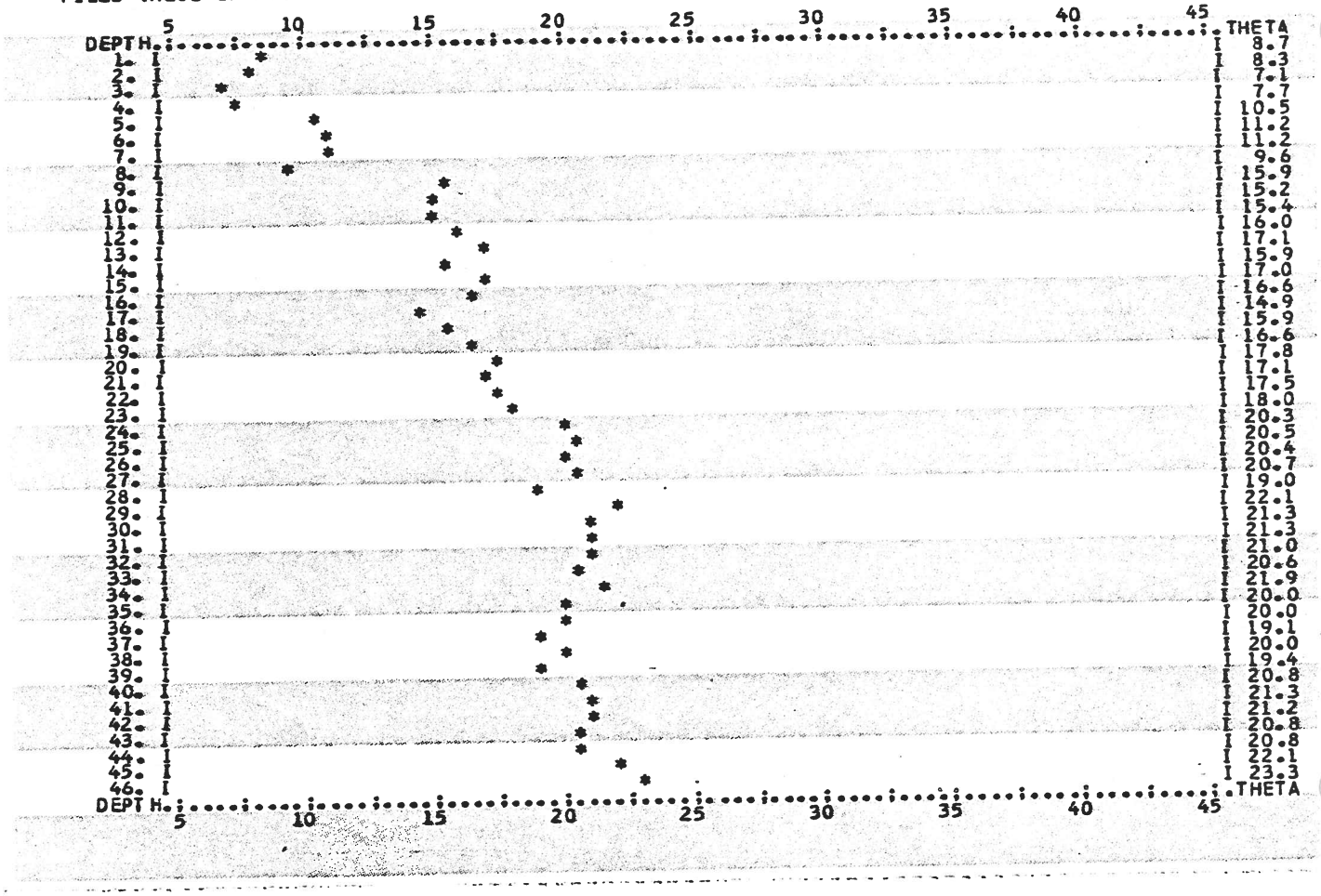
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO NP09 HOLE ID= BM= 0.0
DATE=3-74 6230.2 03 MTIME=AR 7 PROBE NO=6 14 WL=[redacted]
REMARKS= SOHIO NP09

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE.
PROJECT=SOHIO NP10 HOLE ID= BM= 0.0
DATE= 3-76 6165.8 04 MTIME=AR 7 PROBE NO=6 17 WL=[redacted]
REMARKS= SOHIO NP10 12 FT OF WATER IN BOTTOM OF HOLE. CORRECTION MADE.

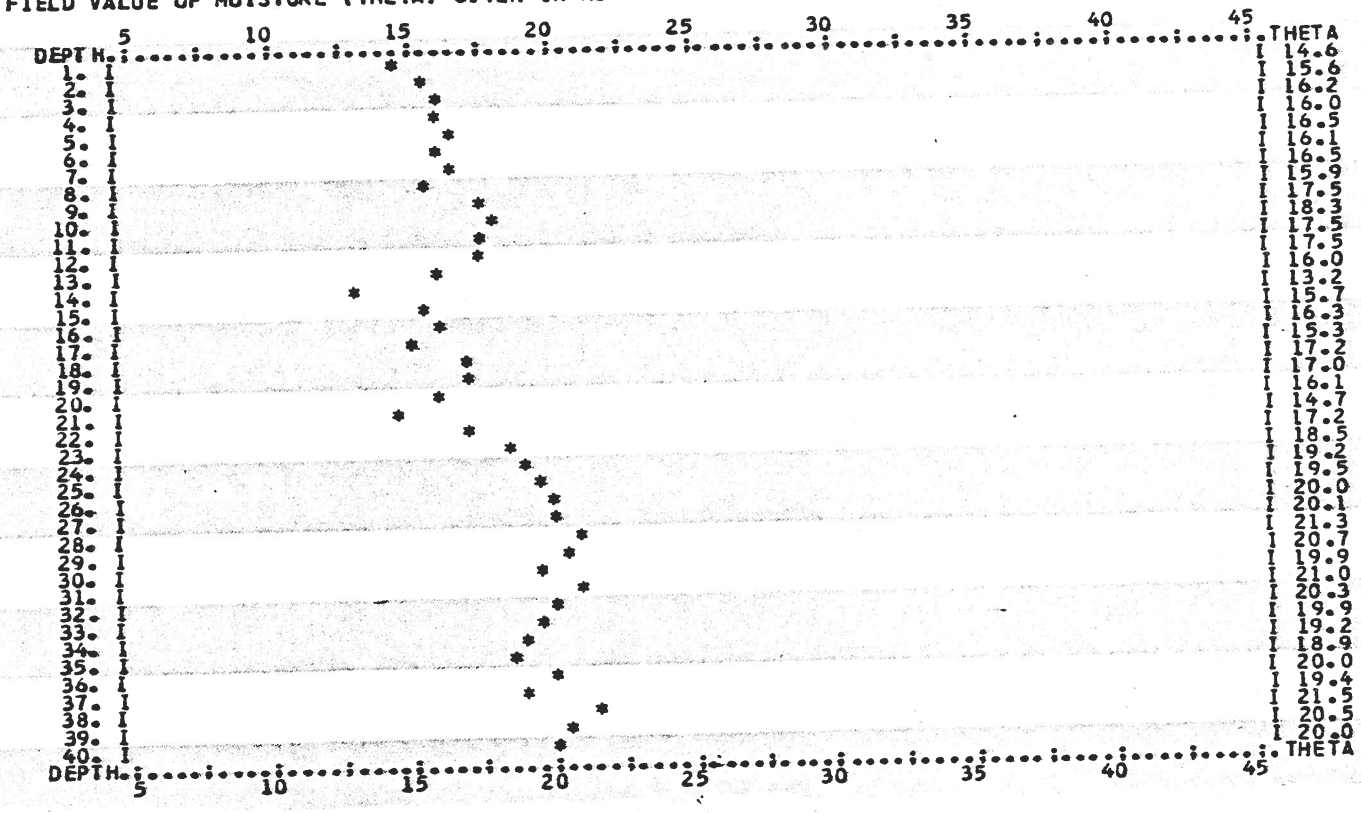
PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



(S)DATA DOCUMENTS/INC SS 342

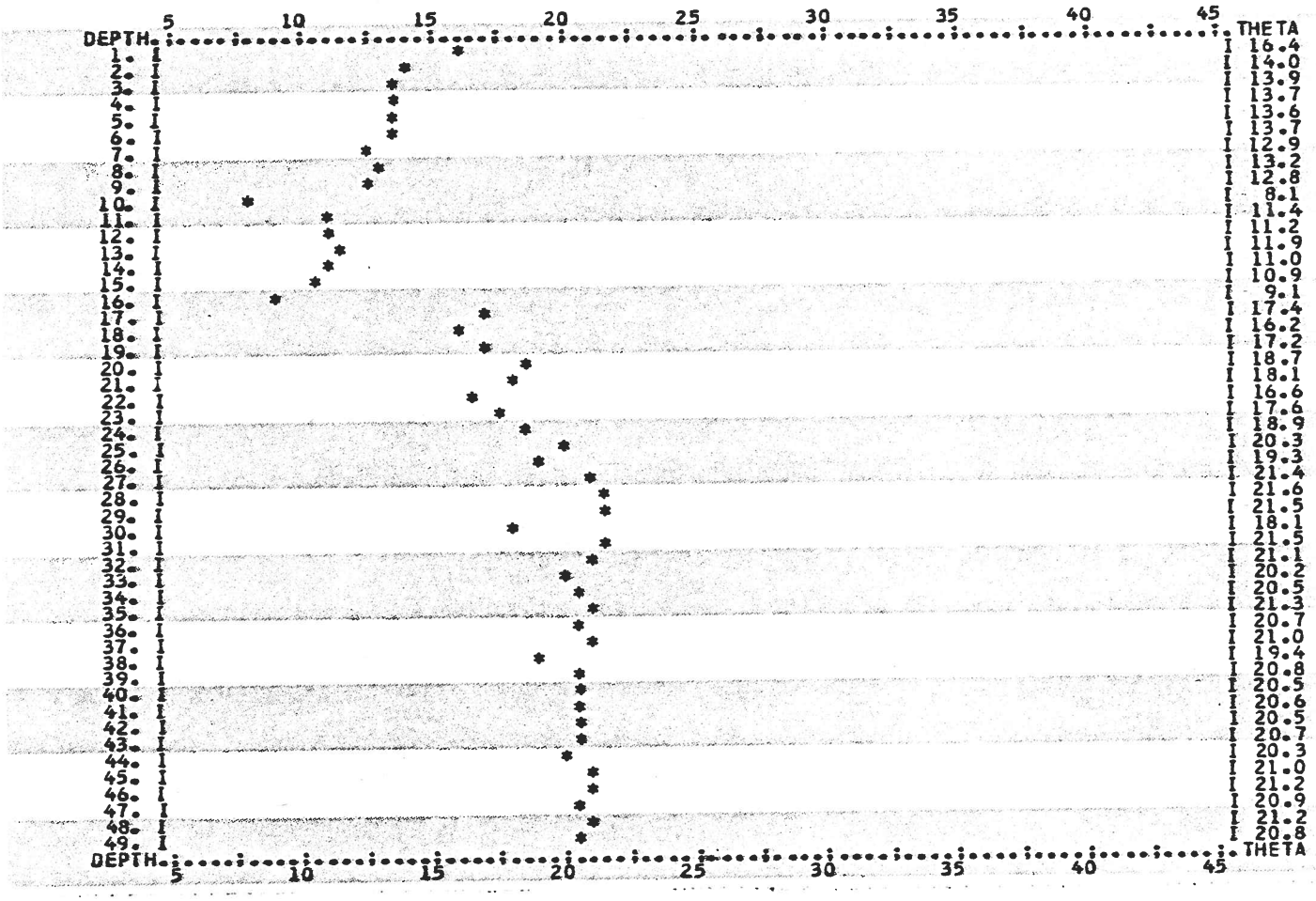
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO NP11 HOLE ID= BM= 0.0
DATE= 3-76 6164.4 03 MTIME=AR 7 PROBE NO=6 16 WL=[redacted]
REMARKS= SOHIO NP11SOME WATER IN BOTTOM OF HOLE

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



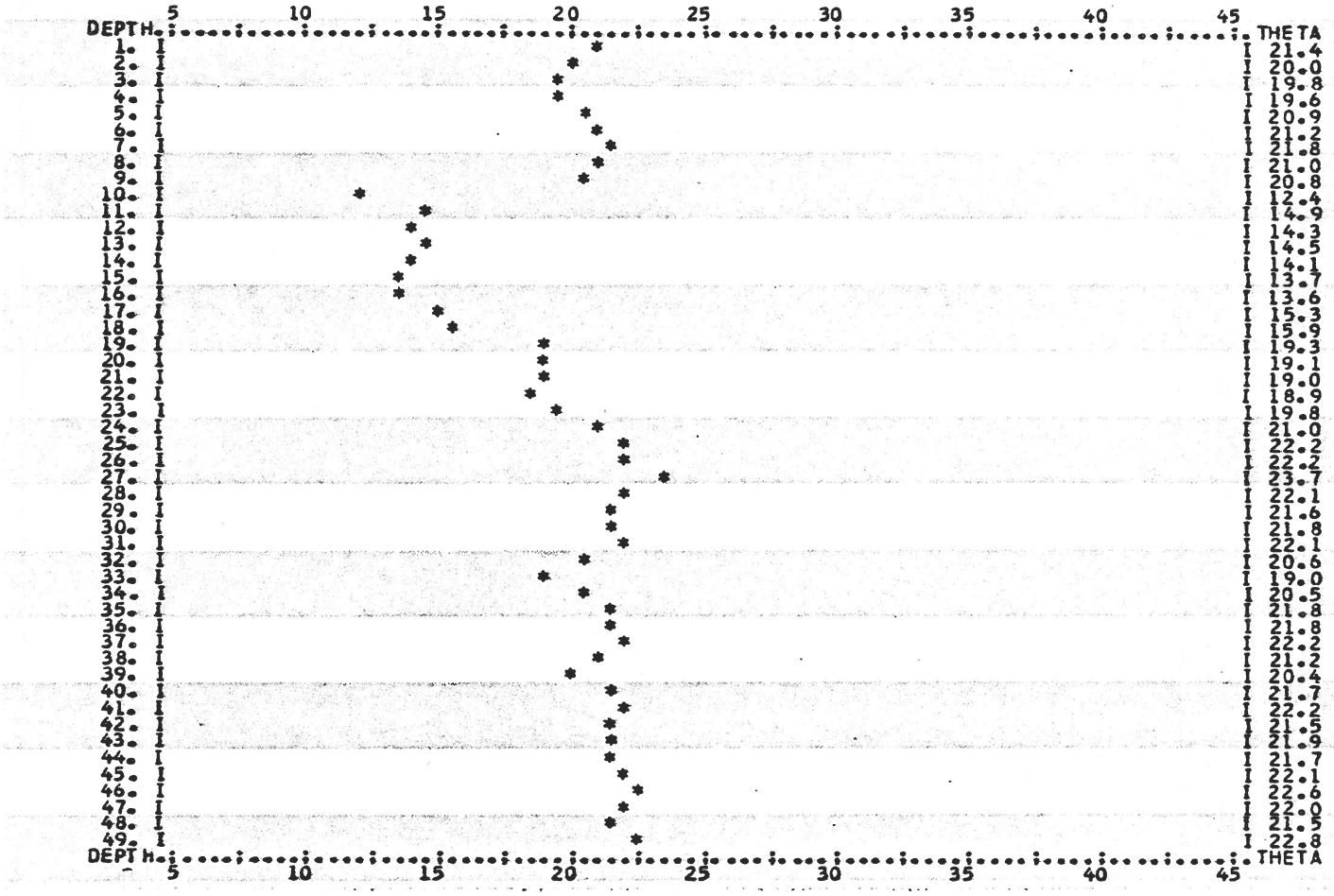
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO NP12 RHOLE ID=T FR BM= 0.0
3-76 DATE=[redacted] 6165.1 03 MTIME=AR 7 PROBE NO=6 15 WL=[redacted]
REMARKS= SOHIO NP12

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



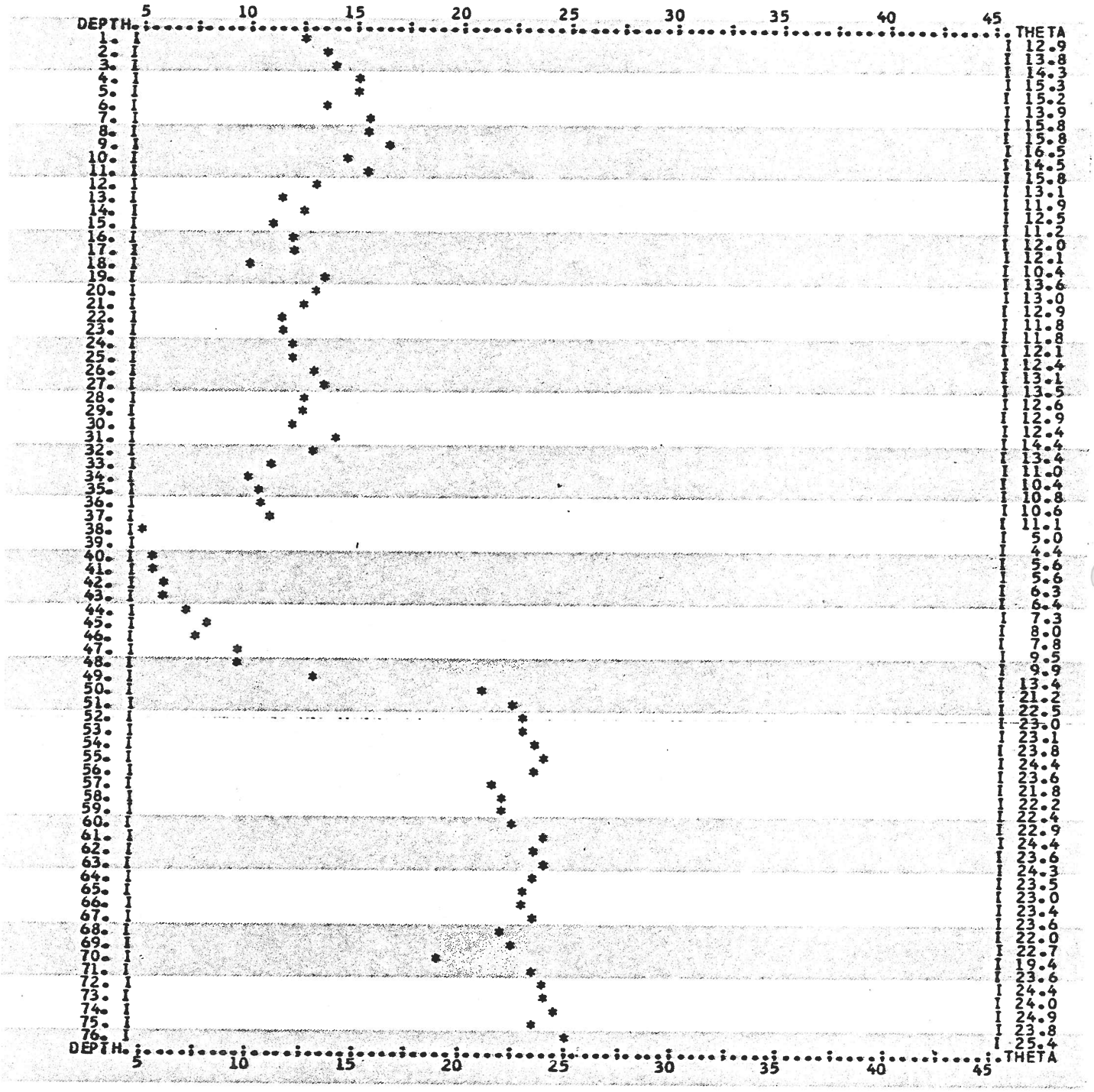
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO NP13 BOREHOLE ID=FT F BM= 0.0
DATE=[redacted]167.3 03 MTIME=AR 7 PROBE NO=6 WL=
REMARKS= SOHIO NP13

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO NP14RTHOLE ID= SID BM= 0.0
3-76 DATE=[redacted] 6185.4 04 MTIME=AR 7 PROBE NO=6 15 WL=[redacted]
REMARKS= SOHIO NP14 11 FT OF WATER IN BOTTOM OF HOLE. CORRECTION MADE.

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



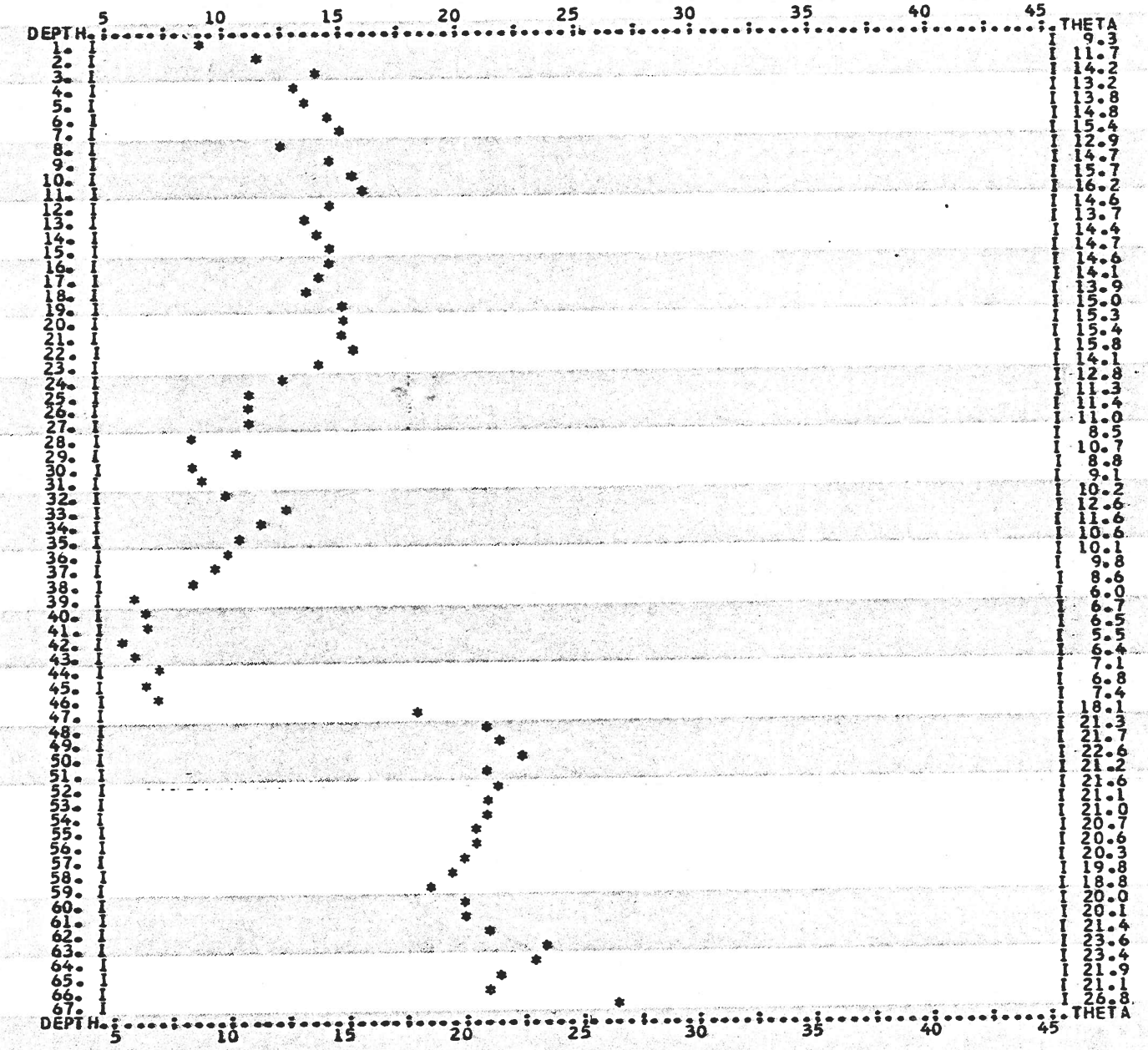
DEPTH	THETA
1.	12.9
2.	13.8
3.	14.3
4.	15.3
5.	15.2
6.	13.9
7.	15.8
8.	15.8
9.	16.5
10.	14.5
11.	15.8
12.	13.1
13.	11.9
14.	12.5
15.	11.2
16.	12.0
17.	12.1
18.	10.4
19.	13.6
20.	13.0
21.	12.9
22.	11.8
23.	11.8
24.	12.1
25.	12.4
26.	13.1
27.	13.5
28.	12.6
29.	12.9
30.	12.4
31.	14.4
32.	13.4
33.	11.0
34.	10.4
35.	10.8
36.	10.6
37.	11.1
38.	5.0
39.	4.4
40.	5.6
41.	5.6
42.	6.3
43.	6.4
44.	7.3
45.	8.0
46.	7.8
47.	9.5
48.	9.9
49.	13.4
50.	21.2
51.	22.5
52.	23.0
53.	23.1
54.	23.8
55.	24.4
56.	23.6
57.	21.8
58.	22.2
59.	22.4
60.	22.9
61.	24.4
62.	23.6
63.	24.3
64.	23.5
65.	23.0
66.	23.4
67.	23.6
68.	22.0
69.	22.7
70.	19.4
71.	23.6
72.	24.4
73.	24.0
74.	24.9
75.	23.8
76.	25.4

5 10 15 20 25 30 35 40 45 DEPTH THETA

(4) DATA DOCUMENTS/DOC. SS 342
(4) DATA DOCUMENTS/DOC. SS 342

AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO NP15 LEHOLE ID=FT S BM= 0.0
3-76 DATE=[redacted]6185.5 04 MTIME=AR 7 PROBE NO=6 16 WL=[redacted]
REMARKS= SOHIO NP15 WATER IN BOTTOM OF HOLE

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.

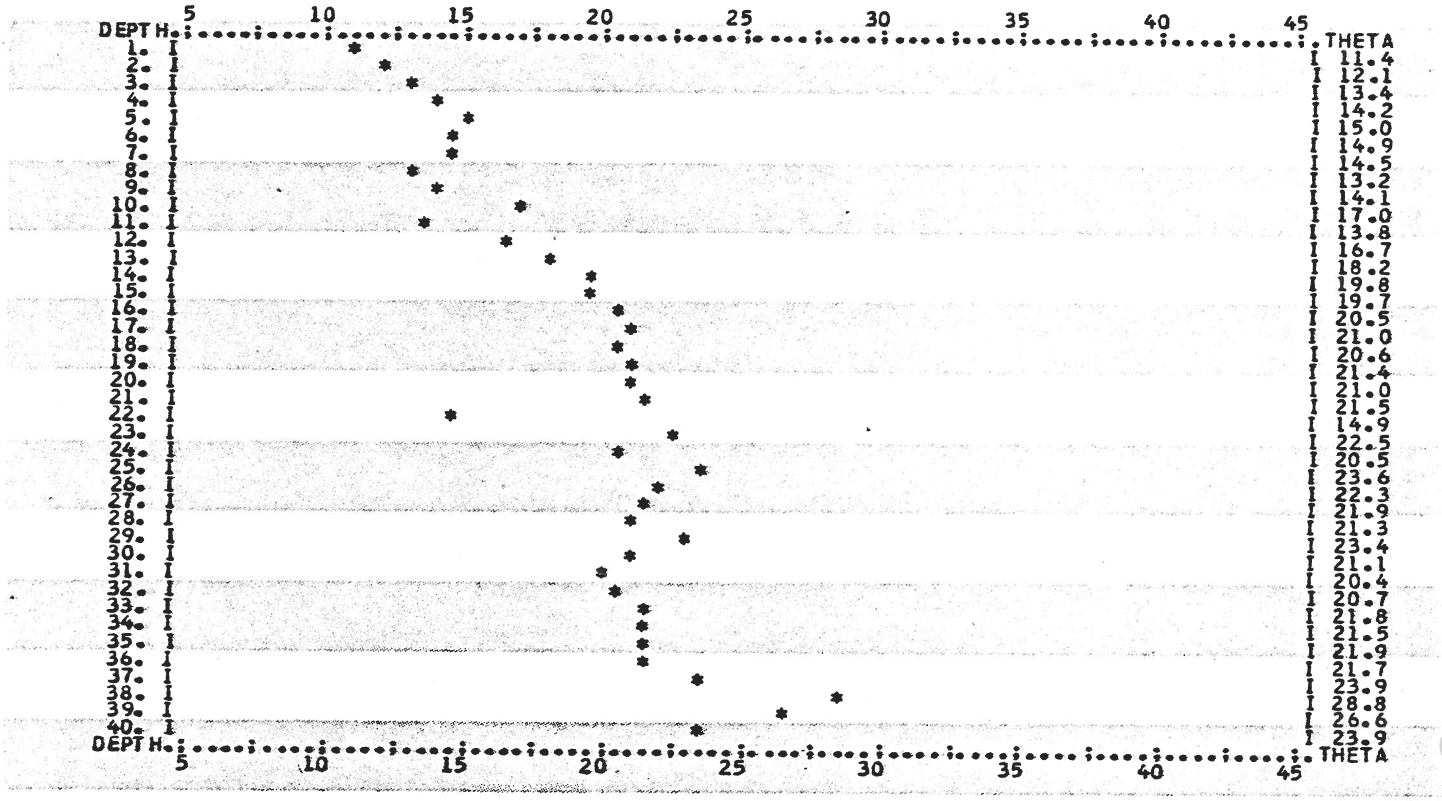


DEPTH	THETA
1.	9.3
2.	11.7
3.	14.2
4.	13.2
5.	13.8
6.	14.8
7.	15.4
8.	12.9
9.	14.7
10.	15.7
11.	16.2
12.	14.6
13.	13.7
14.	14.4
15.	14.7
16.	14.6
17.	14.1
18.	13.9
19.	15.0
20.	15.3
21.	15.4
22.	15.8
23.	14.1
24.	12.8
25.	11.3
26.	11.4
27.	11.0
28.	8.5
29.	10.7
30.	8.8
31.	9.1
32.	10.2
33.	12.6
34.	11.6
35.	10.6
36.	10.1
37.	9.8
38.	8.6
39.	6.0
40.	6.7
41.	6.5
42.	5.5
43.	6.4
44.	7.1
45.	6.8
46.	7.4
47.	18.1
48.	21.3
49.	21.7
50.	22.6
51.	21.2
52.	21.6
53.	21.1
54.	21.0
55.	20.7
56.	20.6
57.	20.3
58.	19.8
59.	18.8
60.	20.0
61.	20.1
62.	21.4
63.	23.6
64.	23.4
65.	21.9
66.	21.1
67.	26.8

(%DATA MEASUREMENTS/INC. SS 342

AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO NP16 HOLE ID= BM= 0.0
DATE= 3-76 6151.0 03 MTIME=AR 7 PROBE NO=6 12 WL=[redacted]
REMARKS= SOHIO NP16 SOME WATER IN BOTTOM OF HOLE

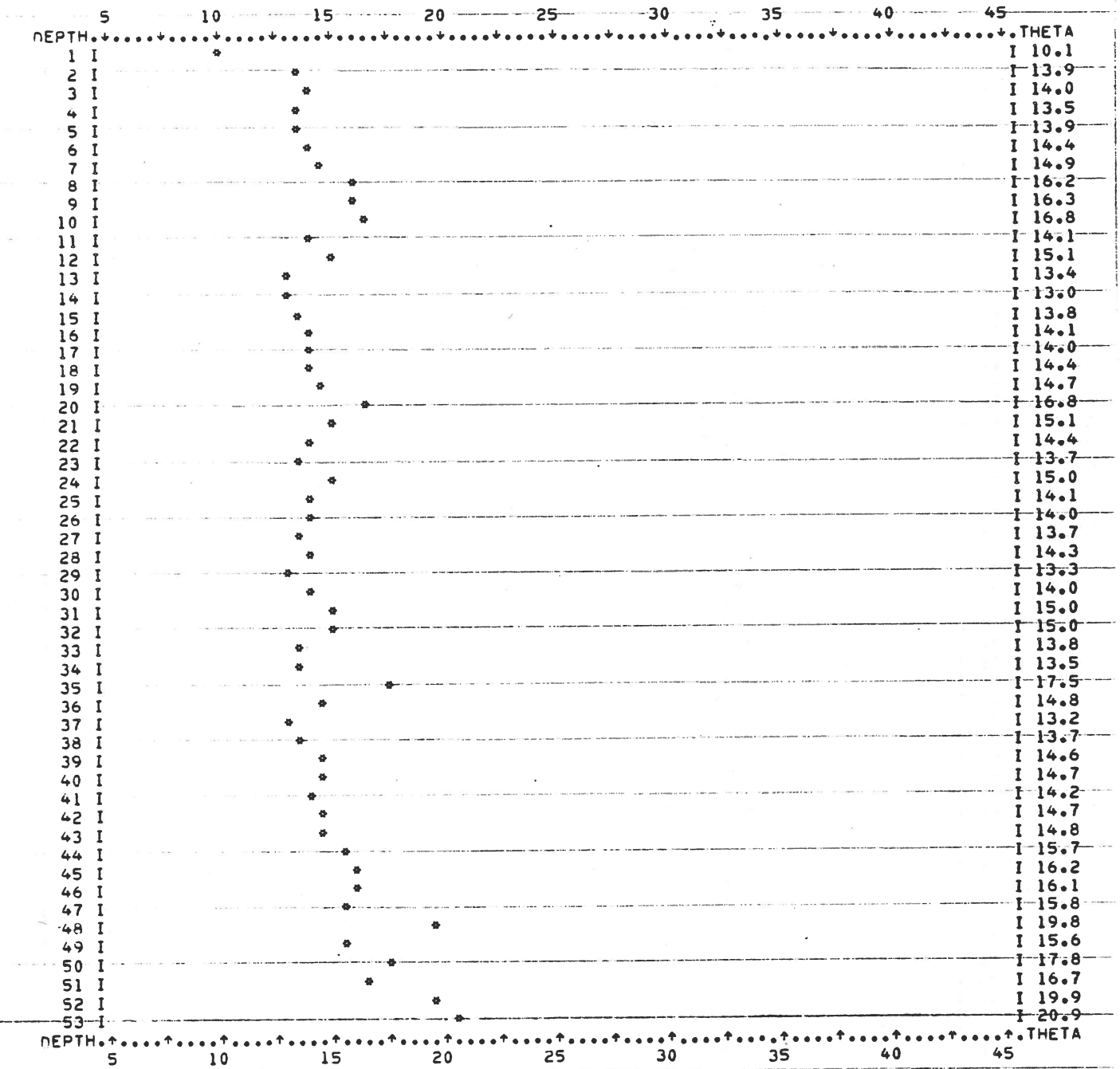
PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



DEPTH.	THETA
1.	11.4
2.	12.1
3.	13.4
4.	14.2
5.	15.0
6.	14.9
7.	14.5
8.	13.2
9.	14.1
10.	17.0
11.	13.8
12.	16.7
13.	18.2
14.	19.8
15.	19.7
16.	20.5
17.	21.0
18.	20.6
19.	21.4
20.	21.0
21.	21.5
22.	14.9
23.	22.5
24.	20.5
25.	23.6
26.	22.3
27.	21.9
28.	21.3
29.	23.4
30.	21.1
31.	20.4
32.	20.7
33.	21.8
34.	21.5
35.	21.9
36.	21.7
37.	23.9
38.	28.8
39.	26.6
40.	23.9

HYDROTECHNICS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT= SOHIO HOLE ID= NP01 LOCATION= BM= 6190.0
DATE= 1 MAY 76 TIME= 1120 PROBE NO= WL=
REMARKS=

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



HYDROTECHNICS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT= SOHIO HOLE ID= NP02 LOCATION= BM= 6218.3
DATE= 1 MAY 76 TIME= 1300 PROBE NO= WL=
REMARKS=

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.

DEPTH		THETA
1		12.9
2		15.2
3		15.3
4		15.7
5		16.2
6		16.9
7		15.9
8		17.2
9		16.8
10		16.7
11		16.6
12		17.5
13		16.9
14		17.5
15		17.5
16		17.4
17		16.8
18		16.9
19		16.7
20		17.6
21		16.3
22		16.0
23		16.1
24		12.7
25		14.8
26		15.0
27		15.1
28		15.0
29		14.7
30		14.4
31		14.5
32		15.1
33		15.1
34		15.6
35		15.6
36		15.2
37		15.7
38		14.5
39		14.7
40		14.4
41		14.8
42		14.8
43		14.3
44		14.5
45		14.9
46		15.2
47		15.0
48		15.3
49		14.4
50		15.2
51		15.2
52		15.3
53		15.5
54		15.1
55		15.6
56		15.0
57		15.3
58		15.3
59		15.1
60		14.5
61		14.3
62		15.4
63		16.2

5 10 15 20 25 30 35 40 45

HYDROTECHNICS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT= SOMIO HOLE ID= NP03 LOCATION= BM= 6229.4
DATE= 1330 TIME= PROBE NO= WL=
REMARKS=

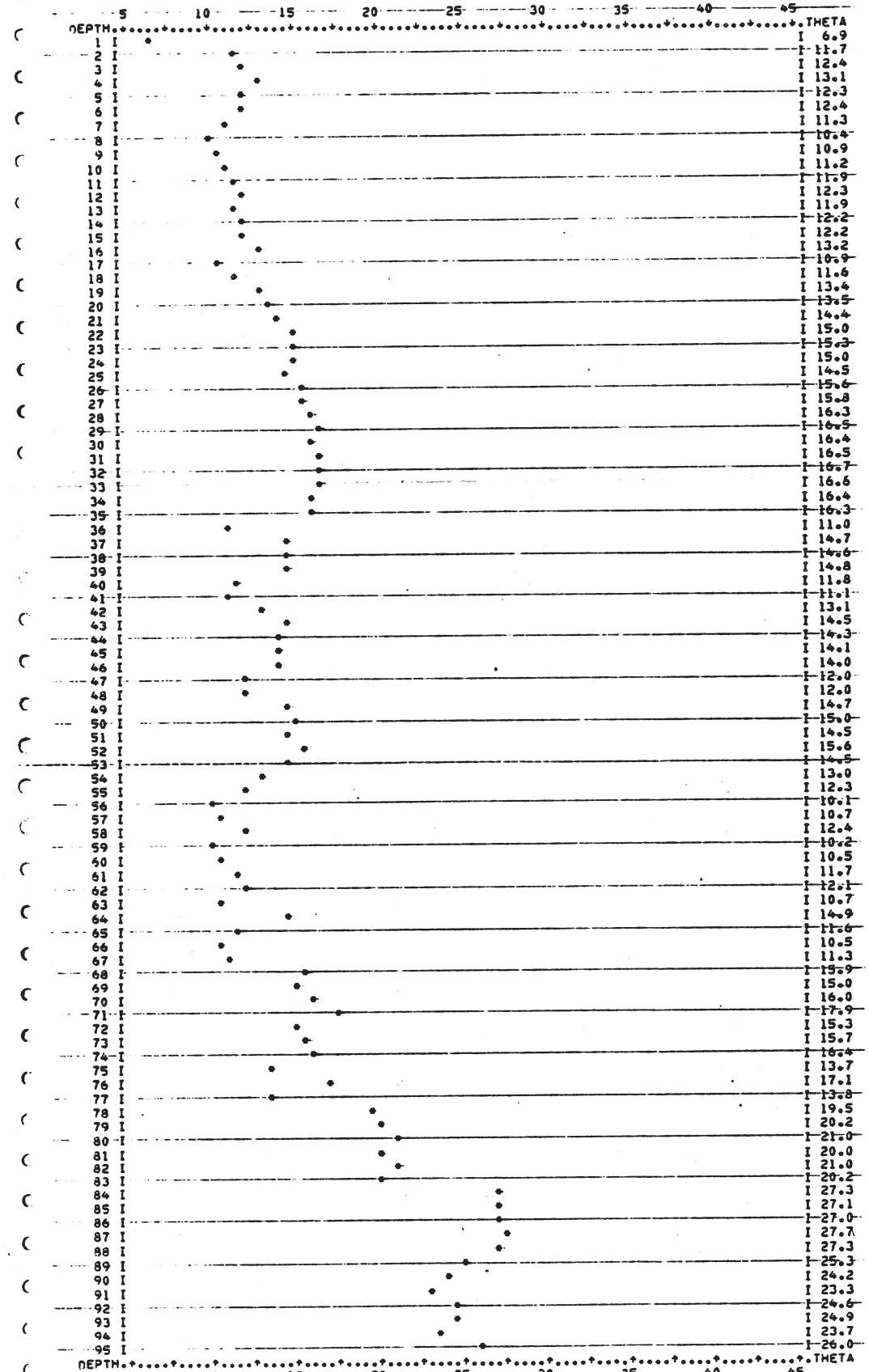
PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.

DEPTH	THETA
1	13.4
2	15.0
3	14.6
4	14.8
5	10.8
6	15.5
7	15.5
8	15.2
9	15.4
10	15.2
11	17.0
12	16.3
13	15.8
14	15.9
15	15.5
16	16.0
17	16.8
18	16.6
19	16.2
20	16.4
21	17.0
22	16.8
23	16.4
24	17.0
25	14.2
26	17.0
27	17.5
28	17.4
29	16.9
30	16.6
31	16.3
32	16.6
33	16.1
34	16.6
35	16.6
36	16.8
37	16.2
38	16.4
39	16.2
40	16.7
41	16.1
42	16.8
43	16.2
44	14.0
45	15.5
46	15.6
47	15.1
48	16.0
49	16.3
50	15.6
51	16.2
52	16.4
53	15.9
54	15.7
55	16.0
56	15.4
57	15.8
58	15.5
59	15.7
60	15.9
61	16.7
62	16.4
63	16.7
64	12.8
65	15.8
66	16.1
67	15.7
68	15.6
69	15.9
70	15.5
71	16.4
72	16.2
73	16.0
74	16.1
75	16.1
76	15.6
77	15.7
78	16.2
79	15.5
80	15.8
81	15.2
82	16.0
83	15.4
84	15.3
85	16.3
86	16.0
87	16.4
88	16.5
89	16.4
90	16.4
91	16.7
92	15.5
93	16.0
94	18.1
95	15.3
96	14.7
97	15.9
98	16.1
99	14.9
100	21.5
101	16.4
102	15.3
103	11.6
104	15.6
105	13.9
106	15.0
107	19.7
108	15.3
109	16.6
110	16.7
111	16.3
112	18.6
113	15.5
114	14.9
115	15.3
116	14.8
117	14.7
118	15.9
119	16.6
120	19.6
121	20.7
122	19.9

DEPTH 5 10 15 20 25 30 35 40 45 THETA

HYDROTECHNICS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT= SOHIO HOLE ID= NP04 LOCATION= BM= 6204.5
DATE= 1 MAY 76 TIME= 1445 PROBE NO= WL=
REMARKS=

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



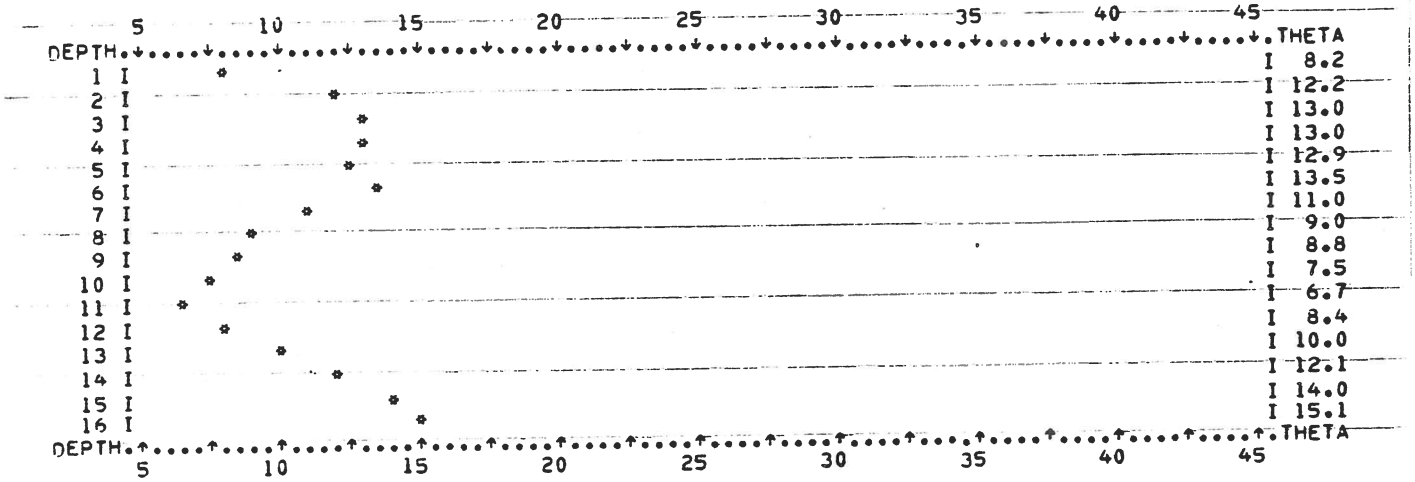
HYDROTECHNICS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT= SOHIO HOLE ID= NP05 LOCATION= BM= 6167.8
DATE= 1MAY76 TIME= 1545 PROBE NO= WL=
REMARKS=

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.

```
      5        10        15        20        25        30        35        40        45
DEPTH.+....+....+....+....+....+....+....+....+....+....+....+....+....+....+....+.THETA
    1 I         *                                                                  I  9.8
    2 I          *                                                                 I 10.4
    3 I         *                                                                  I  9.8
    4 I           *                                                                I 10.5
    5 I           *                                                                I 10.9
    6 I            *                                                               I 11.0
    7 I            *                                                               I 11.1
    8 I          *                                                                 I  9.0
    9 I      *                                                                     I  7.9
   10 I         *                                                                  I  9.2
   11 I          *                                                                 I  9.6
   12 I              *                                                             I 12.0
   13 I             *                                                              I 11.9
   14 I                *                                                           I 13.3
   15 I                  *                                                         I 14.1
   16 I             *                                                              I 11.7
   17 I             *                                                              I 11.5
   18 I                *                                                           I 13.4
   19 I             *                                                              I 11.7
   20 I                  *                                                         I 14.1
   21 I                   *                                                        I 14.5
   22 I                     *                                                      I 16.5
   23 I                    *                                                       I 15.6
   24 I                     *                                                      I 16.3
   25 I                    *                                                       I 15.6
   26 I                     *                                                      I 16.3
   27 I                     *                                                      I 16.2
   28 I                     *                                                      I 16.3
   29 I                     *                                                      I 16.3
   30 I                     *                                                      I 16.1
   31 I                     *                                                      I 16.3
   32 I                        *                                                   I 18.4
   33 I                           *                                                I 20.2
DEPTH.+....+....+....+....+....+....+....+....+....+....+....+....+....+....+....+.THETA
      5        10        15        20        25        30        35        40        45
```

HYDROTECHNICS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT= SOHIO HOLE ID= NP06 LOCATION= BM= 6152.7
DATE= 1 MAY 76 TIME= PROBE NO= WL=
REMARKS=

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



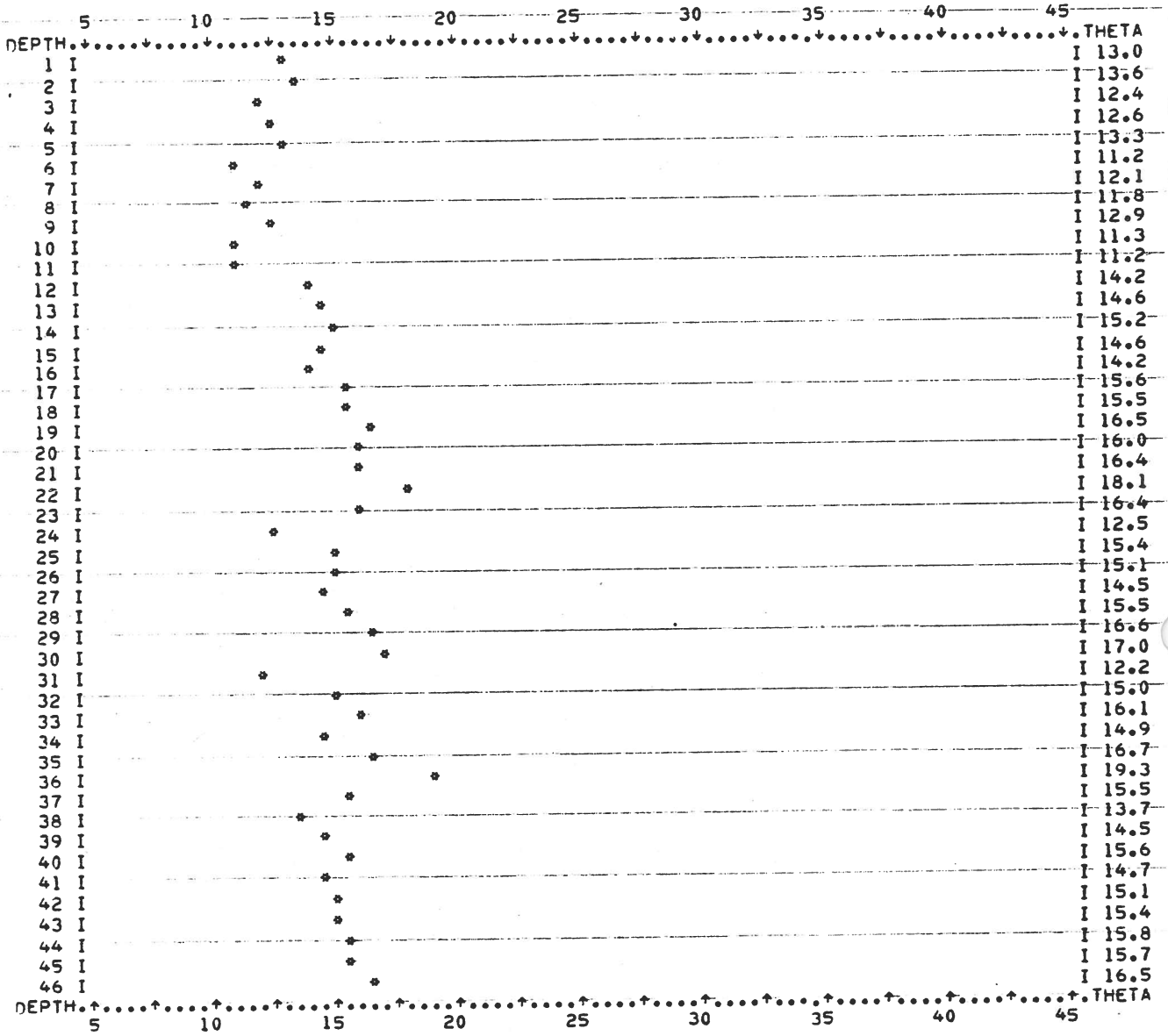
HYDROTECHNICS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT= SOHIO HOLE ID= NP07 LOCATION= BM= 6173.4
DATE= 1MAY 76 TIME= PROBE NO= WL=
REMARKS=

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.

DEPTH	5 10 15 20 25 30 35 40 45	THETA
1	I *	I 12.6
2	I *	I 12.7
3	I *	I 12.6
4	I *	I 12.7
5	I *	I 12.2
6	I *	I 14.1
7	I *	I 15.6
8	I *	I 17.3
9	I *	I 15.6
10	I *	I 15.9
11	I *	I 15.5
12	I *	I 15.1
13	I *	I 14.7
14	I *	I 15.8
15	I *	I 15.3
16	I *	I 16.0
17	I *	I 15.8
18	I *	I 15.0
19	I *	I 16.6
20	I *	I 17.7
21	I *	I 14.6
22	I *	I 16.2
23	I *	I 15.6
24	I *	I 15.4
DEPTH	5 10 15 20 25 30 35 40 45	THETA

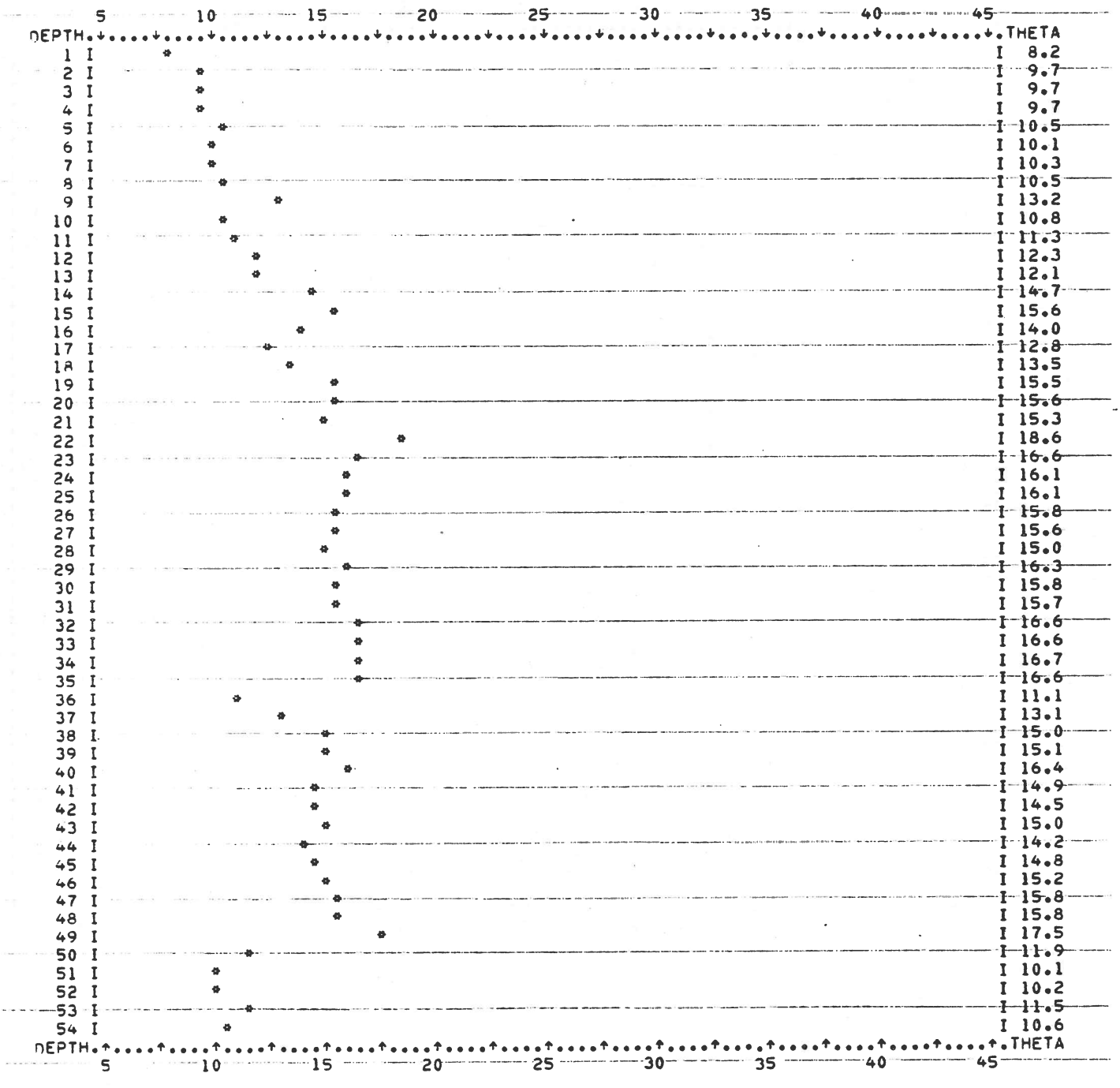
HYDROTECHNICS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT= SOHIO HOLE ID= NP08 LOCATION= BM= 6225.4
DATE= 1MAY 76 TIME= PROBE NO= WL=
REMARKS=

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



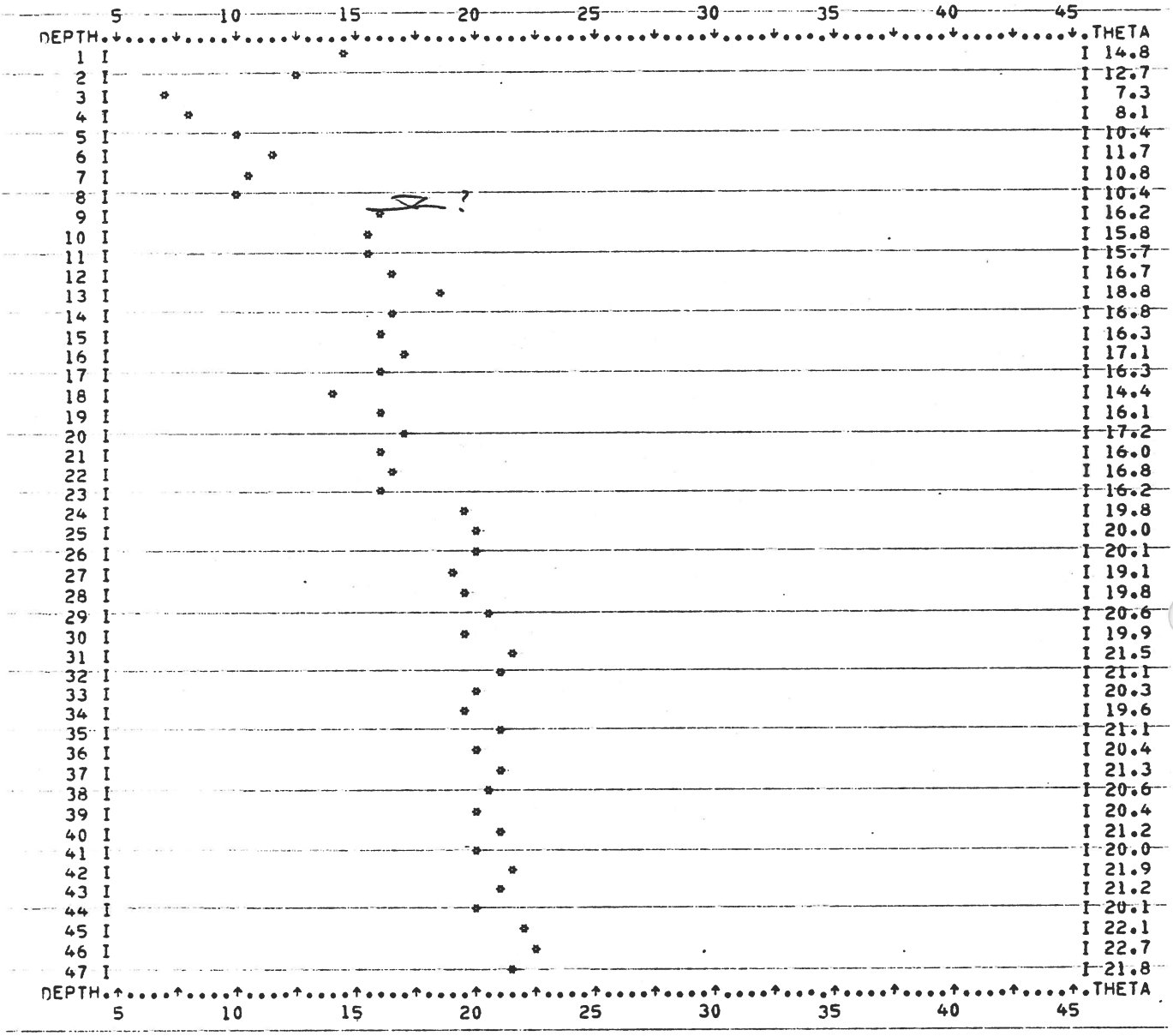
HYDROTECHNICS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT= SOHIO HOLE ID= NP09 LOCATION= BM= 6226.6
DATE= 1 MAY 76 TIME= PROBE NO= WL=
REMARKS=

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



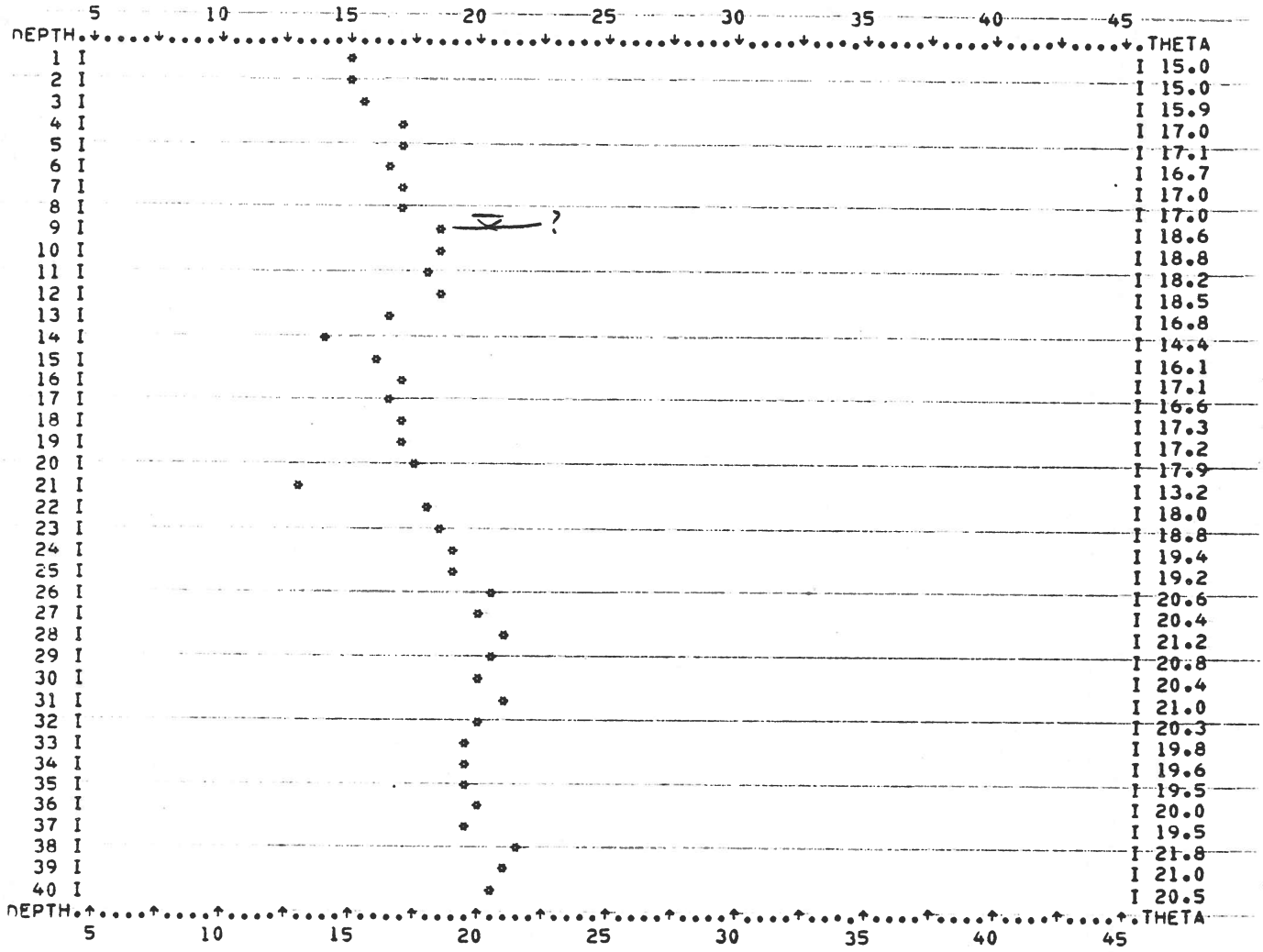
HYDROTECHNICS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT= SOHIO HOLE ID= NP10 LOCATION= BM= 6159.1
DATE= 1 MAY 76 TIME= PROBE NO= WL=
REMARKS=

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



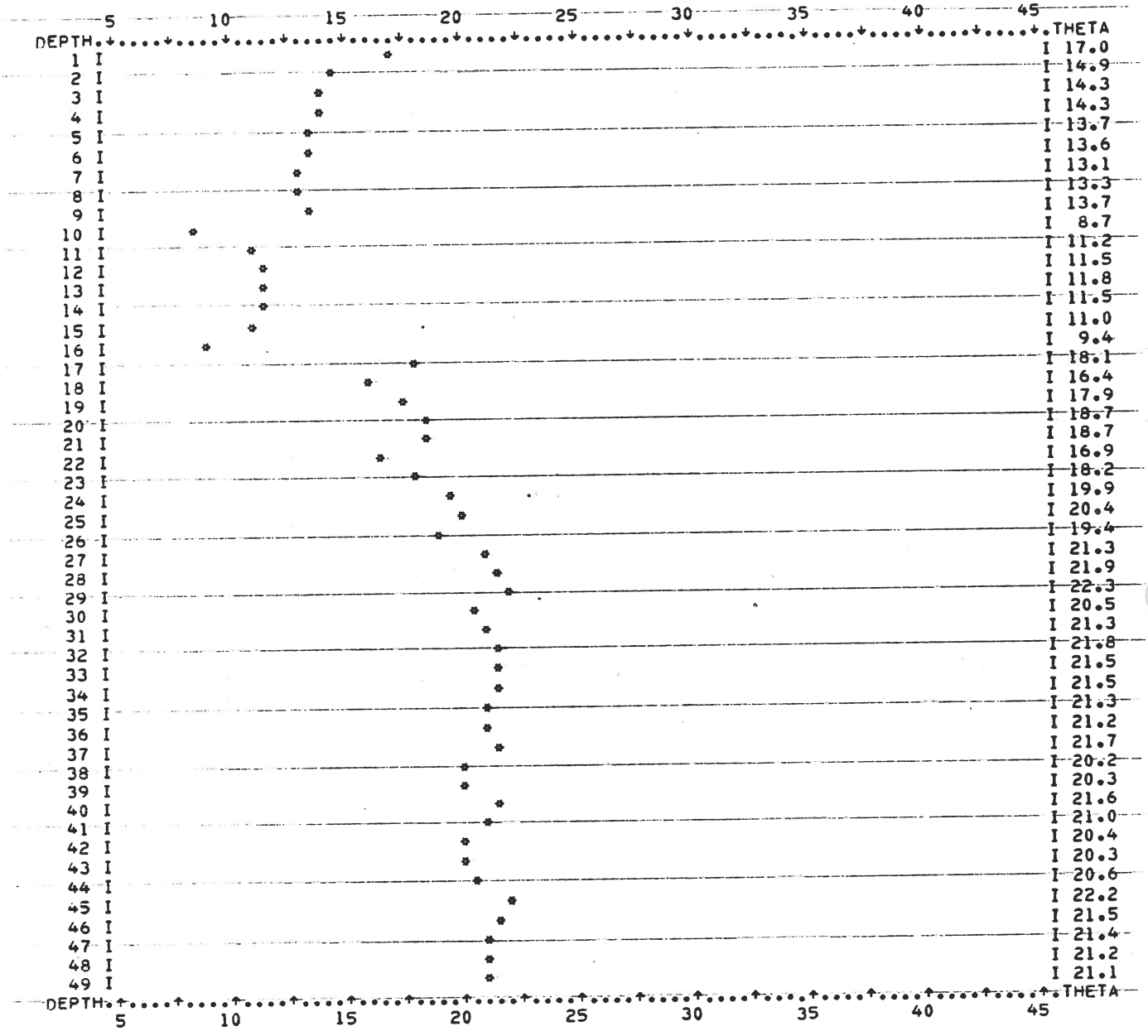
HYDROTECHNICS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT= SOHIO HOLE ID= NP11 LOCATION= BM= 6161.3
DATE= 1 MAY 76 TIME= PROBE NO= WL=
REMARKS=

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



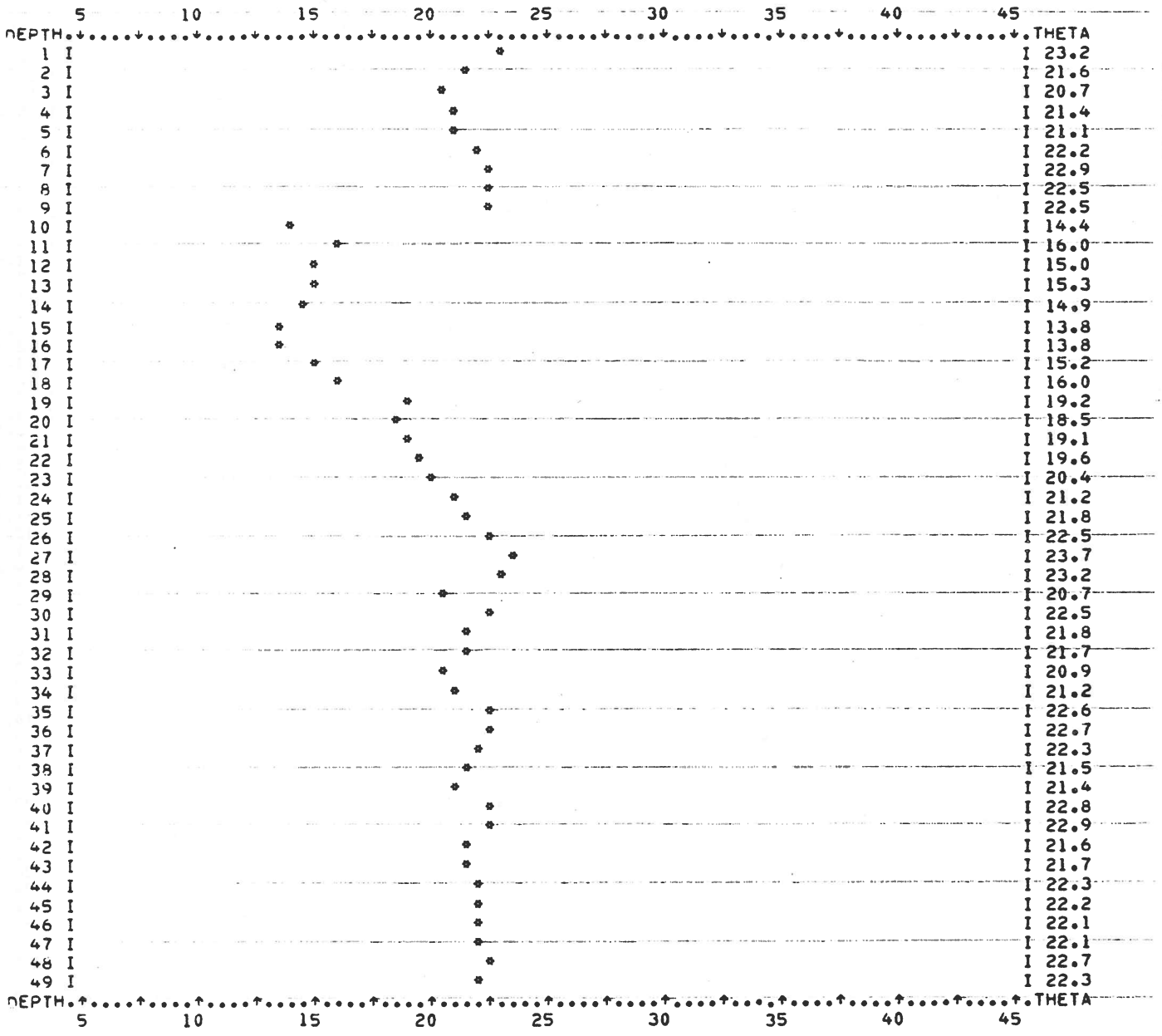
HYDROTECHNICS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT= SOHIO HOLE ID= NP12 LOCATION= BM= 6161.3
DATE= 1 MAY 76 TIME= PROBE NO= WL=
REMARKS=

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



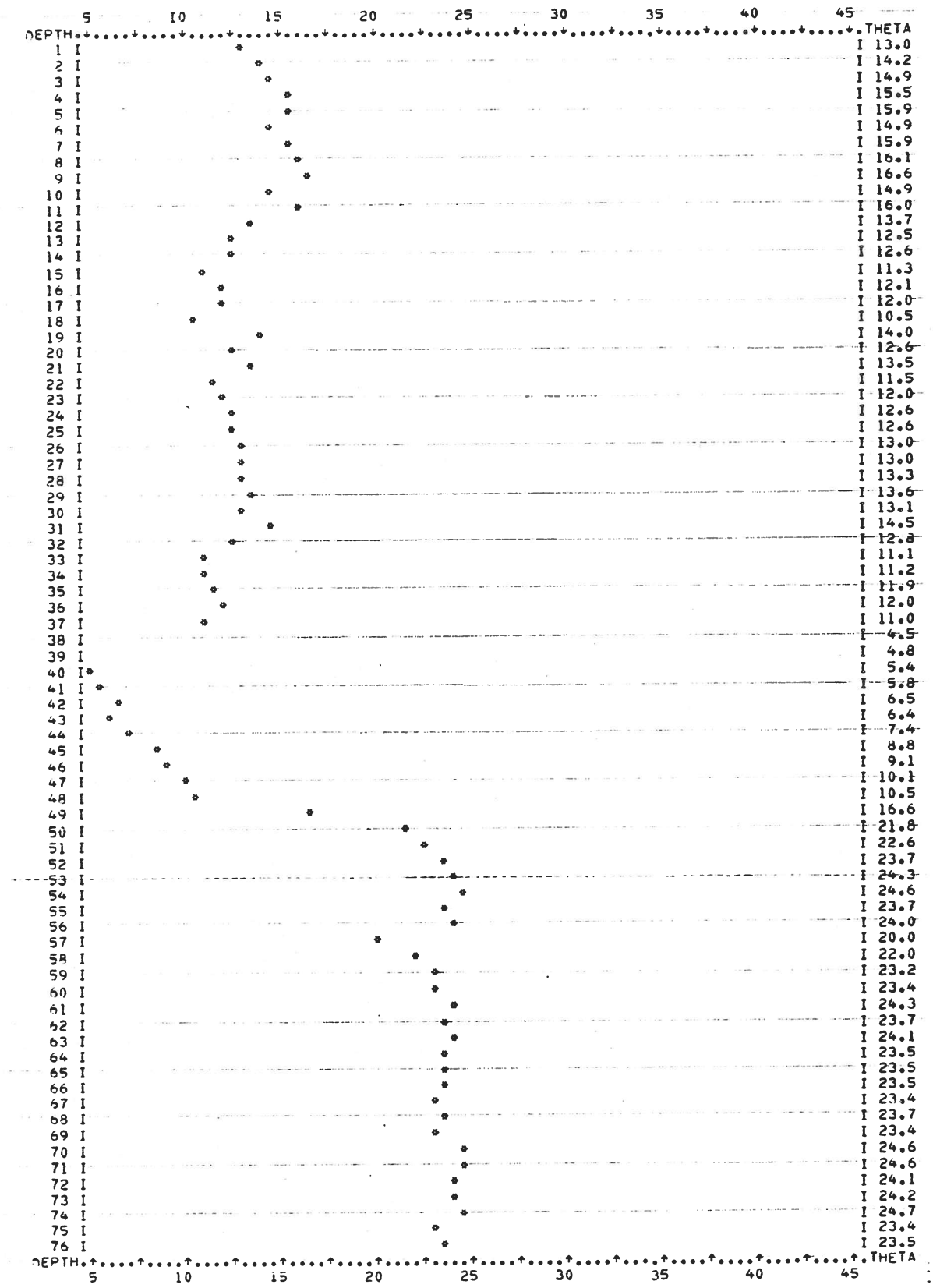
HYDROTECHNICS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT= SOHIO HOLE ID= NP13 LOCATION= BM= 6163.8
DATE= 1 MAY 76 TIME= PROBE NO= WL=
REMARKS=

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



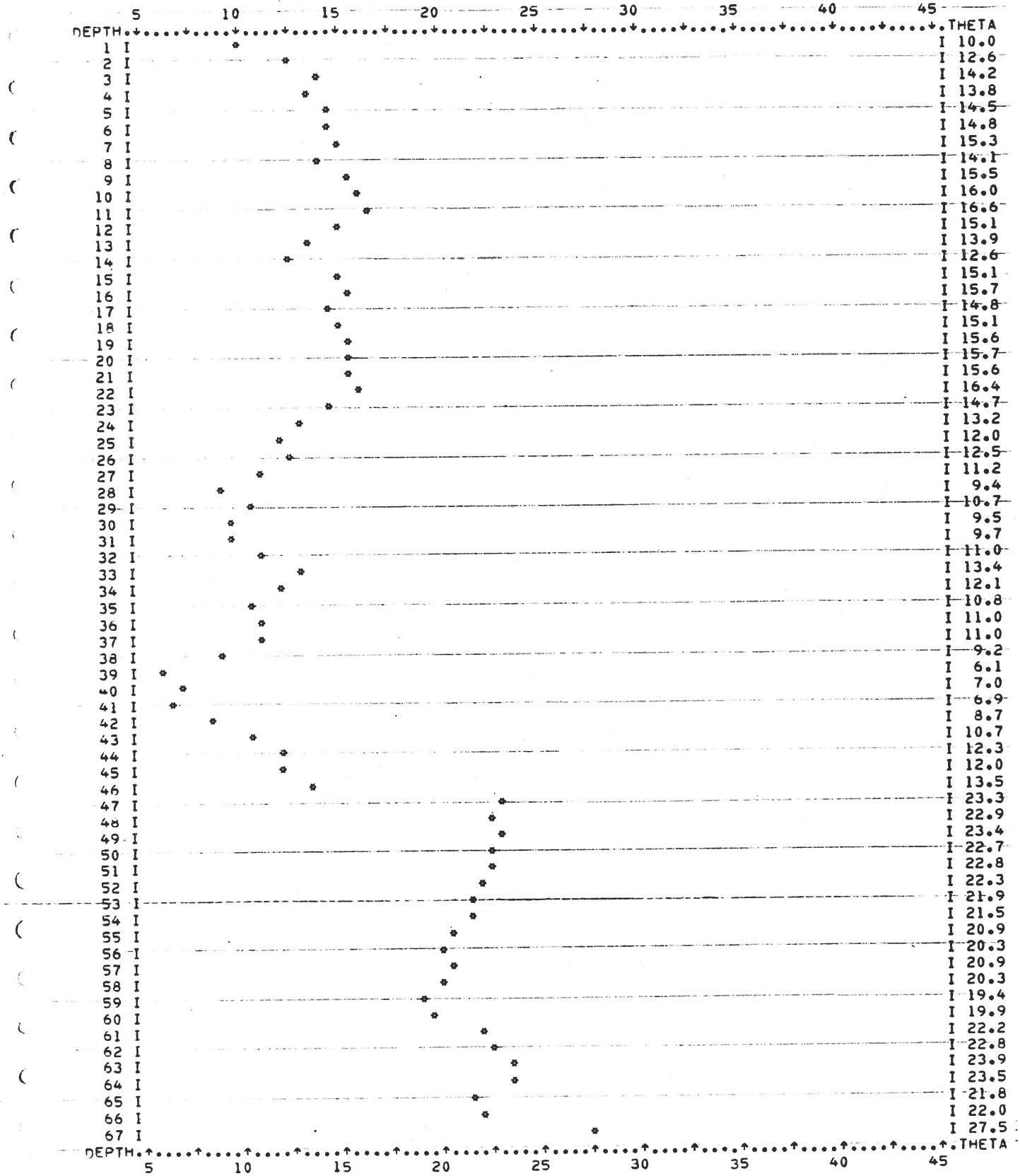
HYDROTECHNICS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT= SOHIO HOLE ID= NP14 LOCATION= BM= 6185.4
DATE= 1 MAY 76 TIME= PROBE NO= WL=
REMARKS=

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



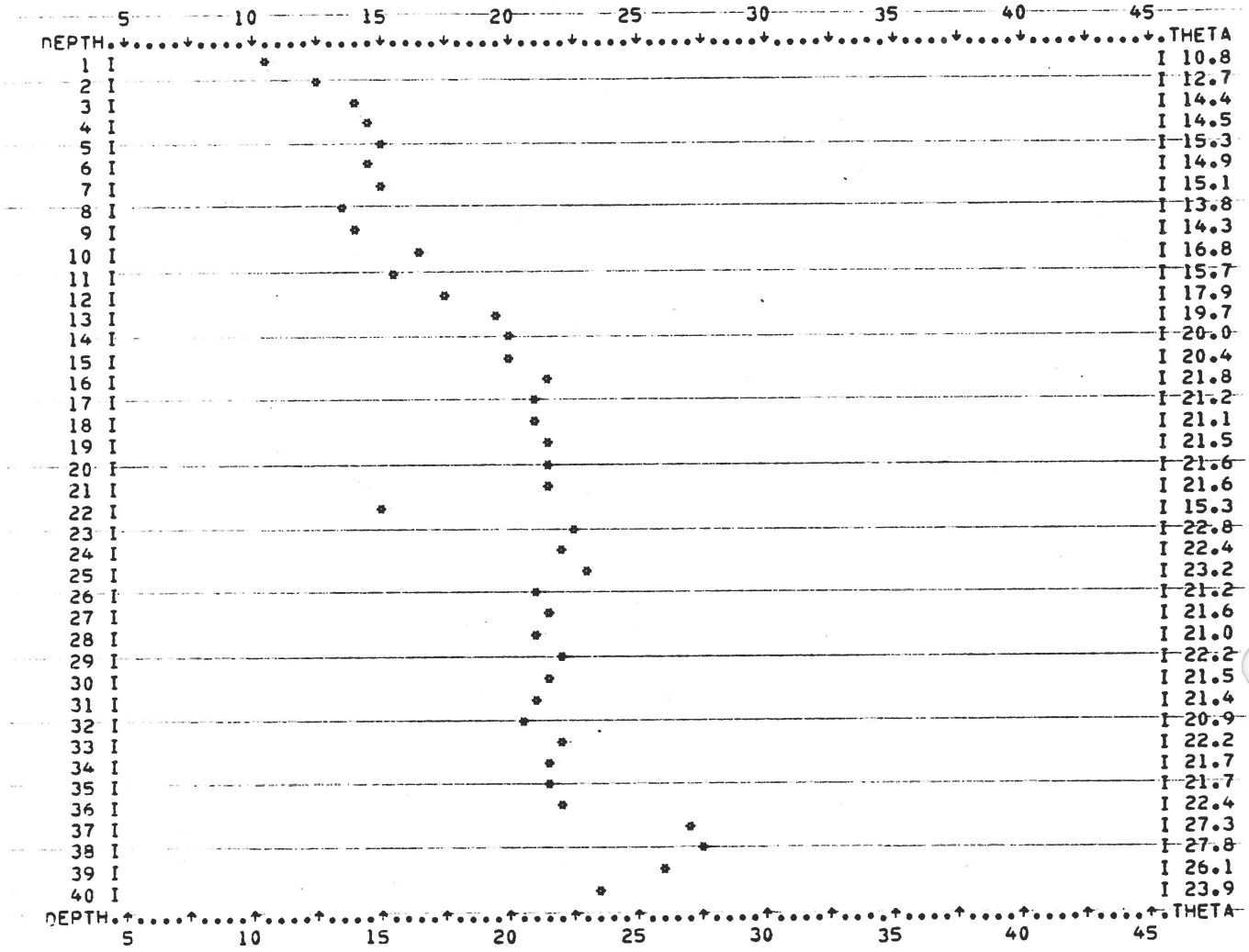
HYDROTECHNICS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT= SOHIO HOLE ID= NP15 LOCATION= BM= 6185.5
DATE= 1 MAY 76 TIME= PROBE NO= WL=
REMARKS=

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



HYDROTECHNICS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT= SOHIO HOLE ID= NP16 LOCATION= BM= 6147.7
DATE= 1 MAY 76 TIME= PROBE NO= WL=
REMARKS=

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



17

HYDROTECHNICS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT= SOHIO HOLE ID= NP01 LOCATION= BM= 6190.0
DATE= 17 JULY 1976 TIME= PROBE NO= WL=
REMARKS= APPROXIMATELY 0.5 FEET OF WATER IN HOLE WHEN LOGGED

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.

DEPTH	THETA
1	9.5
2	12.2
3	14.7
4	14.5
5	14.0
6	14.6
7	15.0
8	16.6
9	16.1
10	16.7
11	13.9
12	15.6
13	14.0
14	12.8
15	13.9
16	14.1
17	14.8
18	14.5
19	14.8
20	17.4
21	16.1
22	14.9
23	14.4
24	15.6
25	14.6
26	13.8
27	13.9
28	14.1
29	18.3
30	14.1
31	14.4
32	14.3
33	13.8
34	12.8
35	18.1
36	14.9
37	13.6
38	14.8
39	14.5
40	14.7
41	14.5
42	14.7
43	15.0
44	15.7
45	14.7
46	15.6
47	15.8
48	20.4
49	16.3
50	17.8
51	16.8
52	20.1
53	21.1

DEPTH 5 10 15 20 25 30 35 40 45 THETA

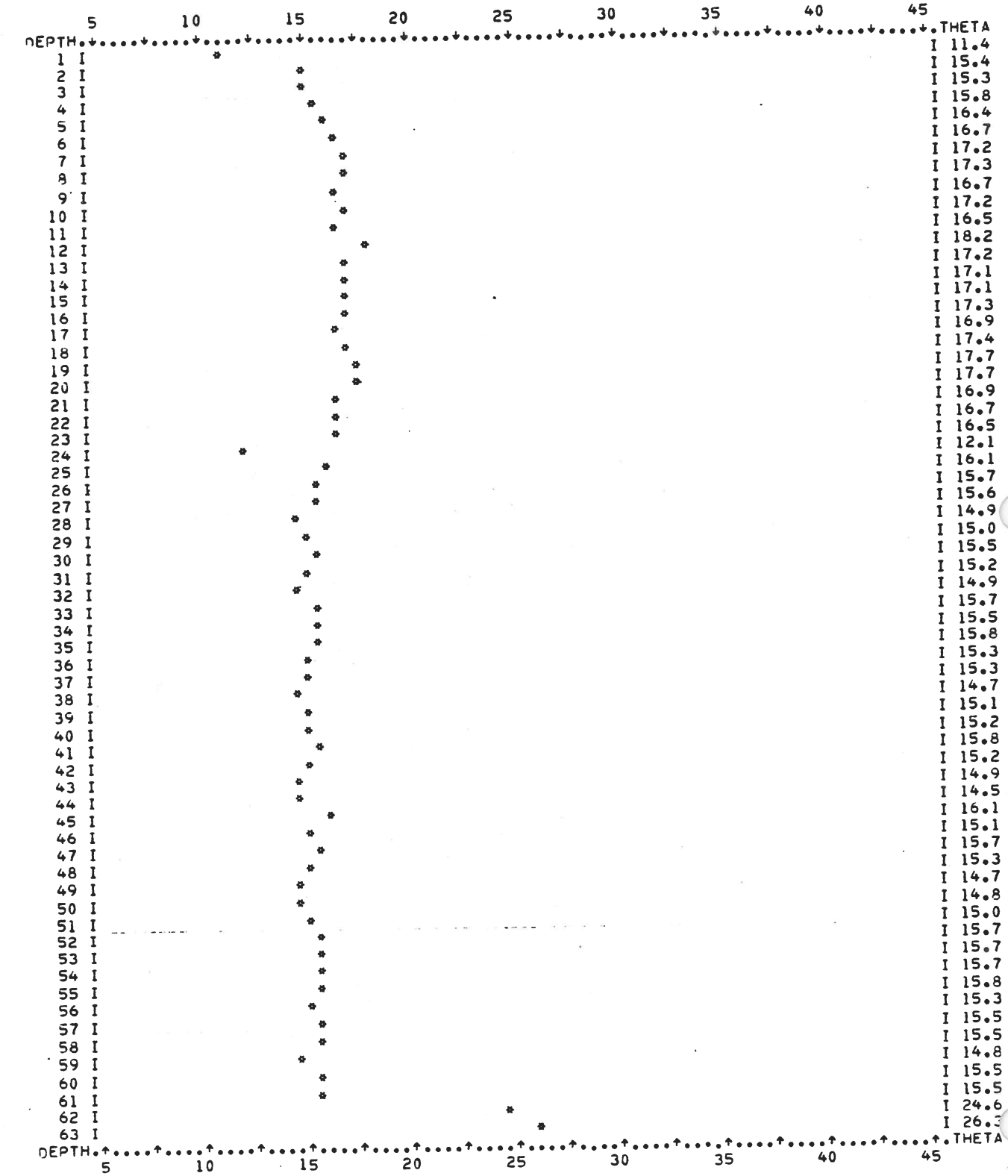
HYDROTECHNICS NEUTRON PROBE SOIL MOISTURE PROFILE

PROJECT= SOHIO HOLE ID= NP02 LOCATION= BM= 6218.3

DATE= 17 JULY 17 TIME= 1130 PROBE NO= WL=

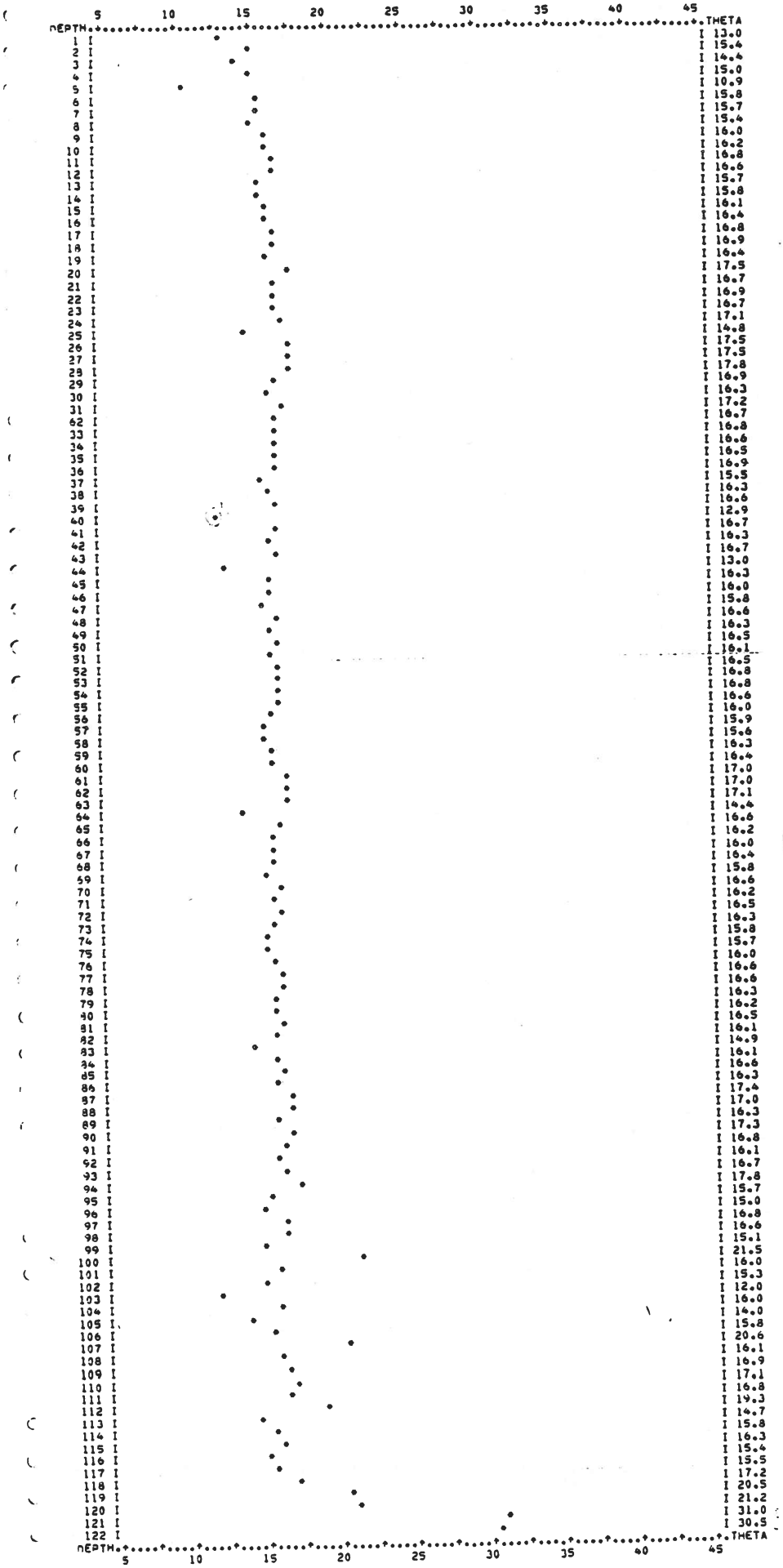
REMARKS= APPROXIMATELY 0.5 FEET OF WATER IN HOLE WHEN LOGGED

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



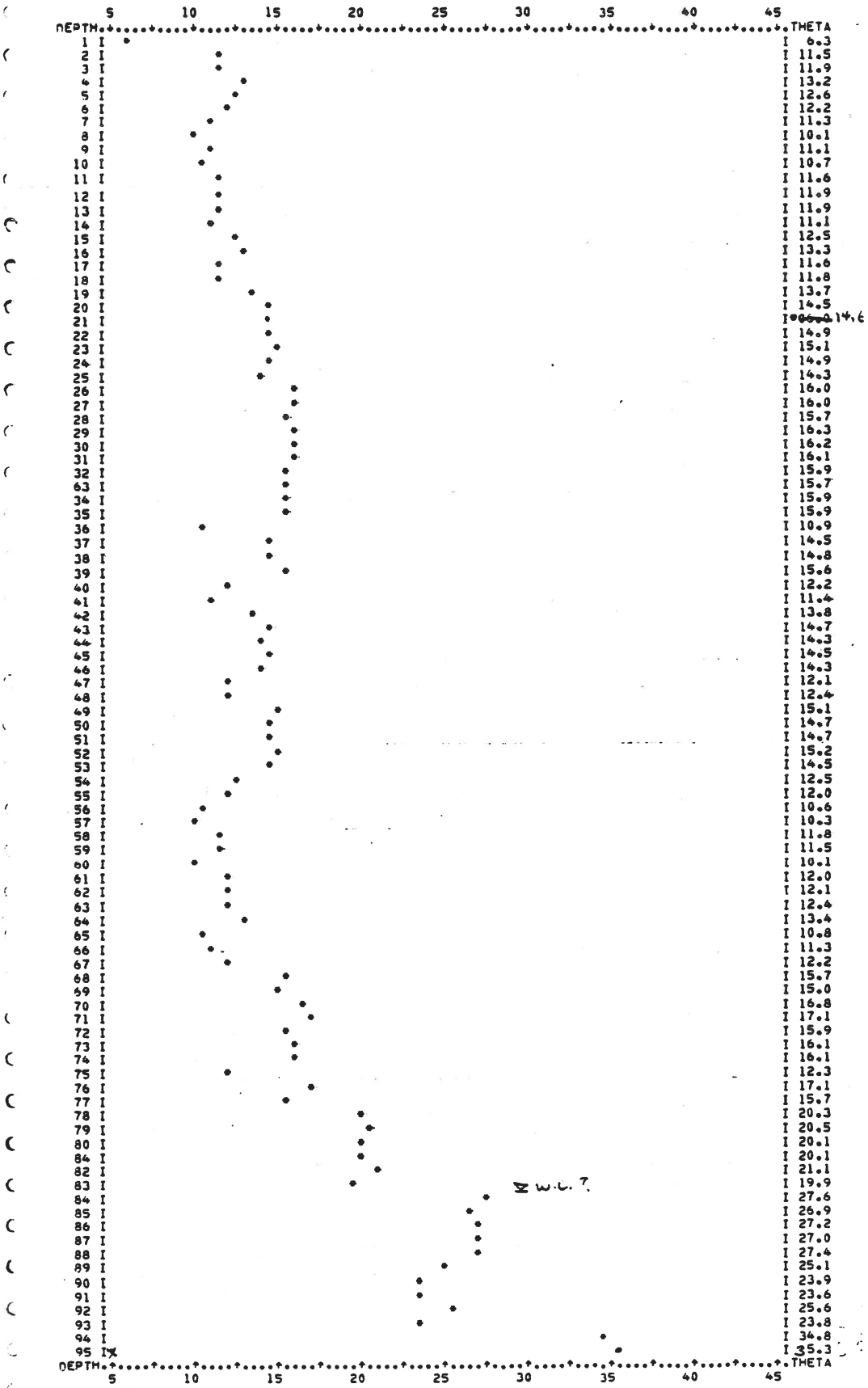
HYDROTECHNICS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT= SOMIO HOLE ID= NP03 LOCATION= AM= 6229.4
DATE= 7JULY 76 TIME= 1200 PROBE NO= WL=
REMARKS= APPROXIMATELY 2.2 FEET OF WATER IN HOLE WHEN LOGGED

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



HYDROTECHNICS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT= OHIO HOLE ID= NP04 LOCATION= RM= 6904.
DATE= 5 JULY 76 TIME= 1730 PROBE NO= WL=
REMARKS= APPROXIMATELY 1.2 FEET OF WATER IN HOLE WHEN LOGGED

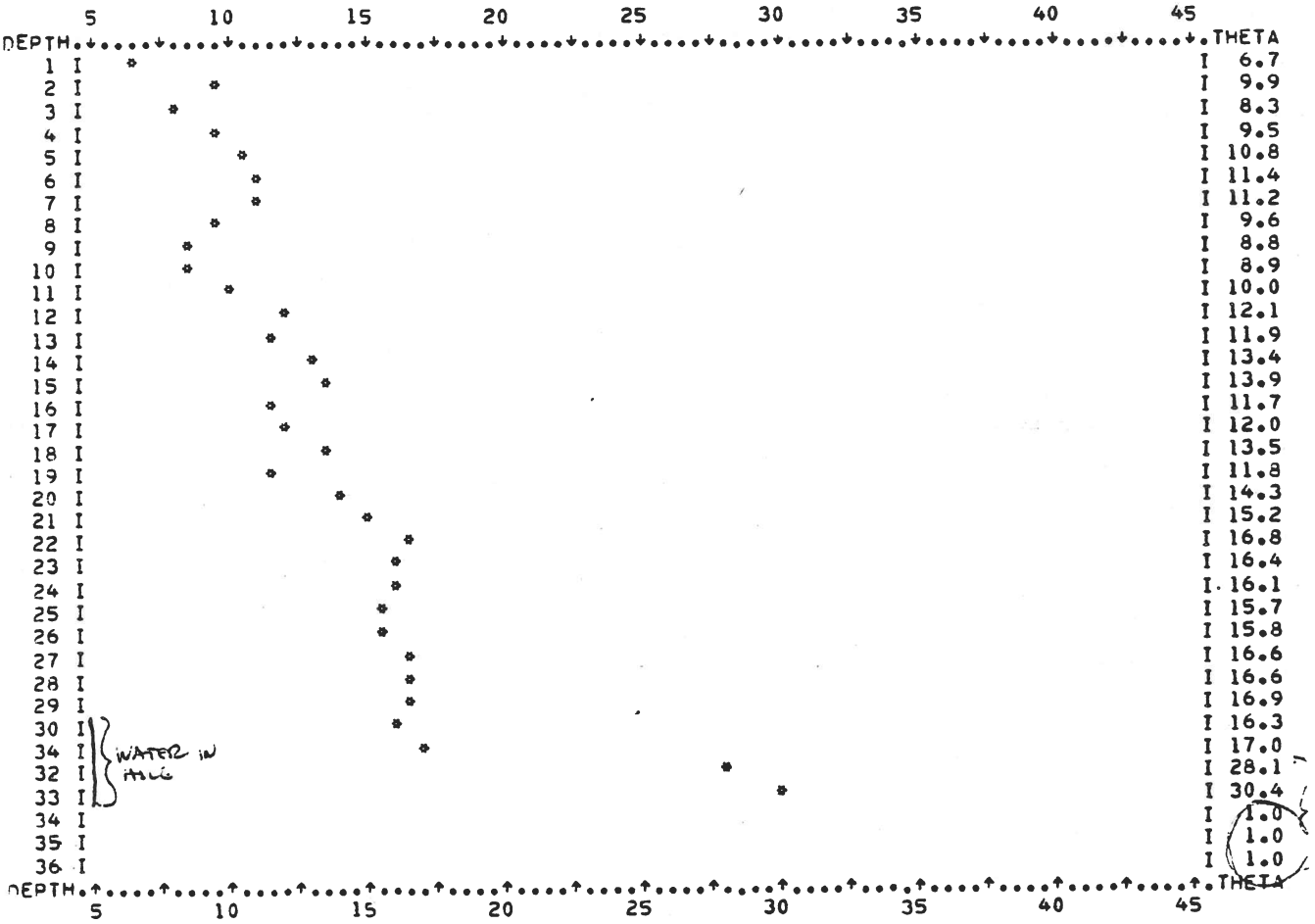
PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



17

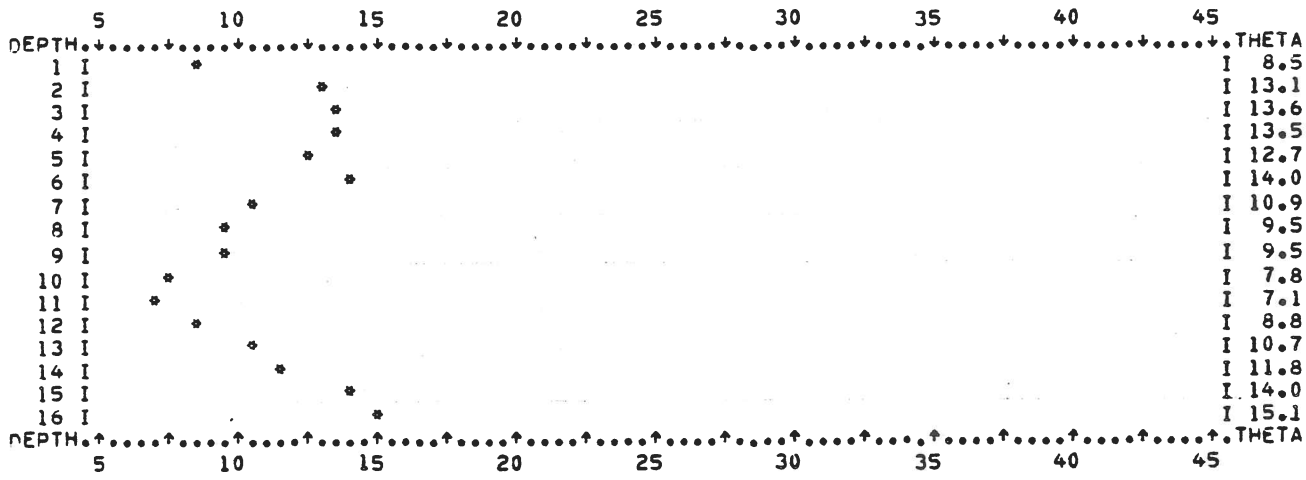
HYDROTECHNICS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT= SOHIO HOLE ID= NP05 LOCATION= BM= 6167.8
DATE= 1 JULY 76 TIME= 1400 PROBE NO= WL=
REMARKS= APPROX 4.7 FEET OF WATER IN HOLE WHEN LOGGED

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



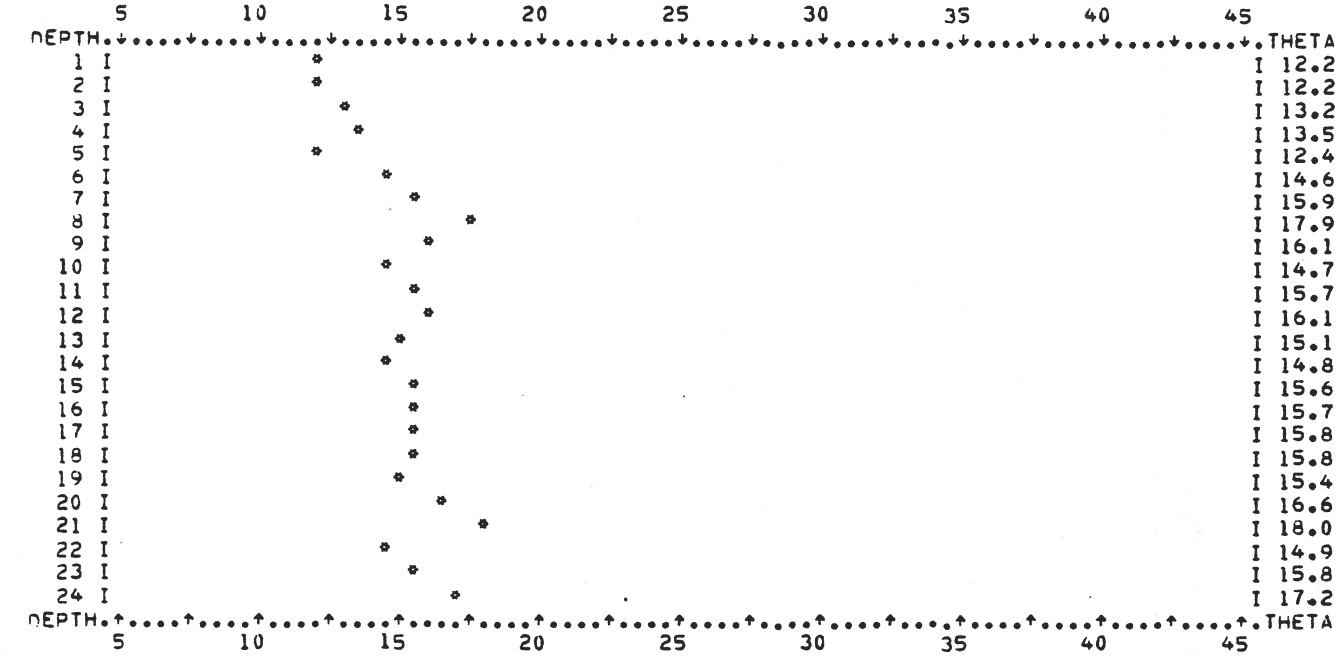
HYDROTECHNICS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT= SOHIO HOLE ID= NP06 LOCATION= BM= 6152.7
DATE= 1 JULY 76 TIME= 1530 PROBE NO= WL=
REMARKS= APPROXIMATELY 1.2 FEET OF WATER IN HOLE WHEN LOGGED

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



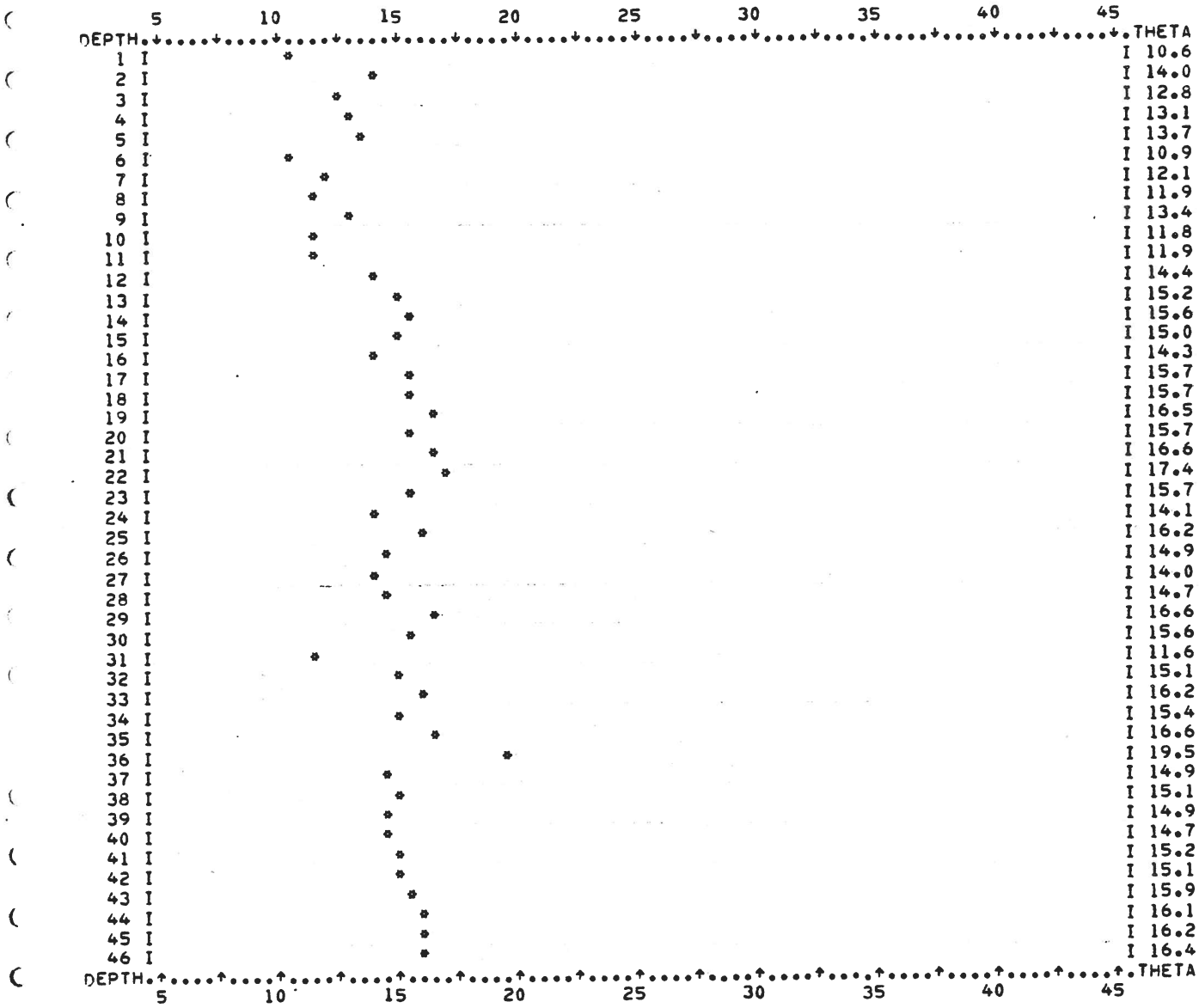
HYDROTECHNICS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT= SOHIO HOLE ID= NP07 LOCATION= BM= 6173.4
DATE= 17 JULY 76 TIME= 1600 PROBE NO= WL=
REMARKS= APPROXIMATELY ~~41.2 FT OF WATER IN HOLE. BLOWN BEFORE LOGGED~~ DR Y

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



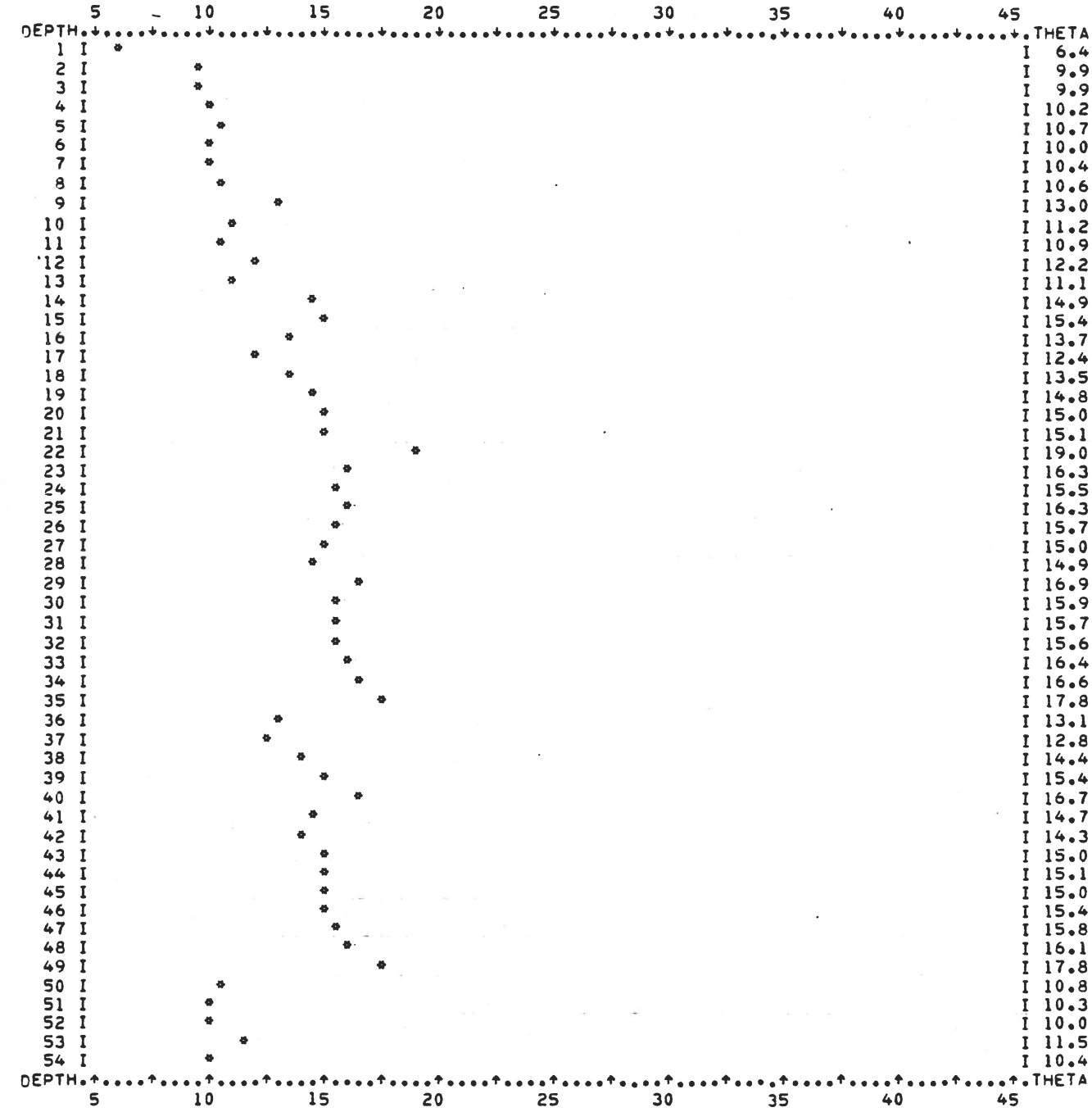
HYDROTECHNICS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT= SOHIO HOLE ID= NP08 LOCATION= BM= 6225.4
DATE= JULY 76 TIME= 1300 PROBE NO= WL=
REMARKS= APPROXIMATELY 0.6 FEET OF WATER IN HOLE WHEN LOGGED

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



HYDROTECHNICS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT= SOHIO HOLE ID= NP09 LOCATION= BM= 6226.6
DATE= 18 JULY76 TIME= 1700 PROBE NO= WL=
REMARKS= HOLE WAS DRY WHEN LOGGED

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



HYDROTECHNICS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT= SOHIO HOLE ID= NP10 LOCATION= BM= 6159.1
DATE= 18JULY76 TIME= 1830 PROBE NO= WL=
REMARKS= APPROX. 20.6 FEET OF WATER IN HOLE. BLOWN BEFORE LOGGING

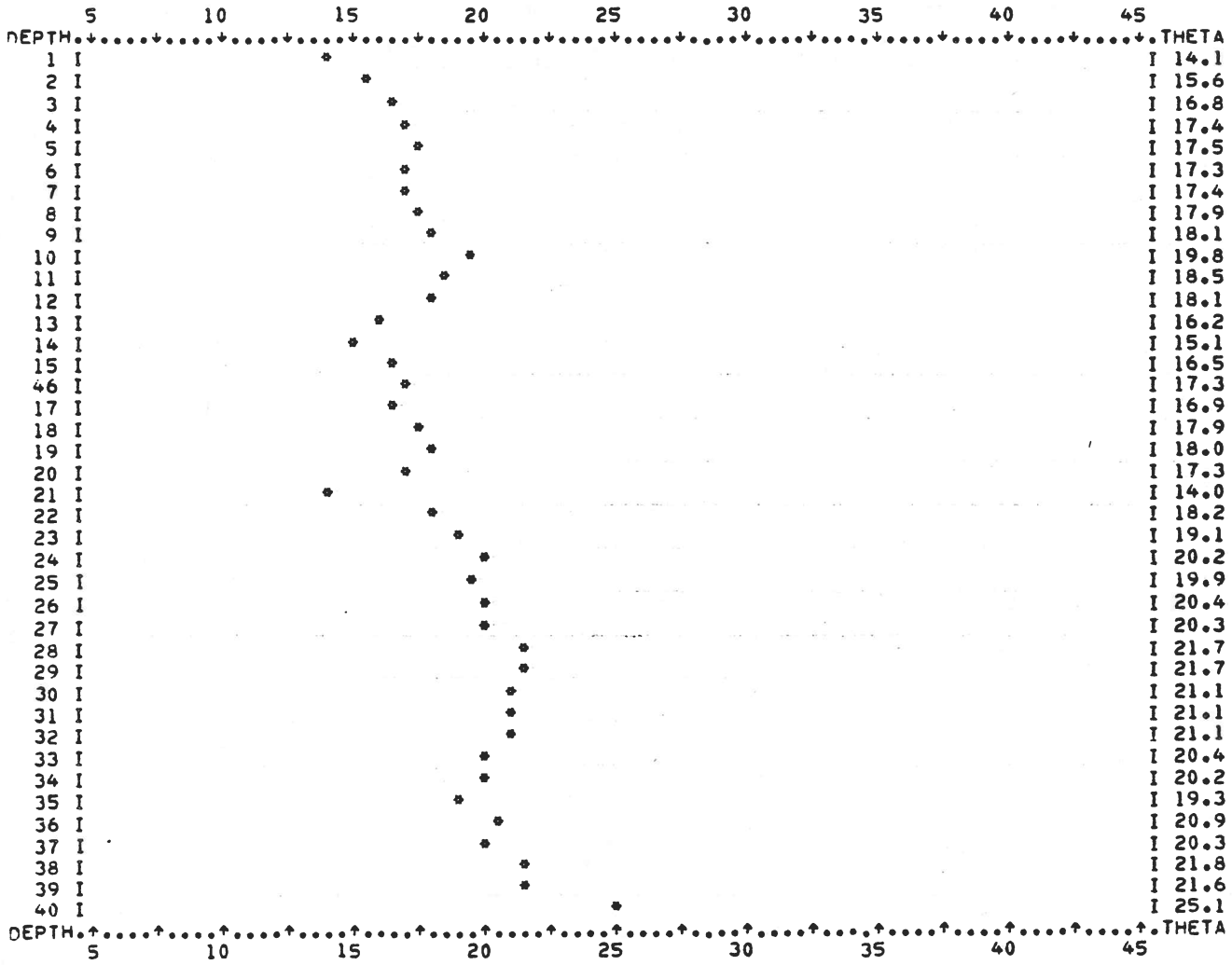
PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.

DEPTH	THETA
1	15.1
2	12.6
3	7.5
4	8.8
5	11.2
6	11.6
7	11.1
8	10.8
9	16.7
10	15.5
11	15.8
12	17.6
13	20.1
14	16.9
15	17.2
16	17.2
17	15.6
18	16.8
19	17.6
20	18.9
21	17.8
22	18.6
23	18.7
24	22.1
25	21.9
26	22.5
27	19.4
28	21.4
29	20.9
30	21.2
31	21.6
32	22.0
33	21.0
34	20.9
35	22.3
36	21.8
37	21.7
38	21.5
39	22.2
40	22.3
41	21.3
42	22.4
43	21.4
44	22.3
45	34.7
46	34.7
47	33.7

5 10 15 20 25 30 35 40 45

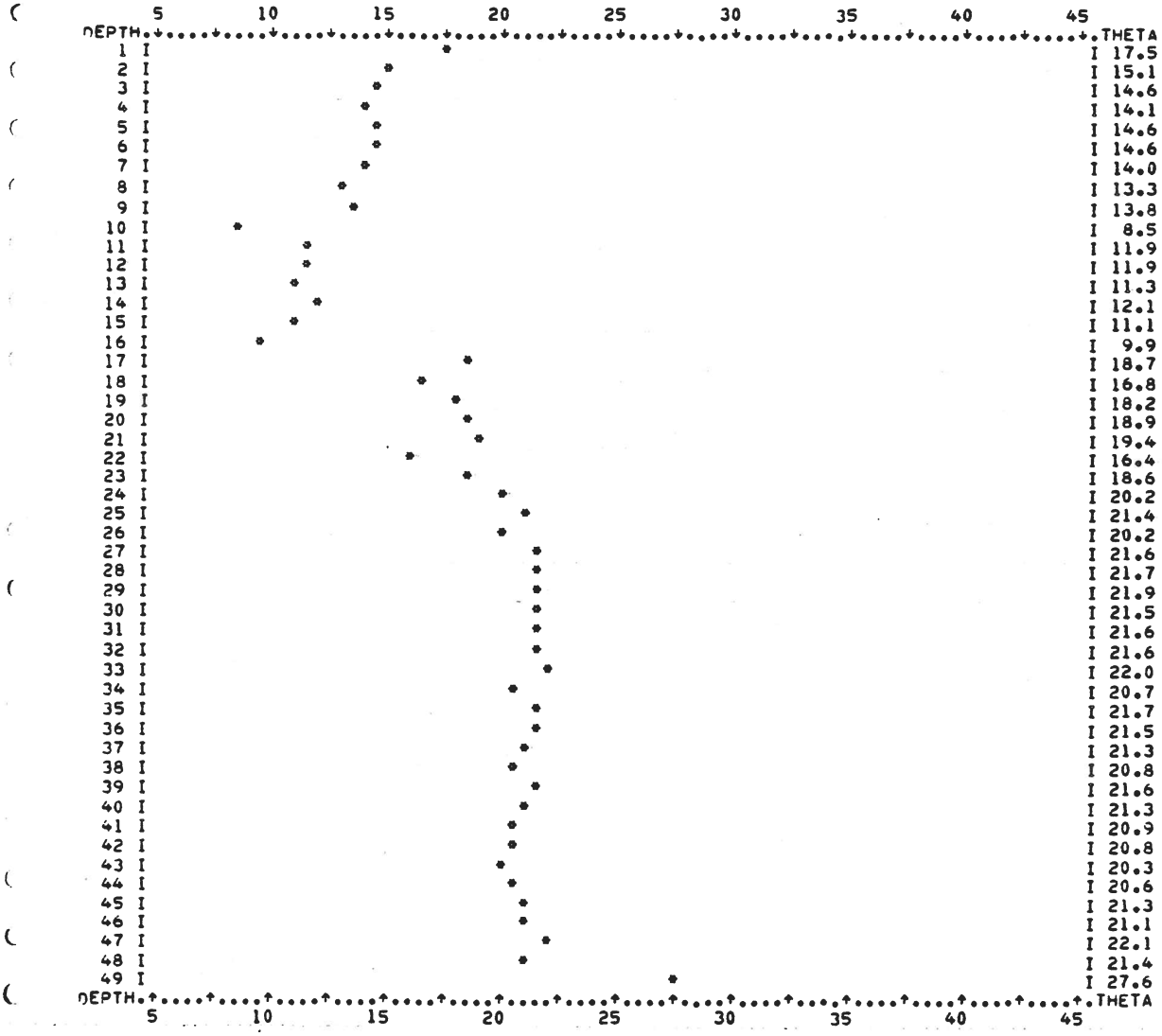
HYDROTECHNICS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT= SOHIO HOLE ID= NP11 LOCATION= BM= 6161.3
DATE= 18JULY76 TIME= 1230 PROBE NO= WL=
REMARKS= APPROX. 0.5 FEET OF WATER IN HOLE WHEN LOGGED

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



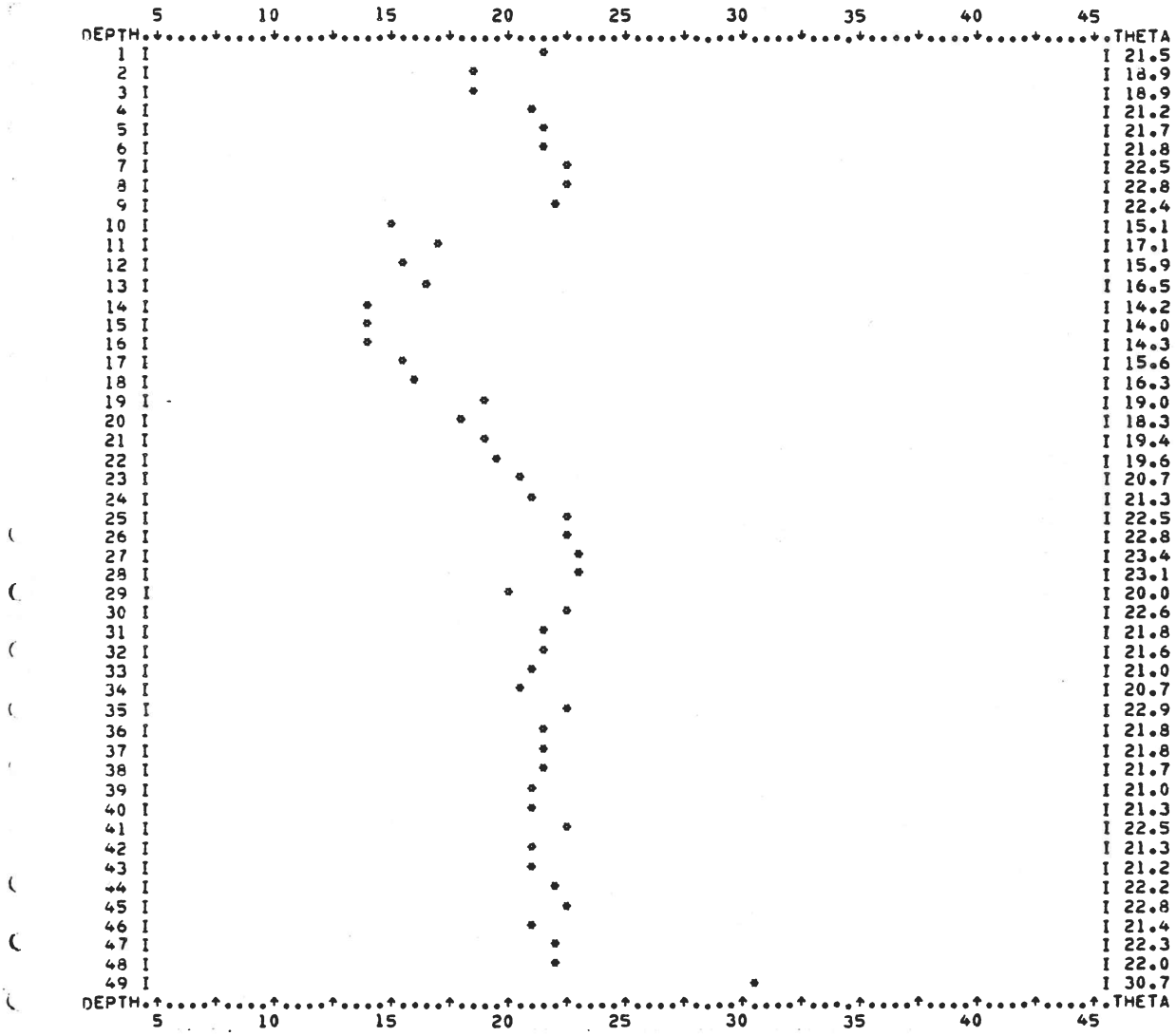
HYDROTECHNICS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT= SOHIO HOLE ID= NP12 LOCATION= BM= 6161.3
DATE= 17JULY76 TIME= 1800 PROBE NO= WL=
REMARKS= APPROX. 0.3 FEET OF WATER IN HOLE WHEN LOGGED

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



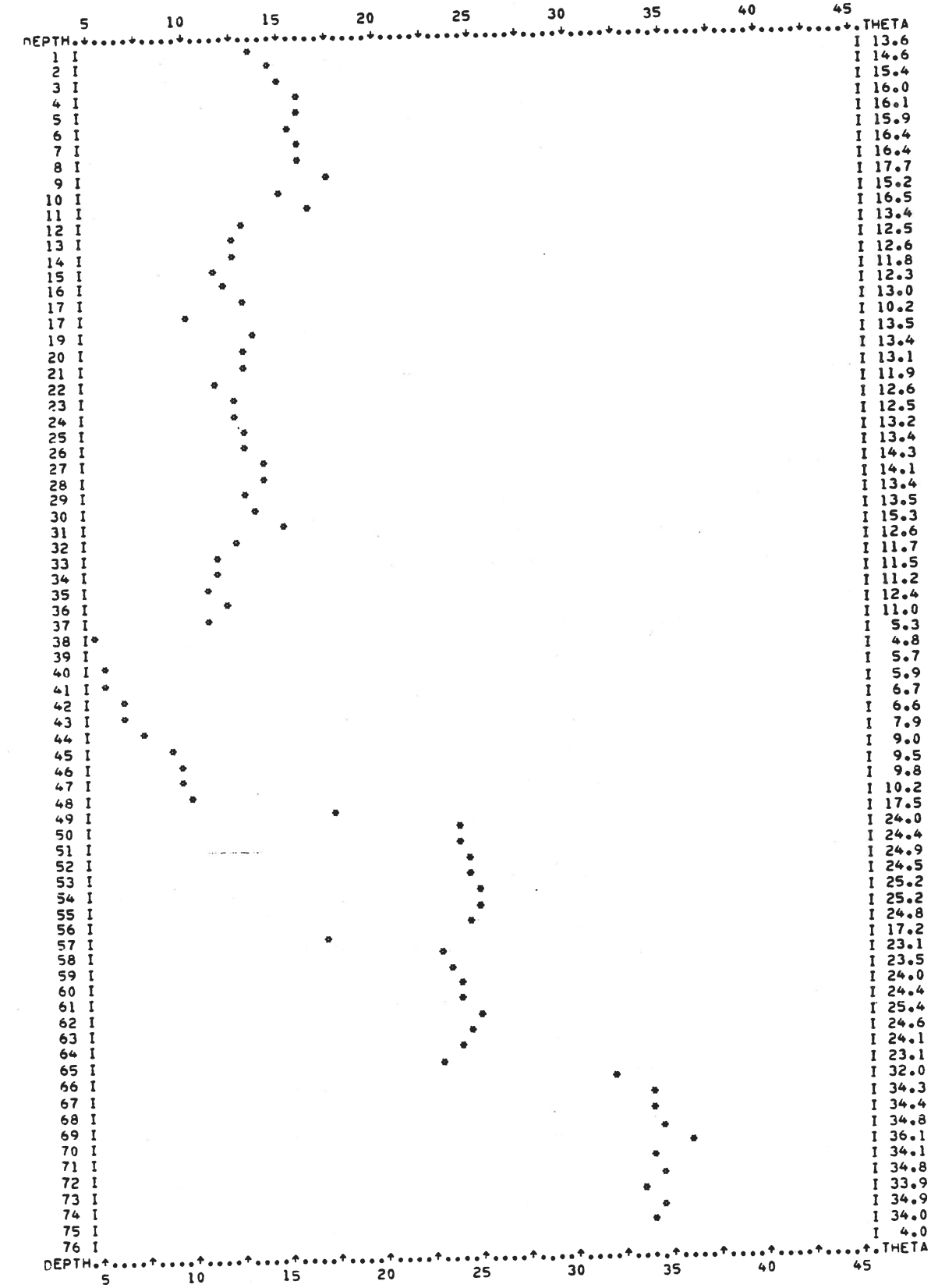
HYDROTECHNICS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT= SOHIO HOLE ID= NP13 LOCATION= BM= 6163.8
DATE= 18JULY76 TIME= PROBE NO= WL=
REMARKS= APPROX. 0.5 FEET OF WATER IN HOLE WHEN LOGGED

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



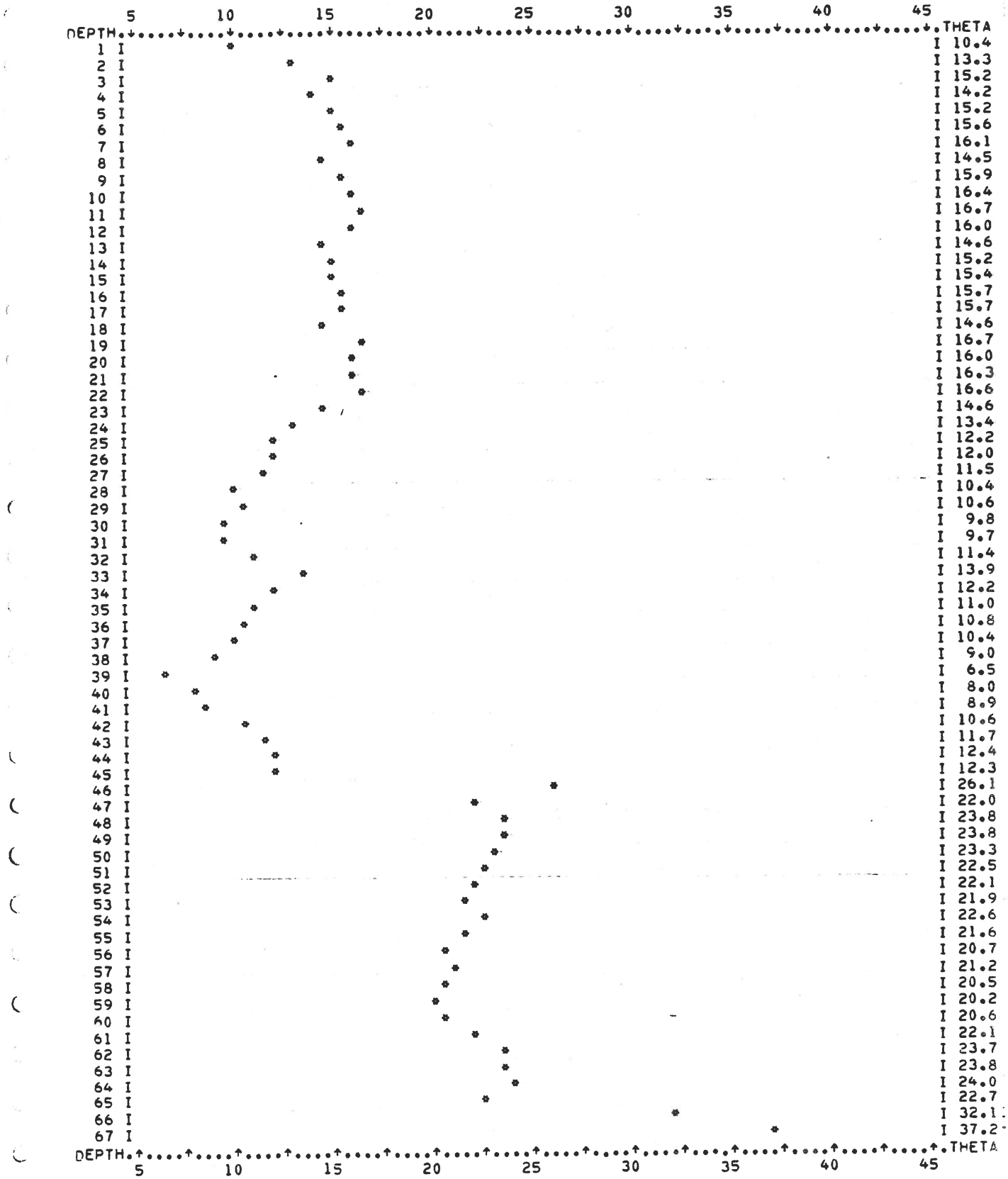
HYDROTECHNICS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT= SOHIO HOLE ID= NP14 LOCATION= BM= 6185.4
DATE= 17JULY76 TIME= PROBE NO= WL=
REMARKS= APPROX. 10.7 FEET OF WATER IN HOLE WHEN LOGGED

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



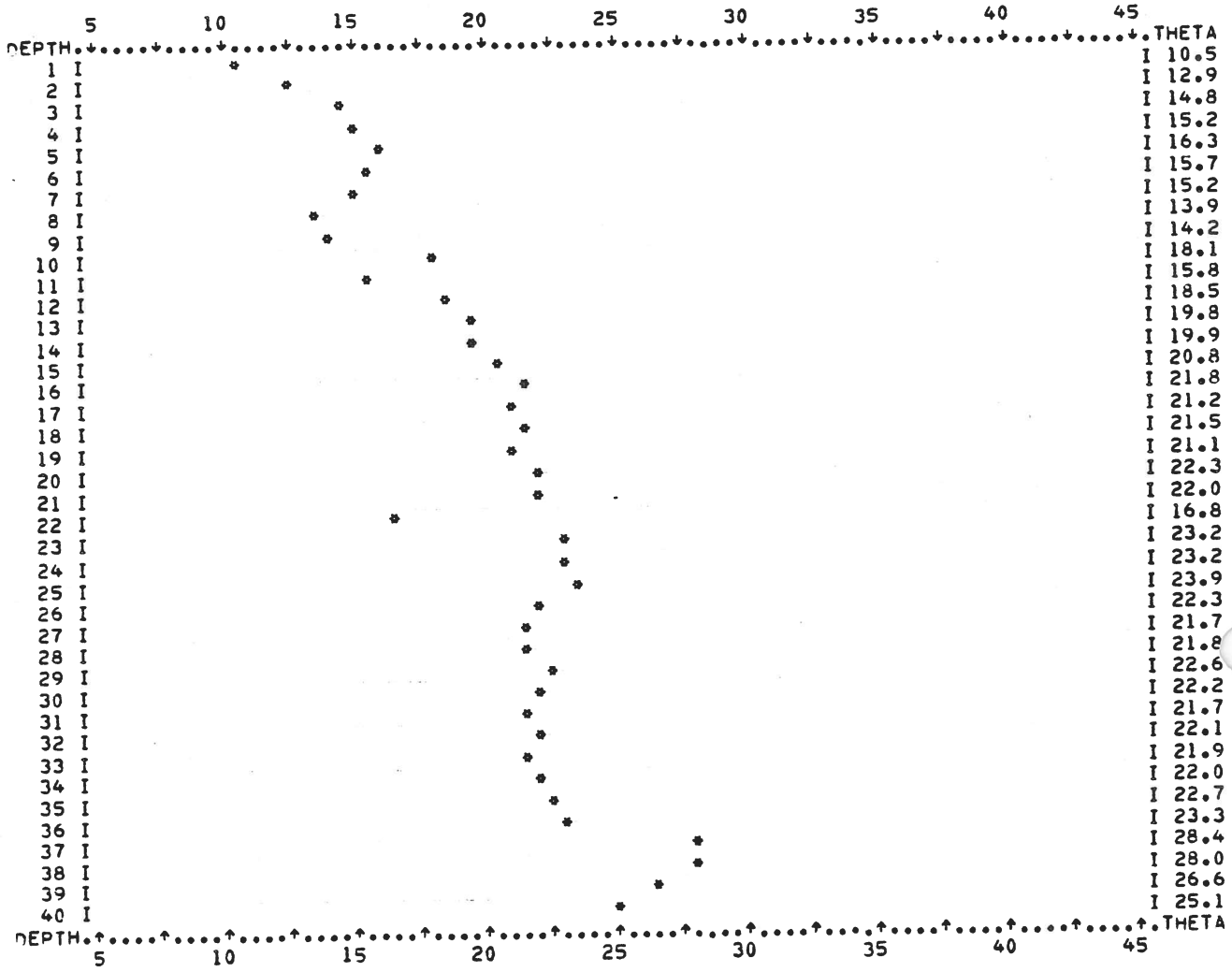
HYDROTECHNICS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT= SOHIO HOLE ID= NP15 LOCATION= BM= 6185.5
DATE= 17JULY76 TIME= 1630 PROBE NO= WL=
REMARKS= APPROX. 1.8 FEET OF WATER IN HOLE WHEN LOGGED

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



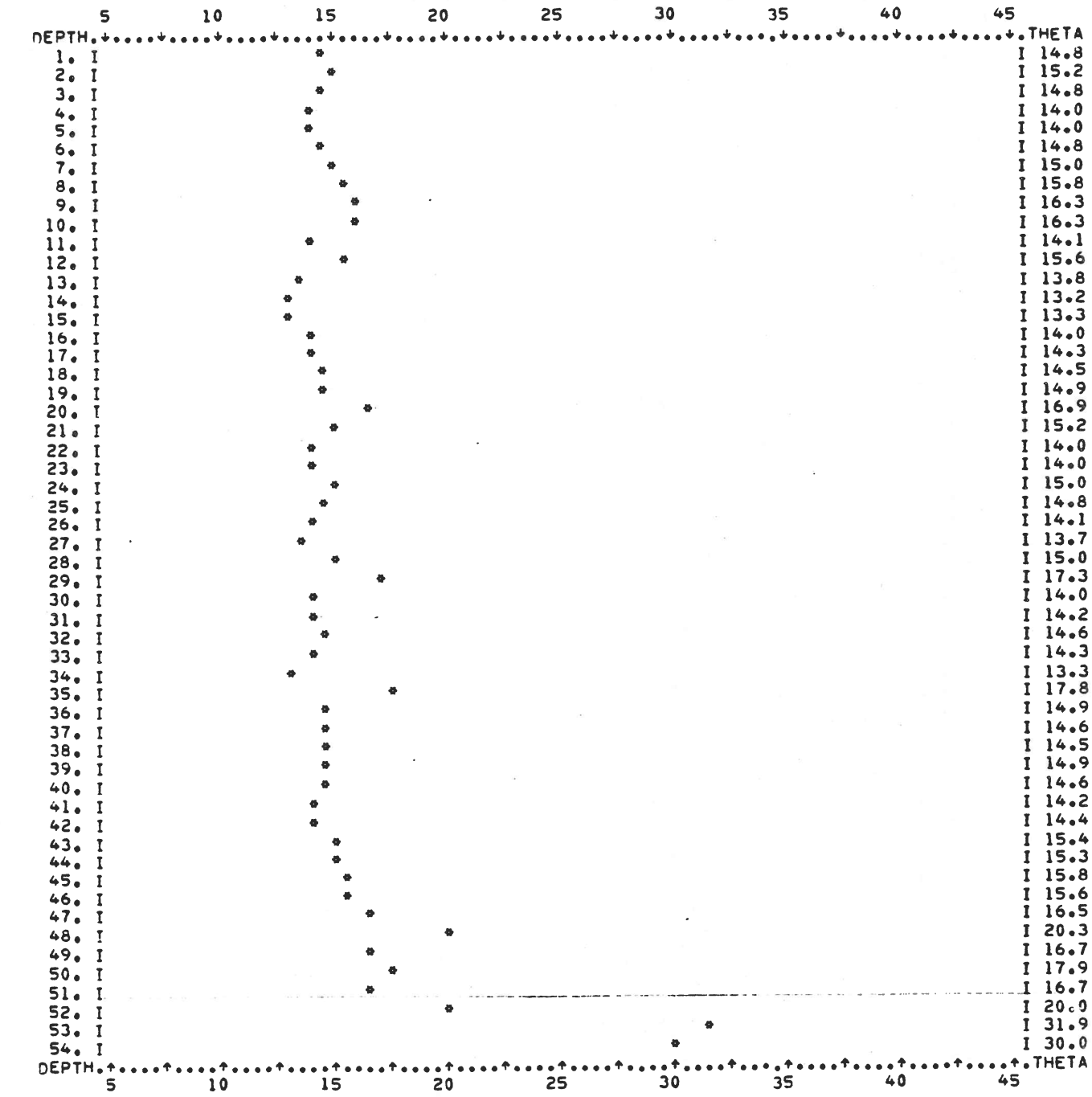
HYDROTECHNICS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT= SOHIO HOLE ID= NP16 LOCATION= BM= 6147.7
DATE= 17JULY76 TIME= 1500 PROBE NO= WL=
REMARKS= APPROX. 0.5 FEET OF WATER IN HOLE WHEN LOGGED

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



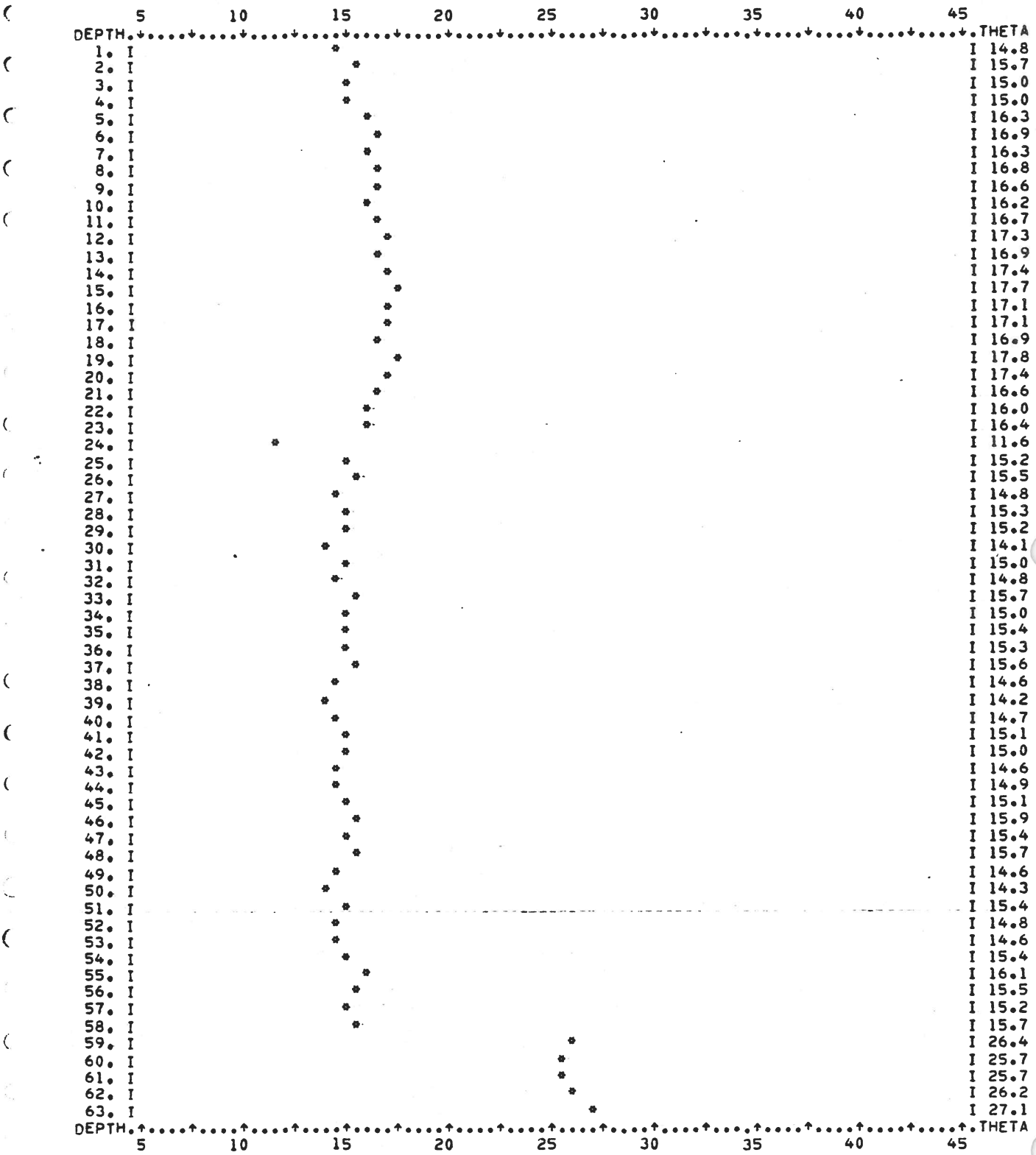
HYDROTECHNICS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT= SOHIO HOLE ID= NP01 LOCATION= BM=
DATE= 19 DEC 76 TIME= 1200 PROBE NO= WL= 55.95
REMARKS= APPROXIMATELY 0.5 FEET OF WATER IN HOLE WHEN LOGGED

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



HYDROTECHNICS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT= SOHIO HOLE ID= NP02 LOCATION= BM=
DATE= 19 DEC 76 TIME= 1330 PROBE NO= WL= 62.00
REMARKS= APPROXIMATELY 0.5 FEET OF WATER IN HOLE WHEN LOGGED

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



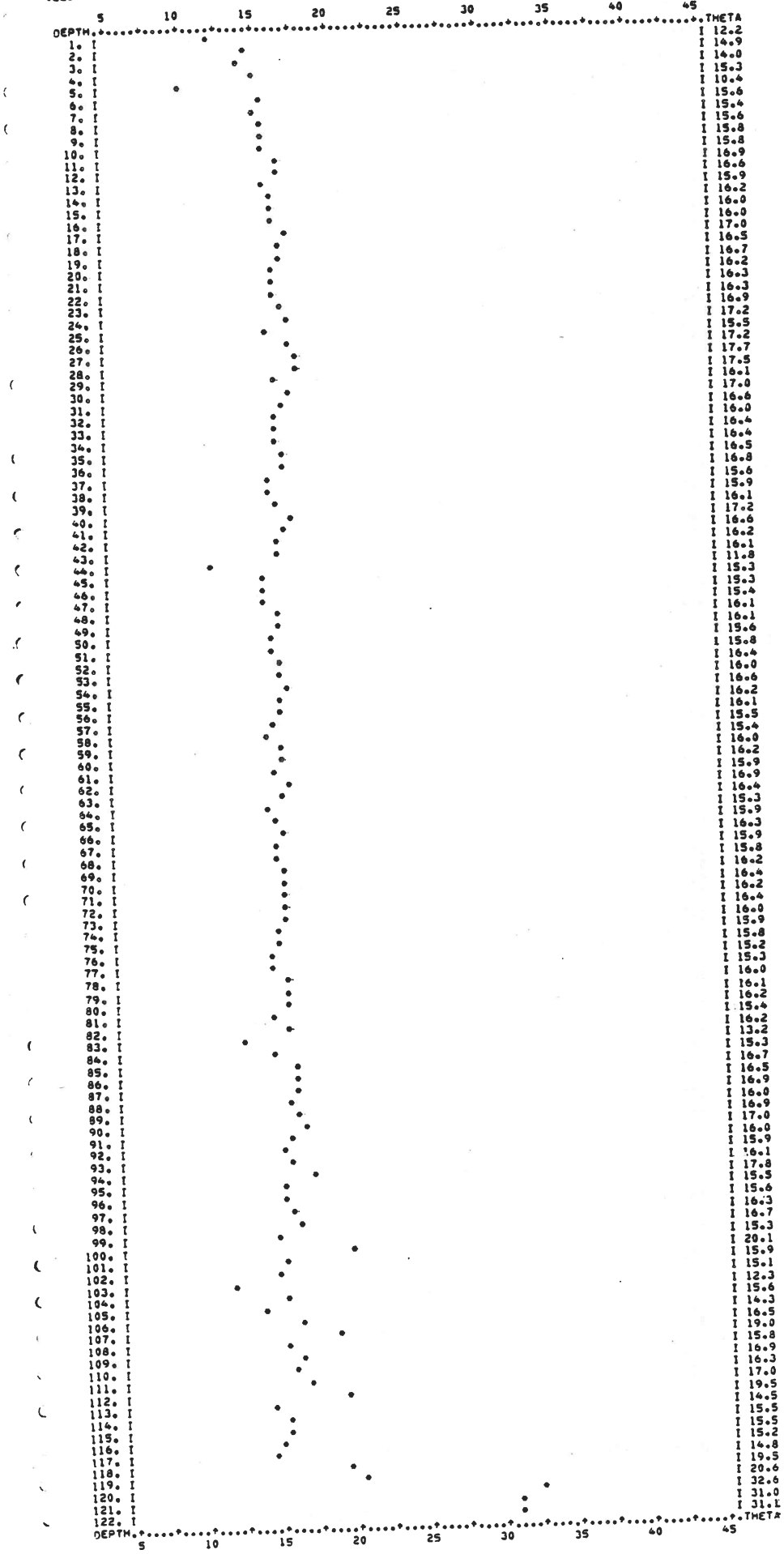
HYDROTECHNICS NEUTRON PROBE SOIL MOISTURE PROFILE

PROJECT= SOMIO HOLE ID= NP03 LOCATION= BM=

DATE= 19 DEC 76 TIME= PROBE NO= WL= 124.35

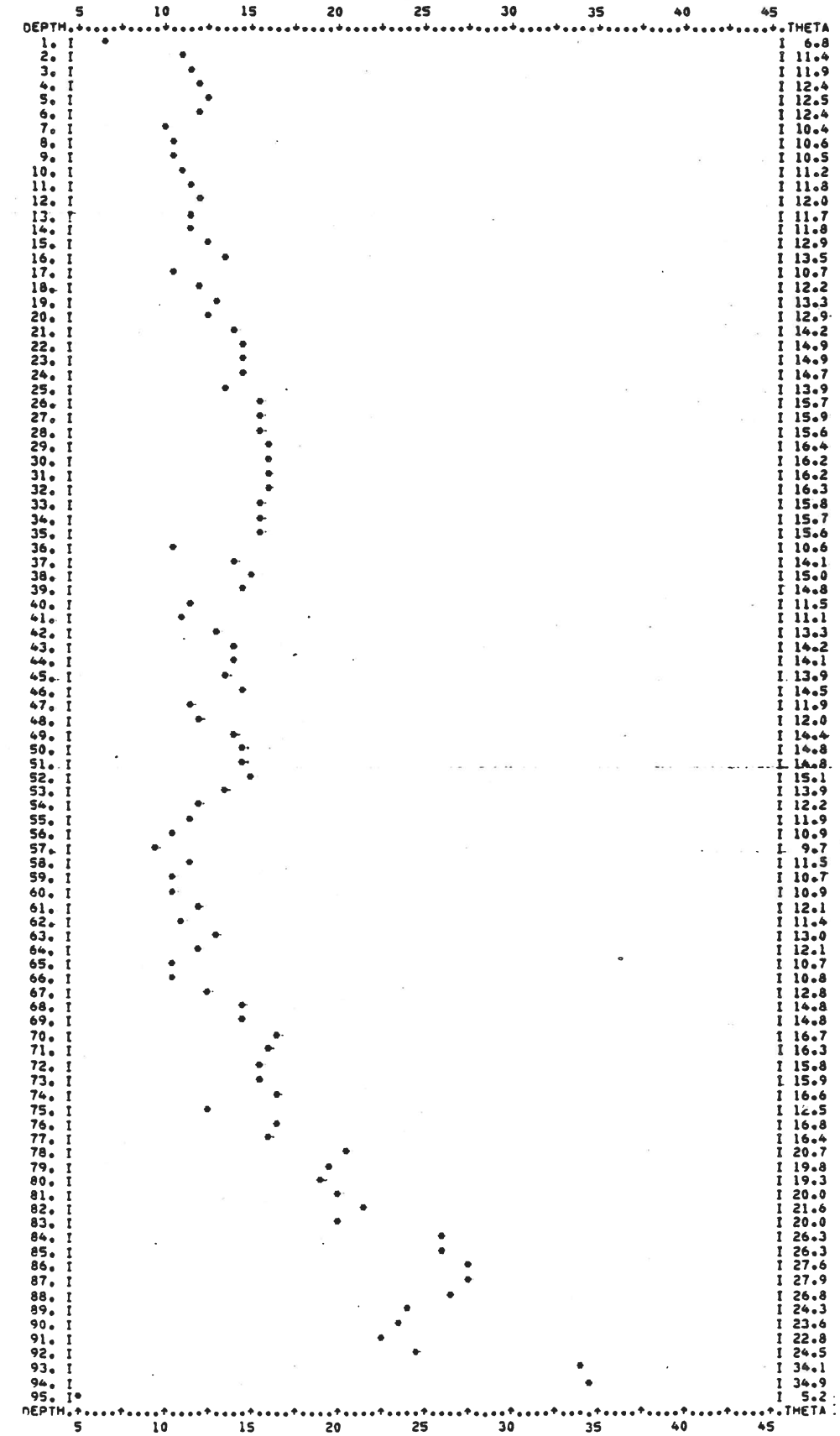
REMARKS= APPROXIMATELY 2.2 FEET OF WATER IN HOLE WHEN LOGGED

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



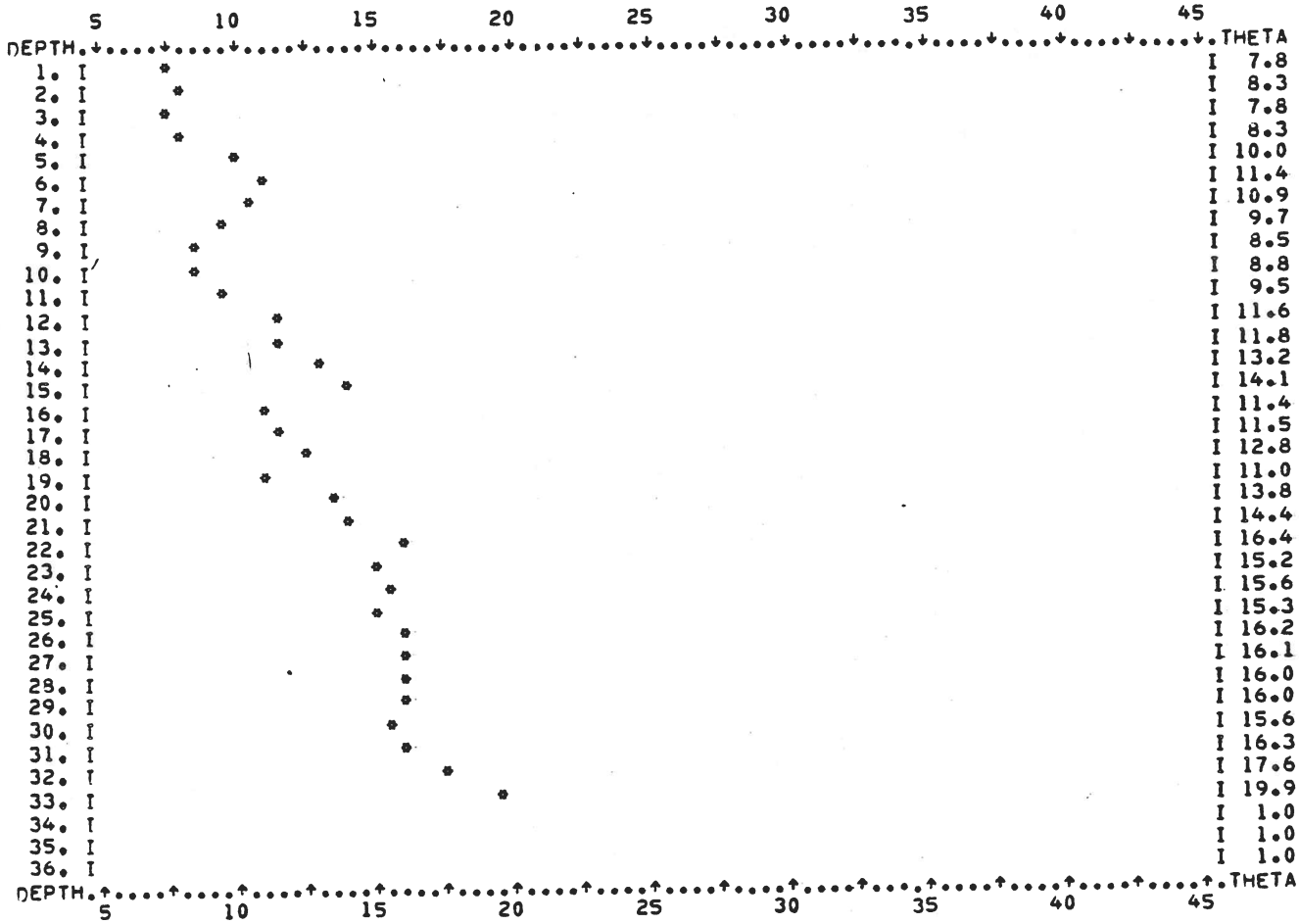
HYDROTECHNICS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT= SOHIO HOLE ID= NP04 LOCATION= BM=
DATE= 19 DEC 14 TIME= 00 PROBE NO= WL= 96.43
REMARKS= APPROXIMATELY 1.2 FEET OF WATER IN HOLE WHEN LOGGED

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



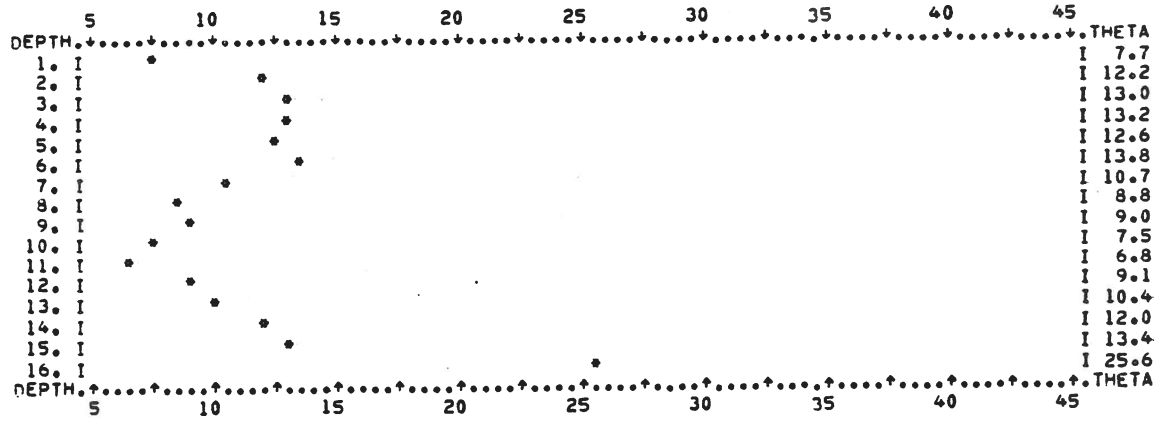
HYDROTECHNICS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT= SOHIO HOLE ID= NP05 LOCATION= BM=
DATE= 19 DEC 76 TIME= PROBE NO= WL= 39.40
REMARKS= APPROXIMATELY 4.7 FEET OF WATER IN HOLE WHEN LOGGED

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



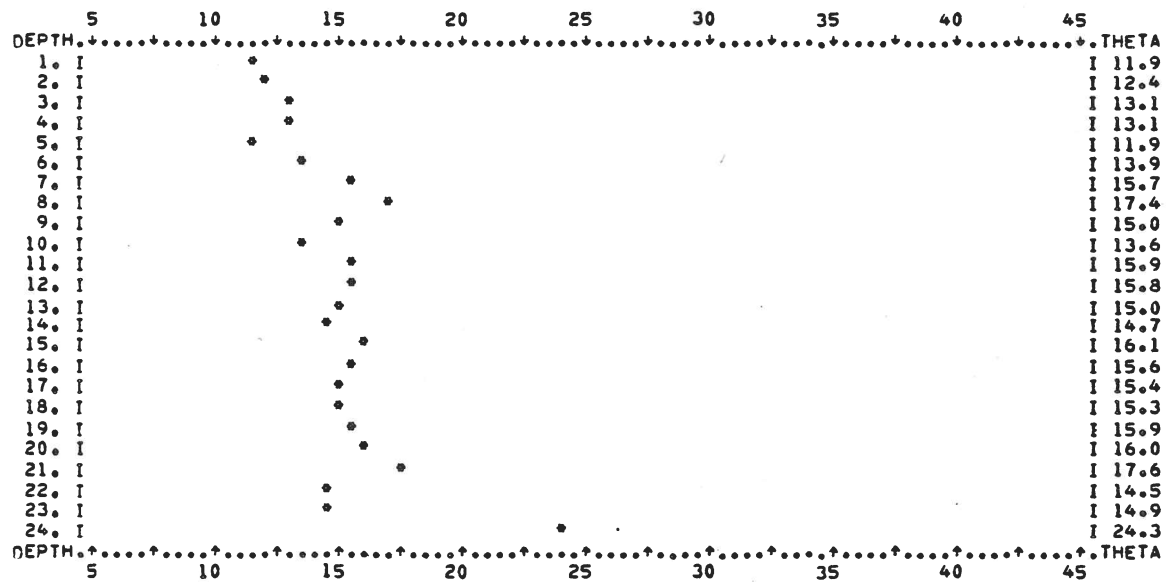
HYDROTECHNICS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT= SOHIO HOLE ID= NP06 LOCATION= BM=
DATE= 19 DEC 76 TIME= 1615 PROBE NO= WL= 18.81
REMARKS= APPROXIMATELY 1.2 FEET OF WATER IN HOLE WHEN LOGGED

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



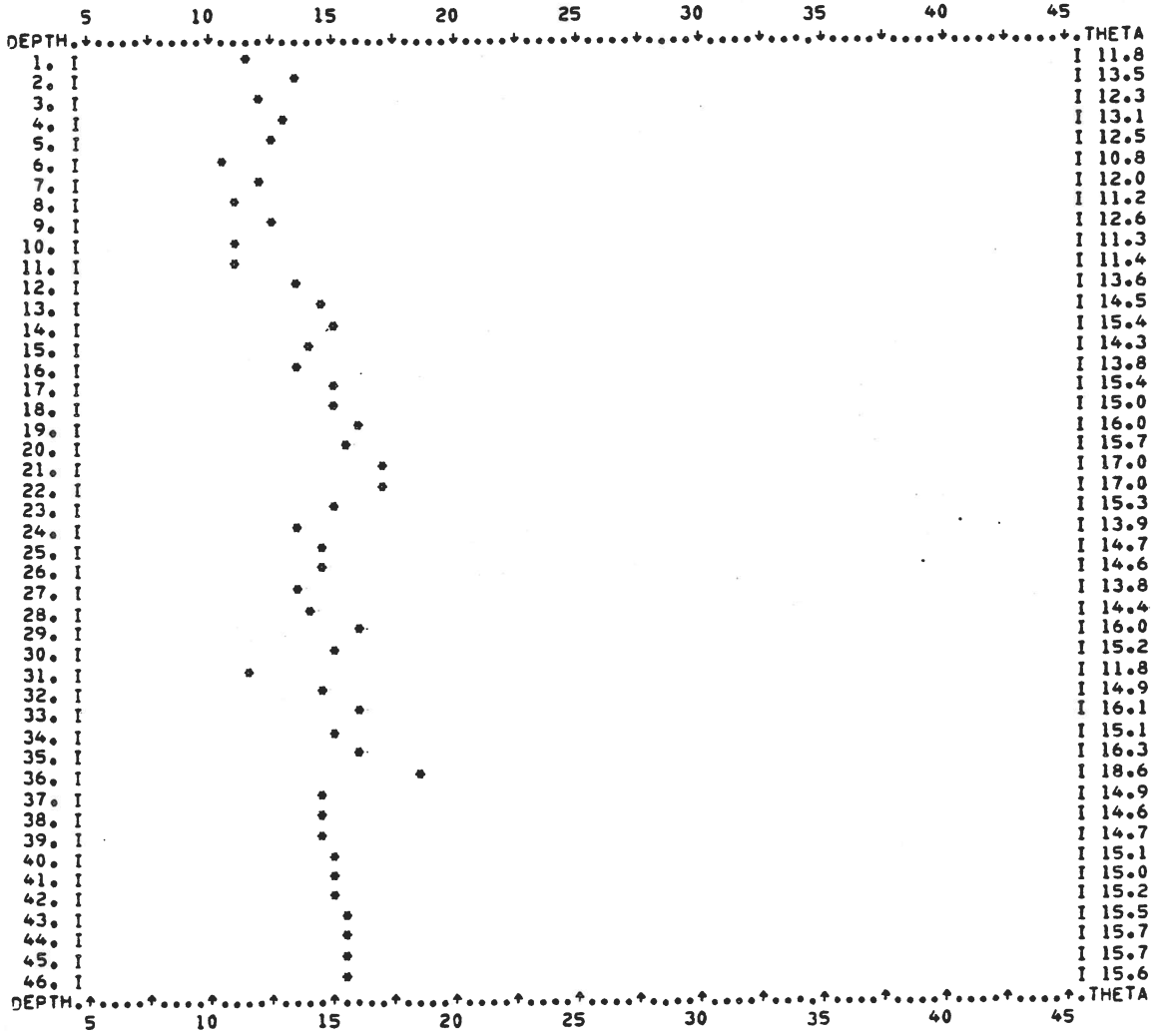
HYDROTECHNICS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT= SOHIO HOLE ID= NP07 LOCATION= BM=
DATE= 19 DEC 76 TIME= 1635 PROBE NO= WL= 26.61
REMARKS= APPROXIMATELY 41.2 FT OF WATER IN HOLE. BLOWN BEFORE LOGGED

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



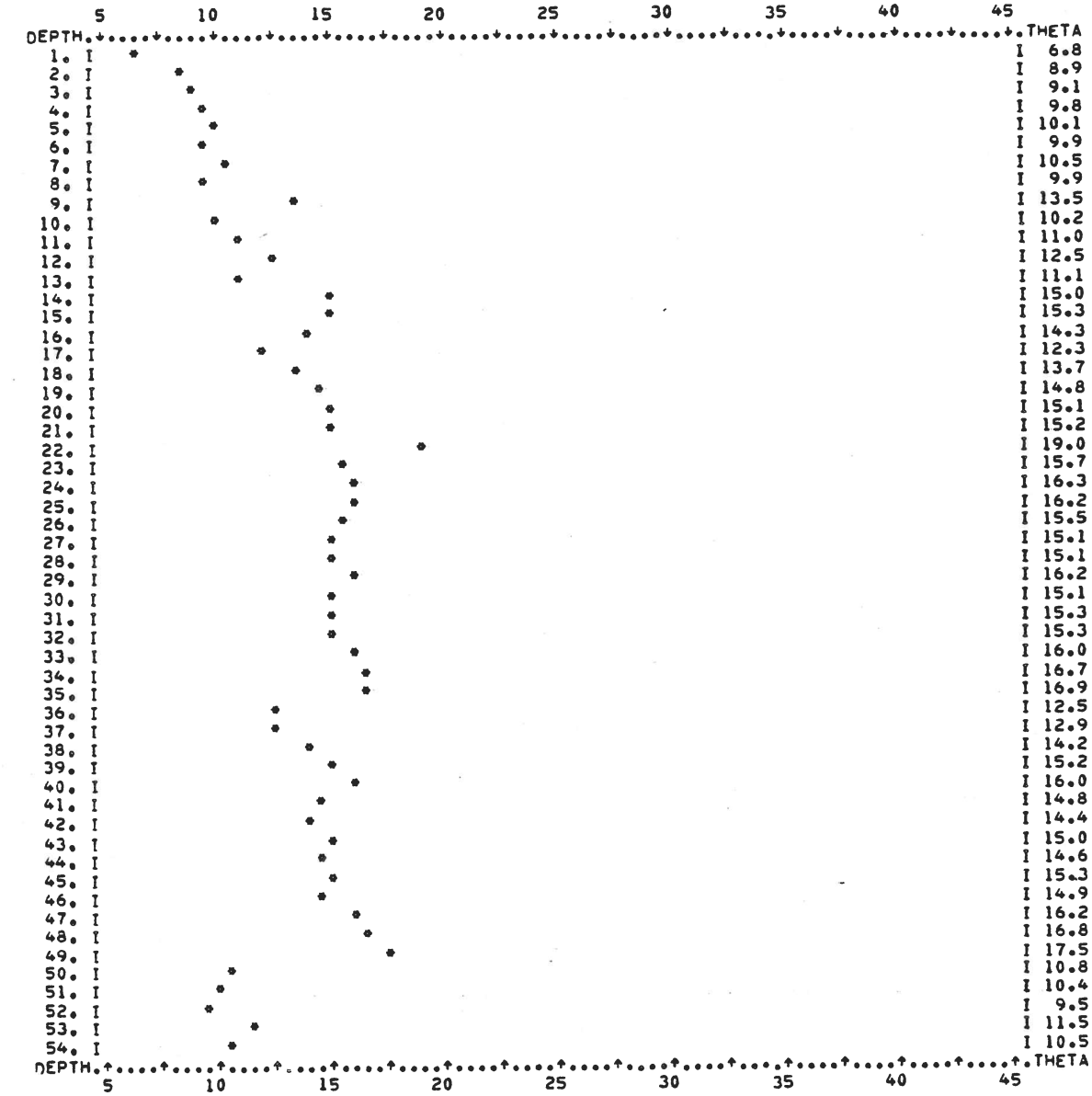
HYDROTECHNICS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT= SOHIO HOLE ID= NP08 LOCATION= BM=
DATE= 19 DEC 76 TIME= 1650 PROBE NO= WL= 52.60
REMARKS= APPROXIMATELY 0.6 FEET OF WATER IN HOLE WHEN LOGGED

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



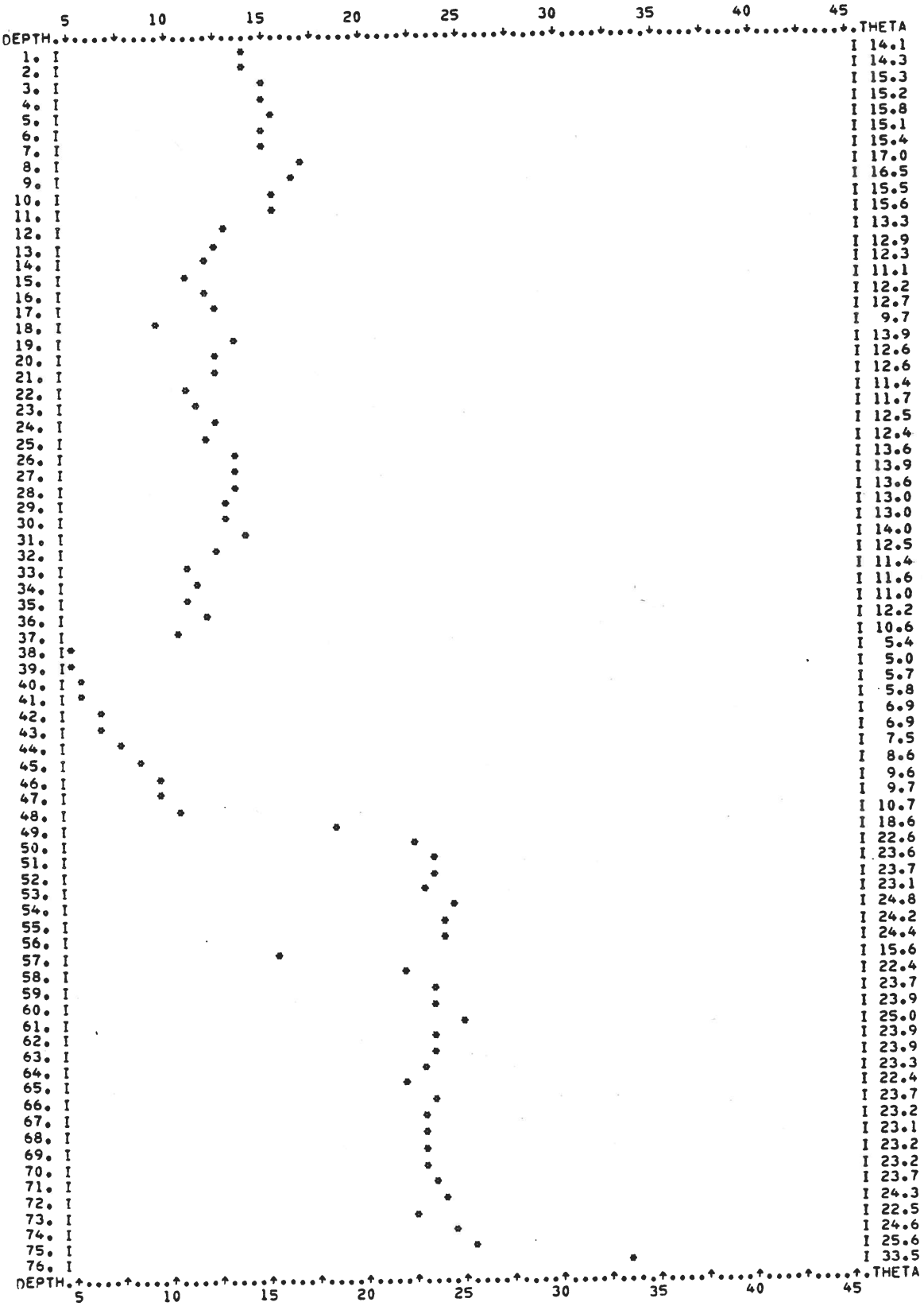
HYDROTECHNICS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT= SOHIO HOLE ID= NP09 LOCATION= BM=
DATE= 19 DEC 76 TIME= 1720 PROBE NO= WL= 60.68
REMARKS= HOLE WAS DRY WHEN LOGGED

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



HYDROTECHNICS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT= SOHIO HOLE ID= NP14 LOCATION= BM=
DATE= 24 DEC 76 TIME= 1200 PROBE NO= WL= 79.83
REMARKS= APPROX. 10.7 FEET OF WATER IN HOLE WHEN LOGGED

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.

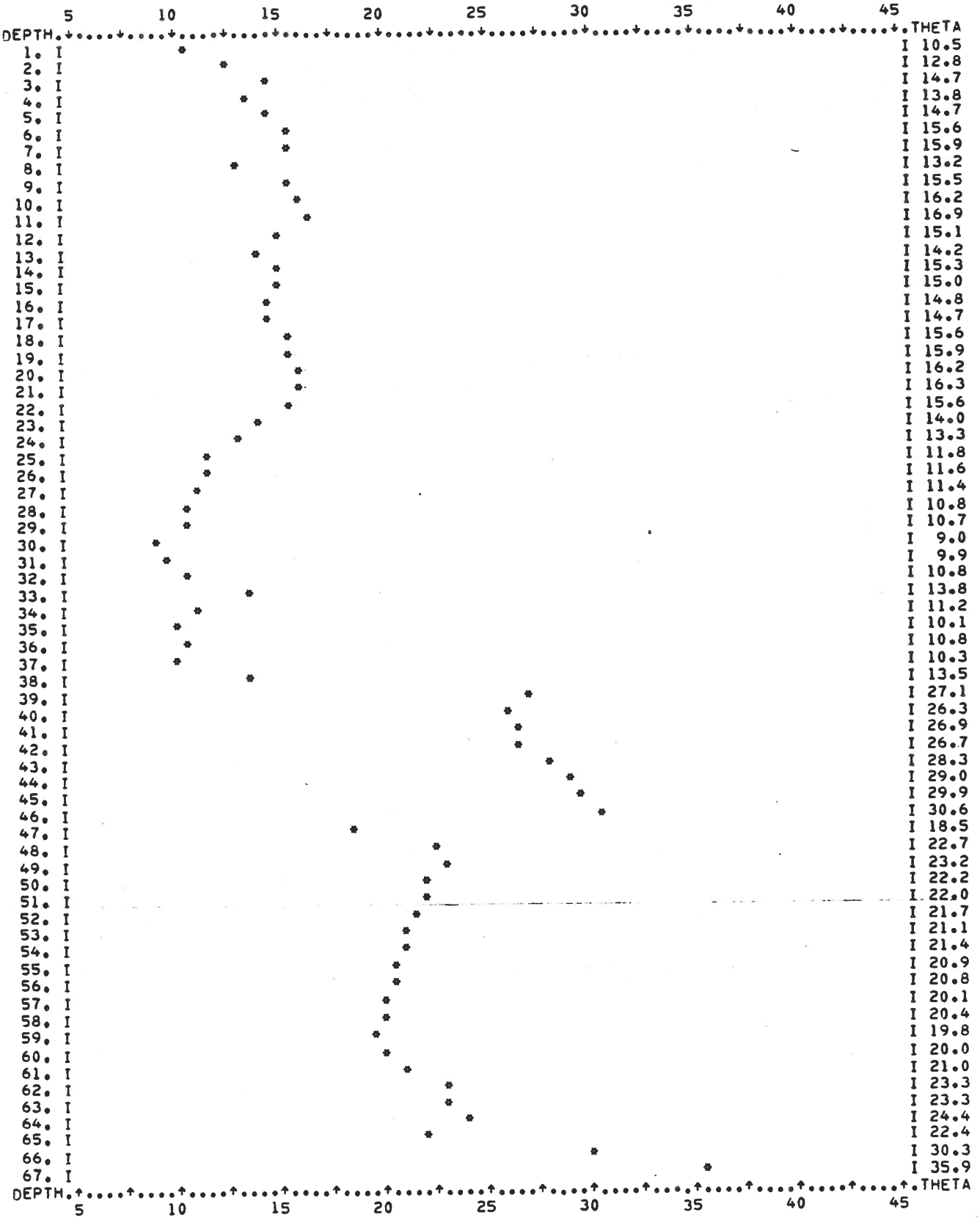


DEPTH	THETA
1.	14.1
2.	14.3
3.	15.3
4.	15.2
5.	15.8
6.	15.1
7.	15.4
8.	17.0
9.	16.5
10.	15.5
11.	15.6
12.	13.3
13.	12.9
14.	12.3
15.	11.1
16.	12.2
17.	12.7
18.	9.7
19.	13.9
20.	12.6
21.	12.6
22.	11.4
23.	11.7
24.	12.5
25.	12.4
26.	13.6
27.	13.9
28.	13.6
29.	13.0
30.	13.0
31.	14.0
32.	12.5
33.	11.4
34.	11.6
35.	11.0
36.	12.2
37.	10.6
38.	5.4
39.	5.0
40.	5.7
41.	5.8
42.	6.9
43.	6.9
44.	7.5
45.	8.6
46.	9.6
47.	9.7
48.	10.7
49.	18.6
50.	22.6
51.	23.6
52.	23.7
53.	23.1
54.	24.8
55.	24.2
56.	24.4
57.	15.6
58.	22.4
59.	23.7
60.	23.9
61.	25.0
62.	23.9
63.	23.9
64.	23.3
65.	22.4
66.	23.7
67.	23.2
68.	23.1
69.	23.2
70.	23.2
71.	23.7
72.	24.3
73.	22.5
74.	24.6
75.	25.6
76.	33.5

DEPTH THETA
5 10 15 20 25 30 35 40 45

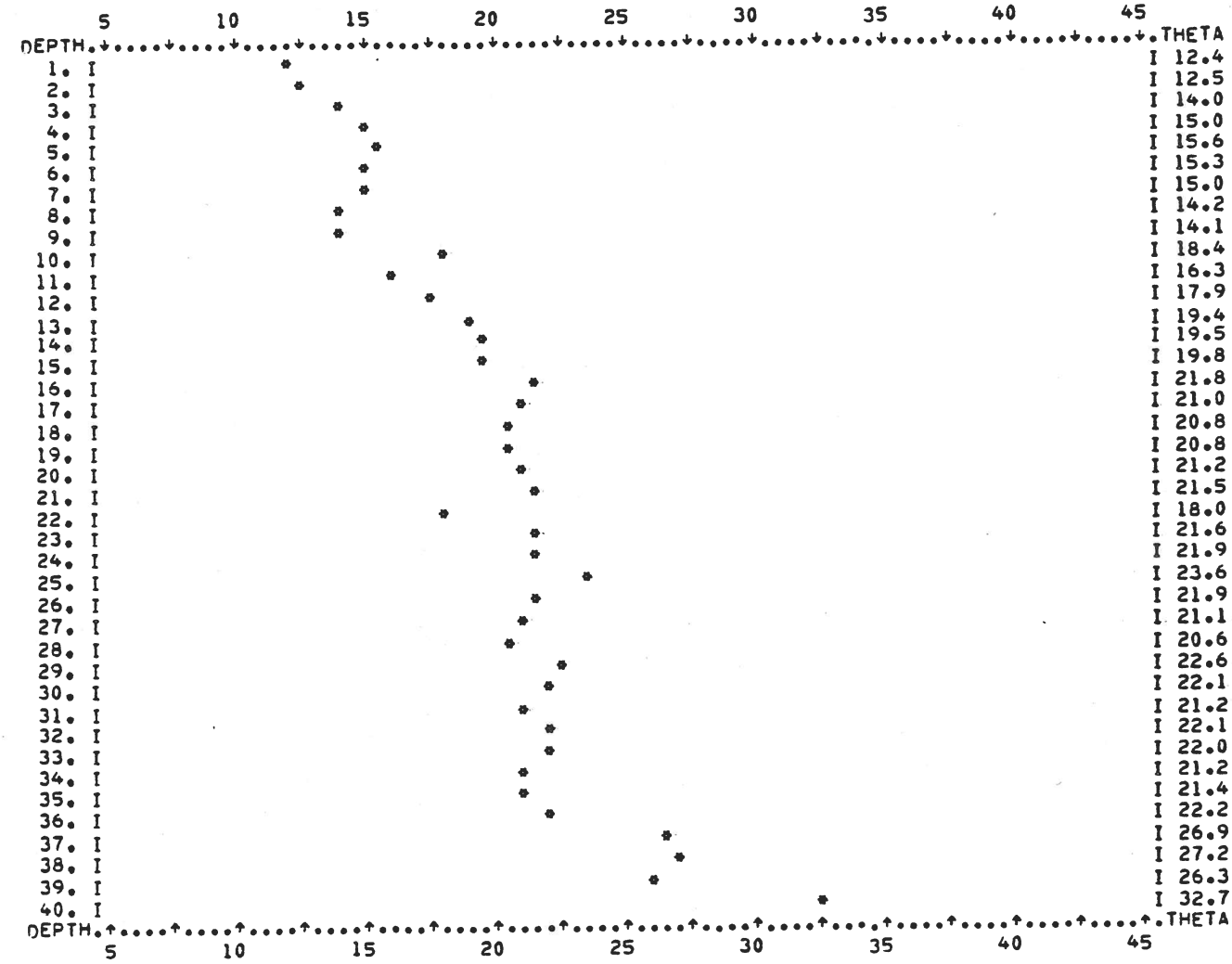
HYDROTECHNICS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT= SOHIO HOLE ID= NP15 LOCATION= BM=
DATE= 24 DEC 76 TIME= 1300 PROBE NO= WL= 0.49
REMARKS= APPROX. 1.8 FEET OF WATER IN HOLE WHEN LOGGED

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



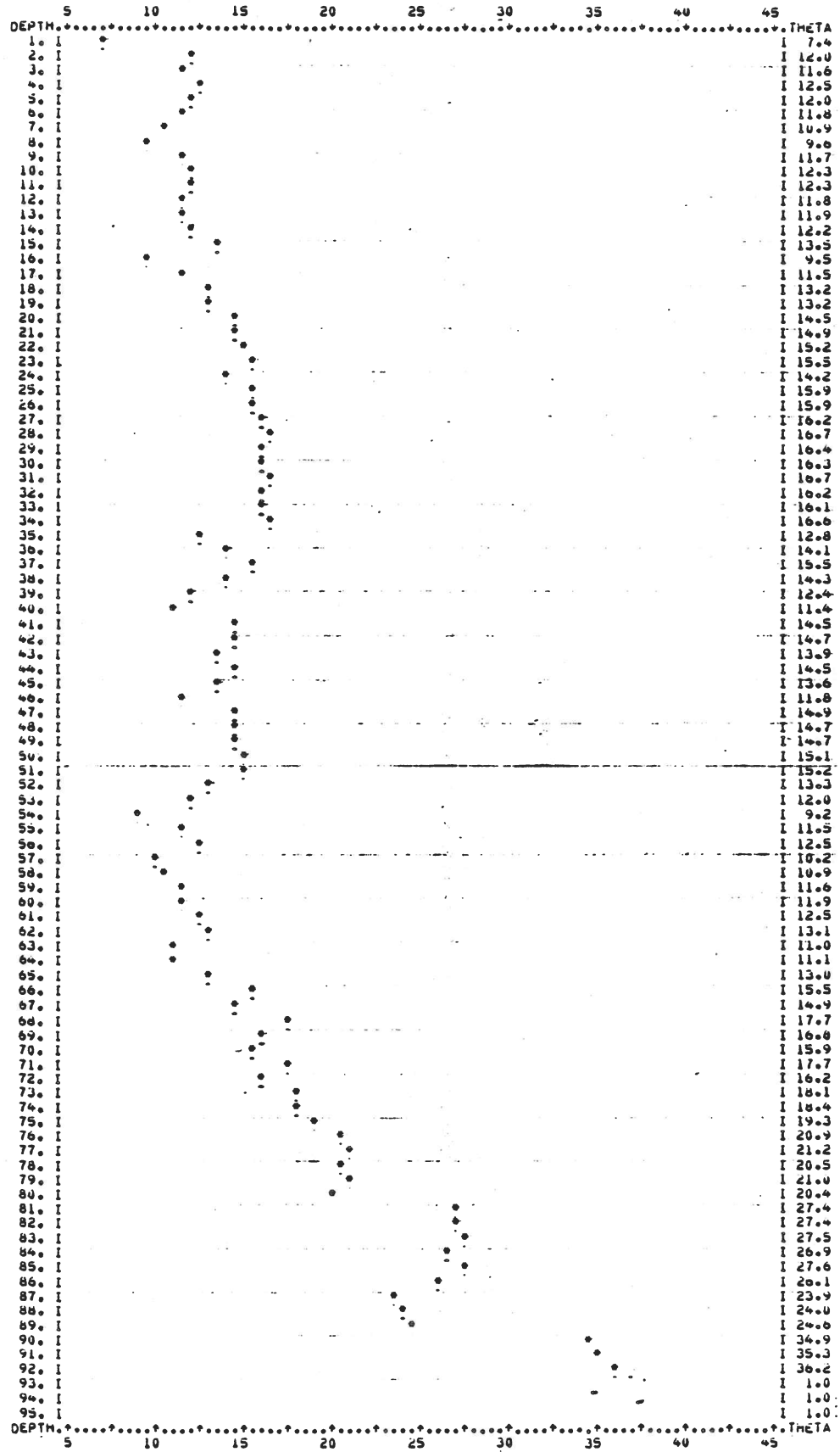
HYDROTECHNICS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT= SOHIO HOLE ID= NP16 LOCATION= BM=
DATE= 19 DEC 76 TIME= 1550 PROBE NO= WL= 43.46
REMARKS= APPROX. 0.5 FEET OF WATER IN HOLE WHEN LOGGED

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



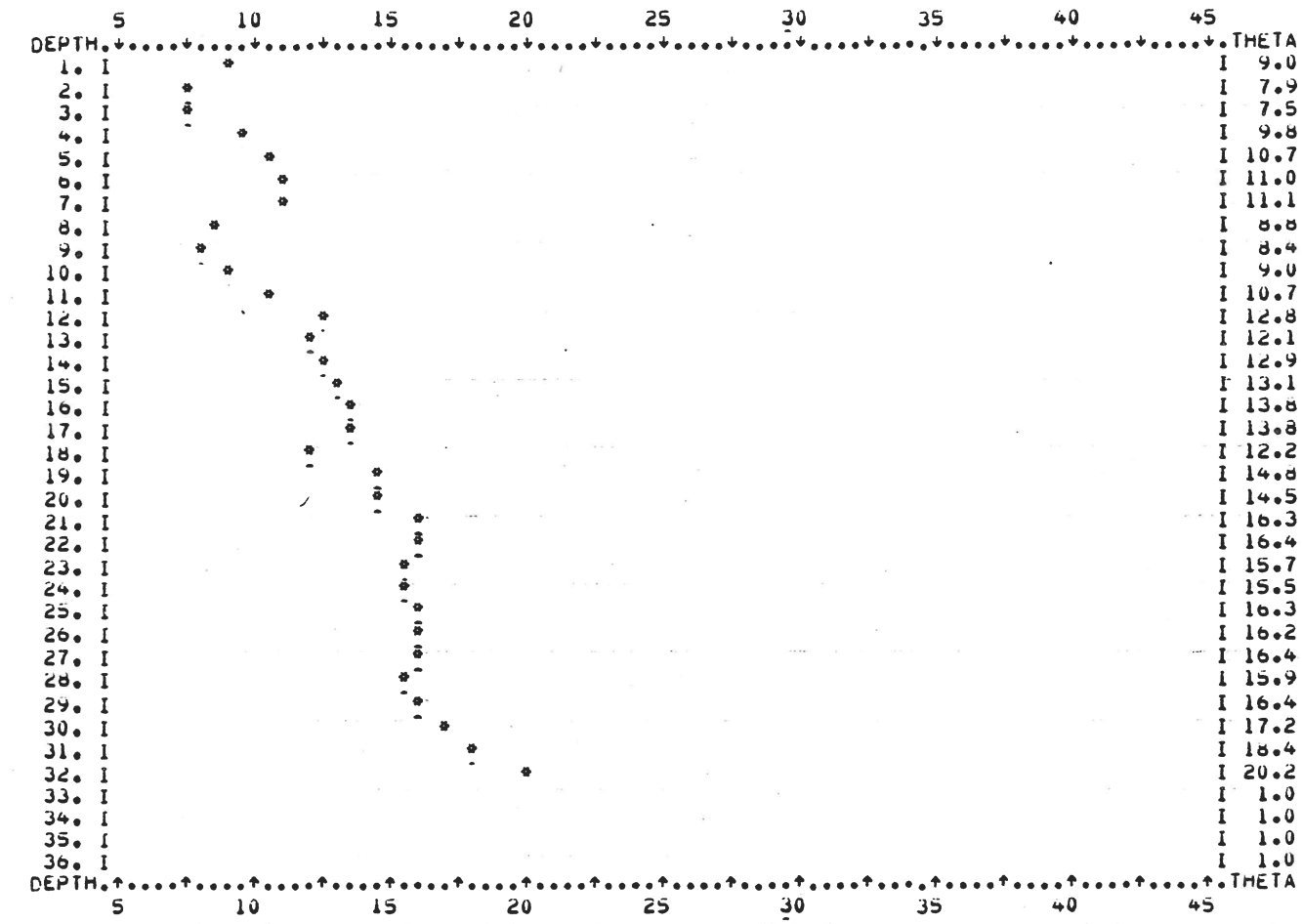
AMERICAN GROUND WATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT= SOMIO HOLE ID= NP04 LOCATION= BM=
DATE= 13 MAR 77 TIME= 1330 PROBE NO= WL= 96.88
REMARKS= APPROXIMATELY 0.8 FEET OF WATER IN HOLE WHEN LOGGED

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



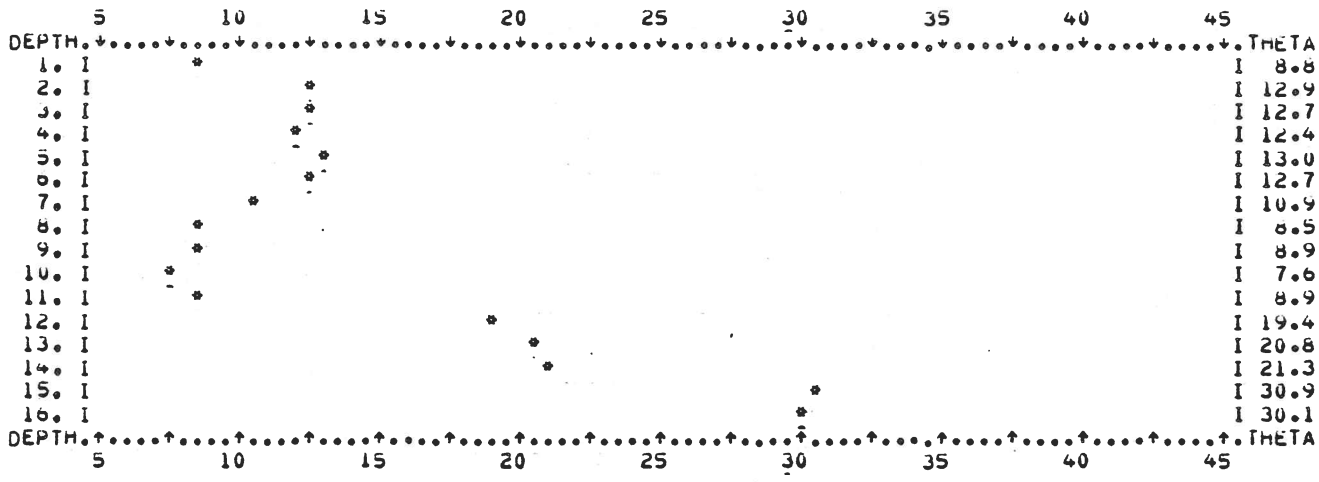
AMERICAN GROUND WATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT= SOHIO HOLE ID= NP05 LOCATION= BM=
DATE= 13 MAR 77 TIME= 1500 PROBE NO= WL= 39.22
REMARKS= APPROXIMATELY 4.9 FEET OF WATER IN HOLE WHEN LOGGED

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



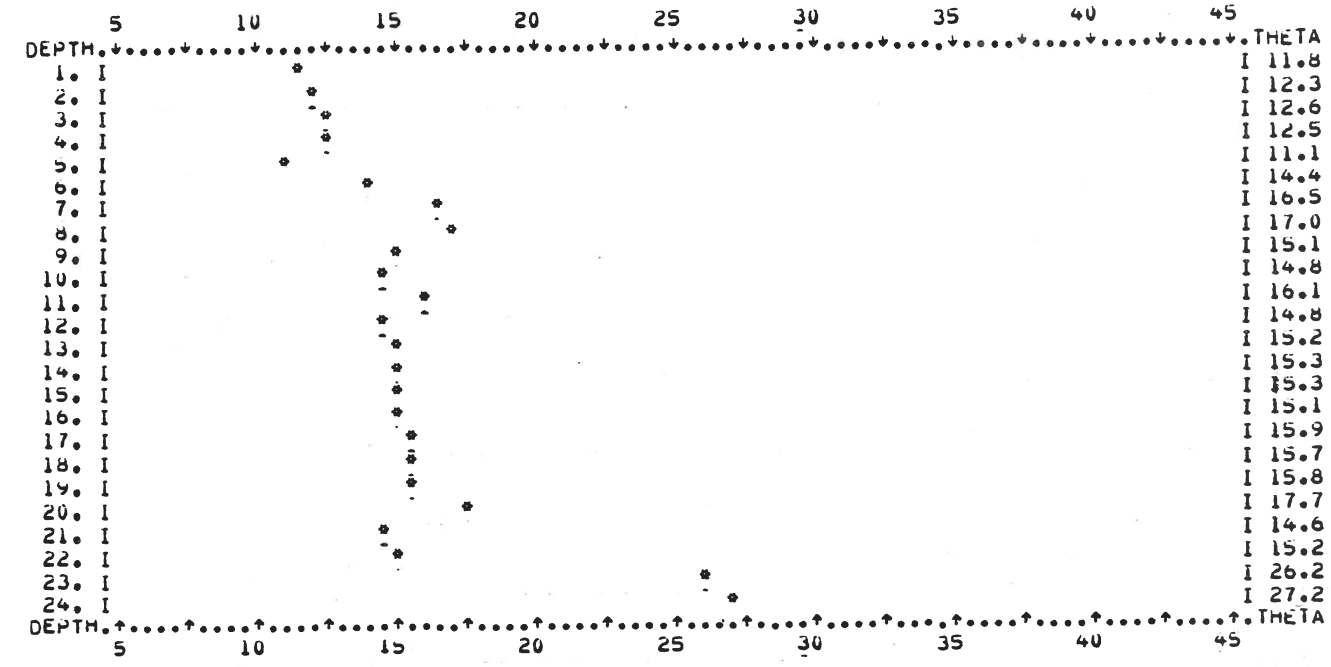
AMERICAN GROUND WATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT= SOH10 HOLE ID= NP06 LOCATION= BM=
DATE= 13 MAR 77 TIME= 1545 PROBE NO= WL= 18.93
REMARKS= APPROXIMATELY 1.1 FEET OF WATER IN HOLE WHEN LOGGED

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



AMERICAN GROUND WATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT= SOM10 HOLE ID= NP07 LOCATION= BM=
DATE= 13 MAR 77 TIME= 1645 PROBE NO= WL= 26.57
REMARKS= APPROXIMATELY 41.2 FEET OF WATER IN HOLE WHEN LOGGED

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



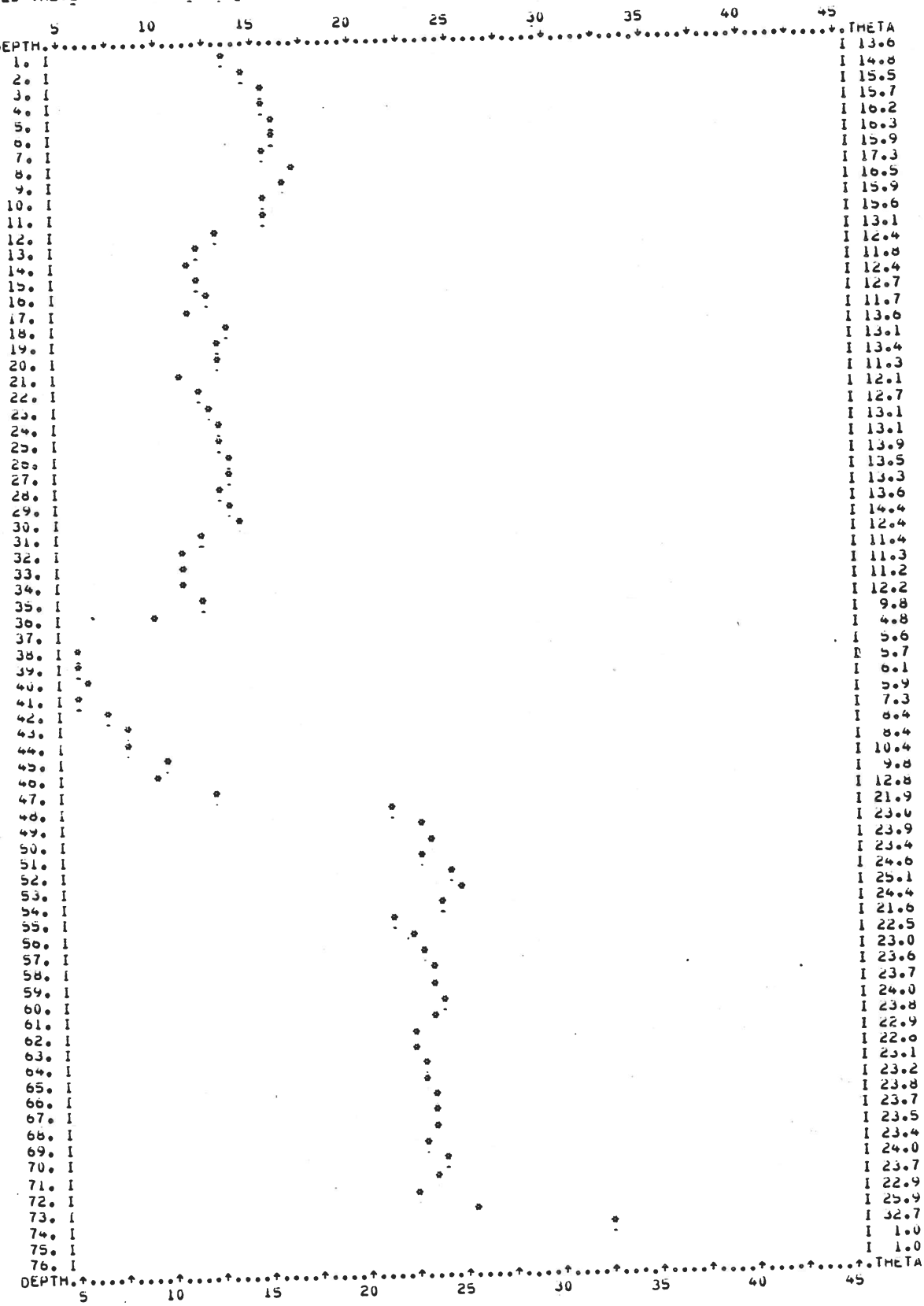
AMERICAN GROUND WATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE

PROJECT= SOM10 HOLE ID= NP14 LOCATION= BM=

DATE= 13 MAR 77 TIME= 1700 PROBE NO= WL= 79.74

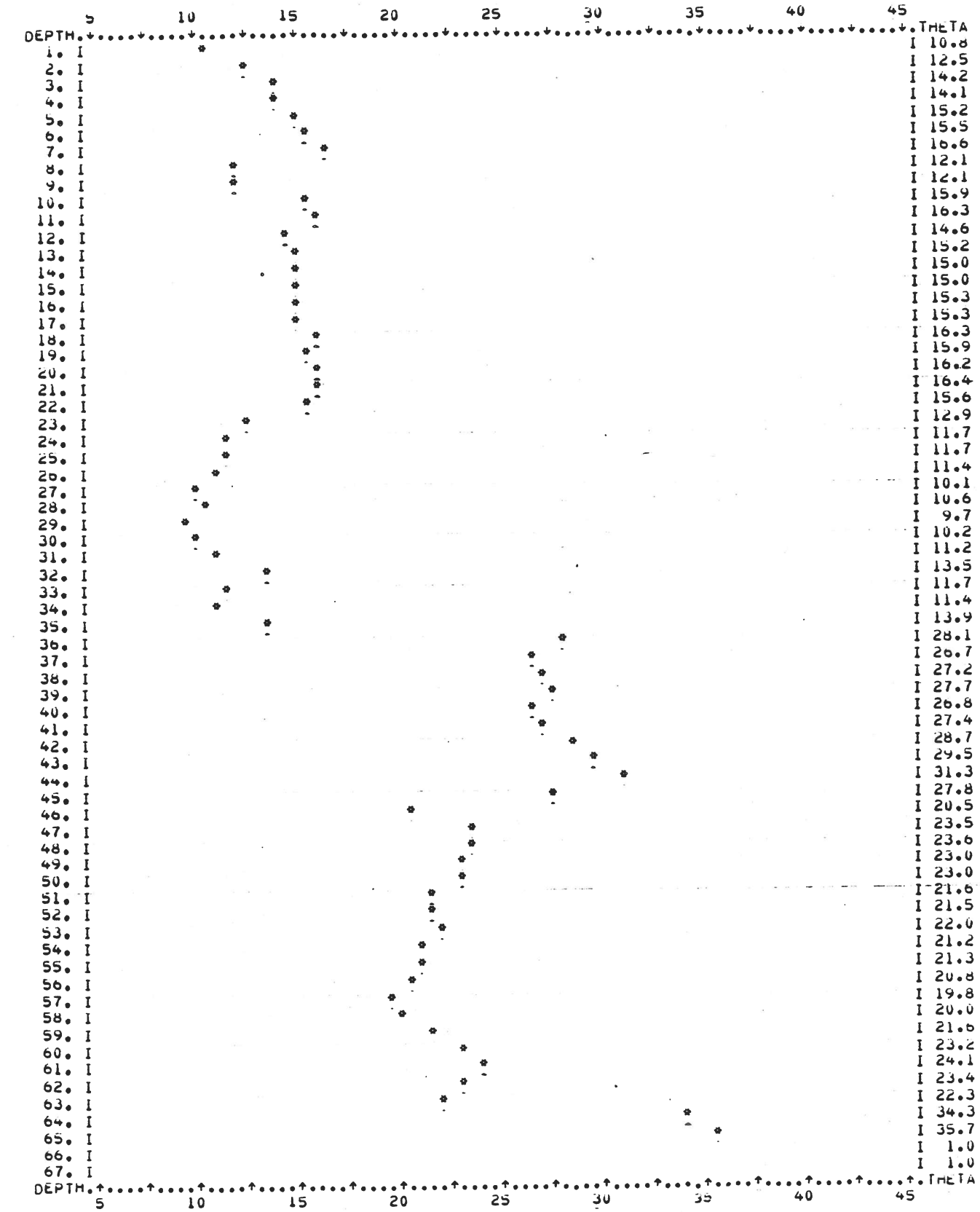
REMARKS= APPROXIMATELY 10.0 FEET OF WATER IN HOLE WHEN LOGGED

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



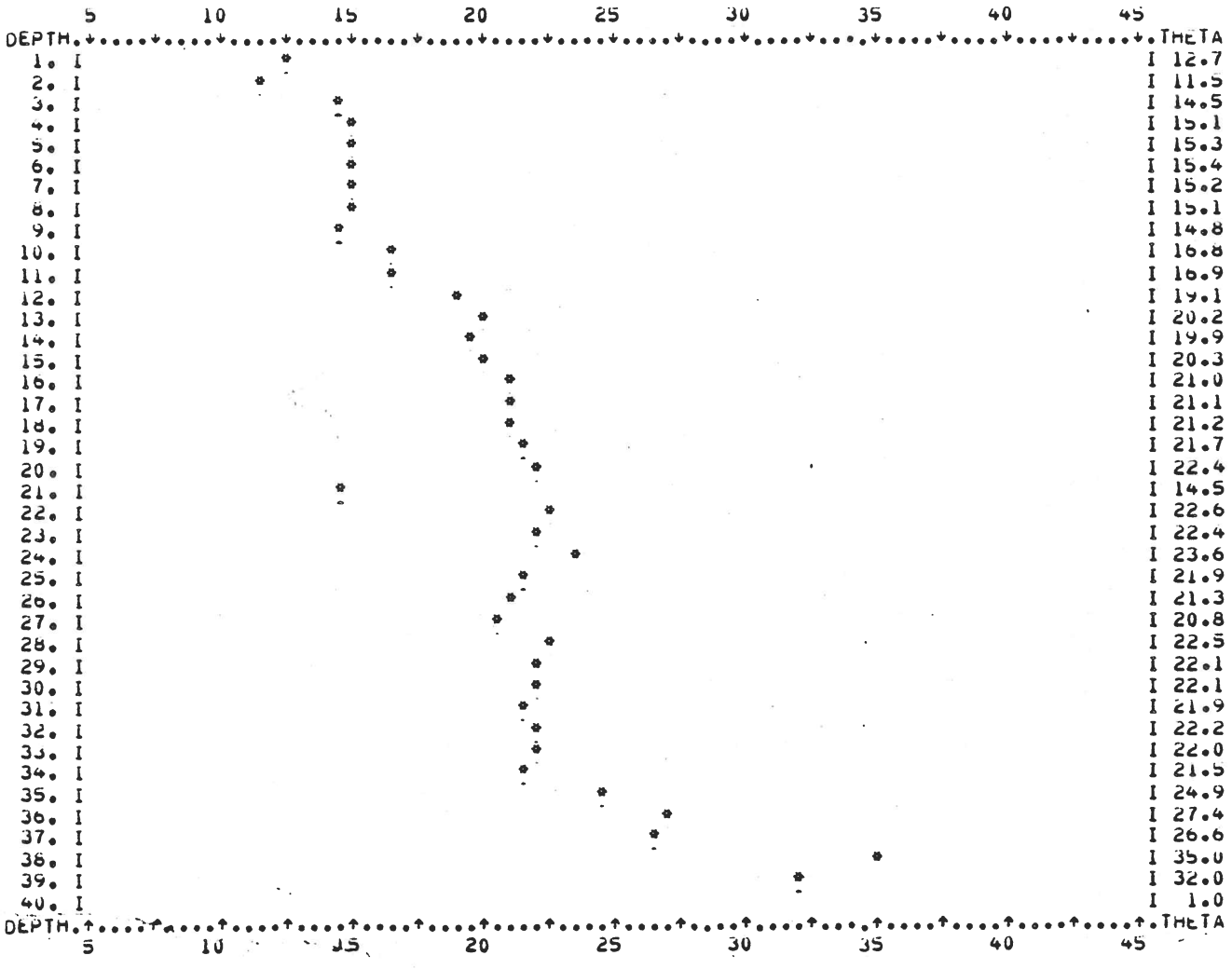
AMERICAN GROUND WATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT= SOHIO HOLE ID= NP15 LOCATION= BM=
DATE= 13 MAR 77 TIME= 1630 PROBE NO= WL= 68.69
REMARKS= APPROXIMATELY 1.6 FEET OF WATER IN HOLE WHEN LOGGED

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



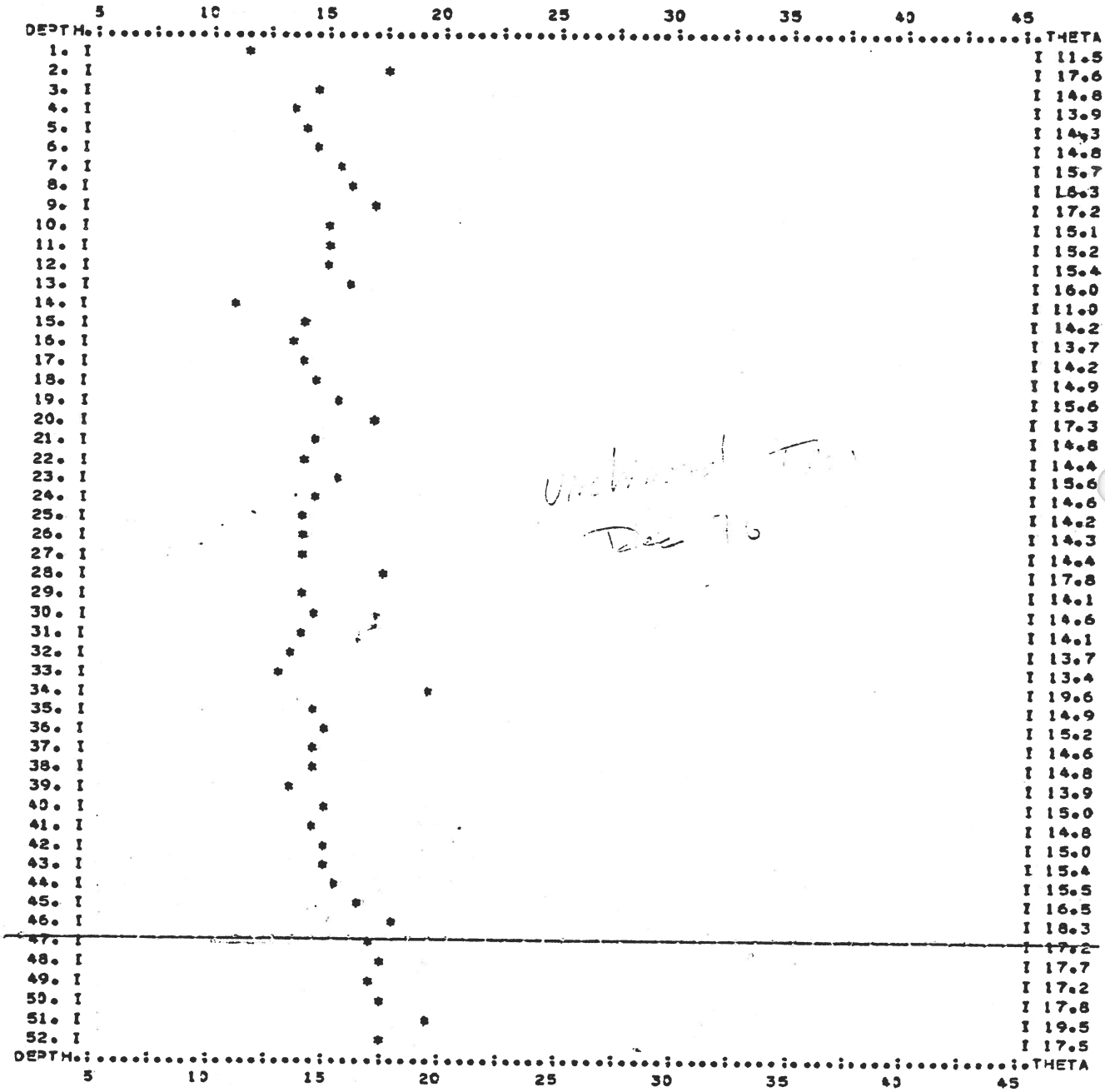
AMERICAN GROUND WATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT= SOH10 HOLE ID= NP16 LOCATION= BM=
DATE= 13 MAR 77 TIME= 1530 PROBE NO= WL= 43.31
REMARKS= APPROXIMATELY 0.4 FEET OF WATER IN HOLE WHEN LOGGED

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



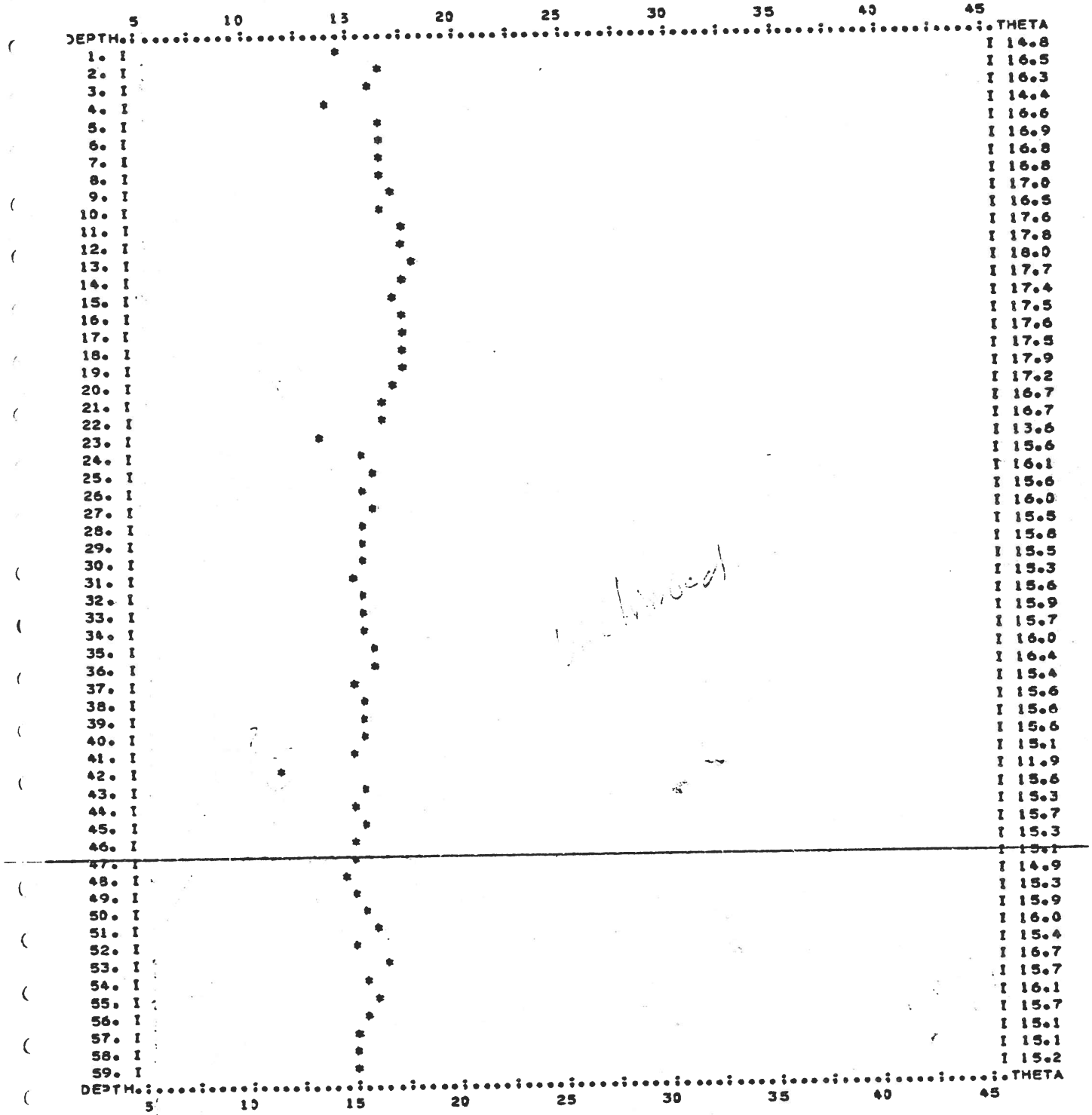
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO HOLE ID=NP 1 BM= 6192.00
DATE= 21 JUNE 1977 TIME=1000 PROBE NO= WL= 0.0
REMARKS= VALUES CORRECTED FOR 4.0 FEET OF WATER IN HOLE WHEN LOGGED NP 1

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



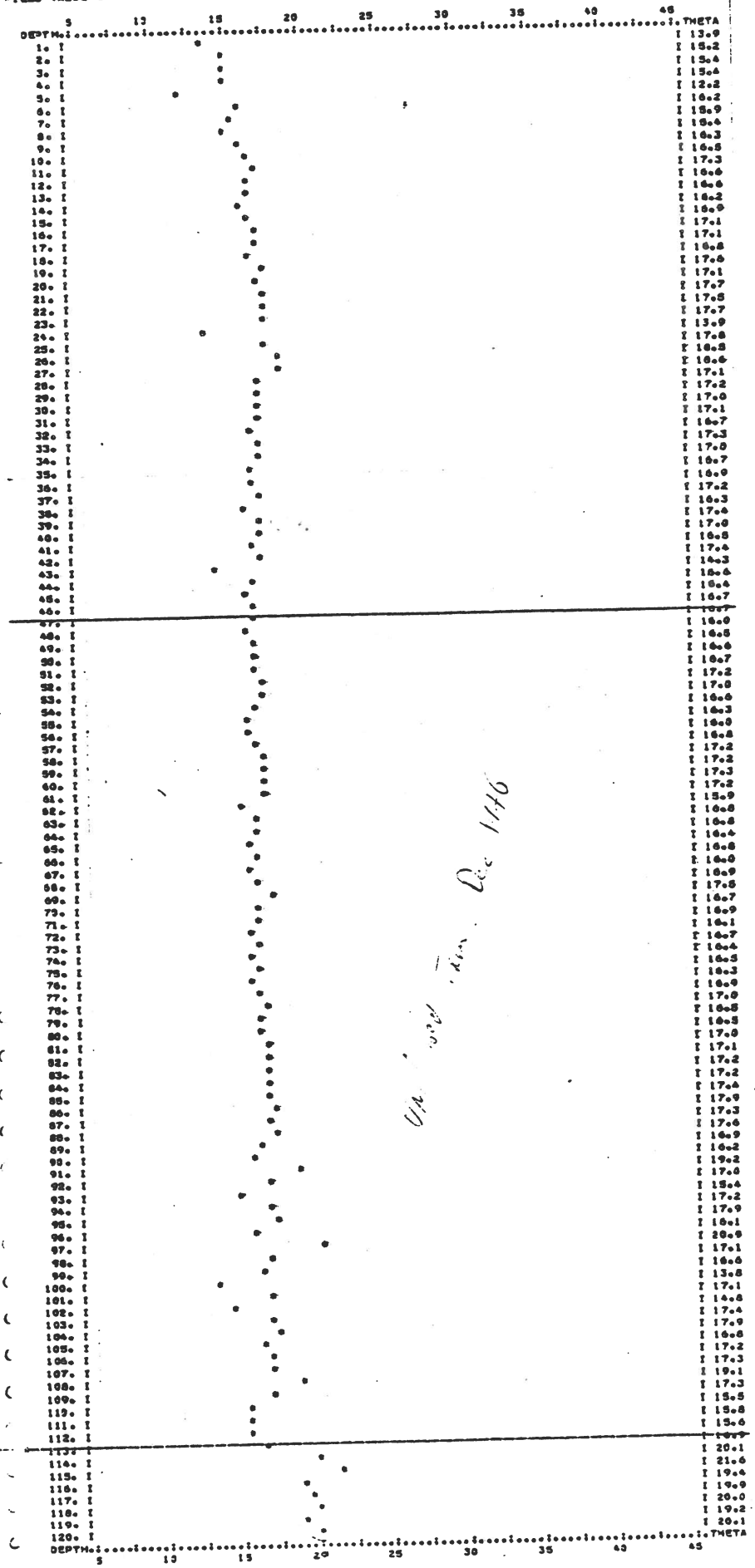
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO HOLE ID=NP 2 BM= 6220.20
DATE= 21 JUNE 1977 TIME=1200 PROBE NO= WL= 61.84
REMARKS= VALUES CORRECTED FOR 4.2 FEET OF WATER IN HOLE WHEN LOGGED

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



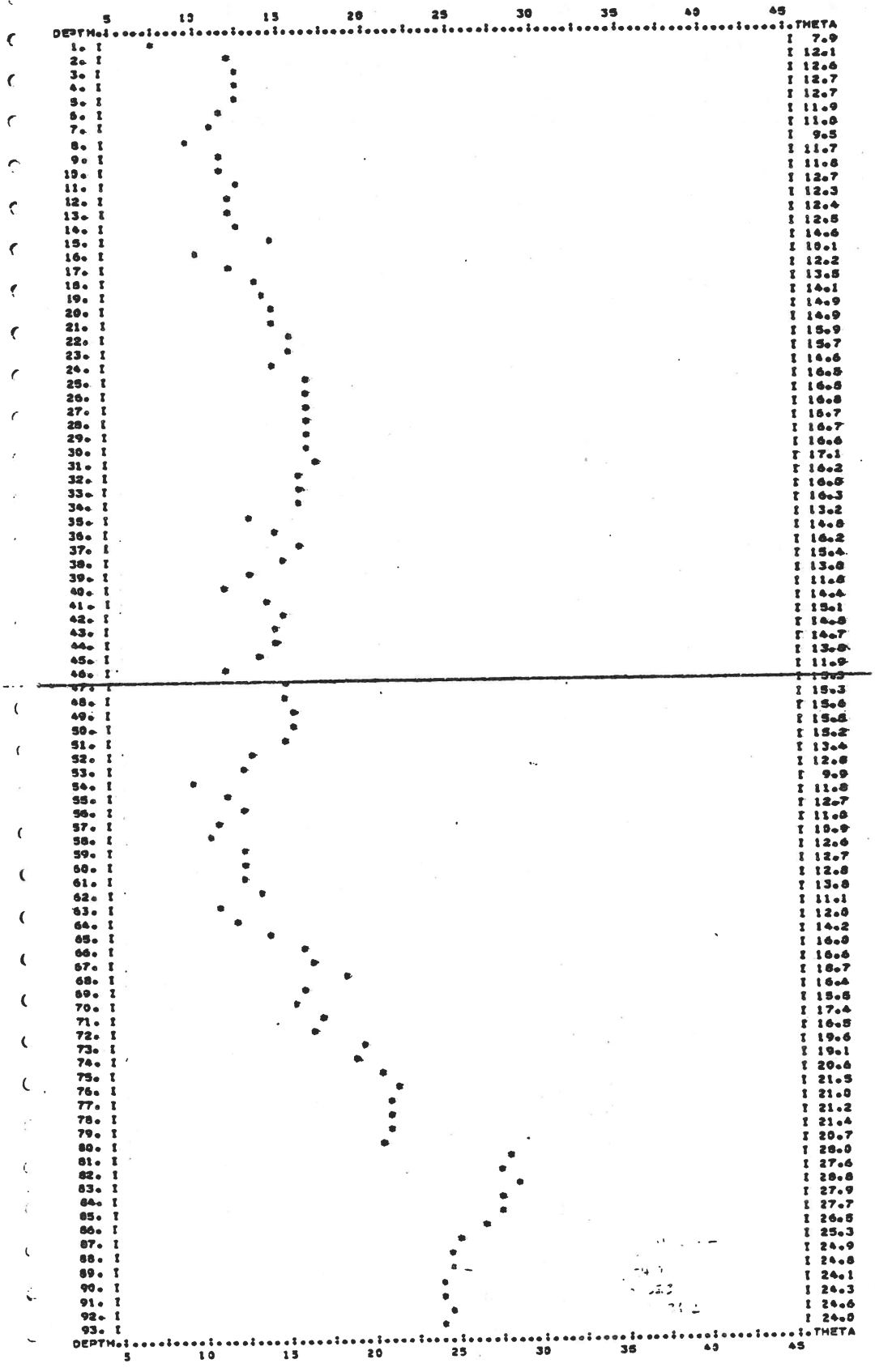
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOMIC HOLE ID=NP 3 SH= 6231.10
DATE= 21 JUNE 1977 TIME=1339 PROBE NO= WL=124.00
REMARKS= VALUES CORRECTED FOR 4.4 FEET OF WATER IN HOLE WHEN LOGGED

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



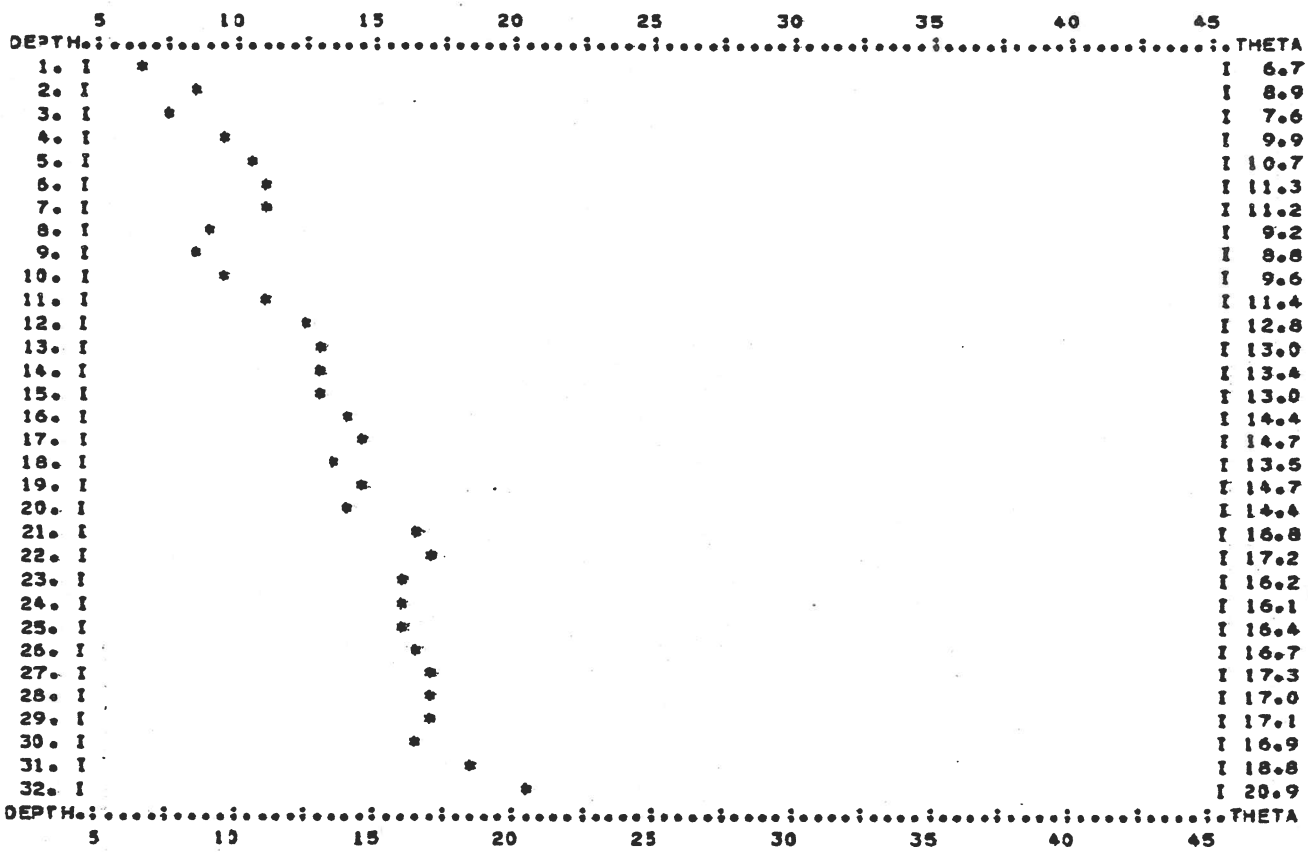
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO HOLE ID=MP 4 SN= 6206.60
DATE= 21 JUNE 1977 TIME=1513 PROBE NO= WL= 96.60
REMARKS= VALUES CORRECTED FOR 2.2 FEET OF WATER IN HOLE WHEN LOGGED

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



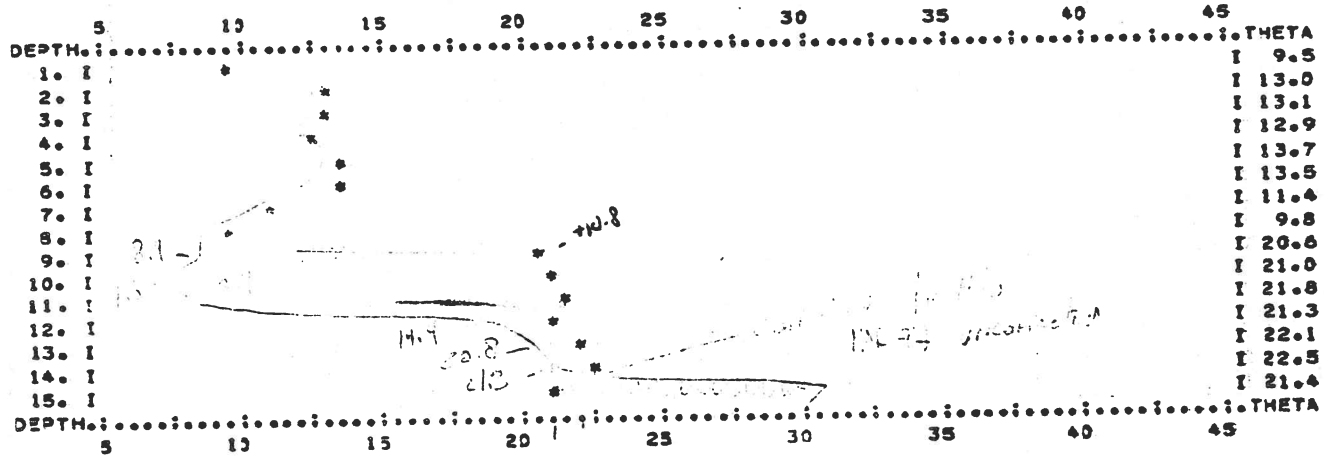
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO HOLE ID=NP 5 BM= 6171.20
DATE= 21 JUNE 1977 TIME=1113 PROBE NO= WL= 38.70
REMARKS= VALUES CORRECTED FOR 1.7 FEET OF WATER IN HOLE WHEN LOGGED

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



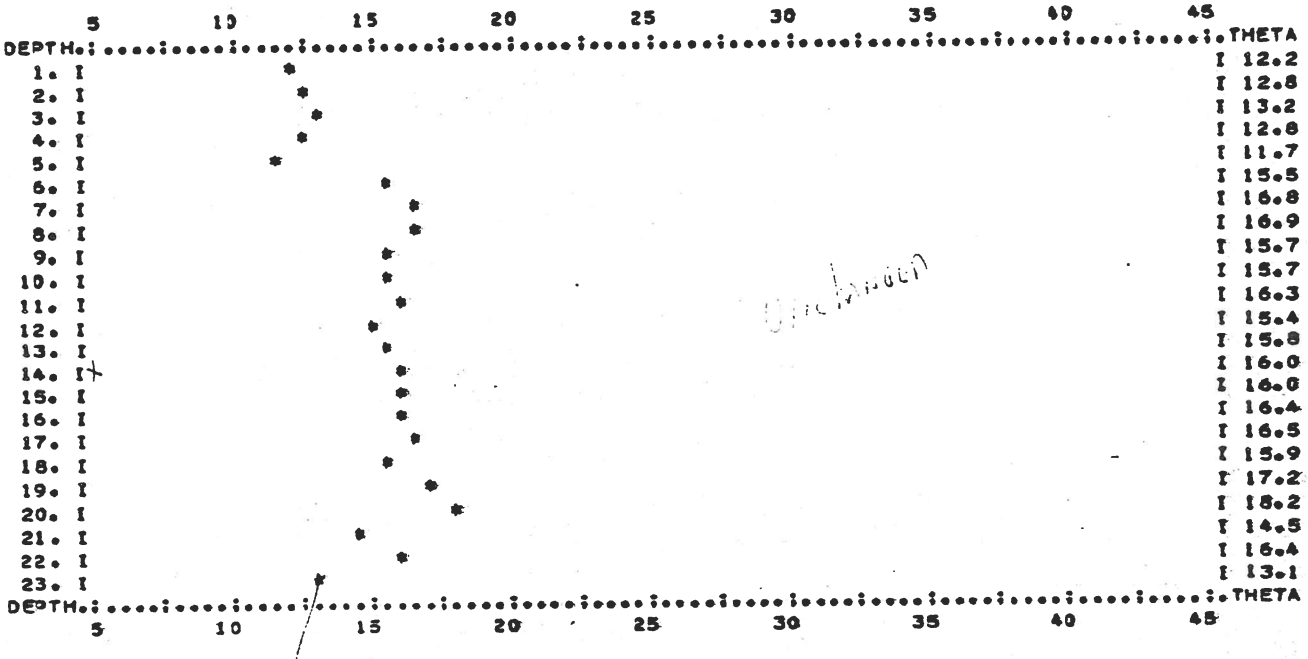
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO HOLE ID=NP 6 BM= 6152.70
DATE= 25 JUNE 1977 TIME=1350 PROBE NO= WL= 18.76
REMARKS= VALUES CORRECTED FOR 1.9 FEET OF WATER IN HOLE WHEN LOGGED NP6

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



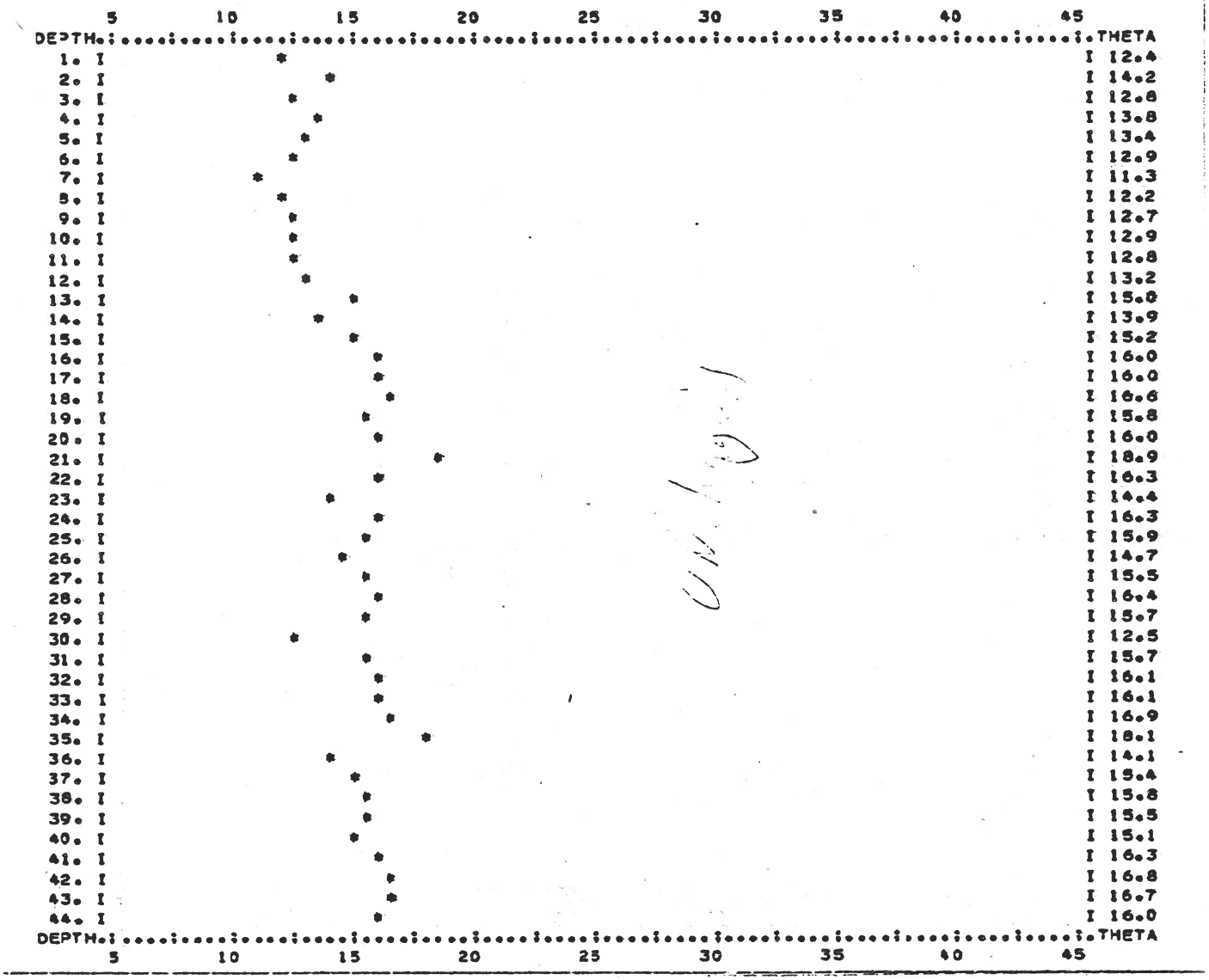
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO HOLE ID=NP 7 BH= 6176.20
DATE= 25 JUNE 1977 TIME=1435 PROBE NO= WL= 0.0
REMARKS= VALUES CORRECTED FOR 1.4 FEET OF WATER IN HOLE WHEN LOGGED NP 7

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



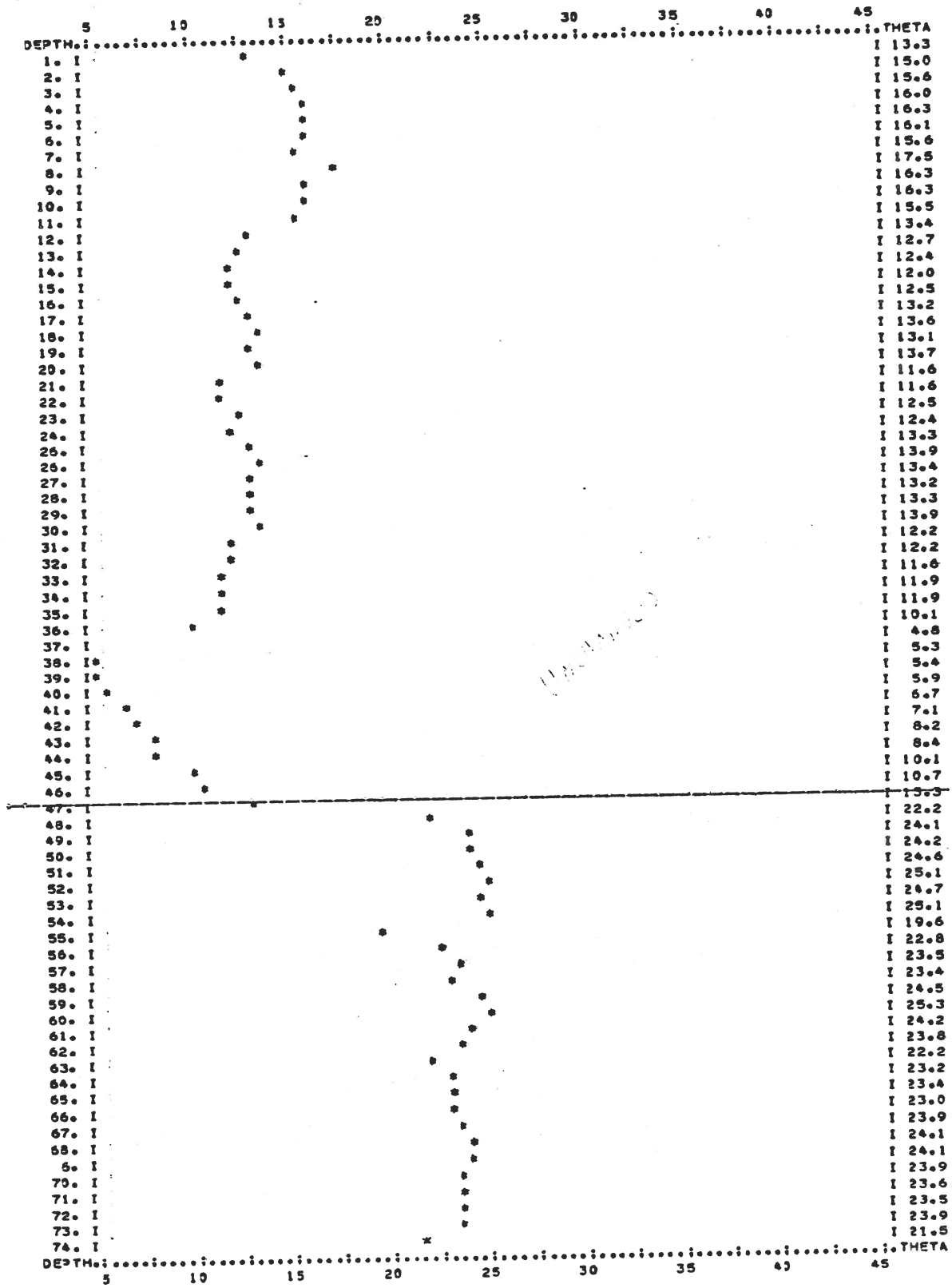
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO HOLE ID=NP 8 BM= 6227.40
DATE= 25 JUNE 1977 TIME=1530 PROBE NO= WL= 52.36
REMARKS= VALUES CORRECTED FOR 1.2 FEET OF WATER IN HOLE WHEN LOGGED NPS

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



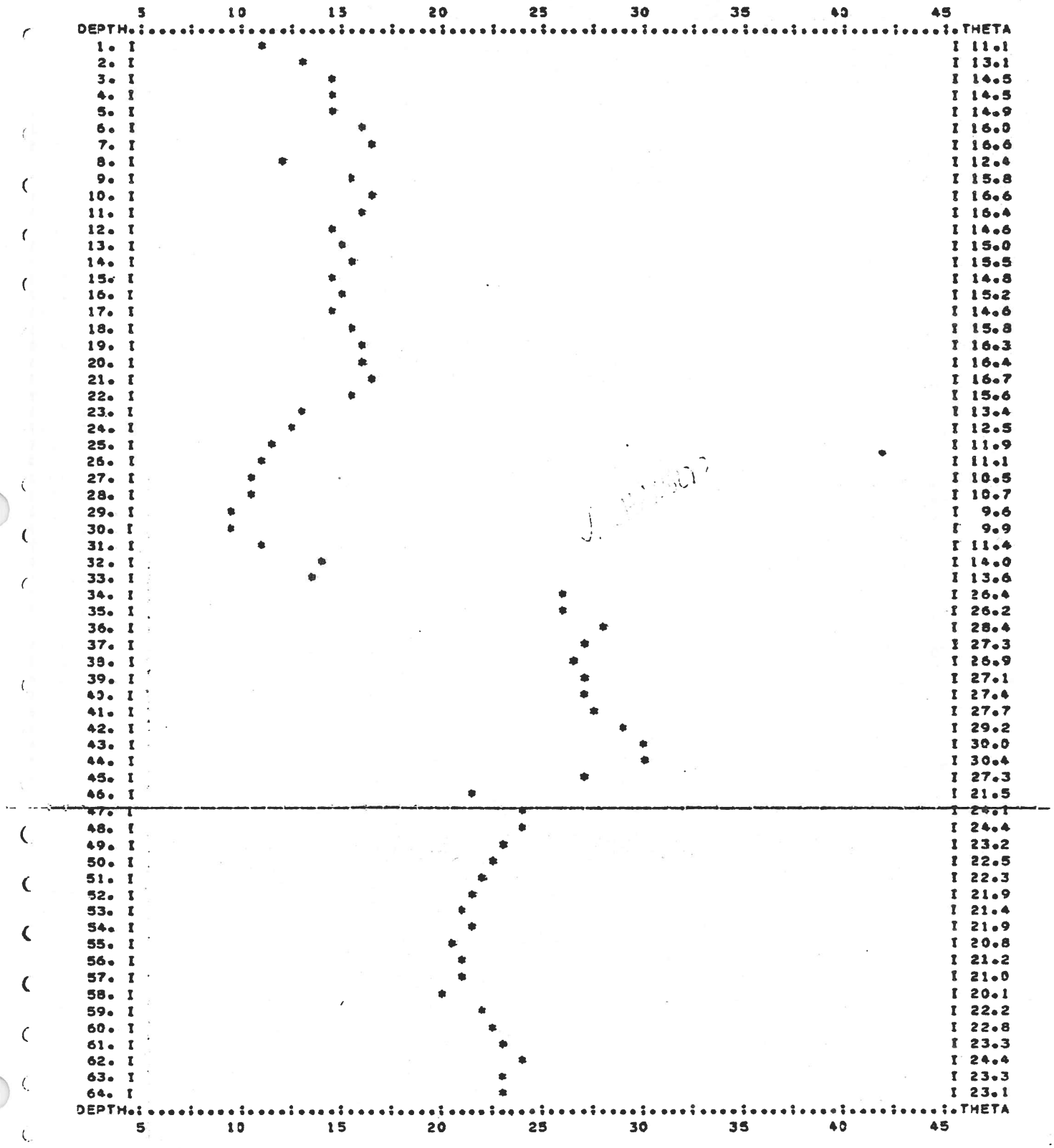
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO HOLE ID=NP14 BM= 6185.40
DATE= 25 JUNE 1977 TIME=1825 PROBE NO= WL= 79.03
REMARKS= VALUES CORRECTED FOR 1.4 FEET OF WATER IN HOLE WHEN LOGGED NP 14

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



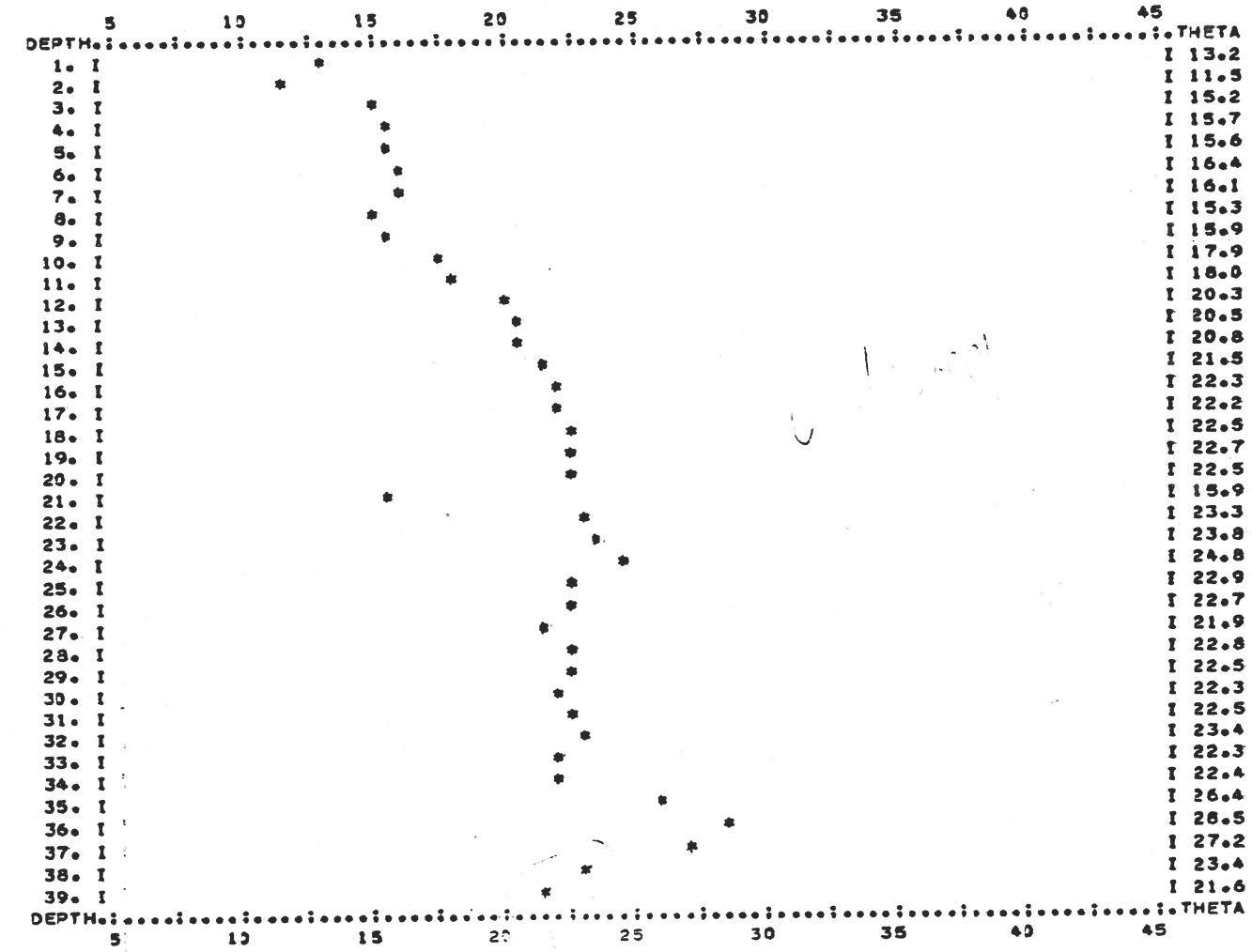
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO HOLE ID=NP15 BM= 6185.50
DATE= 25 JUNE 1977 TIME=1700 PROBE NO= WL= 68.23
REMARKS= VALUES CORRECTED FOR 1.1 FEET OF WATER IN HOLE WHEN LOGGED NP 15

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO HOLE ID=NP15 BM= 6151.00
DATE= 25 JUNE 1977 TIME=1311 PROBE NO= WL= 42.99
REMARKS= VALUES CORRECTED FOR 1.8 FEET OF WATER IN HOLE WHEN LOGGED NP 16

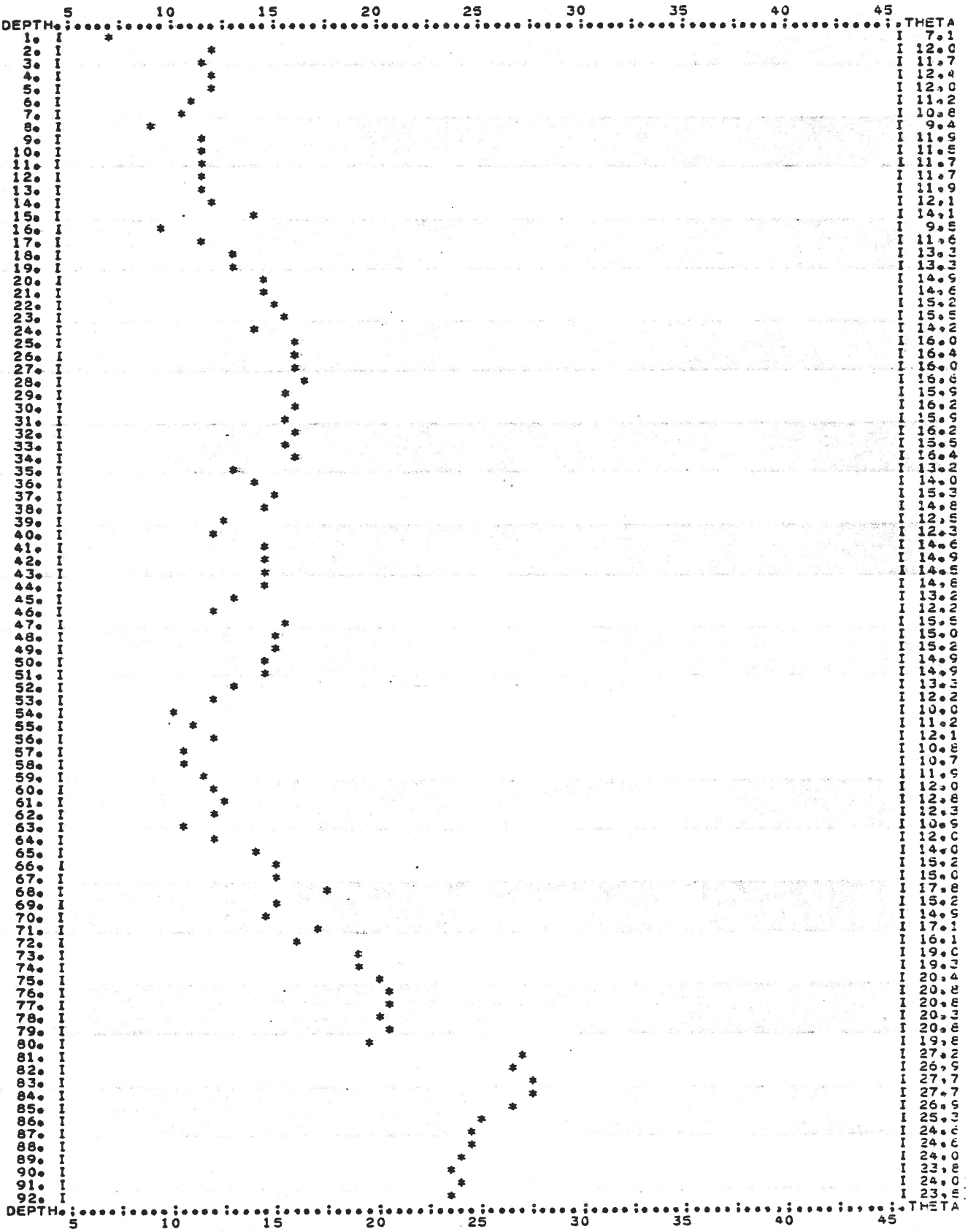
PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



Used for H_2O in hole

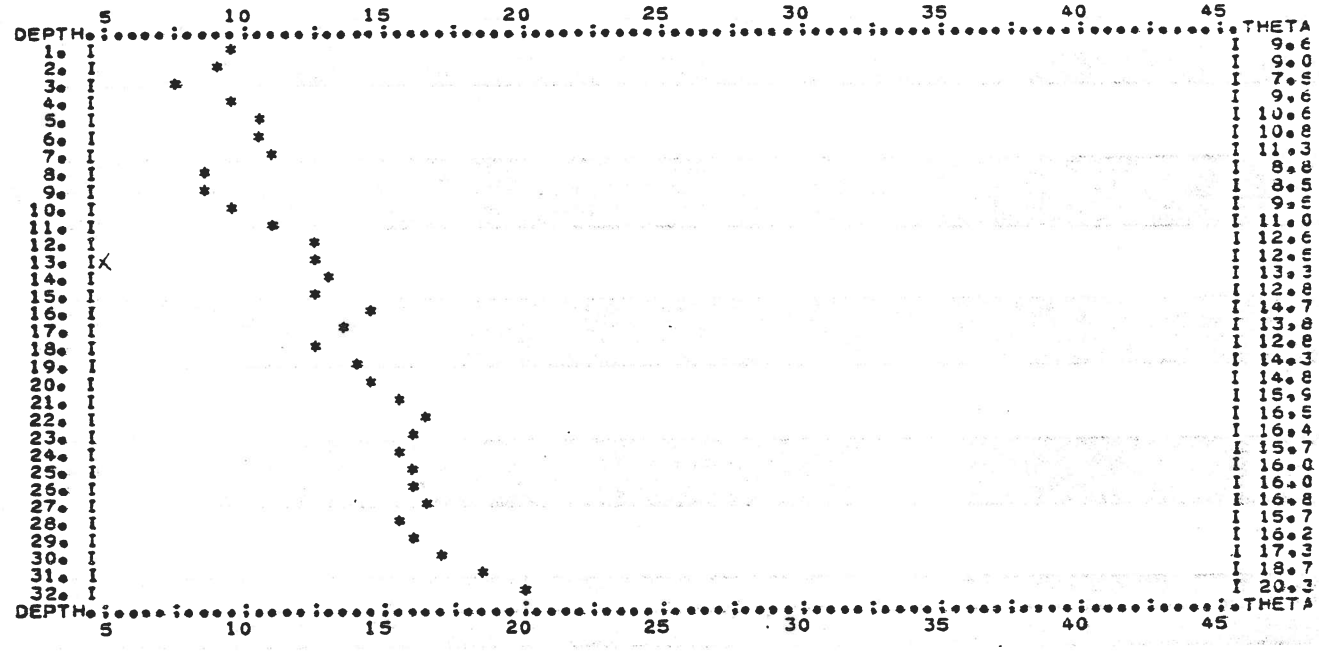
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO HOLE ID=NP-4 BM= 6206.80
DATE= 11 SEPT 1977 TIME=1150 PROBE NO= WL= 91.70
REMARKS= VALUES CORRECTED FOR 4.0 FEET OF WATER IN HOLE WHEN LOGGED NP 4

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



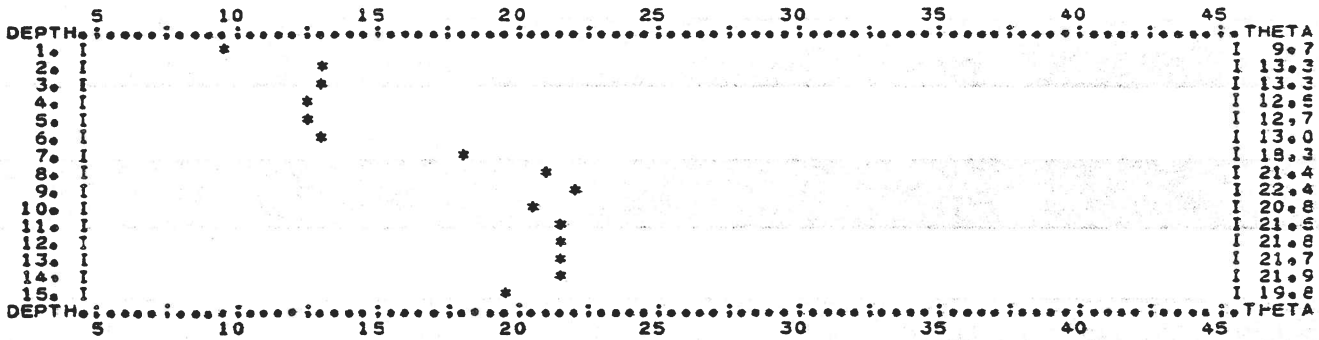
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO HOLE ID=NP-5 BM= 6171.20
DATE= 11 SEPT 1977 TIME=1300 PROBE NO= WL= 38.77
REMARKS= VALUES CORRECTED FOR 0.0 FEET OF WATER IN HOLE WHEN LOGGED NP 5

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



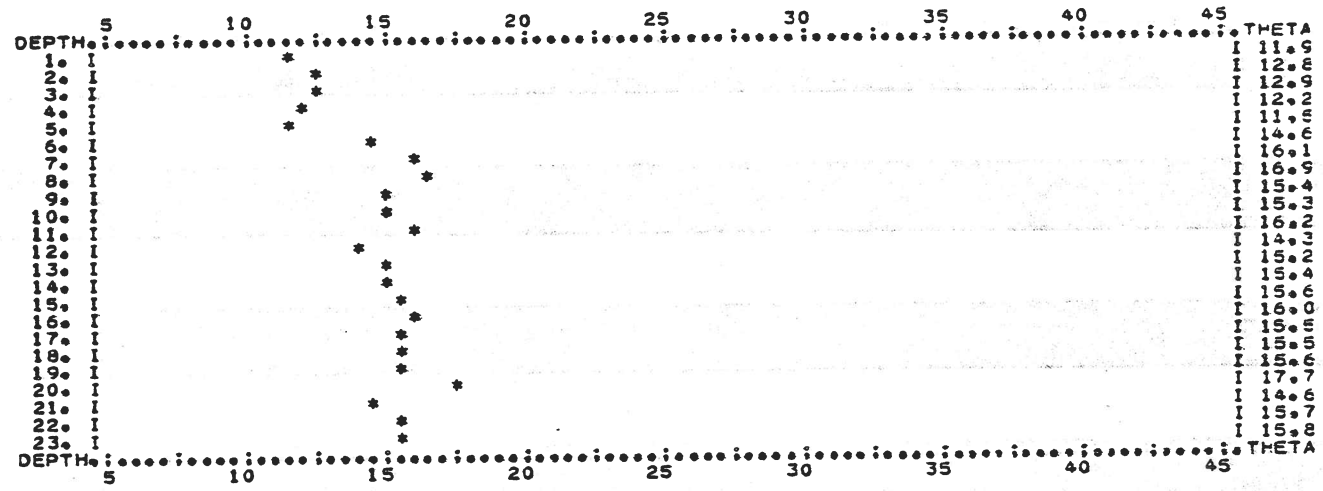
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO HOLE ID=NP-6 BM= 6152.70
DATE= 11 SEPT 1977 TIME=1415 PROBE NO= WL= 18.65
REMARKS= VALUES CORRECTED FOR 1.7 FEET OF WATER IN HOLE WHEN LOGGED NP 6

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



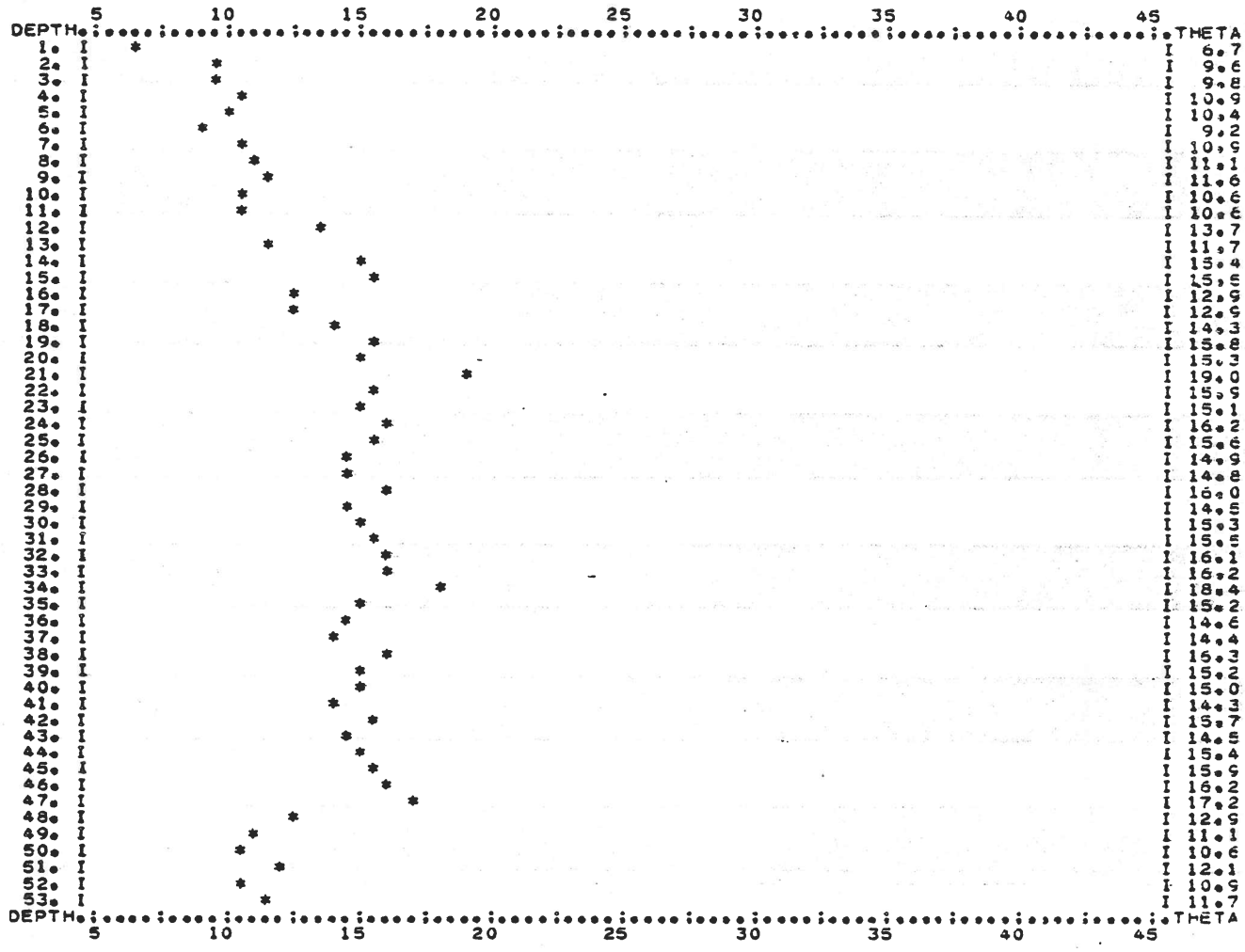
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO HOLE ID=NP-7 BM= 6176.20
DATE= 11 SEPT 1977 TIME=1440 PROBE NO= WL= 27.30
REMARKS= VALUES CORRECTED FOR 1.5 FEET OF WATER IN HOLE WHEN LOGGED NP 7

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



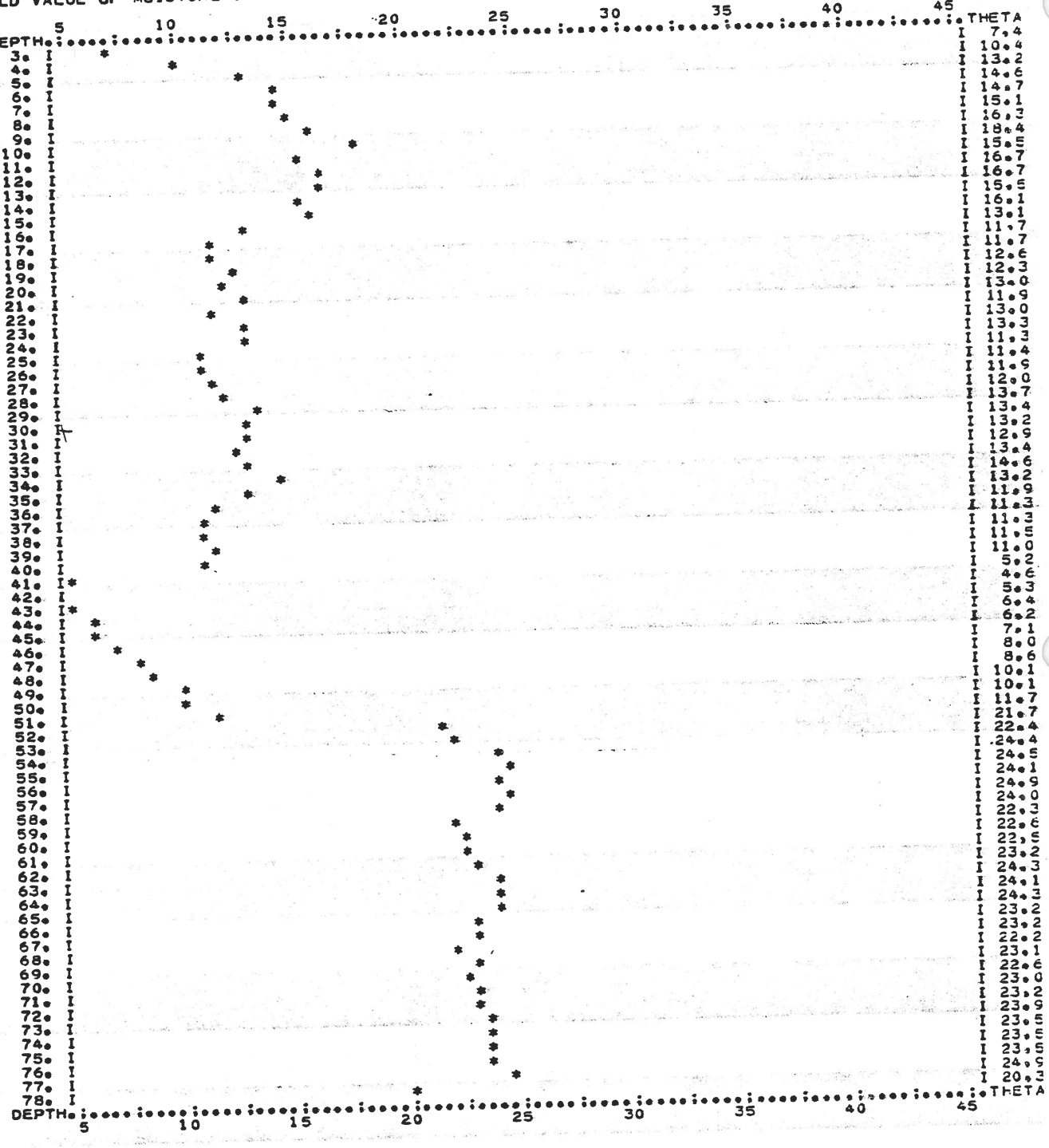
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO HOLE ID=NP-9 BM= 6230.20
DATE= 11 SEPT 1977 TIME=1705 PROBE NO= WL= 60.70
REMARKS= VALUES CORRECTED FOR 1.7 FEET OF WATER IN HOLE WHEN LOGGED NP 9

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO HOLE ID=NP14 BM= 6185.40
DATE= 11 SEPT 1977 TIME=1530 PROBE NO= WL= 83.15
REMARKS= VALUES CORRECTED FOR 2.0 FEET OF WATER IN HOLE WHEN LOGGED NP 14

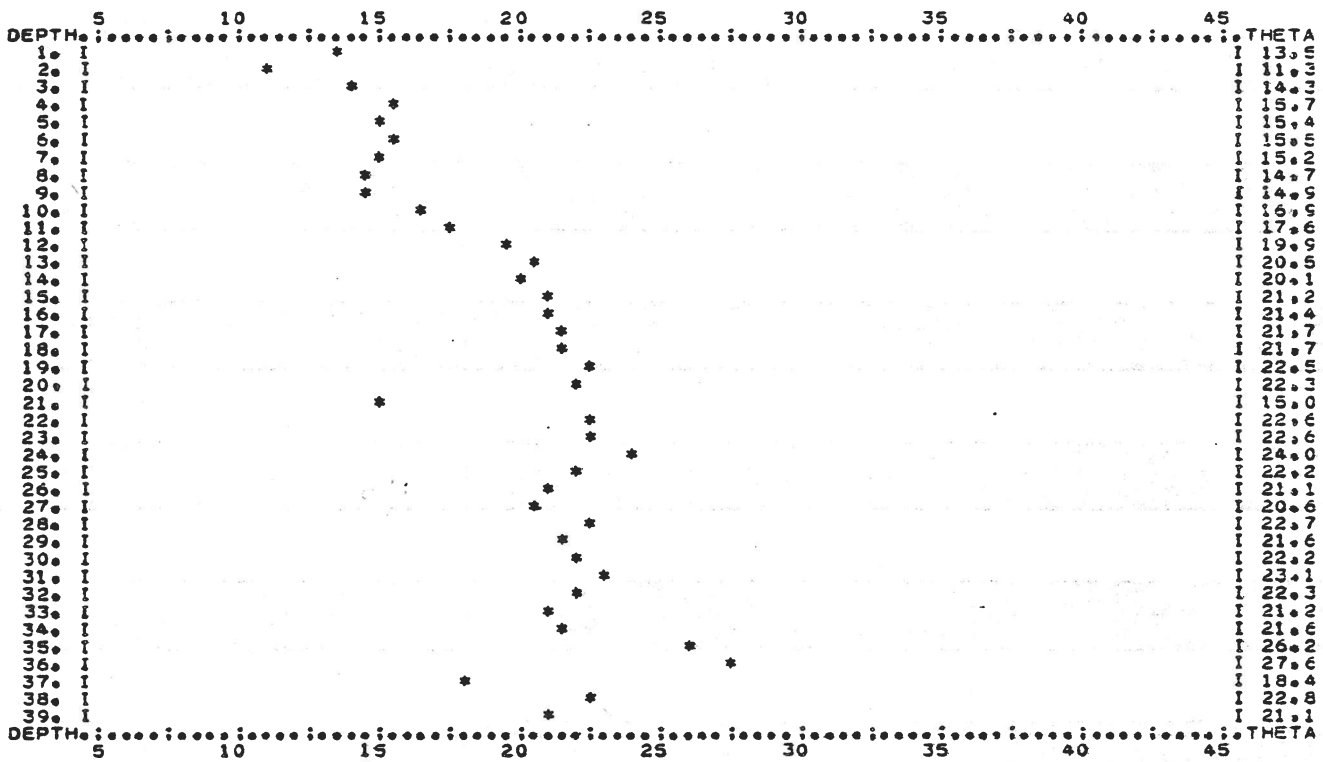
PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



DEPTH	THETA	DEPTH	THETA	DEPTH	THETA
3.	7.4	30.	12.9	57.	22.3
4.	10.4	31.	13.4	58.	22.6
5.	13.2	32.	14.6	59.	22.5
6.	14.6	33.	13.2	60.	23.2
7.	14.7	34.	11.9	61.	24.3
8.	15.1	35.	11.3	62.	24.1
9.	16.3	36.	11.3	63.	24.3
10.	18.4	37.	11.5	64.	23.2
11.	15.5	38.	11.0	65.	23.2
12.	16.7	39.	5.2	66.	22.2
13.	16.7	40.	4.6	67.	23.1
14.	15.5	41.	5.3	68.	22.6
15.	16.1	42.	6.4	69.	23.0
16.	13.1	43.	6.2	70.	23.2
17.	11.7	44.	7.1	71.	23.9
18.	11.7	45.	8.0	72.	23.5
19.	12.6	46.	8.6	73.	23.5
20.	12.3	47.	10.1	74.	23.5
21.	13.0	48.	10.1	75.	24.9
22.	11.9	49.	11.7	76.	20.3
23.	13.0	50.	21.7	77.	
24.	13.3	51.	22.4	78.	
25.	11.3	52.	24.4		
26.	11.4	53.	24.5		
27.	11.9	54.	24.1		
28.	12.0	55.	24.9		
29.	13.7	56.	24.0		

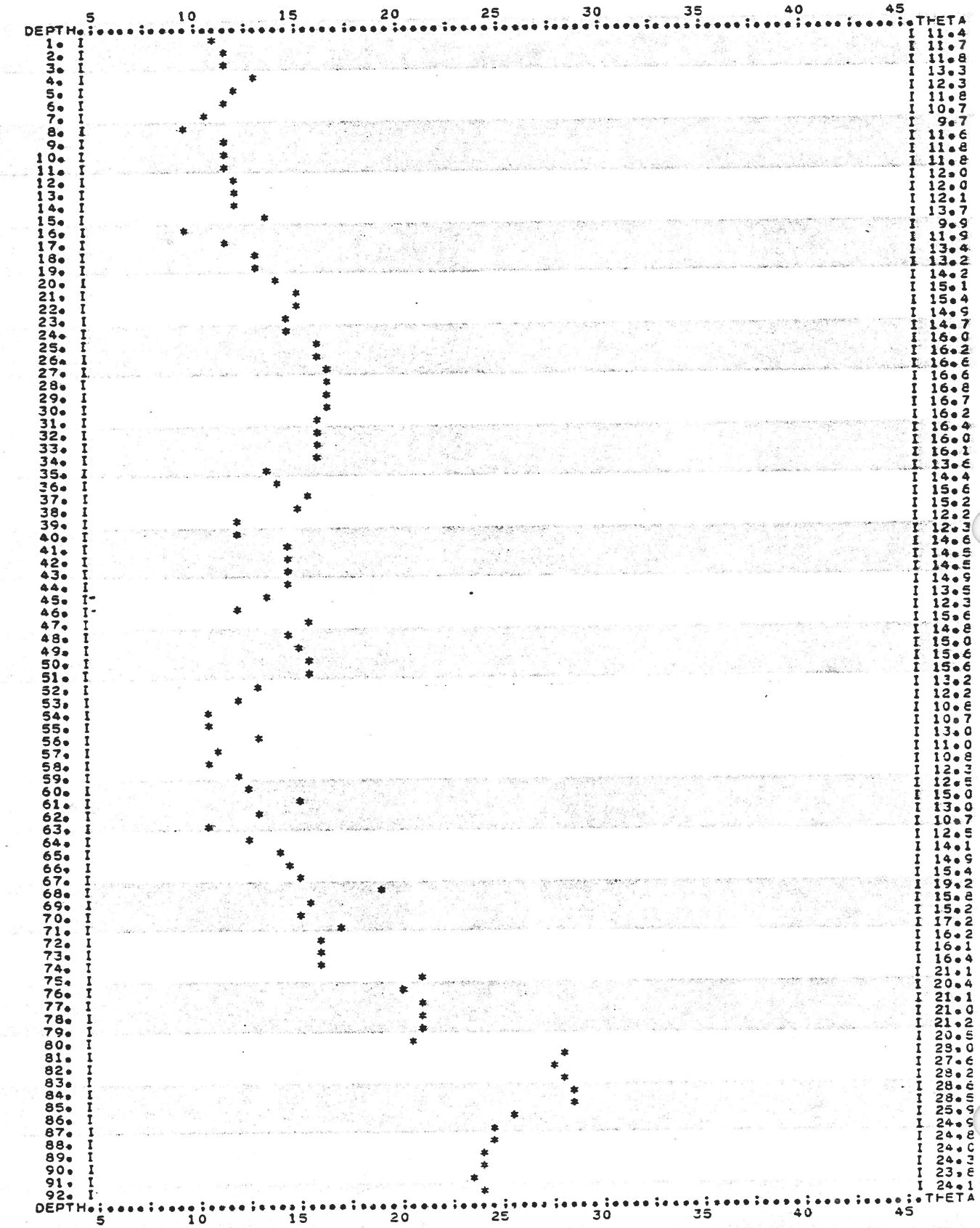
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO HOLE ID=NP16 BM= 6151.00
DATE= 11 SEPT 1977 TIME=1340 PROBE NO= WL= 42.47
REMARKS= VALUES CORRECTED FOR 3.7 FEET OF WATER IN HOLE WHEN LOGGED NP 16

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



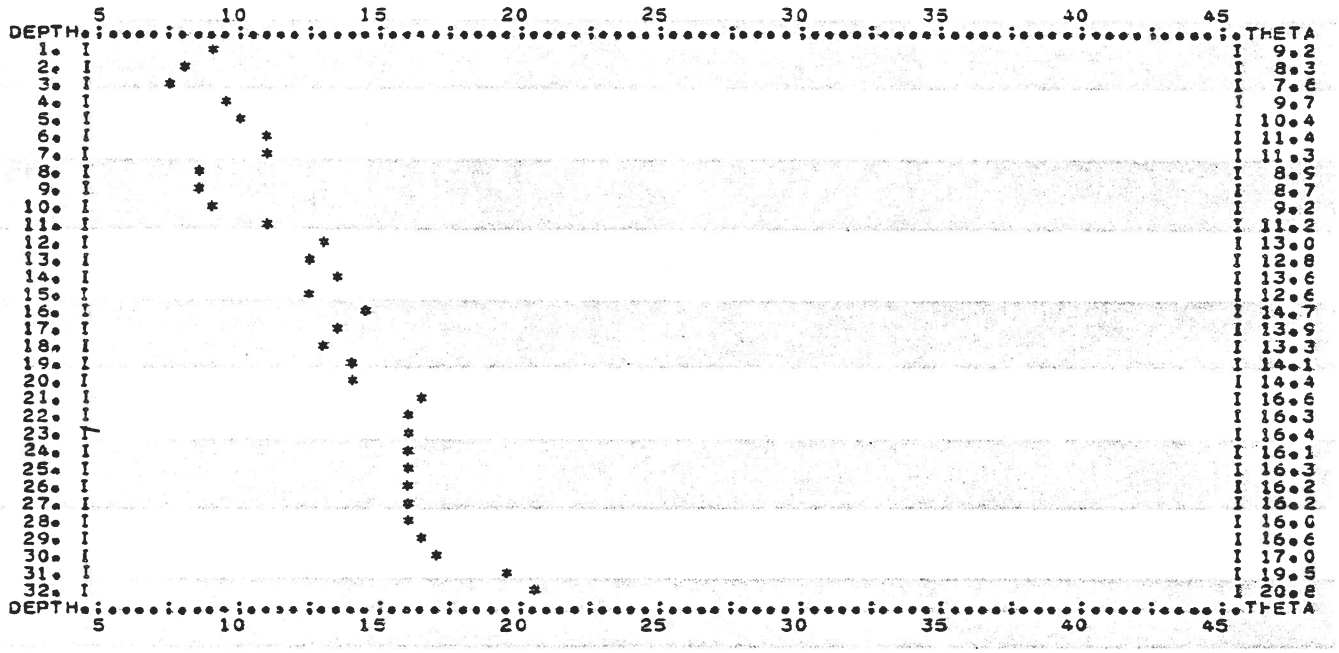
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO HOLE ID=NP-4 BM= 6206.80
DATE= 7 DEC 1977 TIME=1030 PROBE NO= WL= 95.71
REMARKS= VALUES CORRECTED FOR 4.5 FEET OF WATER IN HOLE WHEN LOGGED NP 4

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



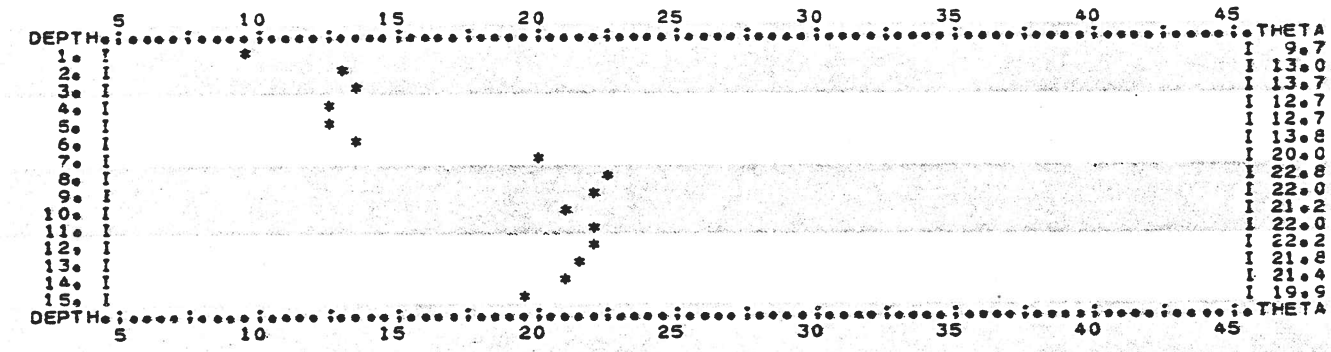
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SCHIO HOLE ID=NP-5 BM= 6171.20
DATE= 7 DEC 1977 TIME=1155 PROBE NO= WL= 38.56
REMARKS= VALUES CORRECTED FOR 0.0 FEET OF WATER IN HOLE WHEN LOGGED NP 5

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



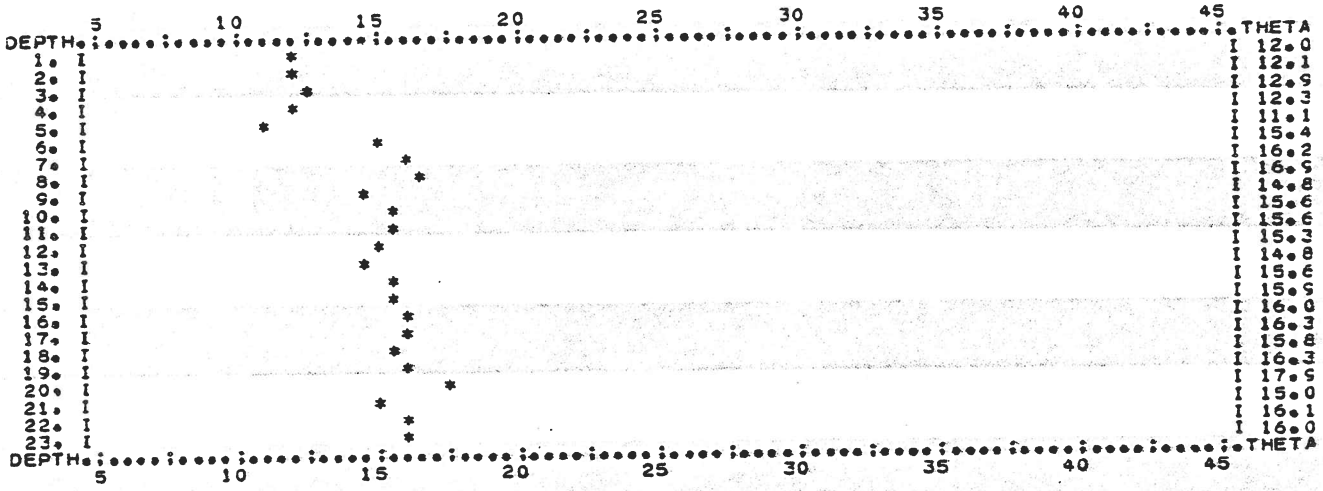
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO HOLE ID=NP-6 BM= 6152.70
DATE= 7 DEC 1977 TIME=1255 PROBE NO= WL= 18.56
REMARKS= VALUES CORRECTED FOR 1.8 FEET OF WATER IN HOLE WHEN LOGGED NP 6

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



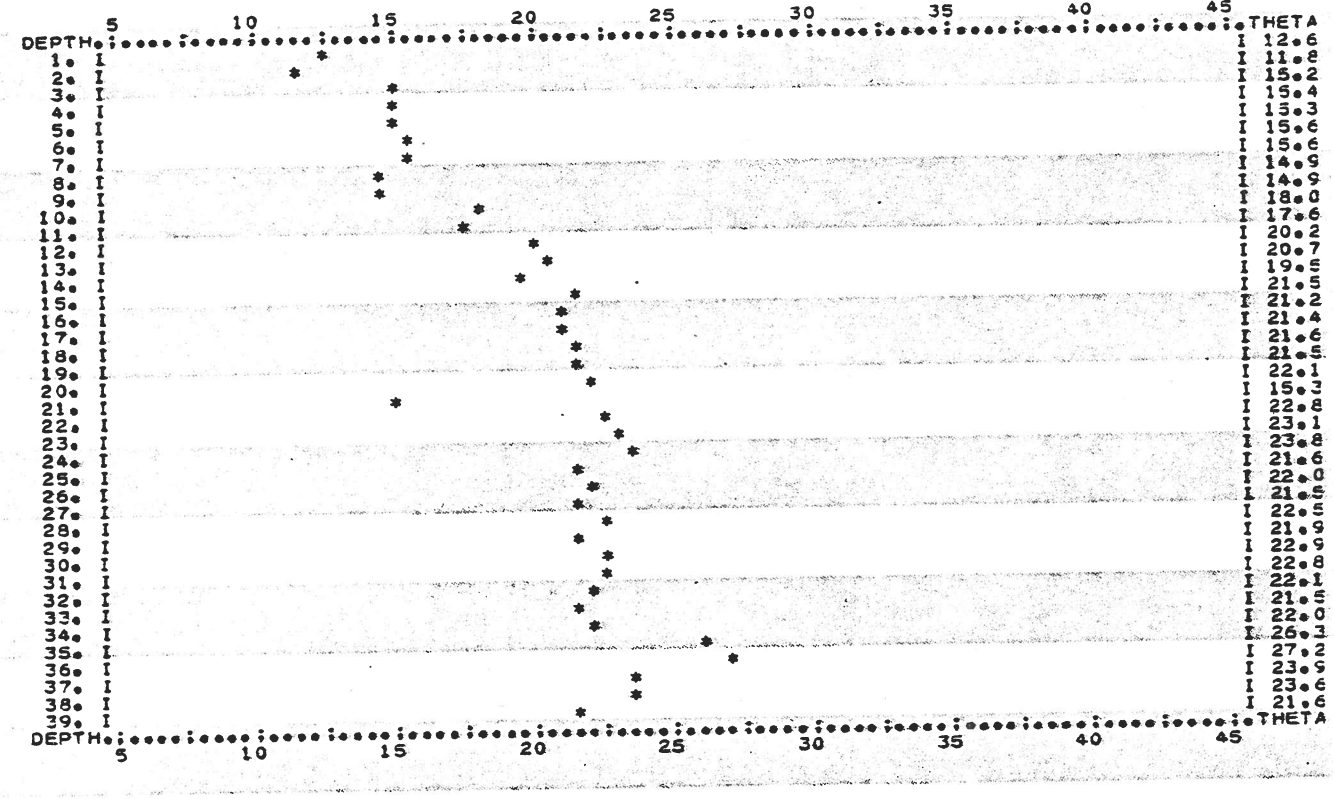
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO HOLE ID=NP-7 BM= 6176.20
DATE= 7 DEC 1977 TIME=1315 PROBE NO= WL= 27.19
REMARKS= VALUES CORRECTED FOR 1.5 FEET OF WATER IN HOLE WHEN LOGGED NP 7

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



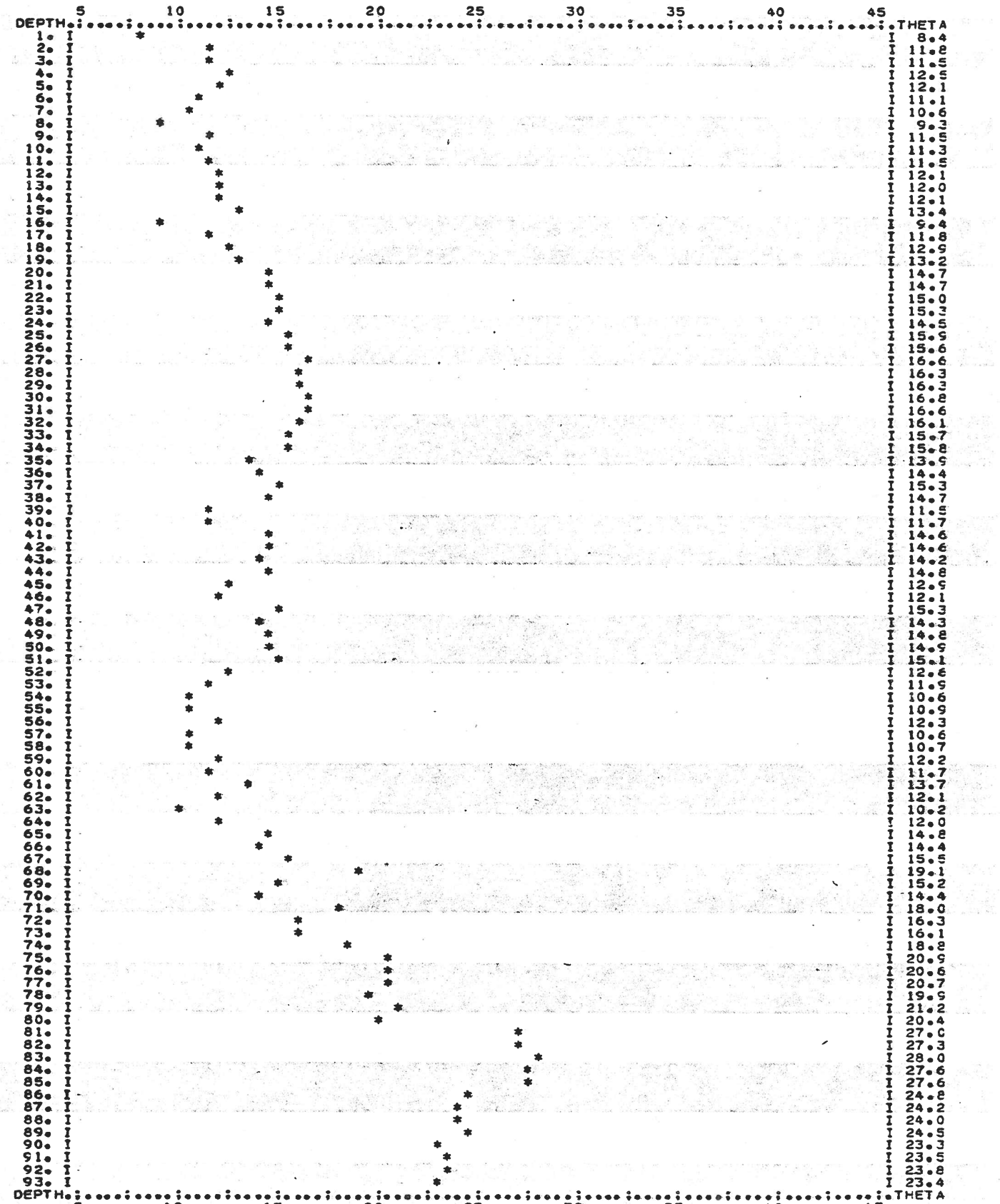
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO HOLE ID=NP16 BM= 6151.00
DATE= 7 DEC 1977 TIME=1220 PROBE NO= WL= 42.19
REMARKS= VALUES CORRECTED FOR 3.0 FEET OF WATER IN HOLE WHEN LOGGED NP 16

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



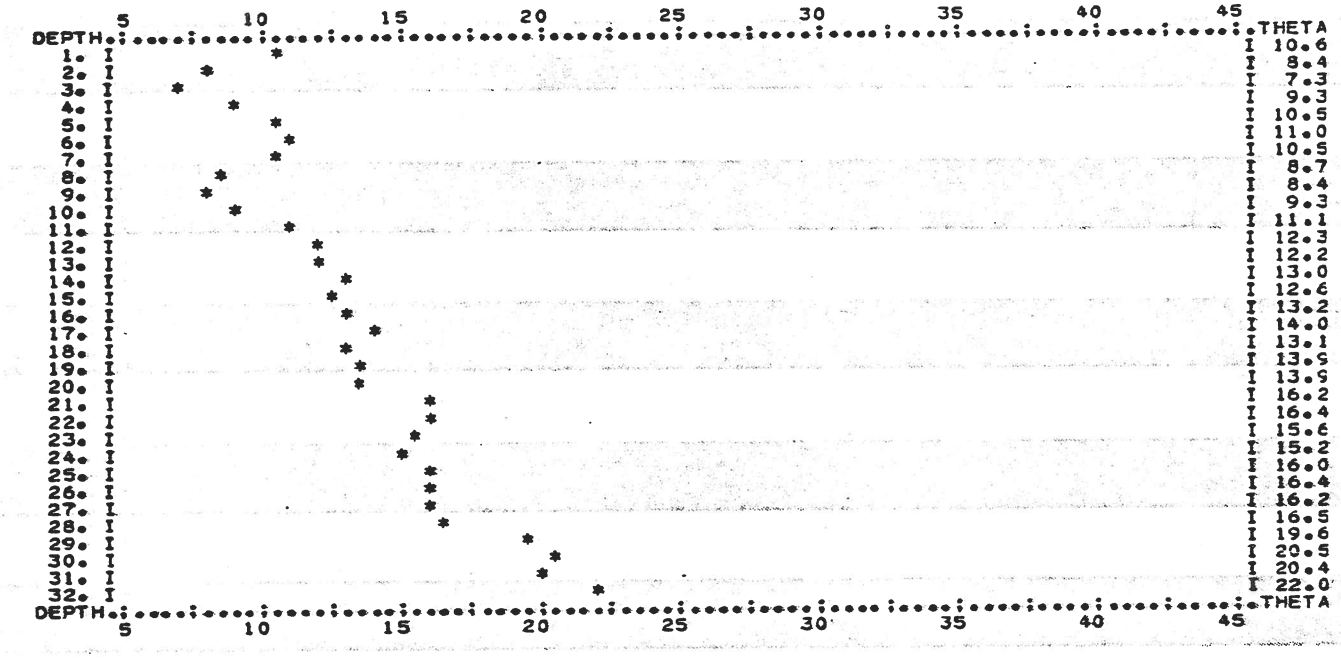
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO HOLE ID=NP-4 BM= 6206.80
DATE= 15 MAR 1978 TIME=1145 PROBE NO= WL=95.92
REMARKS= VALUES CORRECTED FOR 5.0 FEET OF WATER IN HOLE WHEN LOGGED NP 4

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



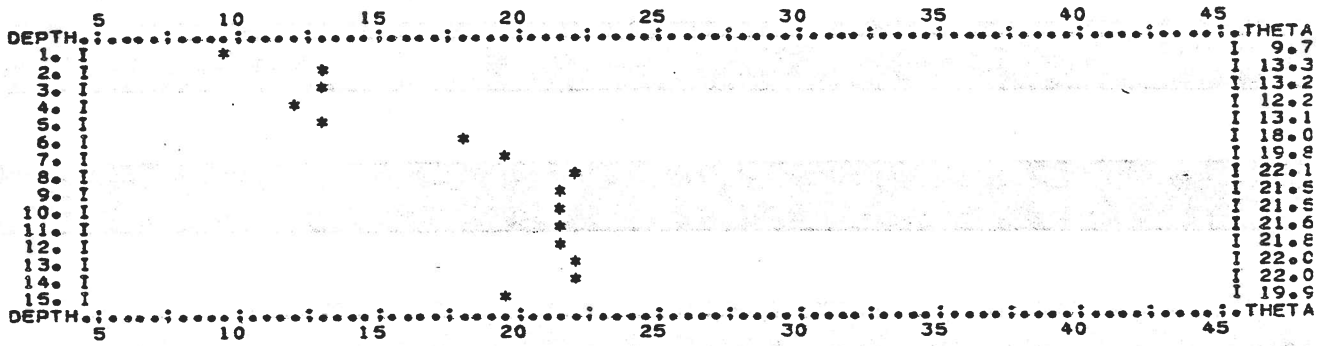
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO HOLE ID=NP-5 BM= 6171.20
DATE= 15 MAR 1978 TIME=1300 PROBE NO= WL=38.40
REMARKS= VALUES CORRECTED FOR 0.0 FEET OF WATER IN HOLE WHEN LOGGED NP 5

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



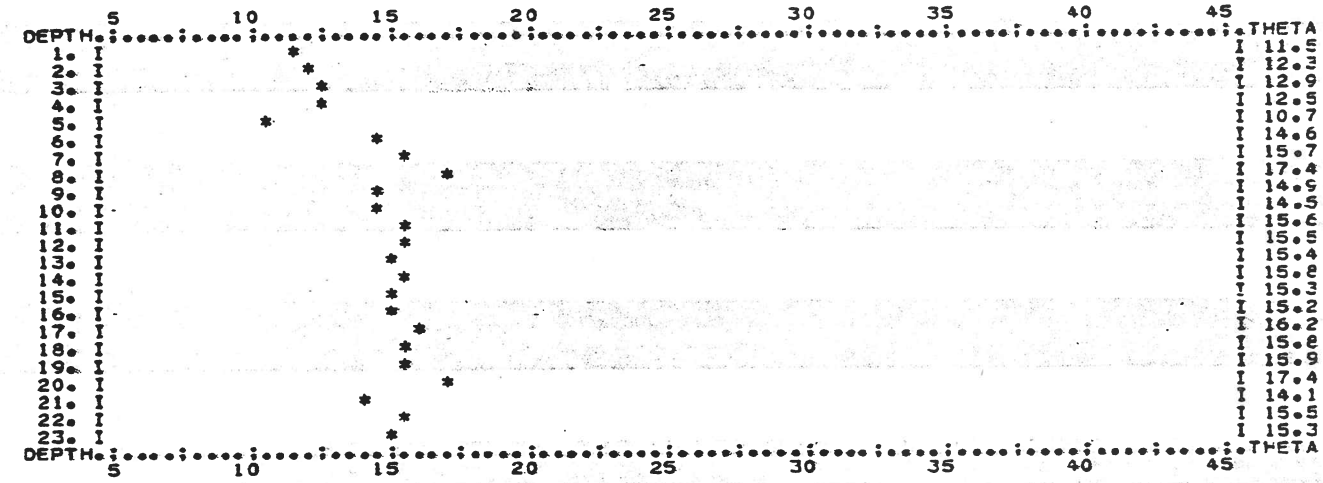
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO HOLE ID=NP-6 BM= 6152.70
DATE= 15 MAR 1978 TIME=1400 PROBE NO= WL=12.39
REMARKS= VALUES CORRECTED FOR 1.0 FEET OF WATER IN HOLE WHEN LOGGED NP 6

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



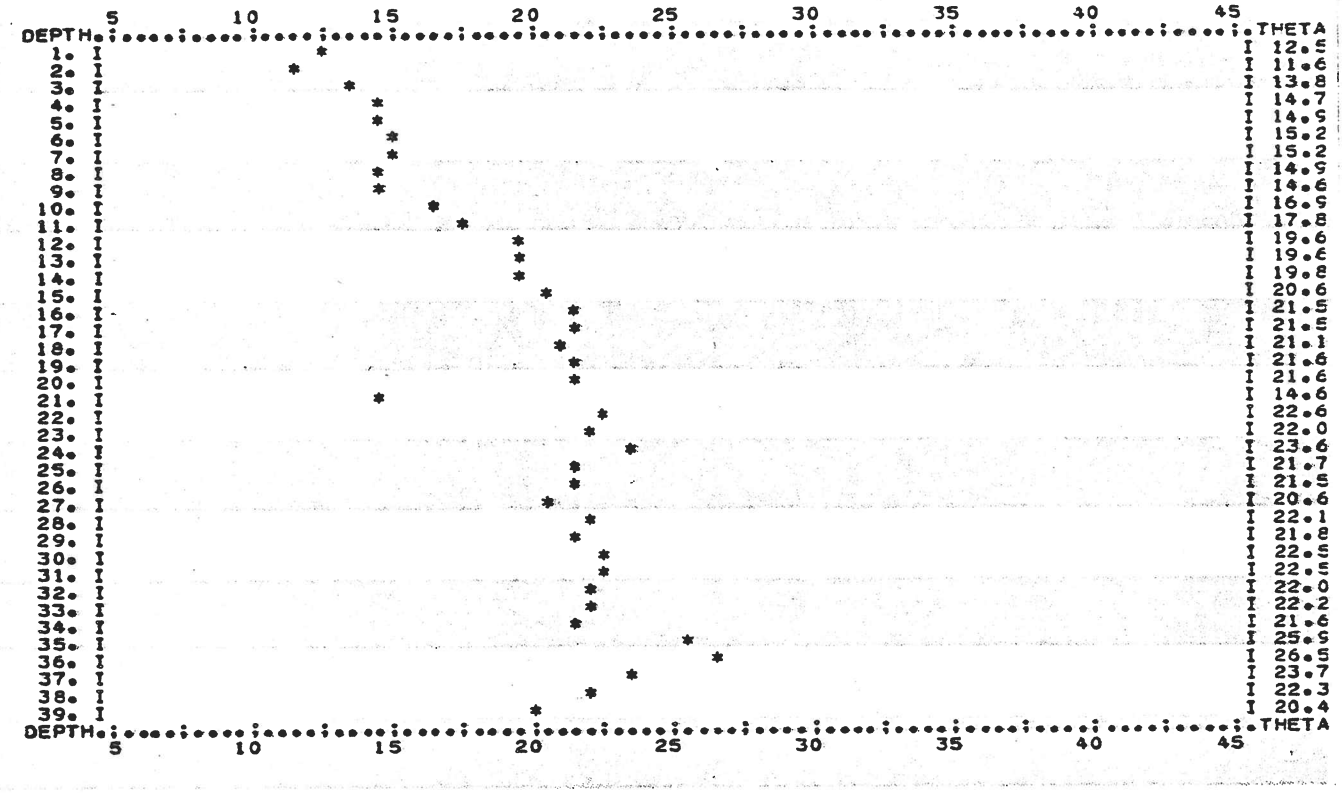
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO HOLE ID=NP-7 BM= 6176.20
DATE= 15 MAR 1978 TIME=1430 PROBE NO= WL=27.20
REMARKS= VALUES CORRECTED FOR 1.0 FEET OF WATER IN HOLE WHEN LOGGED NP 7

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



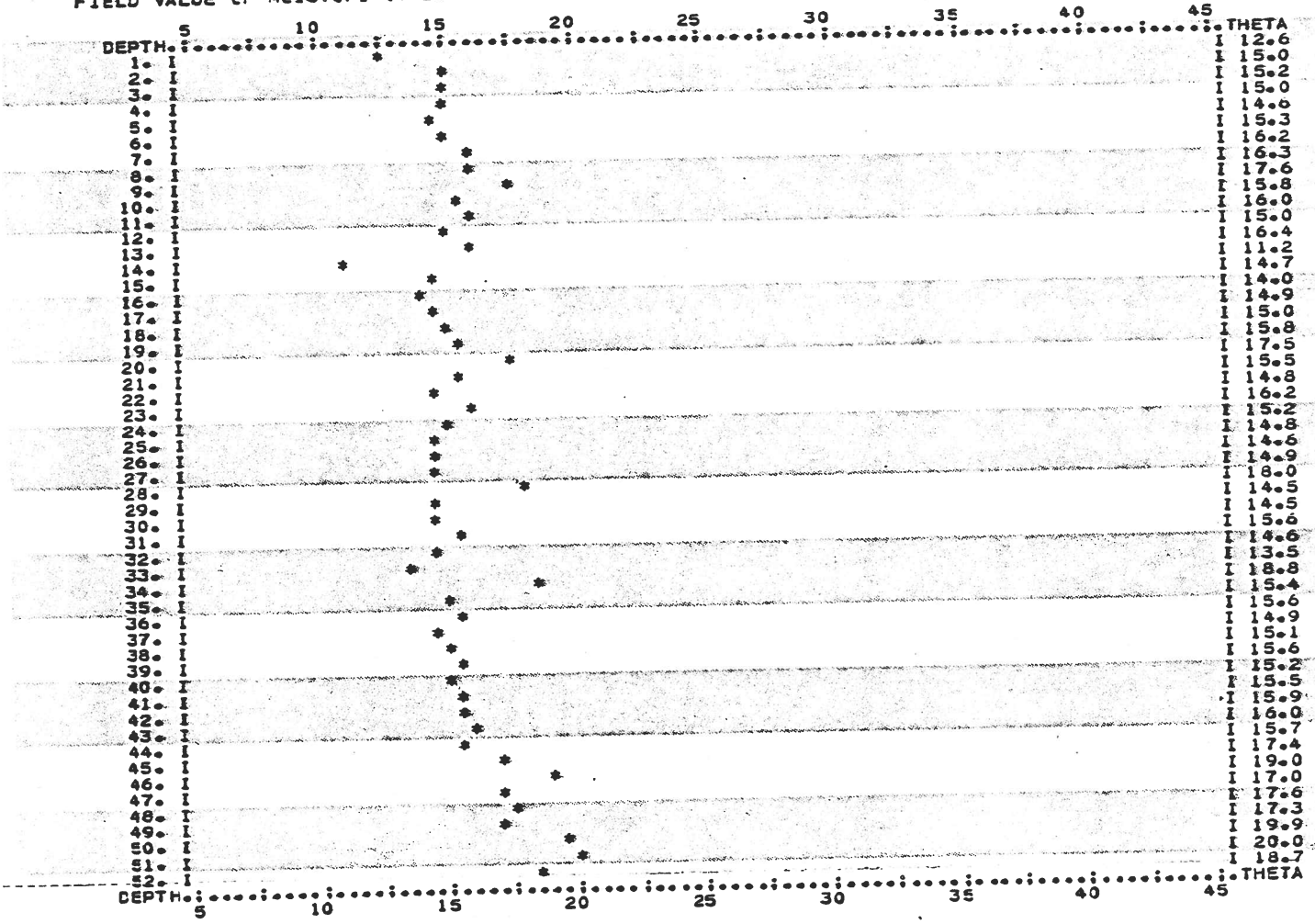
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO HOLE ID=NP16 BM= 6151.00
DATE= 15 MAR 1978 TIME=1330 PROBE NO= WL=41.83
REMARKS= VALUES CORRECTED FOR 3.0 FEET OF WATER IN HOLE WHEN LOGGED NP 16

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



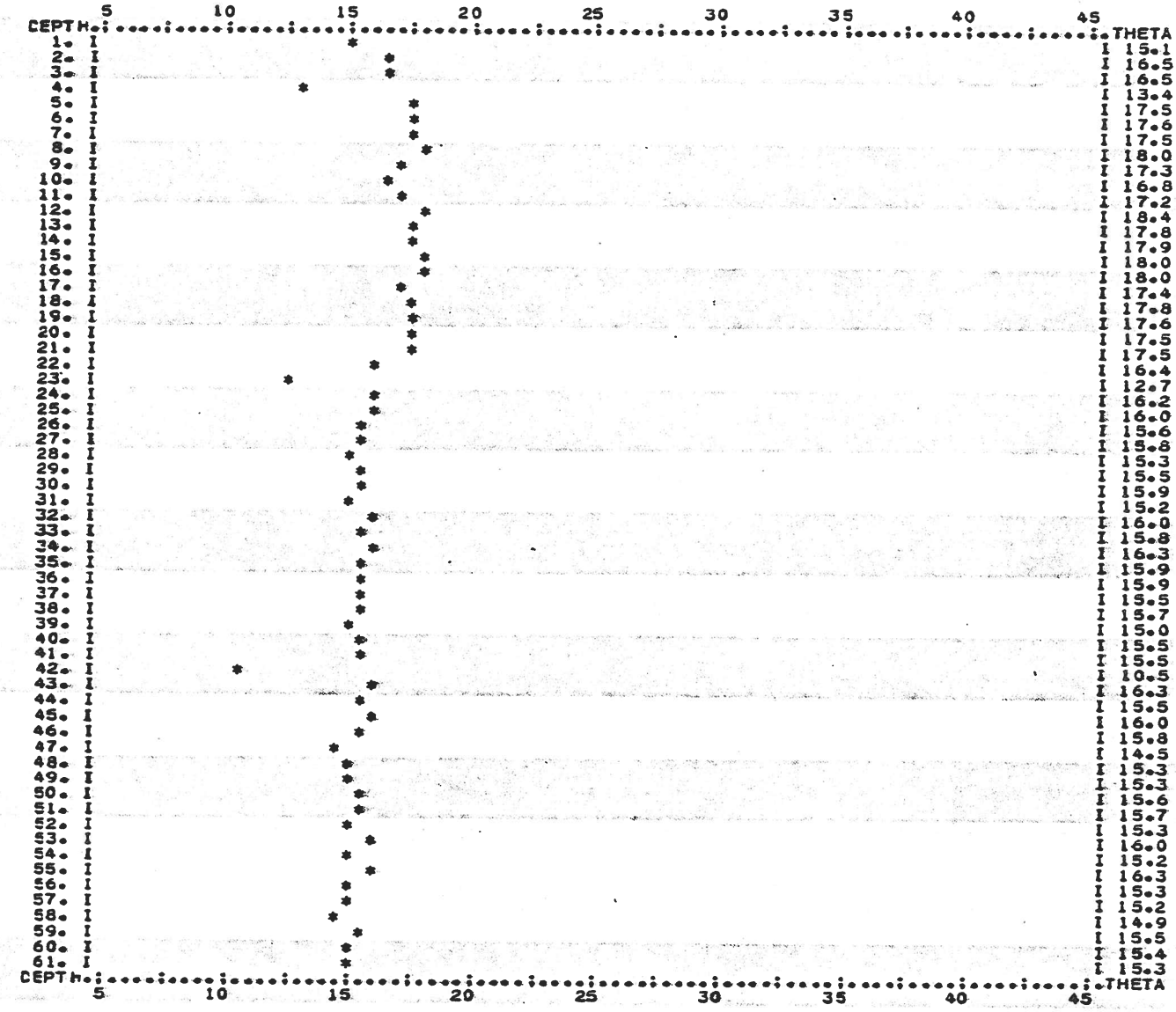
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO HOLE ID=NP 1 BM= 6192.00
DATE= 26 JUNE 1978 TIME=1000 PROBE NO= WL=52.4
REMARKS= VALUES CORRECTED FOR 5.0 FEET OF WATER IN HOLE WHEN LOGGED NP-1

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SONIC HOLE ID=NP 2 BM= 6220.20
DATE= 26 JUNE 1978 TIME=1200 PROBE NO= WL=61.20
REMARKS= VALUES CORRECTED FOR 6.0 FEET OF WATER IN HOLE WHEN LOGGED NP-2

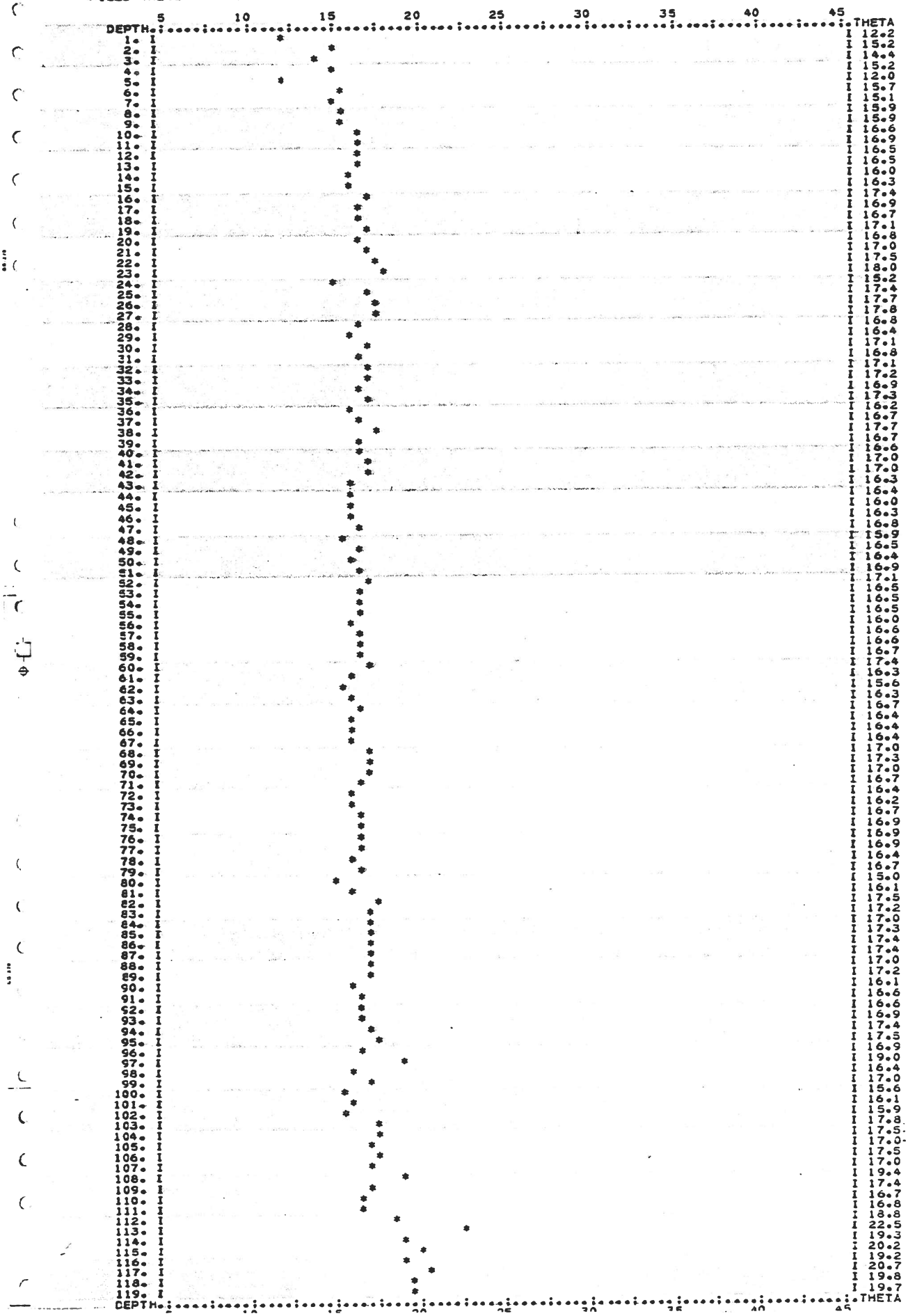
PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



DEPTH	THETA
1.	15.1
2.	16.5
3.	16.5
4.	13.4
5.	17.5
6.	17.6
7.	17.5
8.	18.0
9.	17.3
10.	16.8
11.	17.2
12.	18.4
13.	17.8
14.	17.9
15.	18.0
16.	18.0
17.	17.4
18.	17.8
19.	17.6
20.	17.5
21.	17.5
22.	16.4
23.	12.7
24.	16.2
25.	16.0
26.	15.6
27.	15.8
28.	15.3
29.	15.5
30.	15.9
31.	15.2
32.	16.0
33.	15.8
34.	16.3
35.	15.9
36.	15.9
37.	15.5
38.	15.7
39.	15.0
40.	15.5
41.	15.5
42.	10.5
43.	16.3
44.	15.5
45.	16.0
46.	15.8
47.	14.5
48.	15.3
49.	15.3
50.	15.6
51.	15.7
52.	15.3
53.	16.0
54.	15.2
55.	16.3
56.	15.3
57.	15.2
58.	14.9
59.	15.5
60.	15.4
61.	15.3

AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO HOLE ID=NP 3 BM= 6231.10
DATE= 26 JUNE 1978 TIME=1330 PROBE NO= WL=121.92
REMARKS= VALUES CORRECTED FOR 6.0 FEET OF WATER IN HOLE WHEN LOGGED NP-3

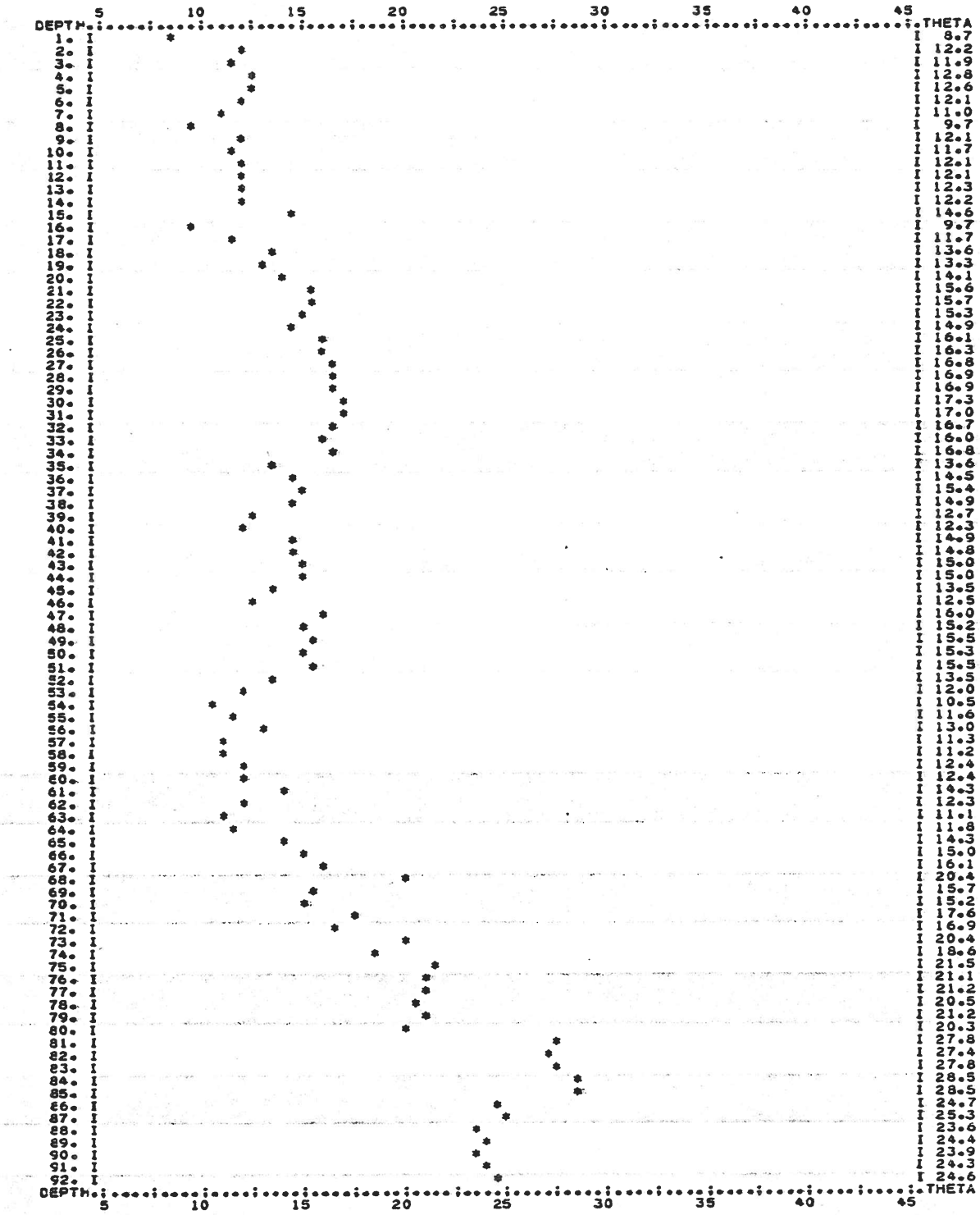
PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



DEPTH	THETA
1.	12.2
2.	15.2
3.	14.4
4.	15.2
5.	12.0
6.	15.7
7.	15.1
8.	15.9
9.	15.9
10.	16.6
11.	16.9
12.	16.5
13.	16.5
14.	16.0
15.	16.3
16.	17.4
17.	16.9
18.	16.7
19.	17.1
20.	16.8
21.	17.0
22.	17.5
23.	18.0
24.	15.2
25.	17.4
26.	17.7
27.	17.8
28.	16.8
29.	16.4
30.	17.1
31.	16.8
32.	17.1
33.	17.2
34.	16.9
35.	17.3
36.	16.2
37.	16.7
38.	17.7
39.	16.7
40.	16.6
41.	17.0
42.	17.0
43.	16.3
44.	16.4
45.	16.0
46.	16.3
47.	16.8
48.	15.9
49.	16.5
50.	16.4
51.	16.9
52.	17.1
53.	16.5
54.	16.5
55.	16.5
56.	16.0
57.	16.6
58.	16.6
59.	16.7
60.	17.4
61.	16.3
62.	15.6
63.	16.3
64.	16.7
65.	16.4
66.	16.4
67.	16.4
68.	17.0
69.	17.3
70.	17.0
71.	16.7
72.	16.4
73.	16.2
74.	16.7
75.	16.9
76.	16.9
77.	16.9
78.	16.4
79.	16.7
80.	15.0
81.	16.1
82.	17.5
83.	17.2
84.	17.0
85.	17.3
86.	17.4
87.	17.4
88.	17.0
89.	17.2
90.	16.1
91.	16.6
92.	16.6
93.	16.9
94.	17.4
95.	17.5
96.	16.9
97.	19.0
98.	16.4
99.	17.0
100.	15.6
101.	16.1
102.	15.9
103.	17.8
104.	17.5
105.	17.0
106.	17.5
107.	17.0
108.	19.4
109.	17.4
110.	16.7
111.	16.8
112.	18.8
113.	22.5
114.	19.3
115.	20.2
116.	19.2
117.	20.7
118.	19.8
119.	19.7

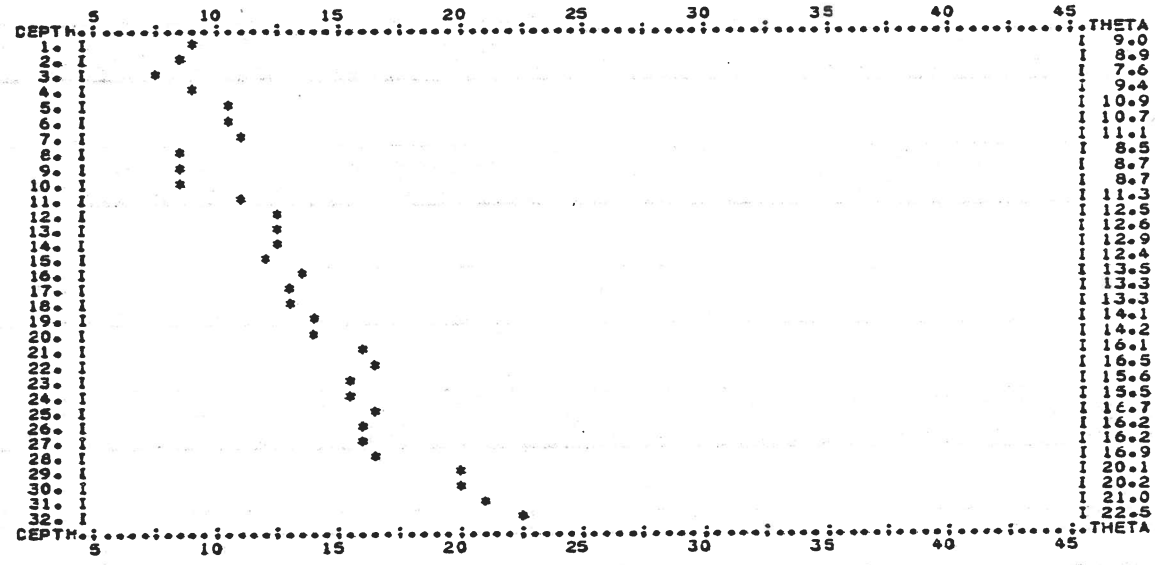
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SCHIC HOLE ID=NP 4 BM= 6206.80
DATE= 26 JUNE 1978 TIME=1510 PROBE NO= WL=95.30
REMARKS= VALUES CORRECTED FOR 5.0 FEET OF WATER IN HOLE WHEN LOGGED NP-4

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SCHIC HOLE ID=NP 5 BM= 6171.20
DATE= 26 JUNE 1978 TIME=1110 PROBE NO= WL=38.15
REMARKS= VALUES CORRECTED FOR 0.0 FEET OF WATER IN HOLE WHEN LOGGED NP-5

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.

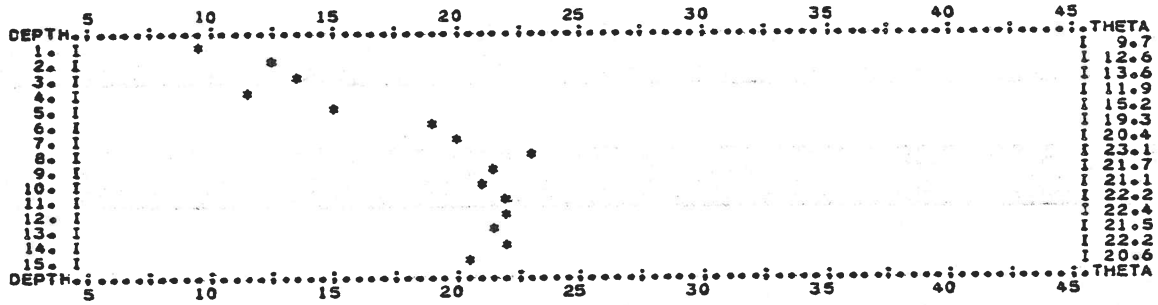


DEPTH	THETA
1.	9.0
2.	8.9
3.	7.6
4.	9.4
5.	10.9
6.	10.7
7.	11.1
8.	8.5
9.	8.7
10.	8.7
11.	11.3
12.	12.5
13.	12.6
14.	12.9
15.	12.4
16.	13.5
17.	13.3
18.	13.3
19.	14.1
20.	14.2
21.	16.1
22.	16.5
23.	15.6
24.	15.5
25.	16.7
26.	16.2
27.	16.2
28.	16.9
29.	20.1
30.	20.2
31.	21.0
32.	22.5

5 10 15 20 25 30 35 40 45 DEPTH THETA

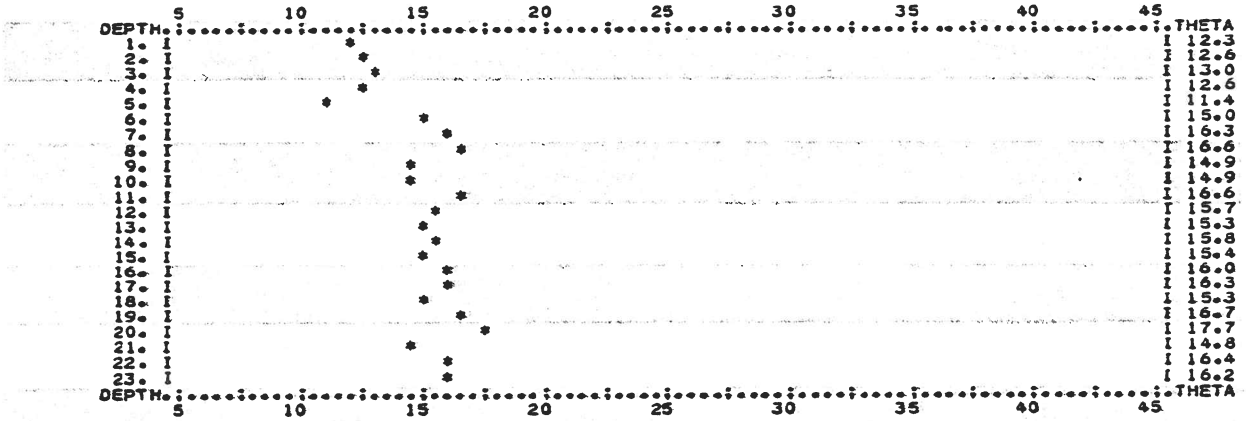
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO HOLE ID=NP 6 BH= 6152.70
DATE= 26 JUNE 1978 TIME=1350 PROBE NO= WL=17.00
REMARKS= VALUES CORRECTED FOR 1.0 FEET OF WATER IN HOLE WHEN LOGGED NP-6

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



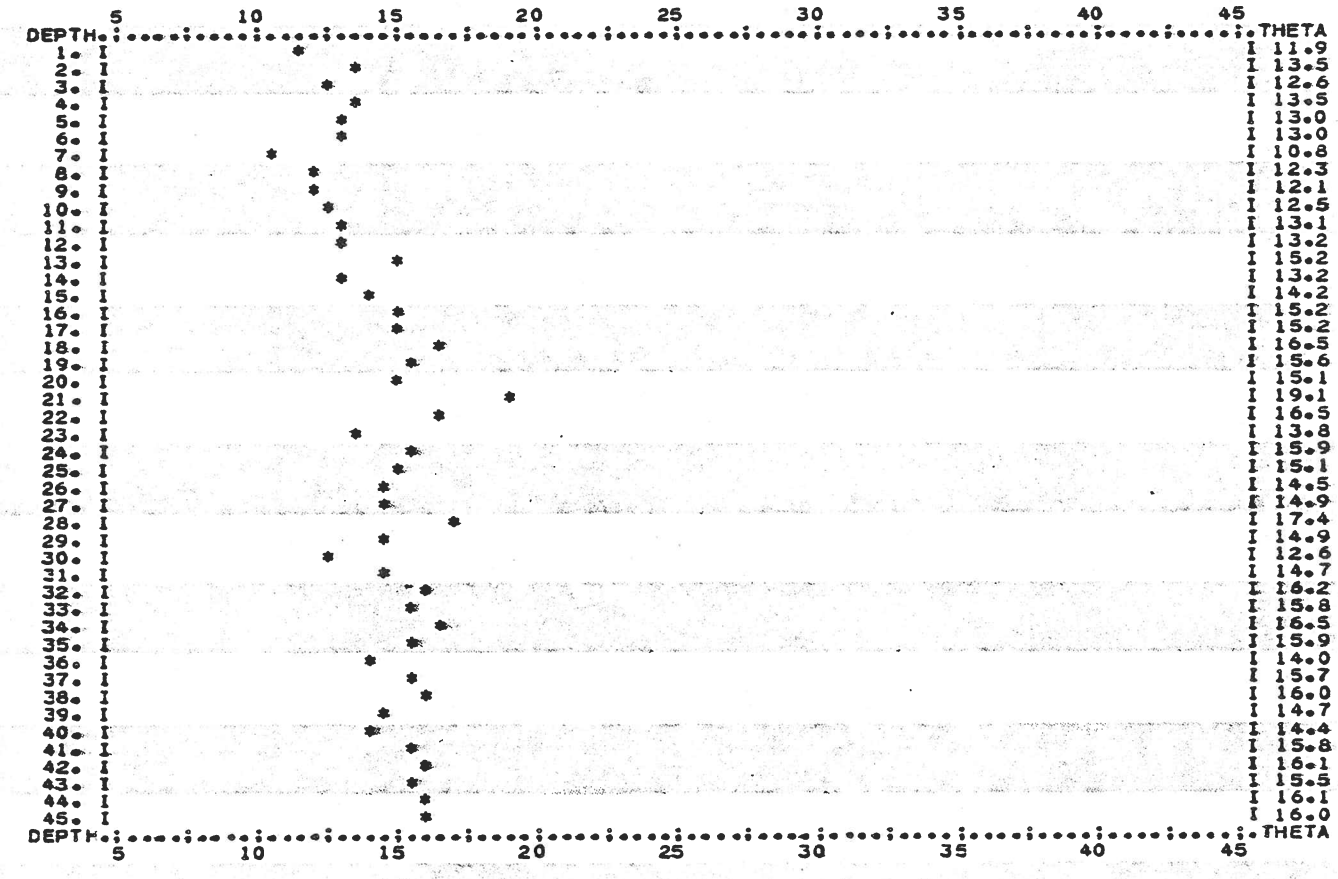
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SCHIC HOLE ID=NP 7 BH= 6176.20
DATE= 27 JUNE 1978 TIME=1435 PROBE NO= WL=27.0
REMARKS= VALUES CORRECTED FOR 1.0 FEET OF WATER IN HOLE WHEN LOGGED NP-7

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



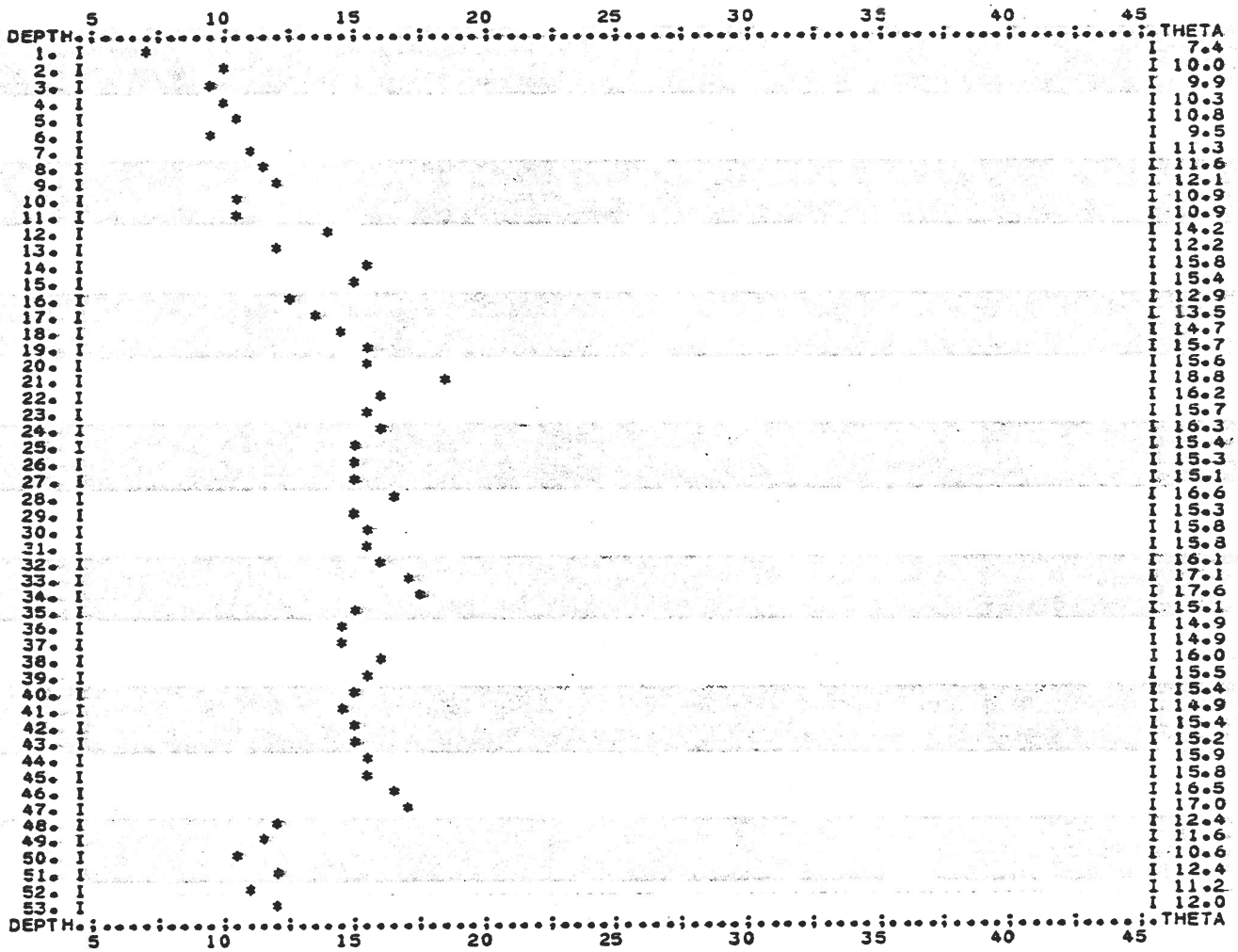
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO HOLE ID=NP 8 BM= 6227.40
DATE= 27 JUNE 1978 TIME=1530 PROBE NO= WL=51.35
REMARKS= VALUES CORRECTED FOR 0.0 FEET OF WATER IN HOLE WHEN LOGGED NP-8

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SCHIC HOLE ID=NP-9 BM= 0.0
DATE= 27 JUNE 1978 TIME= PROBE NO= WL=60.65
REMARKS= VALUES CORRECTED FOR 1.0 FEET OF WATER IN HOLE WHEN LOGGED NP-9

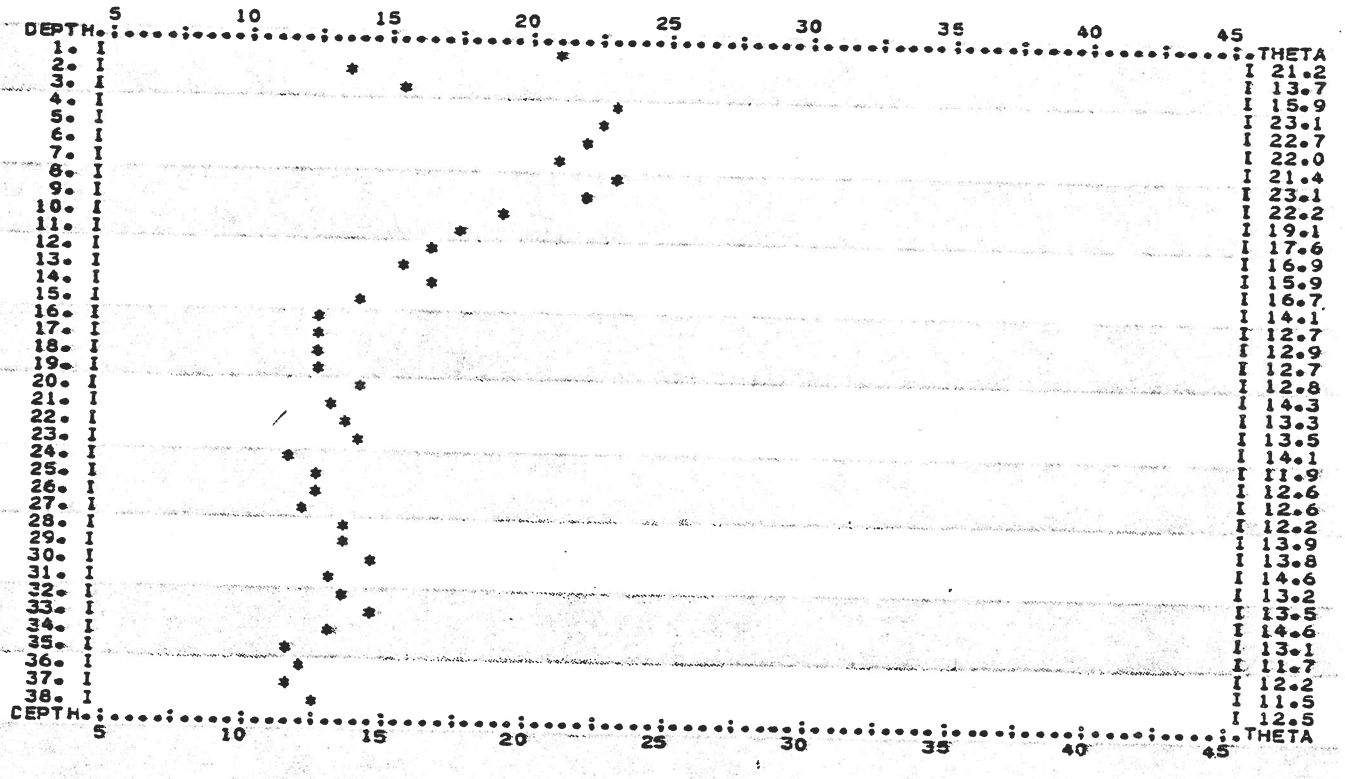
PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SCHIC HOLE ID=NP14 BM= 0.0
DATE= 27 JUNE 1978 TIME=1825 PROBE NO= WL=0.00
REMARKS= VALUES CORRECTED FOR 0.0 FEET OF WATER IN HOLE WHEN LOGGED

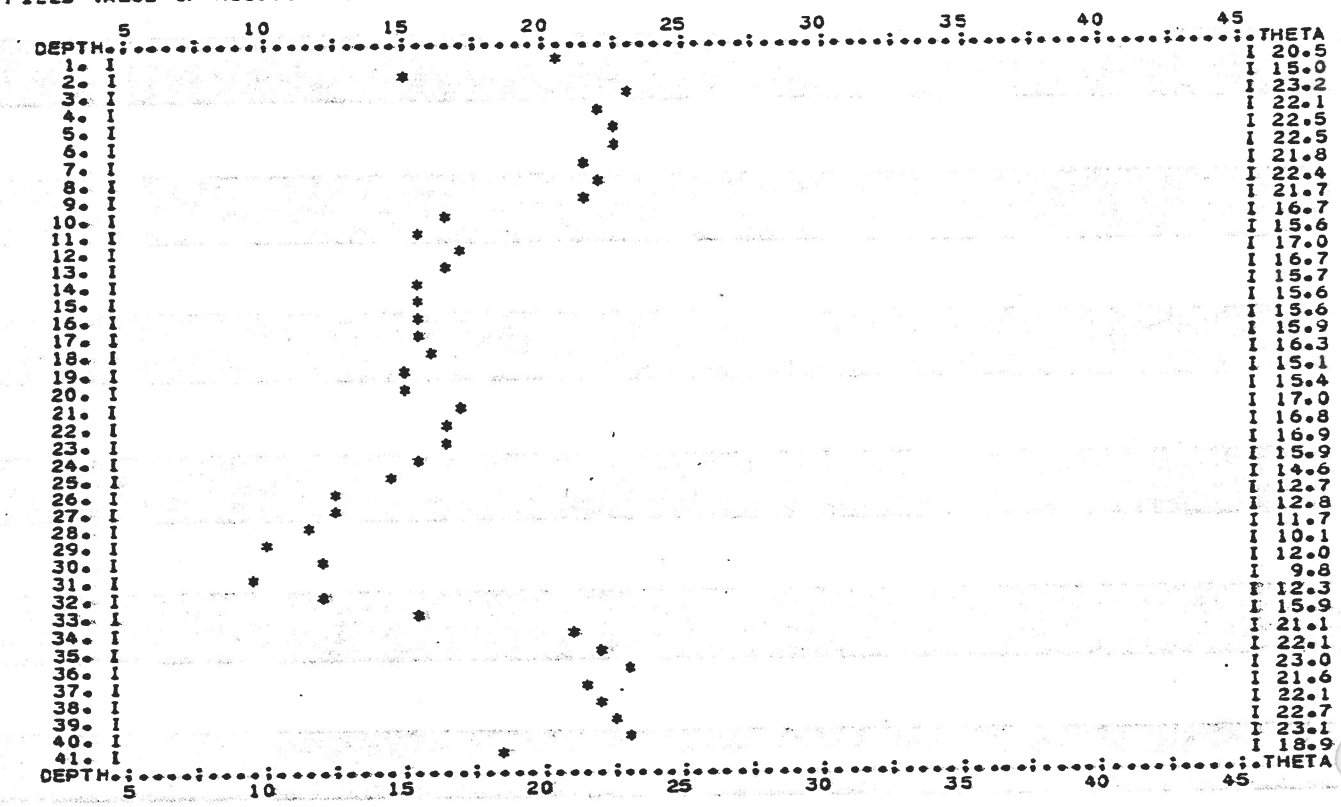
NP-14

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



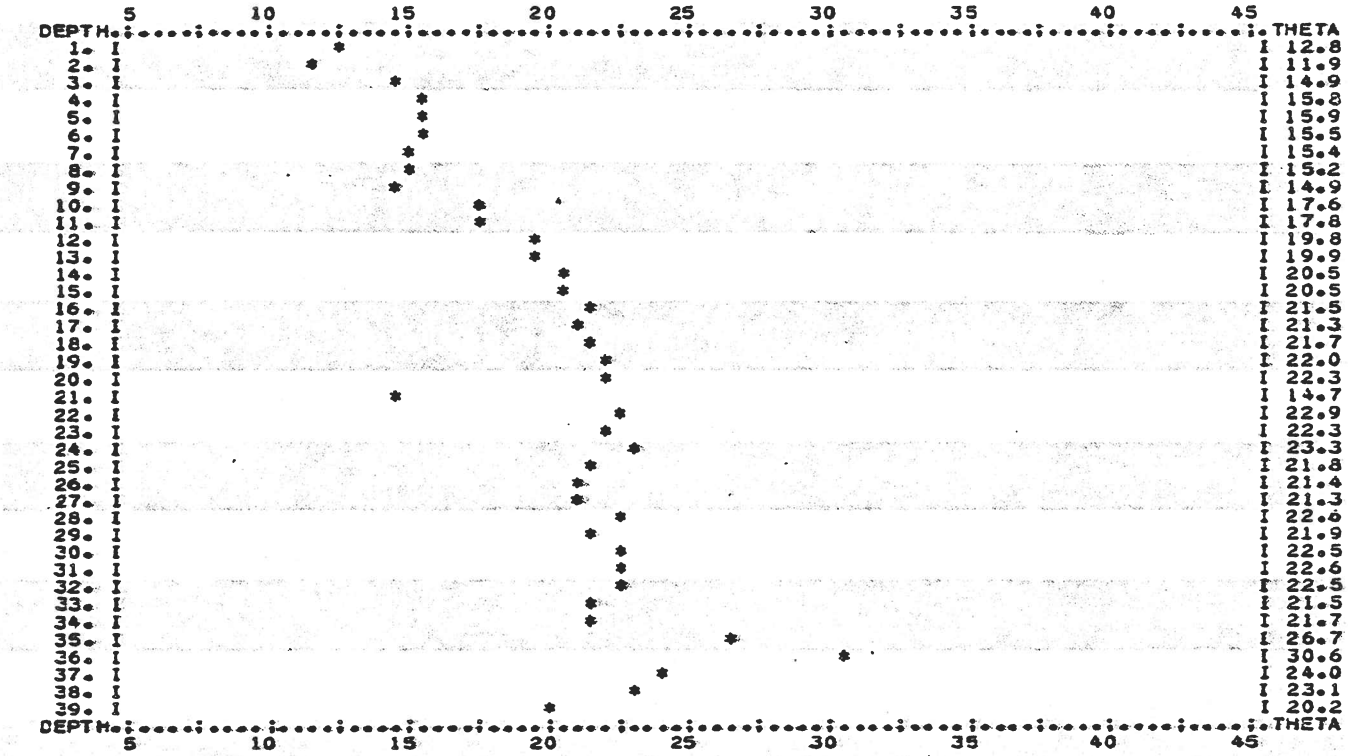
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SCHIC HOLE ID=NP15 BM= 0.0
DATE= 27 JUNE 1978 TIME=1700 PROBE NO= WL=41.6
REMARKS= VALUES CORRECTED FOR 7.0 FEET OF WATER IN HOLE WHEN LOGGED NP-15

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



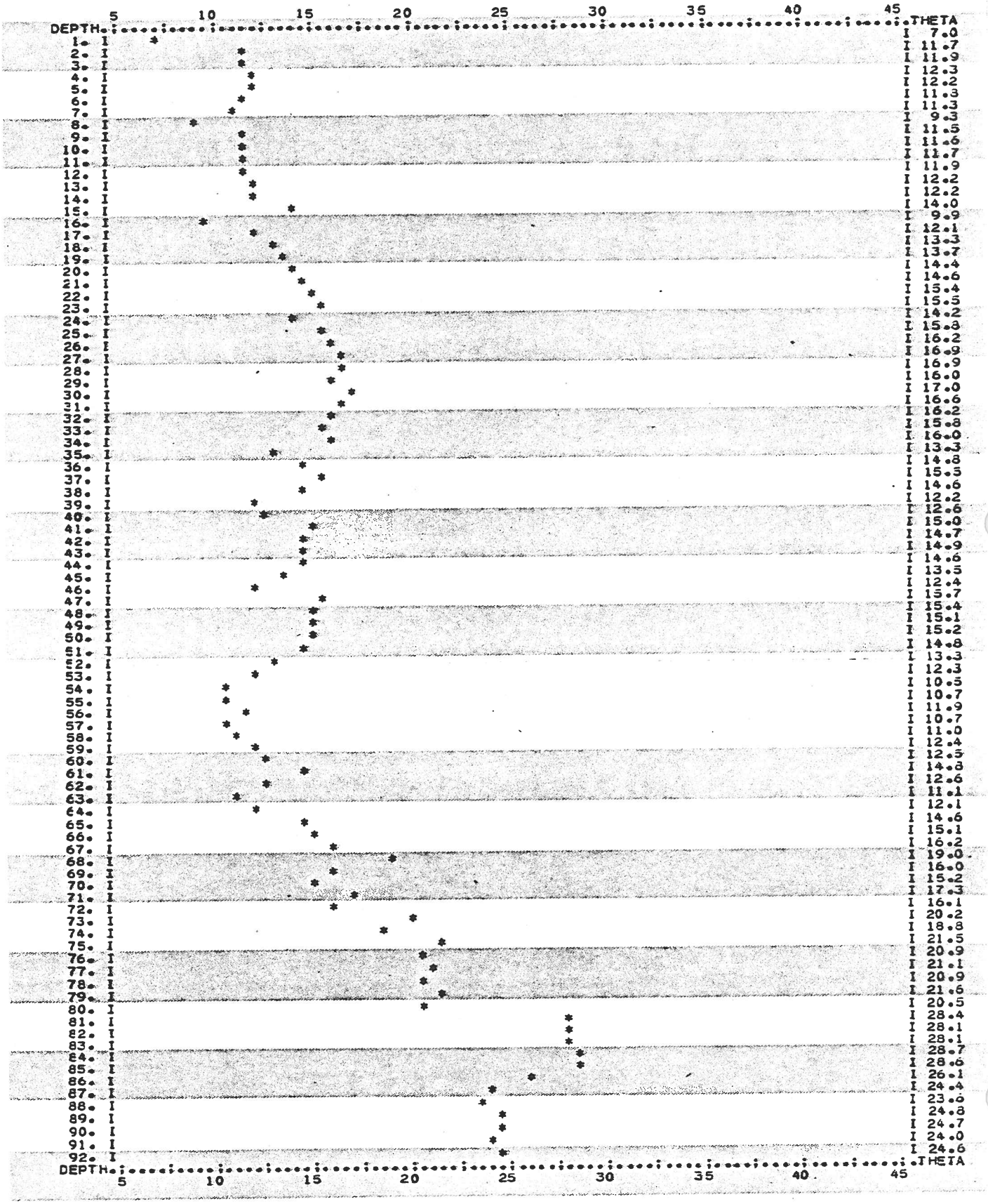
AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIC HOLE ID=NP16 BM= 6151.00
DATE= 26 JUNE 1978 TIME=1310 PROBE NO= WL=41.55
REMARKS= VALUES CORRECTED FOR 3.0 FEET OF WATER IN HOLE WHEN LOGGED NP-16

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SCHIC HOLE ID=NP 4 BM= 6206.80
DATE= 13 SEPT 1978 TIME=1510 PROBE NO= WL=93.66
REMARKS= VALUES CORRECTED FOR 5.0 FEET OF WATER IN HOLE WHEN LOGGED NP-4

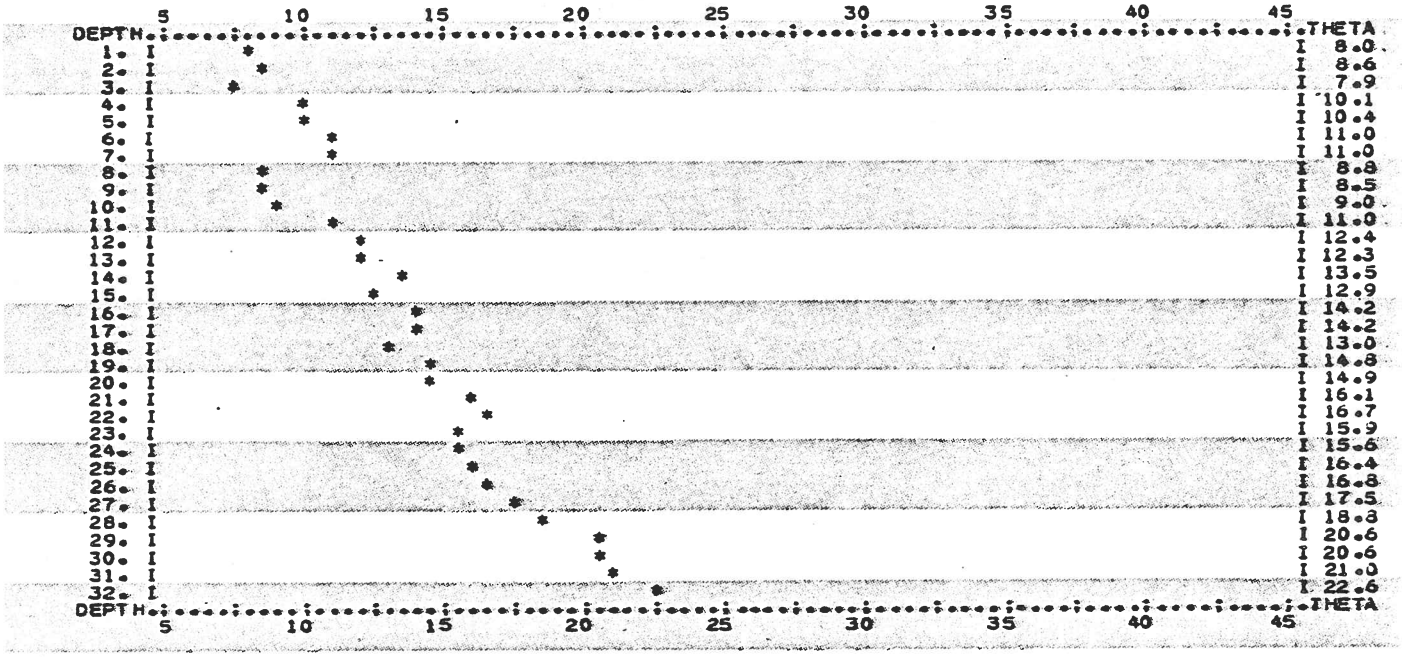
PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



(R) DATA DOCUMENTS/INC. SS 142
(R) DATA DOCUMENTS/INC. SS 142

AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIC HOLE ID=NP 5 BM= 6171.20
DATE= 13 SEPT 1978 TIME=1110 PROBE NO= WL=37.58
REMARKS= VALUES CORRECTED FOR 0.0 FEET OF WATER IN HOLE WHEN LOGGED

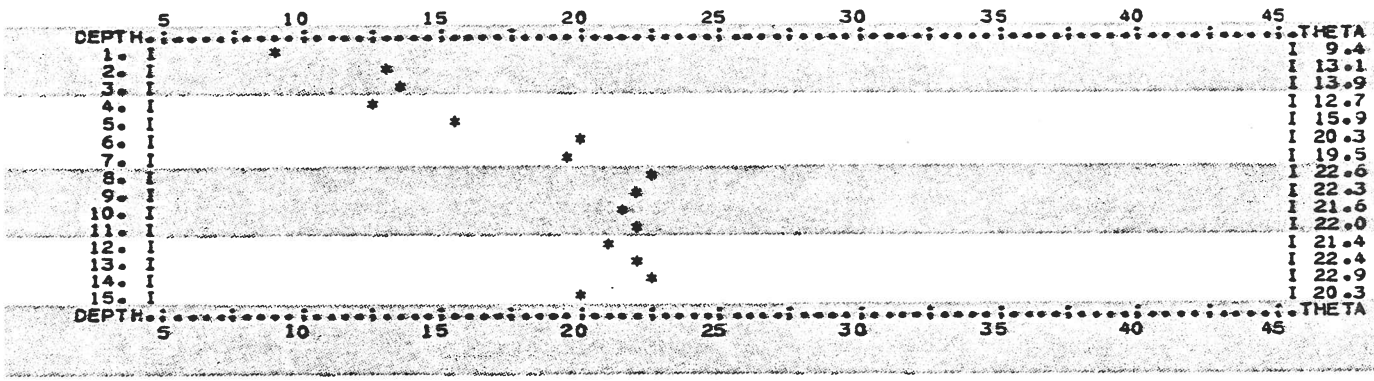
PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



(6) DATA DOCUMENTS/DNC 65 342

AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SCHIC HOLE ID=NP 6 BM= 6152.70
DATE= 13 SEPT 1978 TIME=1350 PROBE NO= WL=18.03
REMARKS= VALUES CORRECTED FOR 1.0 FEET OF WATER IN HOLE WHEN LOGGED NP-6

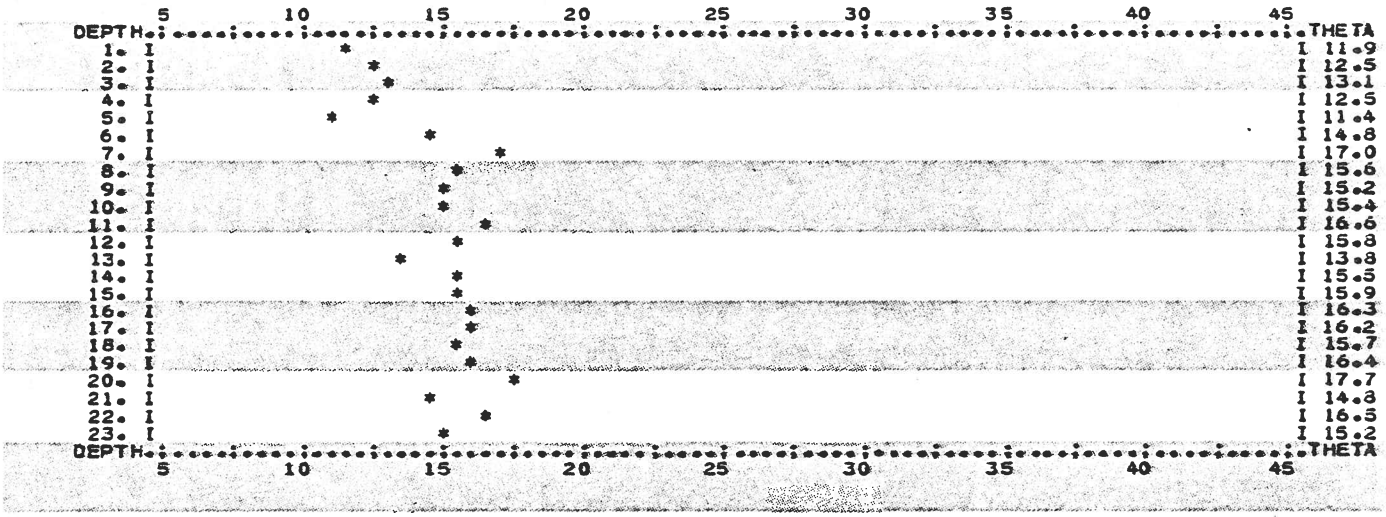
PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



(6) DATA DOCUMENTS/INC. SS 344

AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SCHIC HOLE ID=NP 7 BM= 6176.20
DATE= 13 SEPT 1978 TIME=1435 PROBE NO= WL=26.82
REMARKS= VALUES CORRECTED FOR 1.0 FEET OF WATER IN HOLE WHEN LOGGED NP-7

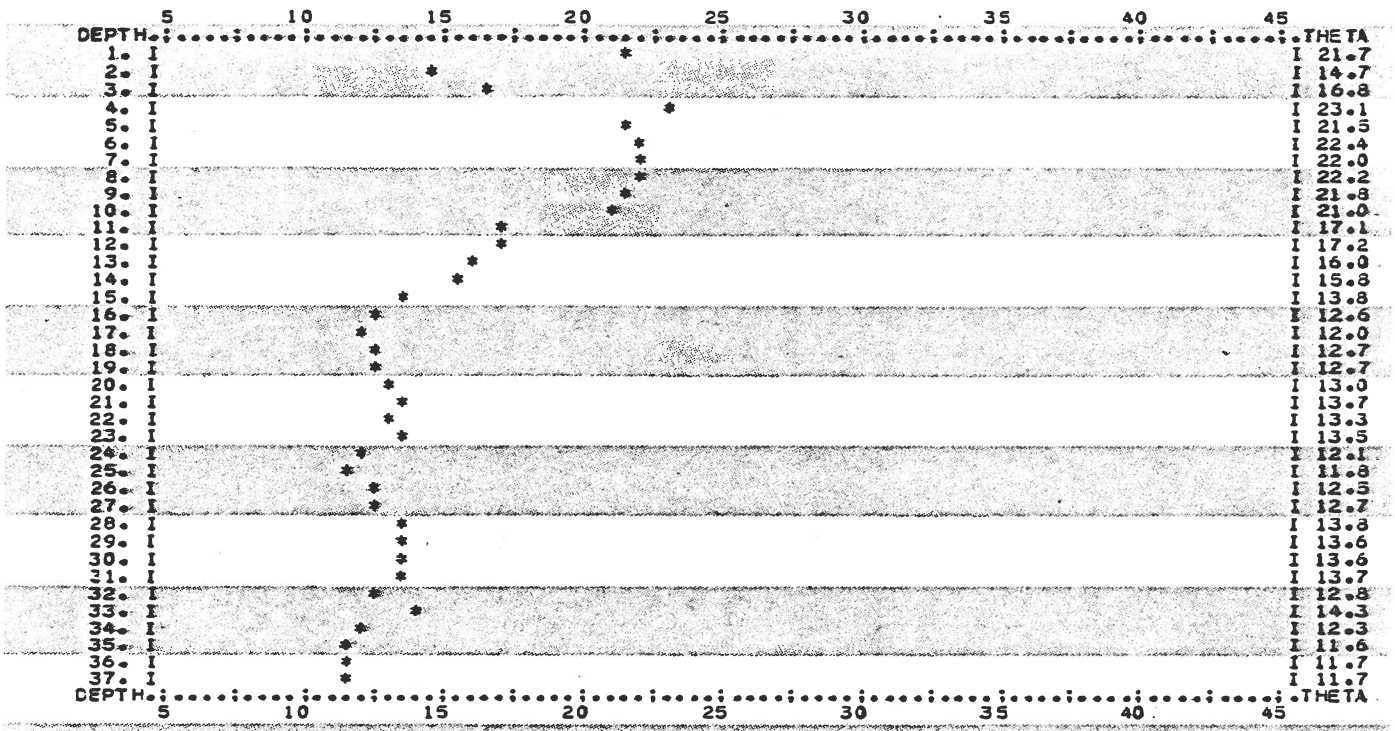
PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



(C) DATA DOCUMENTS INC.

AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SCHIC HOLE ID=NP14 BM= 0.0
DATE= 13 SEPT 1978 TIME=1850 PROBE NO= WL=DRY
REMARKS= VALUES CORRECTED FOR 0.0 FEET OF WATER IN HOLE WHEN LOGGED NP-14

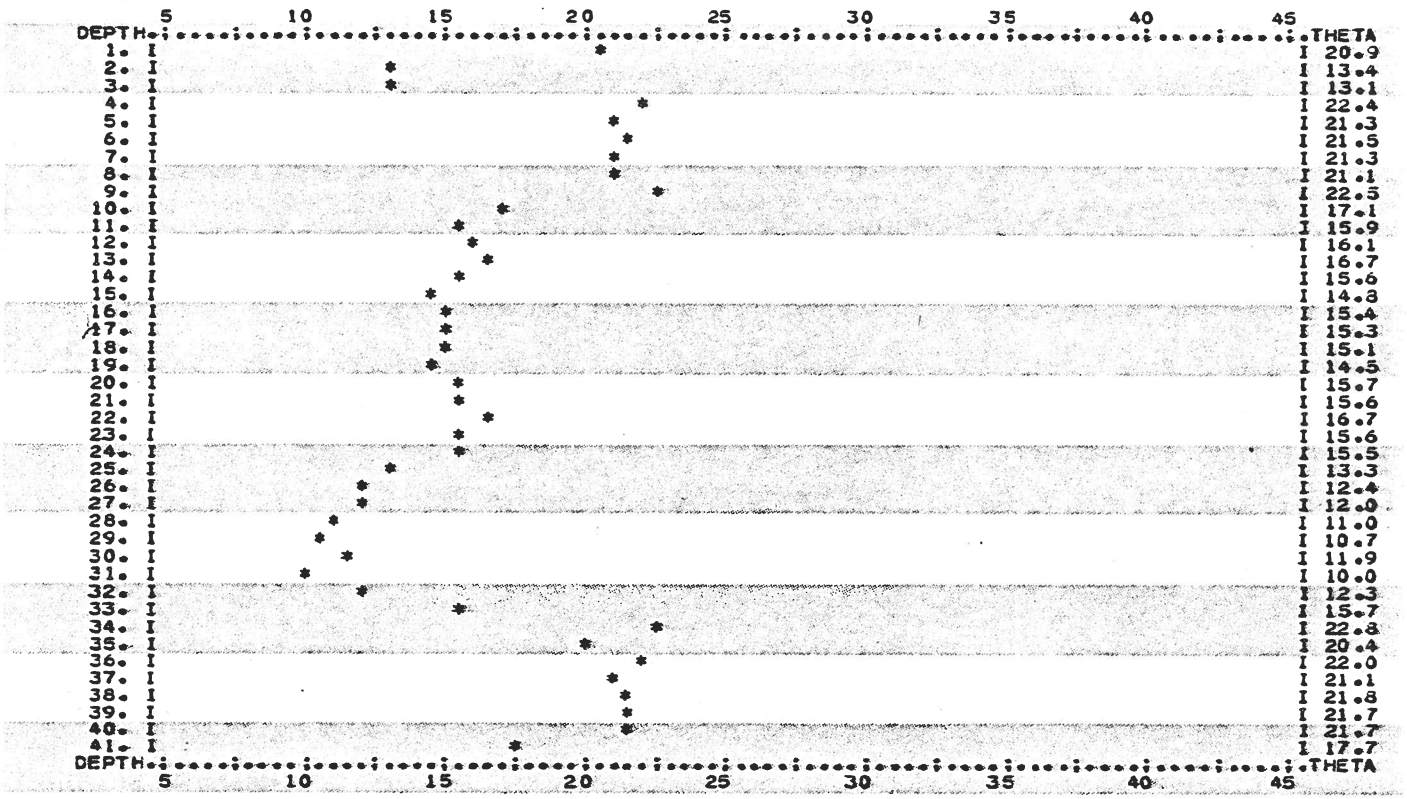
PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



(C) DATA DOCUMENTS, INC. SS 342

AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIC HOLE ID=NP15 BM= 0.0
DATE= 13 SEPT 1978 TIME=1745 PROBE NO= WL=37.19
REMARKS= VALUES CORRECTED FOR 7.0 FEET OF WATER IN HOLE WHEN LOGGED NP-15

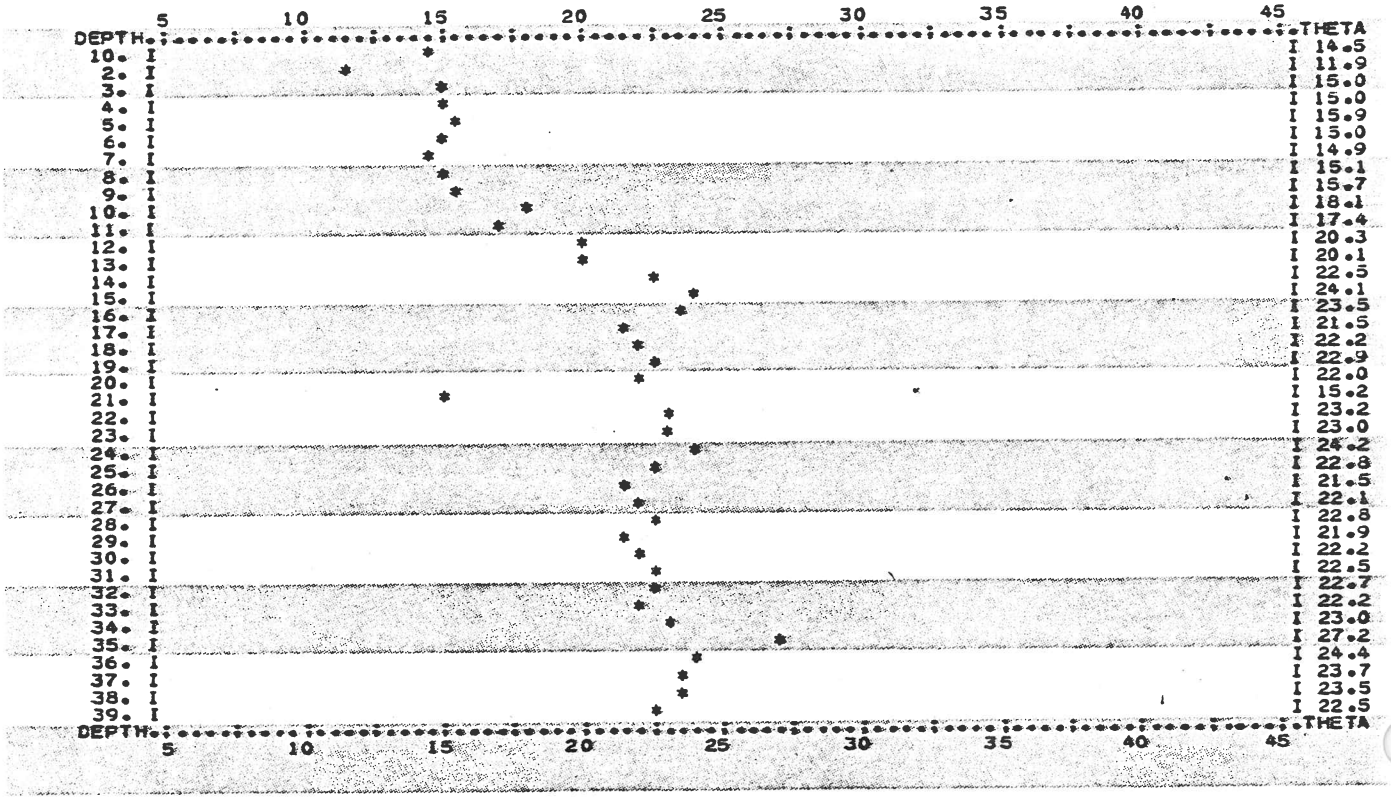
PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



(R) DATA DOCUMENTS, INC. SS 342

AMERICAN GROUNDWATER CONSULTANTS NEUTRON PROBE SOIL MOISTURE PROFILE
PROJECT=SOHIO HOLE ID=NP16 BM= 6151.00
DATE= 13 SEPT 1978 TIME=1540 PROBE NO= WL=40.53
REMARKS= VALUES CORRECTED FOR 4.0 FEET OF WATER IN HOLE WHEN LOGGED NP-16

PERCENT MOISTURE BY VOLUME (ACROSS) VS DEPTH IN FEET (DOWN).
FIELD VALUE OF MOISTURE (THETA) GIVEN IN RIGHT HAND COLUMN.



(N) DATA DOCUMENTS/INC. SS 342

ATTACHMENT 3

SOIL TEMPERATURE DATA

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP-1
FOR DECEMBER 14, 1975

DEPTH (ft)	TEMPERATURE (°C)
5	10.80
10	14.23
15	14.33
20	13.82
25	13.85
30	14.13
35	14.50
40	14.75
45	14.93
50	15.06

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP-1
FOR MAY 2, 1976

DEPTH (ft)	TEMPERATURE (°C)
10	10.46
15	11.72
20	13.01
25	13.68
30	14.08
35	14.40
40	14.66
45	14.83
50	15.00
52.5	15.06

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP- 1
FOR JUNE 18, 1976

DEPTH (ft)	TEMPERATURE (°C)	DEPTH (ft)	TEMPERATURE (°C)
1	19.40	16	12.41
2	18.96	17	12.66
3	17.63	18	12.88
4	16.215	19	13.10
5	15.12	20	13.27
6	14.245	25	13.89
7	13.40	30	14.24
8	12.39	35	14.54
9	11.95	40	14.76
10	11.83	45	14.93
11	11.56	49	15.05
12	11.79		
13	11.88		
14	12.04		
15	12.21		

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP-1
FOR JUNE 25, 1977

DEPTH (ft)	TEMPERATURE (°C)
4	19.72
9	13.96
10	13.03
11	12.56
12	12.17
13	11.99
14	11.92
15	11.94
20	12.78
25	13.69
30	14.13
35	14.41
40	14.65
45	14.84
50	14.95
52	15.04

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP-1
FOR JUNE 27, 1978

DEPTH (ft)	TEMPERATURE (°C)	DEPTH (ft)	TEMPERATURE (°C)
1	26.77	25	12.83
2	24.29	30	14.22
3	22.36	35	14.48
4	21.70	40	14.68
5	19.75	45	14.86
6	17.93	50	14.99
7	16.40	52	15.05
8	15.23		
9	14.31		
10	13.60		
11	13.16		
12	12.84		
13	12.67		
14	12.60		
15	12.60		
16	12.66		
17	12.76		
18	12.91		
19	13.05		
20	13.24		

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP-2
FOR DECEMBER 14, 1975

DEPTH (ft)	TEMPERATURE (°C)
5	12.72
10	15.51
15	15.02
20	14.71
25	14.86
30	15.20
35	15.49
40	15.72
45	15.91
50	16.09
55	16.21
60	16.32
64	16.40

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP- 2
FOR MAY 2, 1976

DEPTH (ft)	TEMPERATURE (°C)
10	12.08
15	13.36
20	14.43
25	14.87
30	15.13
35	15.39
40	15.61
45	15.81
50	16.02
55	16.16
60	16.27
65	16.37

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP- 2
FOR JUNE 18, 1976

DEPTH (ft)	TEMPERATURE (°C)	DEPTH (ft)	TEMPERATURE (°C)
1	19.89		
5	15.87		
10	13.43		
11	13.29		
15	13.74		
20	14.46		
25	14.91		
30	15.21		
35	15.46		
40	15.67		
45	15.87		
50	16.05		
55	16.19		
60	16.32		
64	16.37		

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP-3
FOR DECEMBER 14, 1975

DEPTH (ft)	TEMPERATURE (°C)	DEPTH (ft)	TEMPERATURE (°C)
5	12.95	105	17.01
10	16.17	110	17.07
15	16.00	115	17.14
20	15.40	120	17.21
25	15.29	125	17.28
30	15.48		
35	15.70		
40	15.91		
45	16.06		
50	16.20		
55	16.33		
60	16.42		
65	16.50		
70	16.58		
75	16.64		
80	16.71		
85	16.77		
90	16.84		
95	16.90		
100	16.96		

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP-3
FOR MAY 2, 1976

DEPTH (ft)	TEMPERATURE (°C)	DEPTH (ft)	TEMPERATURE (°C)
10	12.43	105	17.01
15	13.74	110	17.06
20	14.65	115	17.12
25	15.23	120	17.19
30	15.51	125	17.25
35	15.66		
40	15.82		
45	16.00		
50	16.14		
55	16.27		
60	16.38		
65	16.47		
70	16.56		
75	16.62		
80	16.70		
85	16.77		
90	16.83		
95	16.89		
100	16.96		

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP-3
FOR JUNE 25, 1977

DEPTH (ft)	TEMPERATURE (°C)	DEPTH (ft)	TEMPERATURE (°C)
5	20.06	70	16.51
10	14.80	75	16.58
15	13.88	80	16.64
20	14.58	85	16.70
19	14.40	90	16.78
18	14.24	95	16.84
17	14.10	100	16.90
16	14.00	105	16.97
15	13.93	110	17.02
14	13.92	115	17.08
13	13.98	120	17.16
25	15.20	125	17.22
30	15.50	127	17.25
35	15.64		
40	15.79		
45	15.94		
50	16.09		
55	16.22		
60	16.33		
65	16.42		

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP-3
FOR JUNE 27, 1978

DEPTH (ft)	TEMPERATURE (°C)	DEPTH (ft)	TEMPERATURE (°C)
1	29.70	30	15.57
2	29.70	35	15.66
3	25.32	40	15.80
4	23.88	45	15.95
5	21.52	50	16.09
6	19.56	55	16.22
7	18.09	60	16.33
8	17.11	65	16.43
9	16.18	70	16.50
10	15.51	75	16.58
11	15.03	80	16.65
12	14.77	85	16.72
13	14.58	90	16.78
14	14.48	95	16.86
15	14.47	100	16.92
16	14.50	105	16.96
17	14.58	110	17.03
18	14.65	115	17.10
19	14.77	120	17.15
20	14.90	125	17.23
25	15.35		

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP-4
FOR DECEMBER 14, 1975

DEPTH (ft)	TEMPERATURE (°C)
5	11.02
10	14.14
15	14.84
20	14.52
25	14.24
30	14.15
35	14.29
40	14.55
45	14.87
50	15.26
55	15.32
60	15.44
65	15.53
70	15.62
75	15.72
80	15.81
85	15.93
90	16.00
95	16.04

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP-4
FOR MAY 2, 1976

DEPTH (ft)	TEMPERATURE (°C)
10	11.69
15	12.53
20	13.36
25	13.31
30	14.26
35	14.52
40	14.76
45	15.03
50	15.25
55	15.38
60	15.48
65	15.57
70	15.66
75	15.76
80	15.87
85	15.97
90	16.03

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP-4
FOR JUNE 25, 1977

DEPTH (ft)	TEMPERATURE (°C)
5	20.66
10	15.50
15	13.57
16	13.01
17	13.01
18	12.91
19	12.88
20	12.91
25	13.27
30	13.84
35	14.27
40	14.53
45	14.74
50	15.02
55	15.21
60	15.35
65	15.44
70	15.54
75	15.63
80	15.74
85	15.84
90	15.94
95	15.99

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP- 4
FOR JUNE 27, 1978

DEPTH (ft)	TEMPERATURE (°C)	DEPTH (ft)	TEMPERATURE (°C)
1	30.33	35	14.49
2	30.44	40	14.68
3	26.97	45	14.85
4	24.66	50	15.09
5	23.08	55	15.25
6	21.13	60	15.39
7	19.62	65	15.46
8	18.27	70	15.56
9	16.82	75	15.65
10	15.93	80	15.74
11	15.31	85	15.84
12	14.75	90	15.95
13	14.34	95	15.99
14	14.03		
15	13.78		
16	13.63		
17	13.54		
18	13.49		
19	13.49		
20	13.50		
25	13.75		
30	14.15		

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP-5
FOR DECEMBER 14, 1975

DEPTH (ft)	TEMPERATURE (°C)
5	10.28
10	14.01
15	14.77
20	14.48
25	14.06
30	13.93

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP-5
FOR MAY 2, 1976

DEPTH (ft)	TEMPERATURE (°C)
20	12.61
25	13.71
30	13.99

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP-5
FOR JUNE 25, 1977

DEPTH (ft)	TEMPERATURE (°C)
5	21.30
10	16.07
15	13.07
16	12.84
17	12.75
18	12.63
19	12.57
20	12.59
25	12.95
30	13.52
35	13.91

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP- 5
FOR JUNE 27, 1978

DEPTH (ft)	TEMPERATURE (°C)	DEPTH (ft)	TEMPERATURE (°C)
1	28.86	21	13.21
2	28.95	22	13.22
3	29.18	25	13.40
4	26.48	30	13.80
5	24.61	35	14.05
6	23.07		
7	20.97		
8	19.26		
9	17.87		
10	16.84		
11	15.86		
12	15.07		
13	14.51		
14	14.09		
15	13.80		
16	13.56		
17	13.41		
18	13.32		
19	13.23		
20	13.20		

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP-6
FOR DECEMBER 14, 1975

DEPTH (ft)	TEMPERATURE (°C)
5	9.83
10	12.73
15	13.86

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP-6
FOR MAY 2, 1976

DEPTH (ft)	TEMPERATURE (°C)
10	11.33
14.5	11.74

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP- 6
FOR JUNE 25, 1977

DEPTH (ft)	TEMPERATURE (°C)
5	20.74
10	15.36
11	14.46
12	13.60
13	13.09
14	12.84
15	12.75
16	12.61
17	12.53
18	12.48
19	12.43

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP-6
FOR JUNE 27, 1978

DEPTH (ft)	TEMPERATURE (°C)
1	26.71
2	26.91
3	27.64
4	24.39
5	22.35
6	20.15
7	18.27
8	16.68
9	15.60
10	14.81
11	14.28
12	13.71
13	13.44
14	13.29
15	13.18
16	13.08
17	13.00
18	12.97
19	12.91

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP-7
FOR DECEMBER 14, 1975

DEPTH (ft)	TEMPERATURE (°C)
5	
10	14.21
15	14.21
20	13.75
25	13.63

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP- 7
FOR MAY 2, 1976

DEPTH (ft)	TEMPERATURE (°C)
10	11.59
15	12.76
20	13.47

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP-7
FOR JUNE 25, 1977

DEPTH (ft)	TEMPERATURE (°C)
5	19.77
10	13.79
15	12.72
16	12.39
17	12.27
18	12.36
20	12.60
25	13.32
25.6	13.39

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP-7
FOR JUNE 27, 1978

DEPTH (ft)	TEMPERATURE (°C)	DEPTH (ft)	TEMPERATURE (°C)
1	28.52	21	13.04
2	28.94	22	13.16
3	28.13	23	13.25
4	22.88	24	13.35
5	21.62	25	13.47
6	19.63		
7	17.84		
8	16.48		
9	15.32		
10	14.26		
11	13.69		
12	13.13		
13	12.85		
14	12.78		
15	12.77		
16	12.67		
17	12.71		
18	12.77		
19	12.84		
20	12.96		

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP-8
FOR DECEMBER 14, 1975

DEPTH (ft)	TEMPERATURE (°C)
5	
10	14.52
15	14.67
20	14.21
25	13.95
30	14.01
35	14.29
40	14.54
45	14.71
48	14.80

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP-8
FOR MAY 2, 1976

DEPTH (ft)	TEMPERATURE (°C)
10	10.73
15	11.38
20	12.53
25	13.35
30	13.92
35	14.23
40	14.45
45	14.62
50	14.78

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP-8
FOR JUNE 25, 1977

DEPTH (ft)	TEMPERATURE (°C)
5	19.68
10	14.34
15	12.60
16	12.55
17	12.55
18	12.60
20	12.75
25	13.31
30	13.88
35	14.22
40	14.45
45	14.59
49.8	14.72

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP-8
FOR JUNE 27, 1978

DEPTH (ft)	TEMPERATURE (°C)	DEPTH (ft)	TEMPERATURE (°C)
1	26.97	25	13.89
2	27.10	30	14.23
3	24.23	35	14.42
4	23.46	40	14.54
5	21.28	45	14.63
6	19.59	50	14.75
7	18.25		
8	17.08		
9	16.03		
10	15.34		
11	14.82		
12	14.42		
13	14.04		
14	13.80		
15	13.59		
16	13.50		
17	13.45		
18	13.45		
19	13.48		
20	13.53		

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP- 9
FOR DECEMBER 14, 1975

DEPTH (ft)	TEMPERATURE (°C)
5	
10	9.74
15	16.69
20	16.04
25	14.98
30	14.28
35	13.97
40	14.02
45	14.25
50	14.48

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP-9
FOR MAY 2, 1976

DEPTH (ft)	TEMPERATURE (°C)
10	11.19
15	12.43
20	13.62
25	14.20
30	14.34
35	14.32
40	14.30
45	14.39
49	14.50

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP- 9
FOR JUNE 25, 1977

DEPTH (ft)	TEMPERATURE (°C)
5	26.35
10	16.08
15	12.10
16	11.97
17	11.80
18	11.74
19	11.75
20	11.80
25	12.47
30	13.24
35	13.74
40	14.07
45	14.26
50	14.42
54	14.53

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP- 9
FOR JUNE 27, 1978

DEPTH (ft)	TEMPERATURE (°C)	DEPTH (ft)	TEMPERATURE (°C)
1	27.18	21	12.63
2	27.28	22	12.70
3	27.62	23	12.80
4	27.77	25	12.99
5	22.68	30	13.49
6	22.81	35	13.82
7	21.59	40	14.04
8	19.70	45	14.21
9	18.06	50	14.36
10	16.65	54	14.50
11	15.46		
12	14.51		
13	13.90		
14	13.41		
15	13.07		
16	12.87		
17	12.71		
18	12.63		
19	12.59		
20	12.59		

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP-10
FOR DECEMBER 14, 1975

DEPTH (ft)	TEMPERATURE (°C)
5	8.02
10	12.11
15	12.95
20	13.31
25	13.45
30	13.54
35	13.63
40	13.68
43	13.72

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP- 10
FOR MAY 2, 1976

DEPTH (ft)	TEMPERATURE (°C)
10	8.53
15	9.74
20	11.20
25	11.75
30	12.26
35	12.53
40	12.67
45	13.10
50	13.24

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP-11
FOR DECEMBER 14, 1975

DEPTH (ft)	TEMPERATURE (°C)
5	9.33
10	12.85
15	13.35
20	13.45
25	13.50
30	13.53
35	13.60
40	13.61

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP-11
FOR MAY 2, 1976

DEPTH (ft)	TEMPERATURE (°C)
10	11.29
15	11.57
20	12.06
25	12.51
30	12.86
35	13.15
39	13.35

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP-12
FOR DECEMBER 14, 1975

DEPTH (ft)	TEMPERATURE (°C)
5	9.59
10	13.40
15	13.71
20	13.41
25	13.29
30	13.08
35	13.01
40	13.02
45	13.06
50	13.10

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP-12
FOR MAY 2, 1976

DEPTH (ft)	TEMPERATURE (°C)
10	10.75
15	11.65
20	12.38
25	12.68
30	12.87
35	13.00
40	13.10
45	13.15
49	13.20

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP-13
FOR DECEMBER 14, 1975

DEPTH (ft)	TEMPERATURE (°C)
5	11.43
10	13.52
15	13.98
20	14.04
25	14.00
30	13.85
35	13.71
40	13.67
45	13.58
49.5	13.58

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP-13
FOR MAY 2, 1976

DEPTH (ft)	TEMPERATURE (°C)
10	10.90
15	11.41
20	12.11
25	12.64
30	13.02
35	13.31
40	13.47
45	13.56
48	13.62

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP-14
FOR DECEMBER 14, 1975

DEPTH (ft)	TEMPERATURE (°C)
10	9.95
15	11.01
20	12.10
25	13.75
30	15.07
35	15.18
40	14.51
45	14.18
50	13.89
55	13.71
60	13.49
65	13.39
70	13.34
75	13.33
78	13.34

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP- 14
FOR MAY 2, 1976

DEPTH (ft)	TEMPERATURE (°C)
10	9.91
15	10.29
20	11.43
25	12.55
30	13.48
35	13.92
40	13.99
45	13.93
50	13.87
55	13.80
60	13.74
65	13.66
70	13.60
75	13.55
80	13.52

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP- 14
FOR June 25, 1977

DEPTH (ft)	TEMPERATURE (°C)
5	19.40
10	14.53
15	12.95
16	12.89
17	12.80
18	12.78
19	12.80
20	12,85
25	13.15
30	13.47
35	13.64
40	13.67
45	13.63
50	13.63
55	13.62
60	13.60
65	13.59
70	13.59
75	13.59
80	13.60

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP- 15
FOR DECEMBER 14, 1975

DEPTH (ft)	TEMPERATURE (°C)	DEPTH (ft)	TEMPERATURE (°C)
10	9.61		
15	11.04		
20	11.88		
25	12.82		
30	13.89		
35	14.50		
40	14.45		
45	14.28		
50	14.10		
55	13.89		
60	13.69		
65	13.51		
68	13.43		

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP- 15

FOR MAY 2, 1976

DEPTH (ft)	TEMPERATURE (°C)	DEPTH (ft)	TEMPERATURE (°C)
10	9.51		
15	9.98		
20	11.07		
25	12.22		
30	13.00		
35	13.56		
40	13.73		
45	13.78		
50	13.79		
55	13.78		
60	13.75		
65	13.71		
69	13.66		

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP- 15
FOR JUNE 25, 1977

DEPTH (ft)	TEMPERATURE (°C)	DEPTH (ft)	TEMPERATURE (°C)
5	17.79		
10	13.77		
15	12.55		
16	12.48		
17	12.49		
20	12.62		
25	13.02		
30	13.35		
35	13.53		
40	13.57		
45	13.59		
50	13.59		
55	13.59		
60	13.59		
65	13.59		
69	13.60		

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP- 15
FOR JUNE 27, 1978

DEPTH (ft)	TEMPERATURE (°C)	DEPTH (ft)	TEMPERATURE (°C)
7	22.07	50	13.78
8	21.68	55	13.73
9	20.53	60	13.70
10	18.89	65	13.67
11	17.54	69	13.66
12	16.46		
13	15.69		
14	15.02		
15	14.65		
16	14.32		
17	14.09		
18	13.94		
19	13.87		
20	13.87		
21	13.87		
22	13.87		
23	13.88		
24	13.90		
25	13.94		
30	14.04		
35	14.09		
40	14.01		
45	13.85		

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP- 16
FOR DECEMBER 14, 1975

DEPTH (ft)	TEMPERATURE (°C)	DEPTH (ft)	TEMPERATURE (°C)
5	9.35		
10	12.77		
15	13.87		
20	13.81		
25	13.67		
30	13.48		
35	13.37		
40	13.29		

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP- 16

FOR MAY 2, 1976

DEPTH (ft)	TEMPERATURE (°C)	DEPTH (ft)	TEMPERATURE (°C)
10	11.50		
15	11.82		
20	12.22		
25	12.56		
30	12.88		
35	13.09		
39	13.22		

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP- 16
FOR JUNE 25, 1977

DEPTH (ft)	TEMPERATURE (°C)	DEPTH (ft)	TEMPERATURE (°C)
5	23.20		
10	16.17		
15	13.04		
17	12.76		
18	12.67		
19	12.62		
20	12.58		
21	12.57		
22	12.56		
23	12.56		
24	12.58		
25	12.59		
30	12.73		
35	12.92		
40	13.09		
44	13.22		

TEMPERATURE PROFILE FOR NEUTRON-PROBE-ACCESS HOLE NP- 16

FOR JUNE 26, 1978

DEPTH (ft)	TEMPERATURE (°C)	DEPTH (ft)	TEMPERATURE (°C)
1	26.01	23	13.01
2	26.30	24	13.01
3	26.80	25	13.01
4	25.23	26	13.03
5	24.13	27	13.05
6	22.46	30	13.10
7	20.47	35	13.26
8	18.57	40	13.39
9	17.34	44	13.46
10	16.38		
11	15.35		
12	14.54		
13	13.95		
14	13.53		
15	13.33		
16	13.22		
17	13.15		
18	13.11		
19	13.07		
20	13.04		
21	13.04		
22	13.01		

ATTACHMENT 4

GROUND-WATER-LEVEL MEASUREMENTS

WATER LEVEL MEASUREMENTS IN MONITOR WELL 2A

Date	Depth (ft)	W.L. Altitude (ft)	Source of Data
14 December 1975	>80.50	~~<6109.20~~ 6107.08	3
23 March 1976	>80.50	~~<6109.20~~ <6107.08	2
19 April 1976	>80.50	~~<6109.20~~ <6107.08	2
2 May 1976	62.70	~~6127.0~~ 6124.88	3
7 July 1976	62.88	~~6126.82~~ 6124.70	2
6 October 1976	62.83	6126.87 6124.75	2
20 January 1977	63.24	6126.46 6124.34	2
12 April 1977	62.95	~~6126.75~~ 6124.63	2
13 July 1977	63.41	~~6126.29~~ 6124.17	2
19 October 1977	63.24	~~6126.46~~ 6124.34	2
15 March 1978	53.75	6135.95 6133.83	3
31 March 1978	52.69	~~6137.01~~ 6134.89	2
19 May 1978	52.30	~~6137.40~~ 6135.28	2
26 June 1978	51.90	~~6137.80~~ 6135.68	3
1 September 1978	51.37	6138.33 6136.21	3
13 September 1978	51.30	6138.40 6136.28	3
23 October 1978	50.04	6139.66 6137.54	2

1 B.M. ~~6189.7~~ 6187.58

2 SOHIO

3 AGW

WATER LEVEL MEASUREMENTS IN MONITOR WELL 3A

Date	Depth (ft)	W.L. Altitude (ft)	Source of Data
14 December 1975	32.10	~~6129.9~~[1] 6125.41	3
23 March 1976	29.78	~~6129.22~~ 6127.73	2
19 April 1976	29.78	~~6129.22~~ 6127.73	2
2 May 1976	32.10	~~6126.9~~ 6125.41	3
7 July 1976	31.75	~~6127.25~~ 6125.76	2
6 October 1976	31.67	~~6127.33~~ 6125.84	2
20 January 1977	31.65	~~6127.35~~ 6125.86	2
12 April 1977	31.33	~~6127.67~~ 6126.18	2
13 July 1977	31.79	~~6127.21~~ 6125.72	2
19 October 1977	31.43	~~6127.57~~ 6126.08	2
15 March 1978	30.36	~~6128.64~~ 6127.15	3
31 March 1978	31.90	6127.10 6125.61	2
19 May 1978	31.75	6127.25 6125.76	2
26 June 1978	33.33	~~6125.67~~ 6124.18	3
1 September 1978	31.75	6127.25 6125.76	3
13 September 1978	33.18	~~6125.82~~ 6124.33	3
23 October 1978	31.46	~~6127.54~~ 6126.05	2

~~1 B.M. 6159.0~~ 6157.51

2 SOHIO

3 AGW

WATER LEVEL MEASUREMENTS IN MONITOR WELL 4A

Date	Depth (ft)	W.L. Altitude (ft)	Source of Data
14 December 1975	34.10	~~6136.3~~ 6126.65	3
23 March 1976	32.27	~~6138.53~~ 6128.48	2
19 April 1976	32.27	~~6138.53~~ 6128.48	2
2 May 1976	34.30	~~6136.5~~ 6126.45	3
7 July 1976	34.08	~~6136.72~~ 6126.67	2
6 October 1976	34.00	~~6136.80~~ 6126.75	2
20 January 1977	33.94	~~6136.86~~ 6126.81	2
12 April 1977	33.43	~~6137.37~~ 6127.32	2
13 July 1977	33.93	~~6136.87~~ 6126.82	2
19 October 1977	33.83	~~6136.97~~ 6126.92	2
15 March 1978	33.65	~~6137.15~~ 6127.10	3
31 March 1978	33.68	~~6137.12~~ 6127.07	2
19 May 1978	33.70	~~6137.10~~ 6127.05	2
26 June 1978	34.97	6135.83 6125.78	3
1 September 1978	32.50	6138.30 6128.25	3
13 September 1978	33.42	~~6137.38~~ 6127.33	3
23 October 1978	31.32	~~6139.48~~ 6129.43	2

~~1 B.M. 6170.8~~ 6160.75

2 SOHIO

3 AGW

WATER LEVEL MEASUREMENTS IN MONITOR WELL 1B

Date	Depth (ft)	W.L. Altitude[1] (ft)	Source of Data
14 December 1975	>36.25[4]	<~~6188.35~~ <6189.22	3
23 March 1976	36.10	~~6188.50~~ 6189.37	2
19 April 1976	36.10	~~6188.50~~ 6189.37	2
2 May 1976	36.30	~~6188.30~~ 6189.17	3
7 July 1976	36.15	~~6188.45~~ 6189.32	2
6 October 1976	36.00	~~6188.60~~ 6189.47	2
20 January 1977	35.83	~~6188.77~~ 6189.64	2
12 April 1977	35.85	~~6188.75~~ 6189.62	2
13 July 1977	36.21	~~6188.39~~ 6189.26	2
19 October 1977	35.75	~~6188.85~~ 6189.72	2
15 March 1978	35.80	~~6188.80~~ 6189.67	3
31 March 1978	36.21	~~6188.39~~ 6189.26	2
19 May 1978	36.00	~~6188.60~~ 6189.47	2
26 June 1978	35.92	~~6188.68~~ 6189.55	3
1 September 1978	36.98	~~6187.73~~ 6188.49	3
13 September 1978	36.98	~~6187.62~~ 6188.49	
23 October 1978	35.42	~~6189.18~~ 6190.05	2

1 B.M. ~~6224.6~~ 6225.47

2 SOHIO

3 AGW

4 Discrepancy in total depth data.

WATER LEVEL MEASUREMENTS IN MONITOR WELL 3B

Date	Depth (ft)	W.L. Altitude (ft)	Source of Data
14 December 1975	20.10	~~6137.60~~ 6138.90	3
23 March 1976	17.50	6140.20 6141.50	2
19 April 1976	17.50	~~6140.20~~ 6141.50	2
2 May 1976	20.10	6137.60 6138.90	3
7 July 1976	20.00	~~6137.70~~ 6139.00	2
6 October 1976	20.00	~~6137.70~~ 6139.00	2
20 January 1977	19.90	~~6137.80~~ 6139.10	2
12 April 1977	19.71	~~6137.99~~ 6139.29	2
13 July 1977	20.07	~~6137.63~~ 6138.93	2
19 October 1977	19.80	~~6137.90~~ 6139.20	2
15 March 1978	19.60	~~6138.10~~ 6139.40	3
31 March 1978	20.00	6137.70 6139.00	2
19 May 1978	19.95	~~6137.75~~ 6139.05	2
26 June 1978	19.50	~~6138.20~~ 6139.50	3
1 September 1978	20.00	~~6137.70~~ 6139.00	3
13 September 1978	19.19	6138.51 6139.81	3
23 October 1978	20.21	6137.49 6138.79	2

1 B.M. ~~6157.7~~ 6159.00

2 SOHIO

3 AGW

WATER LEVEL MEASUREMENTS IN MONITOR WELL 4B

Date	Depth (ft)	W.L. Altitude[1] (ft)	Source of Data
14 December 1975	>	~~<6032.03~~[1] ~~<6022.03~~[1]	3
23 March 1976	15.91	~~6156.39~~ 6146.30	2
19 April 1976	15.91	~~6156.39~~ 6146.30	2
2 May 1976	16.90	~~6155.40~~ 6145.31	3
7 July 1976	16.94	~~6155.36~~ 6145.27	2
6 October 1976	16.75	~~6155.55~~ 6145.46	2
20 January 1977	16.55	~~6155.80~~ 6145.66	2
12 April 1977	16.64	~~6155.66~~ 6145.57	2
13 July 1977	16.99	~~6155.31~~ 6145.22	2
19 October 1977	16.82	~~6155.98~~ 6145.39	2
15 March 1978	17.05	~~6155.25~~ 6145.16	3
31 March 1978	16.50	~~6155.80~~ 6145.71	2
19 May 1978	16.10	~~6156.20~~ 6146.11	2
26 June 1978	16.88	~~6155.42~~ 6145.33	3
1 September 1978	16.54	~~6155.76~~ 6145.67	3
13 September 1978	16.88	~~6155.42~~ 6145.33	3
23 October 1978	16.29	~~6156.01~~ 6145.92	2

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1 B.M. ~~6172.3~~ 6162.21

2 SOHIO

3 AGW

ATTACHMENT 5

DRILL HOLE DATA FROM WELLS ON THE SOHIO L-BAR SITE

DRILL HOLE DATA FROM WELLS ON THE SOHIO L-BAR SITE,
SEBOYETA GRANT, T. 11 N., R. 5 W., VALENCIA COUNTY, NEW MEXICO

Hole Number[1]	LOCATION Y Coordinate (ft)	LOCATION X Coordinate (ft)	Ground Surface Altitude (ft)	Altitude of Top of First Mancos Sandstone (ft)	Altitude of Bottom of First Mancos Sandstone (ft)	Thickness (ft)
RLB727	1,526,358.8	647,750.93	6331.4	6320	6284	36
1A	1,524,679.3	647,472.7	6223.3	6093		
4NP	1,524,191.9	647,454.8	6204.5	6114		
3NP	1,524,956.5	648,602.9	6229.4	6114		
2NP	1,524,634.5	649,179.3	6218.3	6162		
F3069	1,524,497.1	649,539.6	6202.8	6124	6080	43
1NP	1,524,634.5	650,456.3	6190.0	6141		
RLB517	1,524,302.0	650,498.0	6198.2	6143	6097	46
2A	1,523,693.2	647,462.2	6186.4	6116		
5NP	1,523,200.1	647,460.5	6167.8	6135		
RLB793	1,523,463.5	648,134.2	6171.2	6129	6088	41
10NP	1,523,101.2	648,276.3	6159.1	6146		
RLB514	1,523,500.0	649,000.0	6174.0	6137	6097	40
RLB515	1,523,799.0	649,498.0	6182.7	6140	6098	41
RLB516	1,523,799.0	649,997.0	6201.2	6142	6098	44
R6D-44	1,523,580.1	651,428.5	6210.5	6133	6117	46
LJ190	1,523,302.5	652,800.0	6241.6	6187	6140	46
3A	1,522,817.9	647,420.1	6155.9	6136		
15NP	1,522,280.9	647,730.0	6185.5	6148		
12NP	1,522,985.8	647,883.4	6161.3	6143		
13NP	1,522,251.6	648,087.6	6163.8	6148		
R6D-39	1,522,685.0	648,360.0	6170.0	6138	6111	27
11NP	1,522,856.8	648,430.7	6161.3	6151		
R6D-40	1,522,830.7	649,514.8	6194.6	6152	6106	46
R6D-10	1,521,924.6	649,871.3	6208.8	6133	6080	53
RLB837	1,522,788.0	650,386.0	6235.0	6165	6125	40
RLB791	1,522,519.4	651,029.0	6254.2	6177	6134	43
RLB488	1,522,092.0	652,507.0	6359.5	6204	6154	50
R6D-13	1,522,747.9	652,609.0	6316.2	6191	6143	48
4A	1,521,809.2	647,471.6	6170.8	6150		
RLB792	1,521,966.2	648,510.7	6187.7	6164	6117	46
8NP	1,521,361.2	648,723.1	6225.4	6180		
9NP	1,521,622.7	649,836.0	6226.6	6168		

[1] NP holes refer to Neutron Probe Monitor Wells.
RLB, R6D, and LJ holes refer to Sohio exploration drill holes.
Holes numbered with the letter F refer to Anaconda drill holes.

DRILL HOLE DATA (Continued)

Hole Number[1]	LOCATION Y Coordinate (ft)	LOCATION X Coordinate (ft)	Ground Surface Altitude (ft)	Altitude of Top of First Mancos Sandstone (ft)	Altitude of Bottom of First Mancos Sandstone (ft)	Thickness (ft)
R6D-7	1,521,439.4	649,915.6	6250.2	6159	6116	53
RLB485	1,521,297.0	651,000.0	6257.7	6207	6163	44
RLB709	1,521,300.5	651,400.0	6293.6	6202	6153	49
RLB486	1,521,596.5	651,502.0	6342.4	6197	6147	50
RLB706	1,521,404.0	651,796.5	6366.7	6209	6161	48
R6D-12	1,521,423.0	652,357.8	6416.7	6214	6168	46
R6D-41	1,520,843.3	649,619.4	6344.3	6190	6142	48
R6D-8	1,520,282.2	649,811.5	6340.4	6195	6138	57
R6D-9	1,520,056.3	649,916.4	6363.2	6204	6159	45
R6D-4	1,520,706.3	649,918.9	6321.0	6194	6145	49
RLB484	1,520,503.0	650,003.5	6328.1	6198	6152	46
RLB662	1,520,200.0	650,304.0	6319.9	6209	6154	55
RLB465	1,520,999.0	650,298.0	6266.9	6199	6151	48
RLB663	1,520,801.0	650,299.0	6289.5	6203	6153	50
RLB639	1,520,300.5	650,402.5	6298.0	6210	6159	51
RLB466	1,521,001.0	650,499.0	6257.1	6169	6127	42
RLB467	1,520,804.0	650,504.0	6268.5	6205	6159	46
RLB628	1,520,197.0	650,497.0	6303.0	6211	6153	58
RLB464	1,520,902.5	650,594.5	6261.8	6206	6158	48
RLB355	1,520,483.0	650,604.0	6282.0	6210	6171	39
RLB337	1,520,402.0	650,702.0	6280.4	6212	6162	50
RLB338	1,520,299.0	650,603.0	6287.0	6210	6164	46
RLB374	1,520,586.0	650.722.0	6275.0	6207	6164	43
RLB394	1,520,699.0	650,782.0	6269.5	6208	6161	47
RLB356	1,520,499.0	650,794.0	6273.0	6211	6153	58
RLB335	1,520,300.0	650,801.0	6279.4	6212	6164	48
RLB375	1,520,610.0	650,916.5	6262.1	6210	6163	47
RLB336	1,520,400.0	650,899.0	6275.0	6213	6165	48
RLB393	1,520,686.0	650,979.0	6263.0	6203	6163	40
RLB395	1,520,596.0	651,098.0	6269.0	6213	6159	54
RLB343	1,520,500.0	651,198.0	6275.0	6225	6168	57
RLB342	1,520,400.0	651,300.0	6280.0	6214	6169	45
RLB708	1,520,901.0	651,395.0	6310.5	6210	6161	49
RLB344	1,520,400.0	651,499.0	6293.0	6212	6164	48

DRILL HOLE DATA (Continued)

Hole Number[1]	LOCATION Y Coordinate (ft)	LOCATION X Coordinate (ft)	Ground Surface Altitude (ft)	Altitude of Top of First Mancos Sandstone (ft)	Altitude of Bottom of First Mancos Sandstone (ft)	Thickness (ft)
RLB707	1,520,899.0	651,795.0	6334.3	6213	6164	49
RLB740	1,520,727.0	651,864.0	6352.0	6216	6159	57
RLB724	1,520,614.0	651,973.0	6355.0	6221	6173	48
RLB483	1,519,997.0	649,498.0	6418.0	6202	6153	49
RLB325	1,520,000.0	650,903.0	6287.0	6215	6164	51
RLB322	1,520,000.0	651,100.0	6284.0	6217	6165	52

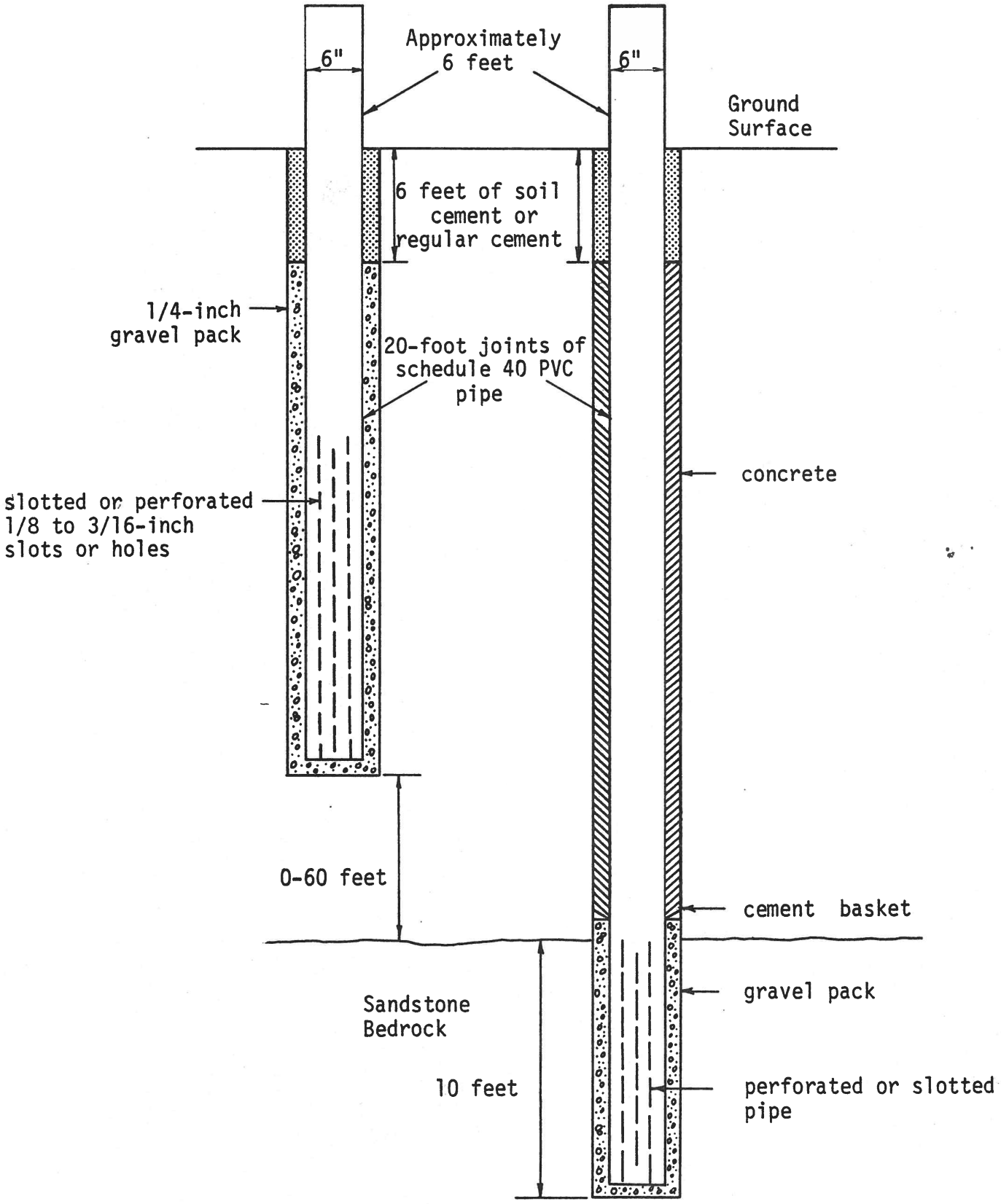
INFORMATION ON NEUTRON PROBE HOLES AND MONITOR WELLS AT THE SOHIO L-BAR SITE, VALENCIA COUNTY, NEW MEXICO

Well No.	Total Depth (ft)	Depth to Sandstone (ft)	Perforated Interval (ft)
1A	138.48	130	130-140
1B	36.30		18- 36
2A	76.46	70	66- 76
2B	35.02		15- 35
3A	29.98	20	20- 30
3B	17.78		7- 17
4A	32.60	20	20- 30
4B	16.04		6- 15
NP 1	54[1]	49	2
NP 2	61[1]	56	2
NP 3	123[1]	115	2
NP 4	95[1]	90	2
NP 5	35[1]	32	2
NP 6	16[1]	11	2
NP 7	25[1]	20	2
NP 8	50[1]	45	2
NP 9	63[1]	58	2
NP 10	39[1]	20	2
NP 11	41[1]	27	2
NP 12	50[1]	30	2
NP 13	50[1]	30	2
NP 14	80[1]	40	2
NP 15	72[1]	38	2
NP 16	42[1]	10	2
New Wells			
5	150[1]	90	110-150
6	140[1]	70	100-140
7	110[1]	55	90-110
8	110[1]	45	90-110

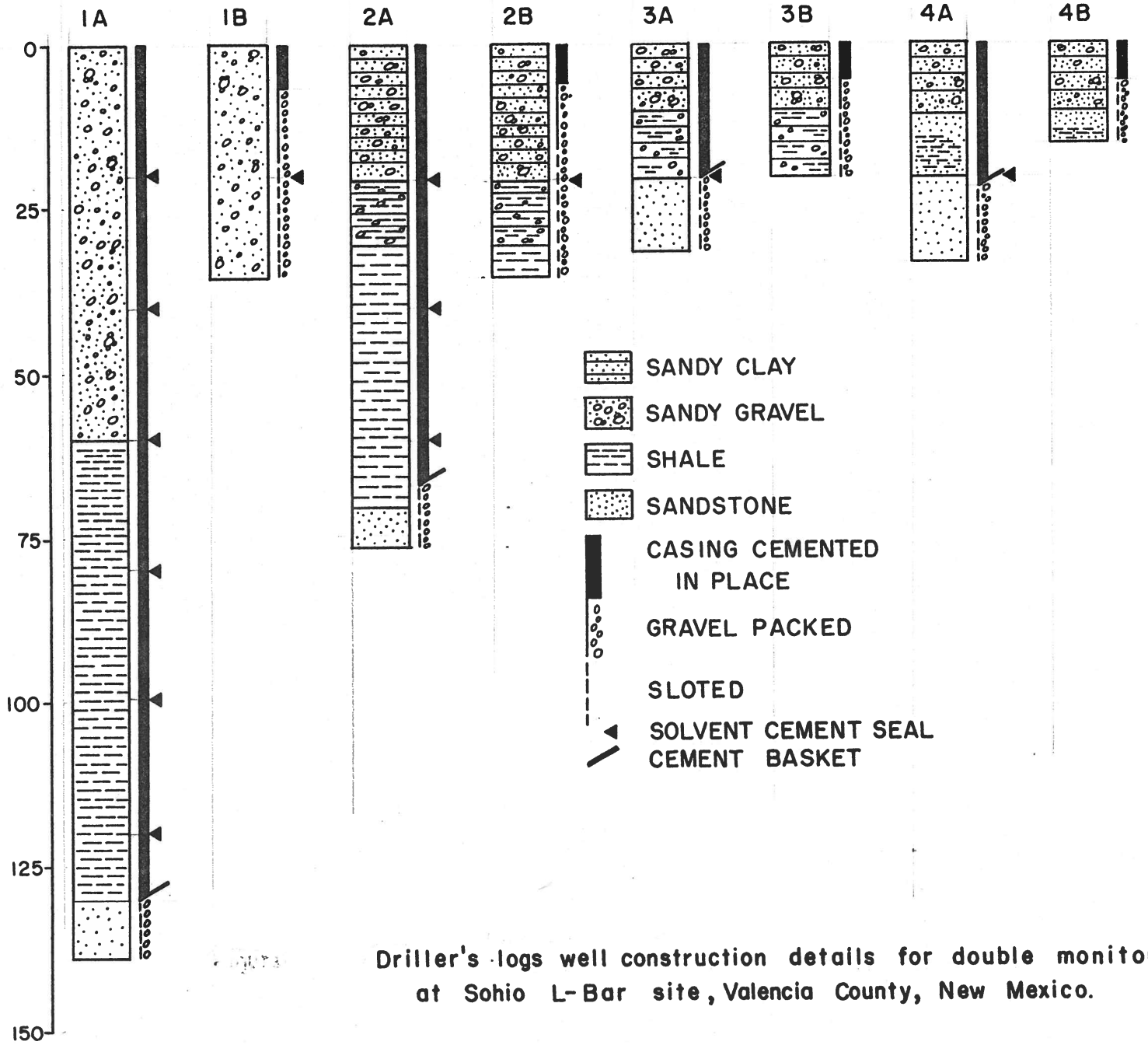
[1] These measurements are approximately ± 1 foot.
[2] Not perforated.

ATTACHMENT 6

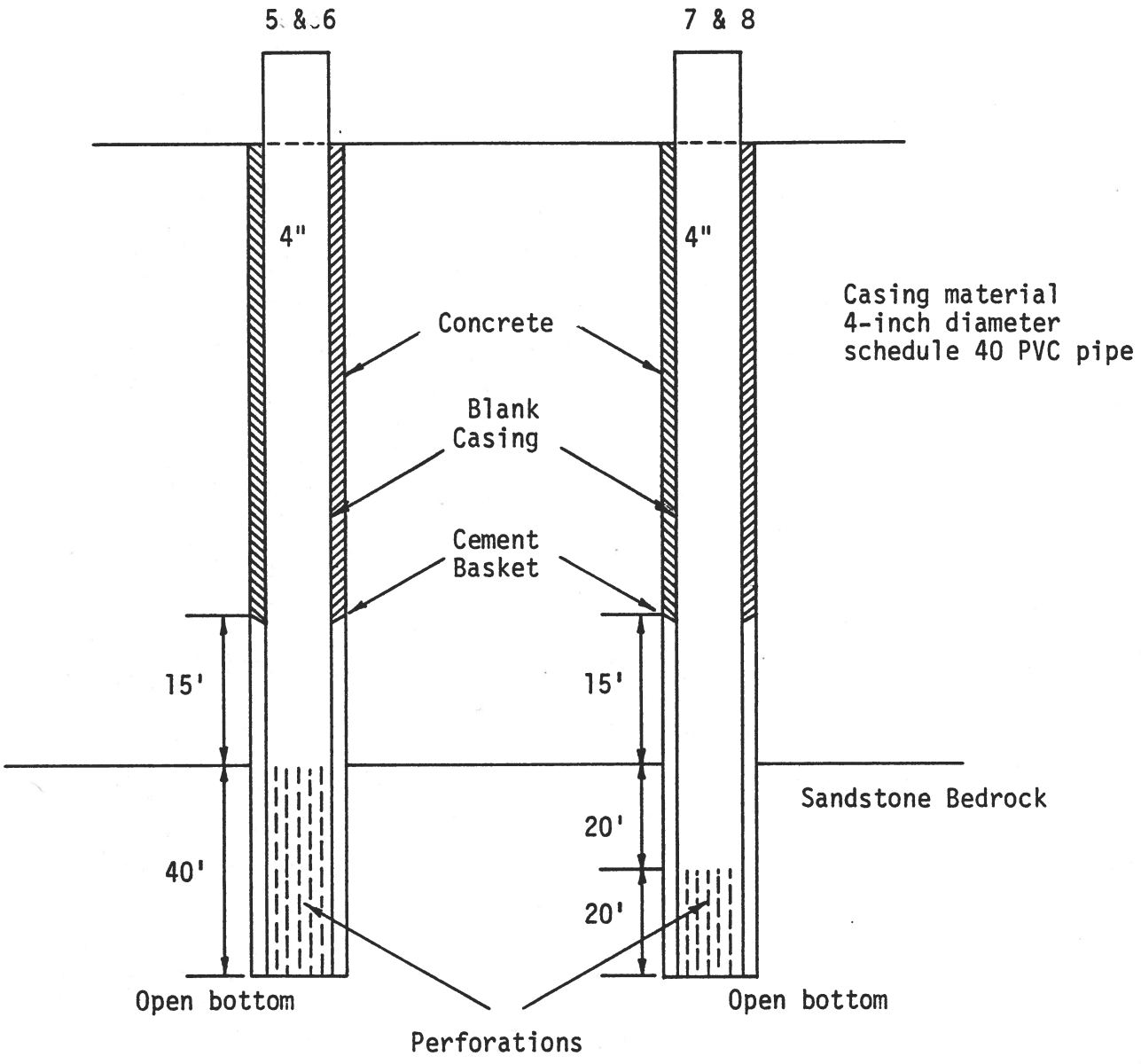
CONSTRUCTION DETAILS AND LITHOLOGIC LOGS OF THE NEUTRON-PROBE-ACCESS HOLES AND WATER LEVEL OF MONITORING HOLES



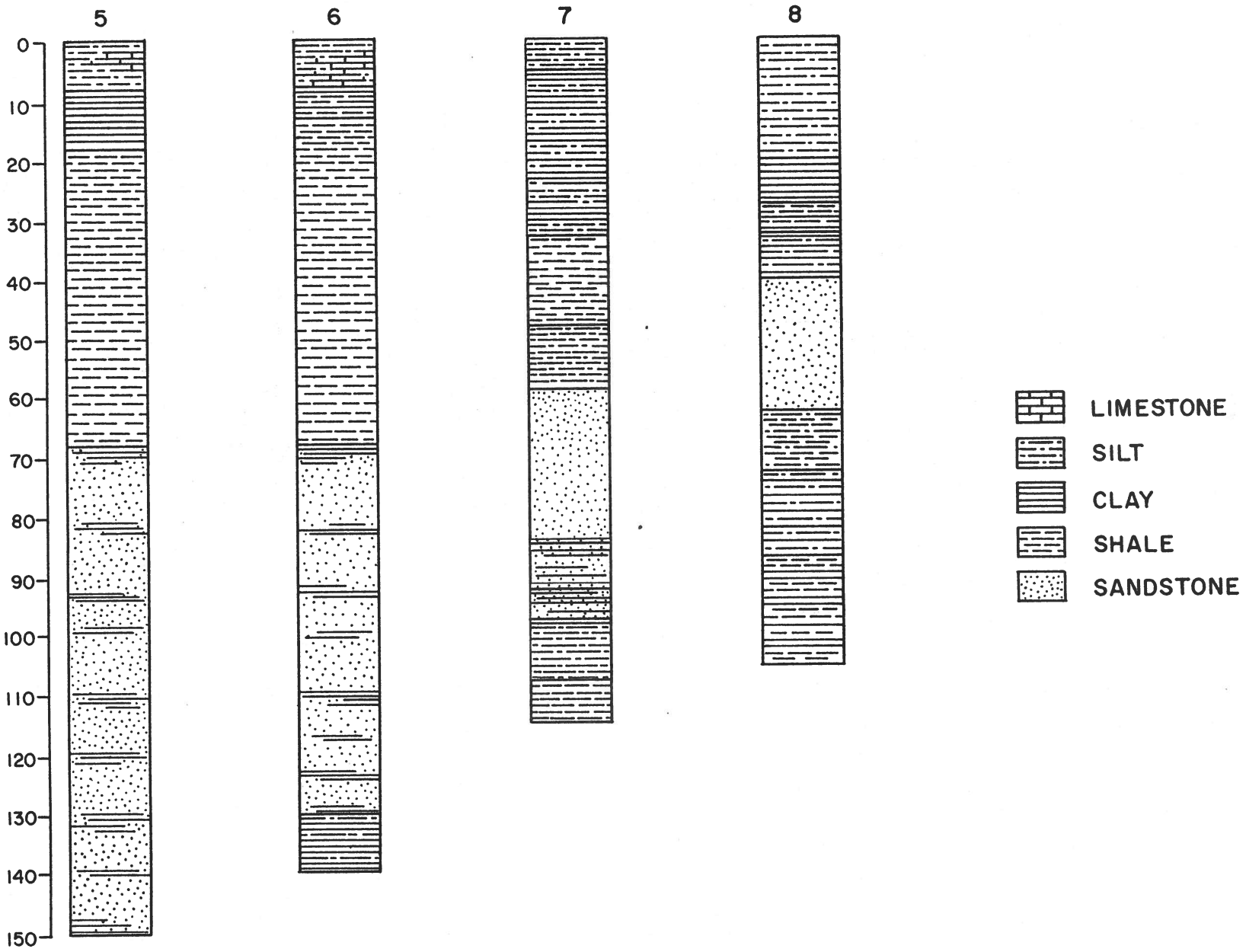
Well construction details for the SOHIO double monitor wells due west of the tailings disposal area at the SOHIO L-Bar property, Valencia County, New Mexico.



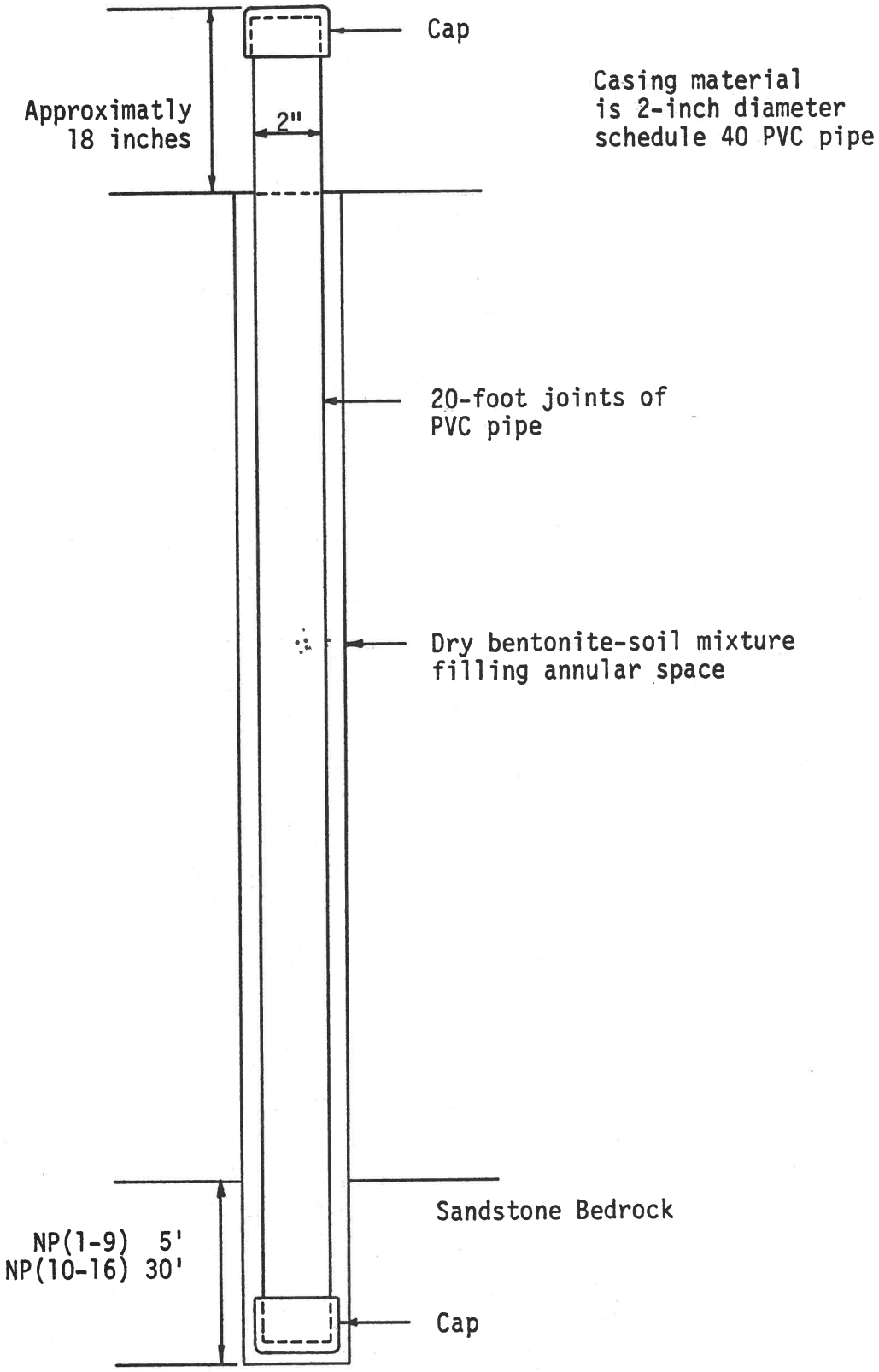
Driller's logs well construction details for double monitor wells at Sohio L-Bar site, Valencia County, New Mexico.



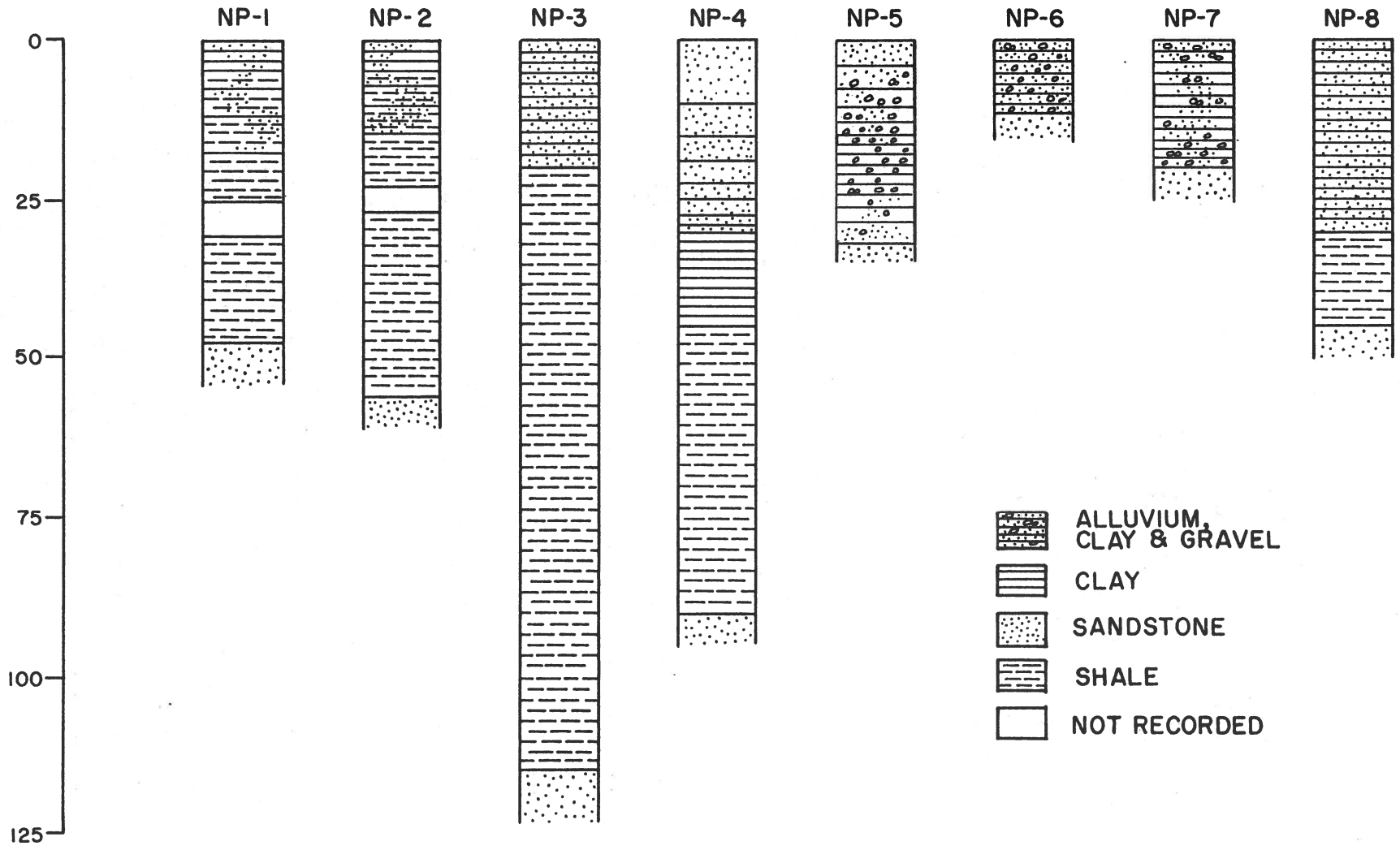
Well construction details for monitoring wells 5, 6, 7, and 8 which were constructed August 29, 1978.



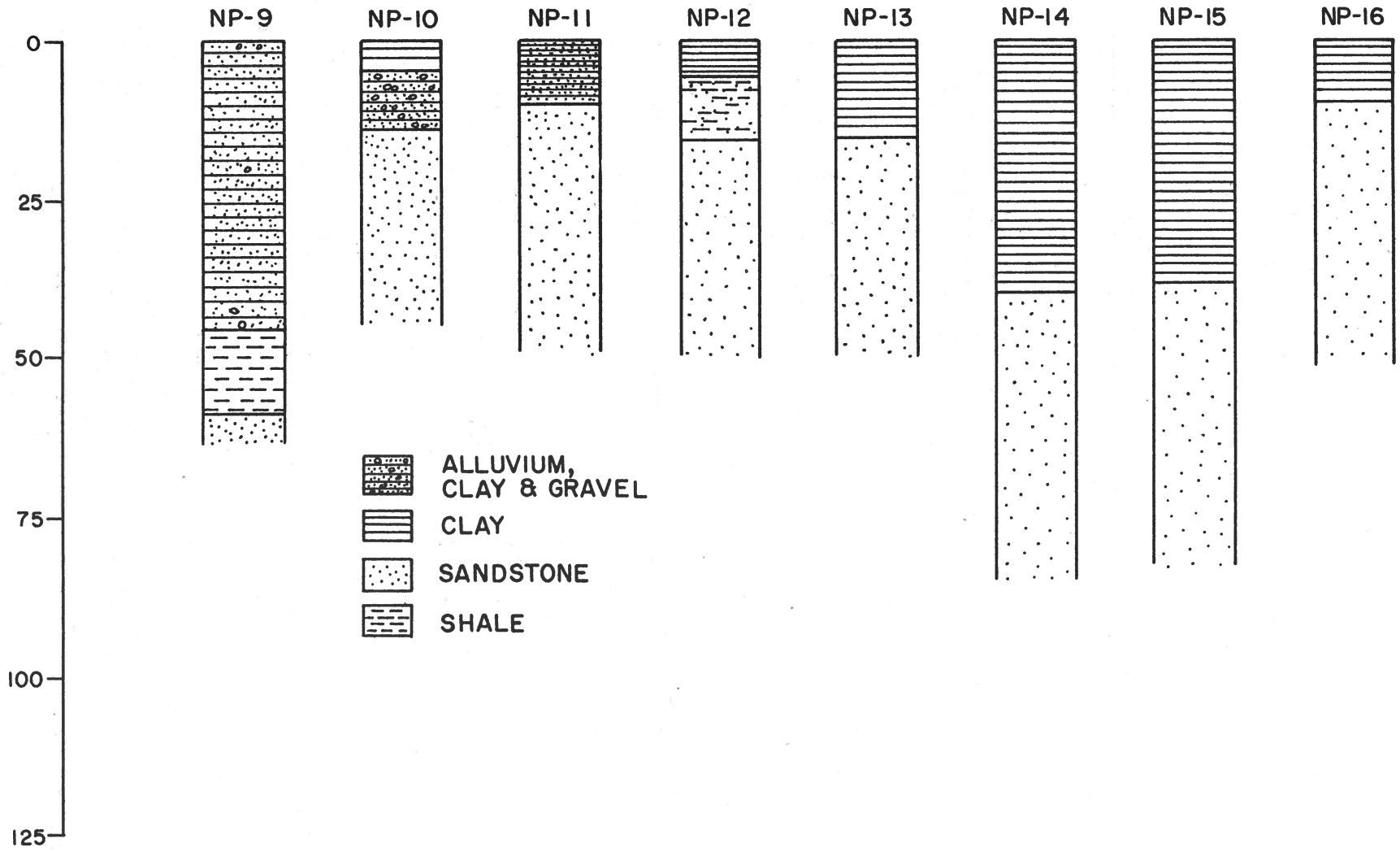
Lithologic logs for monitor wells 5 through 8 constructed at the SOHIO L-Bar property.



Construction details for neutron-probe-access holes NP-1 to NP-16



Lithologic logs of neutron-probe-access holes NP-1 through NP-8 constructed at the tailings disposal site at the SOHIO L-Bar property.



Lithologic logs of neutron-probe-access holes NP-9 through NP-16 constructed at the tailings disposal site at the SOHIO L-Bar property.