ASSESSMENT OF RESIDUAL SEDIMENTS, SAINT JOHN OPEN-WATER DREDGED MATERIALS DISPOSAL SITE, NEW BRUNSWICK

MARCH 2001

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ENVIRONMENTAL CONSULTANTS LTD.

7266-RL/W
31 March 2001

Dr. K.-L. Tay
Environment Canada
4th Floor, Queens Square
45 Alderney Drive
Dartmouth, N.S.

RE: SEDIMENT EVALUATION, SAINT JOHN HARBOUR BLACK PT. DISPOSAL SITE

Dear Dr. Tay:

Enclosed is the final report of the sediment evaluation study for trace organic contaminants undertaken the Black Pt. Open-water Dredged Material Disposal Site, Saint John, N.B.

From the application of the Environment Canada guidelines for statistically-based characterization of dredged sediments, a total of 58 sampling sites were identified within the Disposal Site and the immediately adjacent Slump Area. In addition, 10% or 6 sites were to be sampled in duplicate for quality control. Weather and available time permitted the collection of six additional sediment samples from the Outer Harbour area.

Sampling was successfully completed in March 2001 with samples provided to Philip Analytical – Halifax for testing for polycyclic aromatic hydrocarbons (PAH), polychlorinated biphenyls (PCB), total organic carbon (TOC) and particle size distribution. The results of analyses were tested using SYSTAT 8 and mean and the upper 95% confidence interval for the PCB, TOC and sum of 16 PAH compounds were determined.

Please contact me if you require additional information or clarification.

Yours truly,

LAND & SEA
ENVIRONMENTAL CONSULTANTS LTD.

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President
Encl.

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ASSESSMENT OF RESIDUAL SEDIMENTS, SAINT JOHN OPEN-WATER DREDGED MATERIALS DISPOSAL SITE, NEW BRUNSWICK

Report prepared for:	Environment Canada Atlantic Region 45 Alderney Drive Dartmouth, Nova Scotia
Report prepared by:	Land & Sea Environmental Consultants Ltd. 620-33 Alderney Drive Dartmouth, Nova Scotia

MARCH 2001

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1. SUMMARY

The objective of the study was to use the sediment characterization process, described in Environment Canada (1995) for any dredged material evaluation study, as the method for evaluating the scope and extent of polychlorinated biphenyl (PCB) and polycyclic aromatic hydrocarbons (PAH) contamination of the Saint John Harbour Black Pt. Disposal Site. Based on approximately 550,000 sq m of Disposal Site area and assuming a uniform depth of 1 m, yielded a determination of 551 grid blocks of which 29 should be sampled. Assuming a uniform distribution of contaminants and materials, the 29 blocks can be selected on a truly random basis. Following standard quality assurance requirements, 10% or 3 blocks were randomly selected to be sampled in duplicate. Based on approximately 1,913,062 sq m of Slump Area and assuming a uniform depth of 0.3 m, yielded a determination of 574 grid blocks of which 29 should be sampled. Assuming a uniform distribution of contaminants and materials, the 29 blocks can be selected on a truly random basis. 10% or 3 blocks were randomly selected to be sampled in duplicate. In addition, six sites within the Outer Harbour area were also sampled.

Sampling was successfully completed on 19-21 March 2001 using a 0.25 sq m Van Veen grab deployed from the JORDIVE vessel, the "Bonnie Bride". Samples were submitted to Philip Analytical Services Inc. (Halifax) for testing for PCB, a suite of 16 PAH, particle size distribution (-4 to +9 phi), total organic carbon and a suite of trace metals (the results of the metals will not be discussed in this report).

The results of the analyses were tested using *SYSTAT 8*, a statistical evaluation software, to determine the mean and upper 95% confidence interval. The criteria for evaluation of the PCB and sum of PAH was set at the Ocean Disposal Permit guidelines of 100 ug/kg and 2.5 mg/kg, respectively with the upper 95% confidence level having to be less than the applicable Ocean Disposal Permit guidelines values. The statistics for the samples (excluding duplicates and the six Outer Harbour samples) are:

Substance	Mean (n=57)	Upper 95% confidence value
Total Organic Carbon (g/kg)	6.07	6.89
Polychlorinated biphenyl (ug/kg)	8.2	10.3
Sum of 16 polycyclic aromatic hydrocarbons (mg/kg)	0.67	0.78

As the mean and upper 95% confidence concentrations for PCB and sum PAH were less than their respective Ocean Disposal Permit guideline values, it is concluded the Black Pt. Disposal Site (including the Slump Area) sediments meet the Ocean Disposal Permit requirements.

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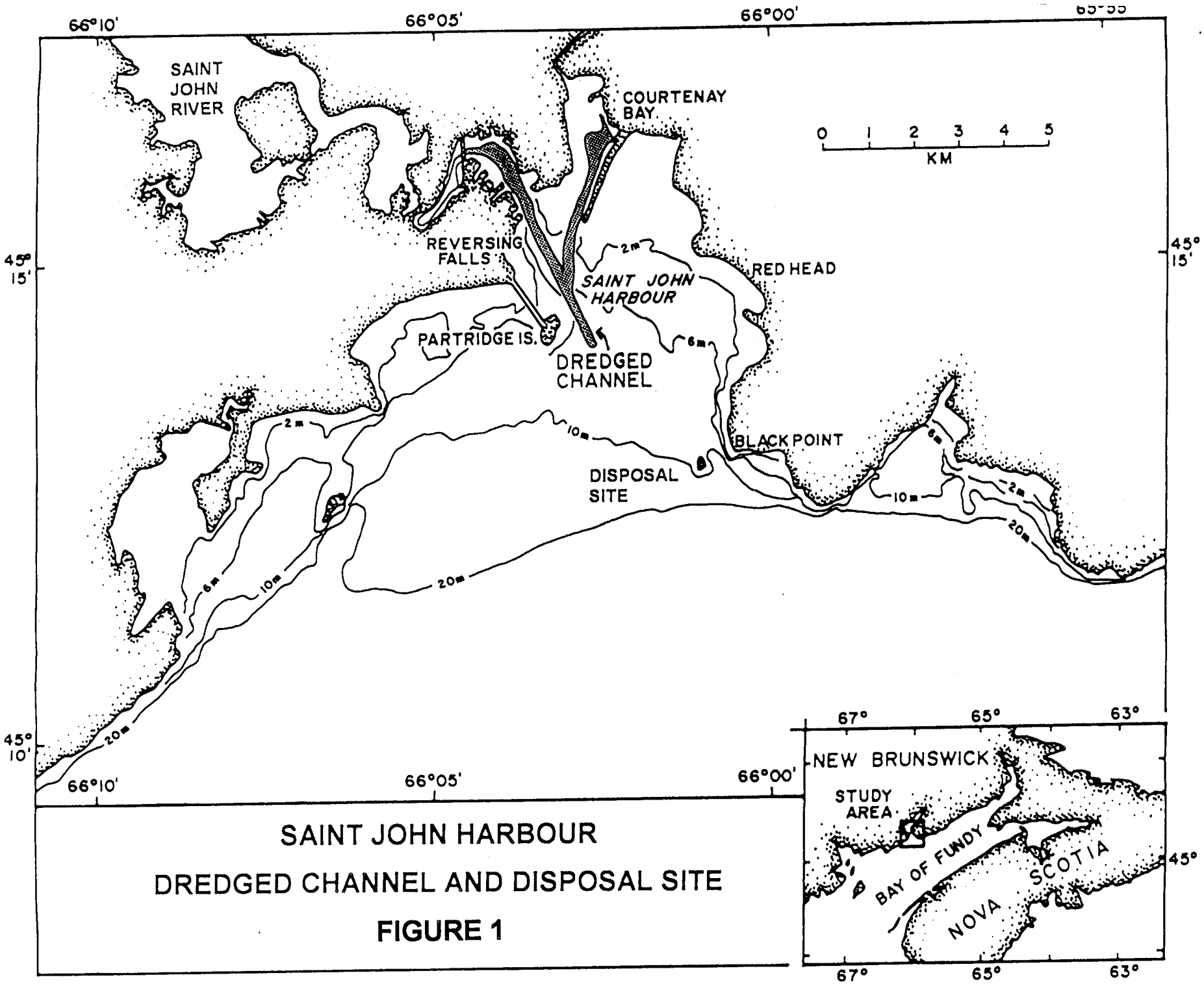
2. INTRODUCTION

Dredging, with open-water disposal of the dredged materials, is a key element in maintaining the navigability of the Port of Saint John, N.B. The unique sediment dynamics of the Harbour, representing a combination of the Saint John River discharge and Bay of Fundy tides, have resulted in an annual maintenance dredging requirement on the order of 750,000 cu m. Much of this material has been open-water dumped at the Black Point Disposal Site (see Figure 1). Several recent studies[1] [2] of the Disposal Site have reported concentrations of PCB and/or PAH in excess of the current Ocean Disposal Permit guidelines. These exceedances have been attributed to materials disposed before the implementation of regulations to characterize materials.

To evaluate the scope and extent of PCB and PAH at the Black Pt. Disposal Site, Environment Canada contracted with Land & Sea Environmental Consultants Ltd. to undertake an investigation using the statistically-based evaluation scheme[3] developed to characterize sediments as part of the Ocean Disposal Permit process. The sediments samples were delivered to Philip Analytical Services Inc. (Halifax) and the results interpreted by Land & Sea Environmental Consultants Ltd. The report, herein, provides the results and findings of the sampling and testing program.

[1] Environment Canada., 1997. (K.-L. Tay, K.G. Doe, A. MacDonald and K. Lee) Monitoring of the Black Point Ocean Disposal Site, Saint John Harbour, New Brunswick, 1992-94. Ocean Dumping Report #9.
[2] Land & Sea Environmental Consultants Ltd. 1994. (S. MacKnight). Collection and Analyses of Bottom Samples, Courtenay Bay, Saint John, N.B. 1994. Report prepared for Public Works and Government Services Canada (on behalf of Transport Canada).
[3] En ironment Canada. 1995. Guidance Document on the Collection and P eparation of Physico-Chemical Characterization and Biological Testing. Environmental Protection Series Report EPS 1/RM/



SAINT JOHN HARBOUR

DREDGED CHANNEL AND DISPOSAL SITE

FIGURE 1

3. SELECTION OF SAMPLING SITES

To obtain a statistically-based mean and upper 95% confidence level for the contaminants of interest, the Disposal Site was divided into a pattern of grid blocks as described in Environment Canada (1995). The concept is to divide the sediment area of interest into 1000 cu m blocks (nominally 20 x 50 x 1m) and number each block sequentially. Assuming a random distribution of contaminants, then a random selection of blocks should provide a statistically-based description of the contaminant distributions. As per Appendix G of Environment Canada (1995) and assuming a uniform 1 m depth, the Black Pt. Disposal Site can be divided into 551 blocks based on a nominal size of 550,000 cu m with a requirement to sample 29 of these blocks. However, assessments of the Disposal Site by the Atlantic Geoscience Centre [4] indicate that long-term deposition of dredged materials has resulted in a "slump" to the south and southeast. Since these materials also represent dumped sediments from the Inner Harbour, the Slump Area was included in the calculations for sampling sites. As per Appendix G of Environment Canada (1995), the approximately 1,913,062 sq m of Slump Area, assuming a uniform depth of 0.3 m yields a determination of 574 grid blocks of which 29 should be sampled.

The sampling sites are illustrated in Figures 2A and 2B.

Disposal Site

Since the Disposal Site area is not a uniform shape, a nominal perimeter was determined from the AGC (2000) multi-beam bathymetry output and the resultant area was divided into a series of rectangles and right triangles to derive Site area and thus number of grid blocks and blocks requiring sampling. Based on approximately 550,000 sq m of Disposal Site area and assuming a uniform depth of 1 m yields a determination of 551 grid blocks of which 29 should be sampled. Further assuming a uniform distribution of contaminants and materials, the 29 blocks can be selected on a truly random basis:

[4] Atlantic Geoscience Centre, Geological Survey of Canada. 2000. (R. Parrott and others). Monitoring and Evaluation of Conditions at the Black Point Offshore Disposal Site. Report to Atlantic Region, Environment Canada.

Primary Division	Area (sq m)	Grid blocks	Block Numbers
D-1	27,225	27 (#1-27)	11, 15
D-2	12,375	12 (#29-40)	
D-3	129,600	130 (#41-171)	81, 85, 95, 115, 130, 144
D-4	234,900	235 (#172- 406)	174, 179, 194, 198, 207, 259, 265, 272, 291, 308, 320, 340, 348, 360, 368, 393
D-5	108,675	109 (#407-516)	412, 442, 480, 488
D-6	29,700	30 (#519-547)	
D-7	7,425	8 (#548-558)	556
Total	**549,900**	**551**	**Total = 29**

Blocks 144, 179 and 368 were randomly selected as requiring duplicate samples (10%). In the event of hard-pan bottom and the team is unable to collect an adequate sample, stations: 365, 129, 237, 267, 394, 511, 358, 104 were selected as alternates. It should be noted that the primary divisions were only identified to assist in determining surface area and the total number of grid blocks required. All grid blocks were sequentially numbered and the reference to a primary division was no longer used.

Slump Section

A nominal perimeter was determined from the AGC (2000) multi-beam bathymetry output and the resultant area was divided into a series of rectangles and right triangles to derive the total area and thus number of grid blocks and blocks requiring sampling.

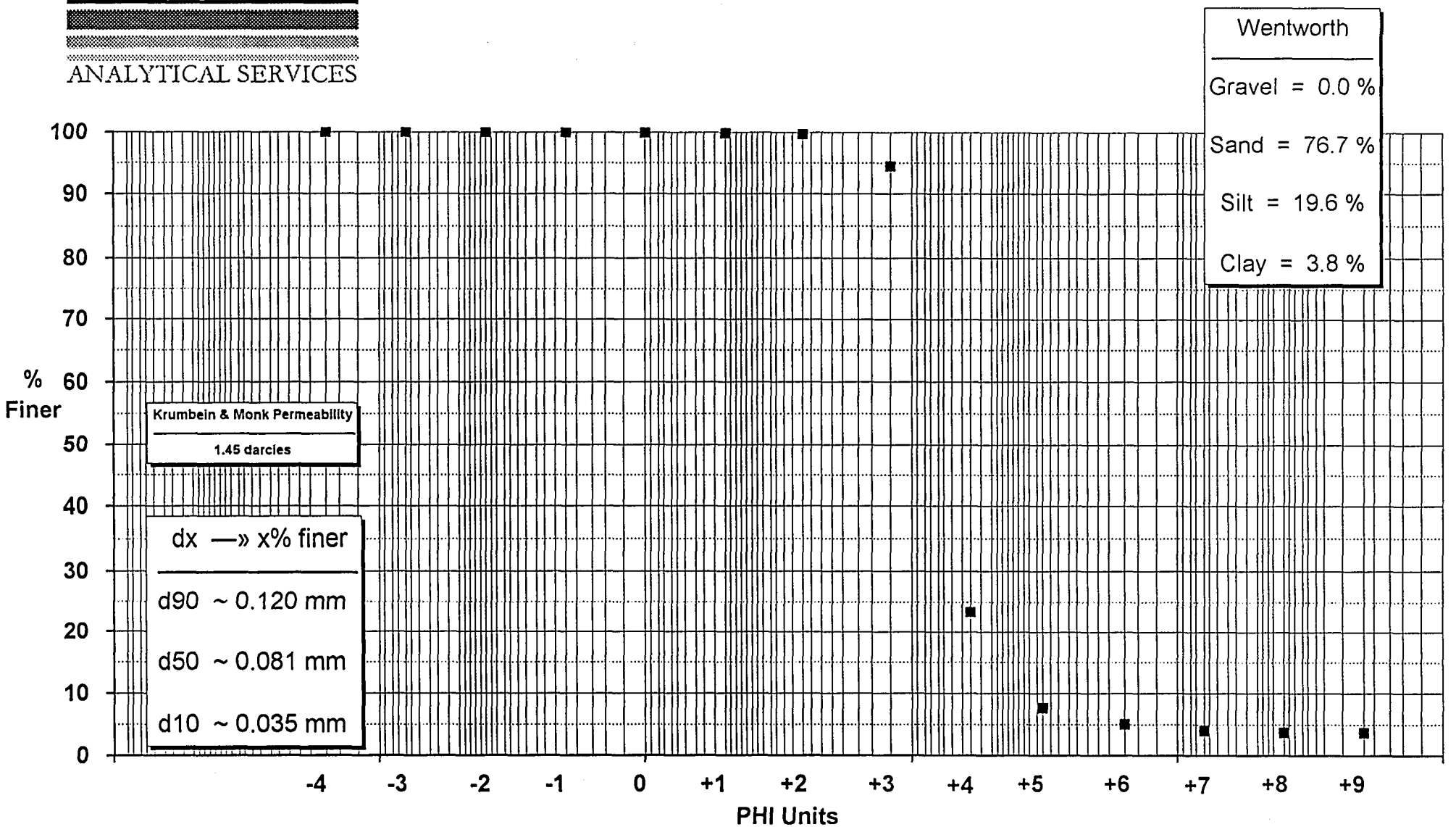
Based on approximately 1,913,062 sq m of Slump Area and assuming a uniform depth of 0.3 m yields a determination of 574 grid blocks of which 29 should be sampled. Further, assuming a uniform distribution of contaminants and materials, the 29 blocks can be selected on a truly random basis with Blocks 689, 578 and 610 sampled in duplicate (10%).

Primary Division	Area (sq m)	Grid blocks	Blocks to be Sampled
D-8	1,623,600	487 (#557 to 1044)	918, 578, 997, 936, 865, 859, 610, 961, 626, 663, 695, 847, 703, 969, 636, 737, 974, 617, 952, 689, 975, 868, 916, 735, 977, 707
D-9	193,725	58 (#1045 to 1102)	1048, 1056
D-10	49,612	15 (#1103 to 1118)	
D-11	46,125	14 (#1119 to 1132)	1129
Total	**1,913,062**	**574**	**Total = 29**

PSC ID: 01-H012529

ANALYTICAL SERVICES

Control 6

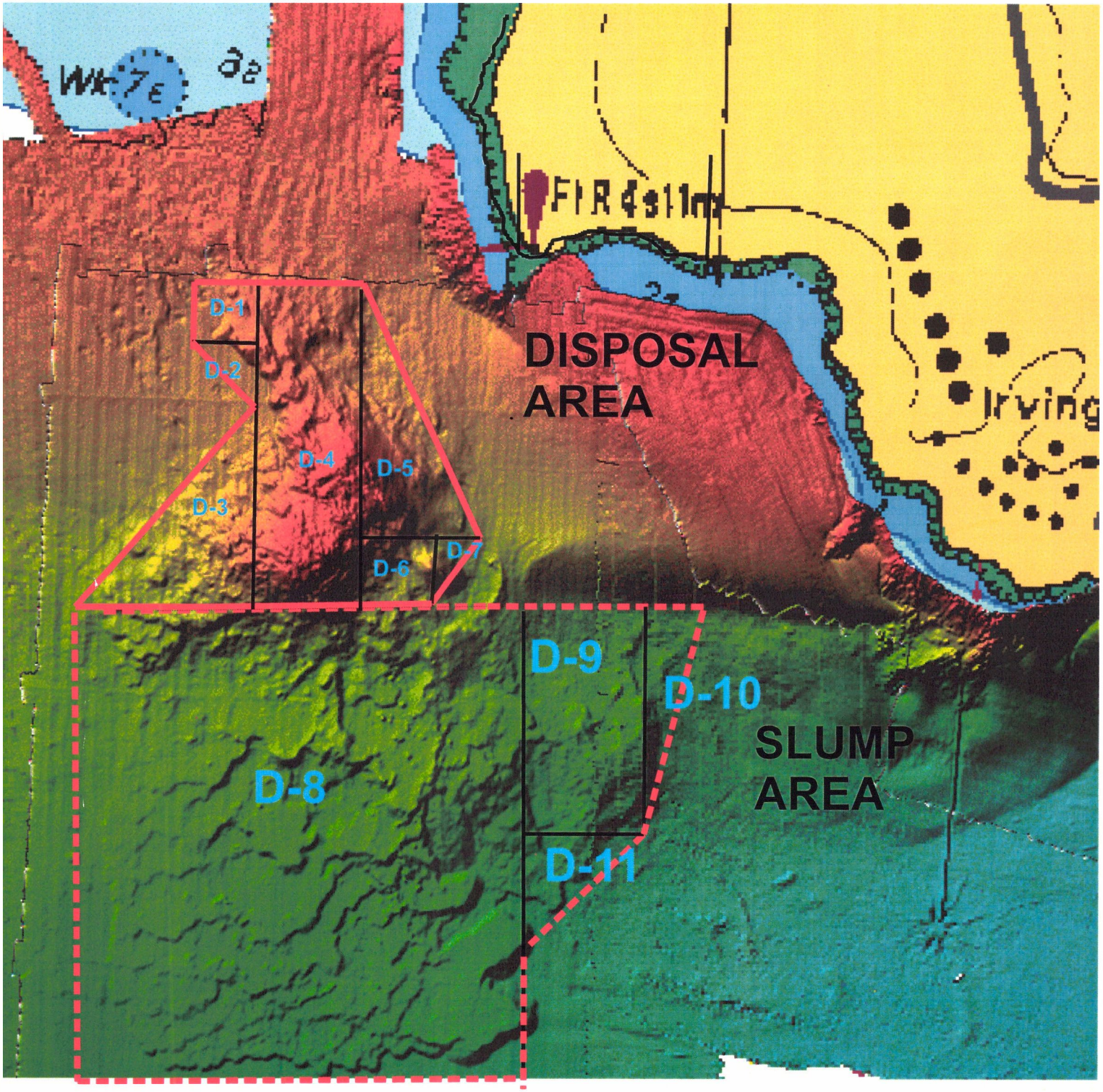


JBK

Approved

FIGURE 2A: BLACK PT. DISPOSAL SITE AND SLUMP AREA ILLUSTRATING LAYOUT OF SAMPLING GRID

(*Note: Division into sections was only made to facilitate determing sizes and laying out grid blocks; they have no other significance*)



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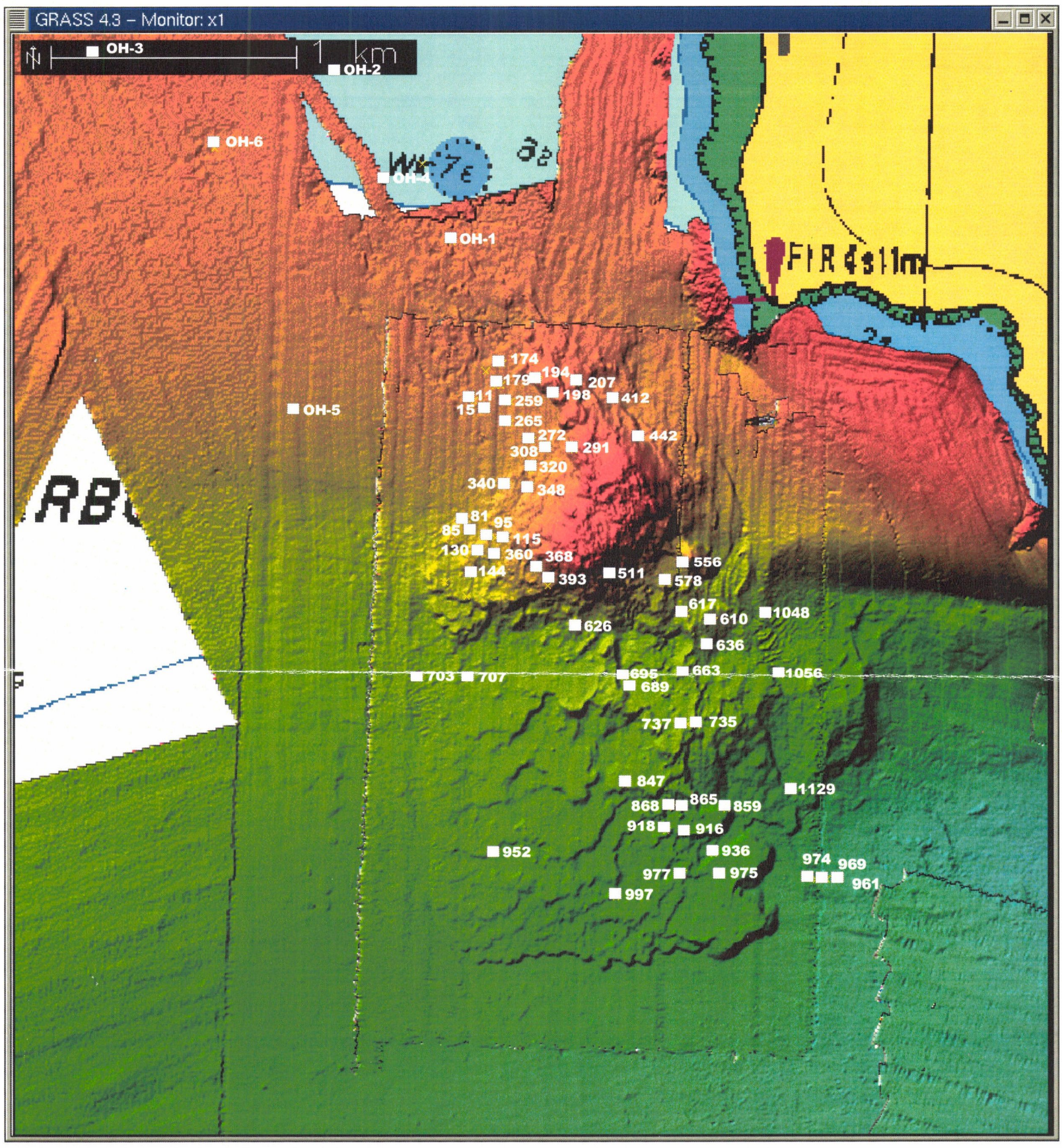

FIGURE 2B: LOCATIONS OF SAMPLING SITES
(Thanks to R. Parrott of AGC/GSC for map preparation)

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4. FIELD NOTES AND METHODOLOGY

The sampling grids described in Section 3 were applied to the Disposal Site and Slump Area as illustrated in Figures 2A and 2B. From these layouts, the site locations were selected as provided in Appendix A.

Sampling took place on 19, 20 and 21 March 2001 using the JORDIVE vessel "Bonnie Bride", a 15-m Cape Island style vessel, with a hydraulic winch and boom system to deploy the 0.25 m^2 Van Veen grab.

The time and actual location of all sampling is provided in the table in Appendix A.

Field notes are as follows:

1. Evening of 19 March. Arrived in Saint John and loaded boat. Departed wharf at 2000 AST. Collected sediment samples from 4 Outer Harbour sites. Winds light to moderate. High tide at 20:20 AST. Seas calm.

2. 20 March. Left wharf for Disposal Site at 0700. Winds light to moderate from north. High tide at 0900 AST. Clear, sunny, calm. Started at Block 11 and collected samples in order of listing. All positions established by LORAN C. Encountered rock and coarse gravel at Block 480 and 488. Substituted 511. Returned to wharf at 1700 AST.

3. 21 March. Left wharf at 0715. Winds light and from north. High tide at 0950 AST. Clear, sunny, light seas. Proceeded to Block 695 and sampled, although not in order. Sample 735 was gravel. Shifted 2 minutes west and re-sampled into softer bottom. Due to shortage of vials for AGC samples, they will have to obtain sub-surface samples from Blocks 847, 859 or 868 from Environment Canada samples. Insufficient vials and therefore no AGC samples at Blocks 952, 916 or 1129. Sub-surface samples will have to be taken from Environment Canada samples. Collected two Outer Harbour sediment samples. Returned to wharf at 1430 AST.

4. 22 March. Delivered samples to Philip Analytical Services Inc. (Halifax).

5. 23 March. Delivered samples to R. Parrott, AGC/BIO.

All samples were collected using the following field protocol:

1. Locate site using latitude and longitude locators provided in table (see Appendix B). Make note of actual location and time of sampling. Keep separate notes as to general weather and tide conditions.

2. When the grab is taken, open the top-access doors to enable sampling of the surface layer. Using a Teflon-coated large spoon, scrap a thin layer from the top and place in a 100-dram plastic container (as provided by Russ Parrott). Note the sample site on the top of the container.

3. Open the grab and access the centre of the grab sample. Using a Teflon-coated large spoon, fill a second 100-dram plastic container as provided by Russ Parrott. Note the sample site on the top of the container and the letter "S" (for sub-surface).

4. Also from the centre of the grab, fill one Zip-loc bag about 75% full and one 500 mL glass Mason jar about 75% full. Note the sample number on the label on the Zip-loc and also on the sample bottle. Cover the sample bottle top with a section of aluminum foil and screw on the top. Note the sample site on the top of the Mason jar as well.

5. Rinse off spoons between sample sites in clean seawater.

6. Collect duplicate bottles/bags form the same grab at Stations noted on the list with "DUP".

7. Collect samples from 58 sites within the Disposal Area and Slump Area with 6 samples taken in Duplicate for a total of 64 sets.

8. Collect samples from 6 sites to the west of the Disposal Area – your choice of sampling site (recommend these be collected on the route back to base).

9. Samples can freeze; however ensure minimum water content to limit problems of bottle breakage.

10. Return Environment Canada samples to Philip Analytical Services Inc. (Halifax).

11. Return AGC sediment samples to Russ Parrott.

5. LABORATORY RESULTS

All analyses were performed by Philip Analytical Services Inc. (Halifax) under a direct contract with Environment Canada. A summary of the analytical methods is provided in Appendix B; a complete print-out of the testing results in Appendix C.

The results of the chemical analyses are provided in Table 1 (PCB), Table 2 (suite of PAH), Table 3 (four categories of particle size) and Table 4 (total organic carbon). All particle size distributions are also graphed, as provided in Appendix D.

Table 1: Results of PCB Analyses

	Block	PCB (ug/kg)	Comments
D-1	11	<10	
	15	<10	
D-3	81	<10	
	85	34.8	Aroclor 1254
	95	<10	
	115	<10	
	130	<10	
	144	<10	
	144 DUP	<10	
D-4	174	<10	
	179	<10	
	179 DUP	<10	
	194	<10	
	194 Lab Dup	<10	
	198	<10	
	207	<10	
	259	<10	
	265	33.9	Aroclor 1242
	272	<10	
	291	<10	
	308	<10	
	320	<10	
	340	<10	
	348	<10	
	348 Lab Dup	<10	
	360	<10	
	368	<10	
	368 DUP	<10	
	393	<10	
D-5	412	<10	
	442	<10	
	480	<10	
	511Alt	<10	
D-7	556	<10	
D-8	578	<10	
	578 DUP	<10	

Table 1 Continued

	610	23.4	Aroclor 1254
	610 DUP	19.5	Aroclor 1254
	617	21	Aroclor 1242
	626	<10	
	636	15.2	Aroclor 1242
	663	<10	
	689	<10	
	689 DUP	<10	
	695	<10	
	703	<10	
	707	<10	
	735	<10	
	735 Lab Dup	<10	
	737	17.8	Aroclor 1254
	847	20	Aroclor 1254
	859	<10	
	865	<10	
	868	19.3	Aroclor 1242
	916	<10	
	918	<10	
	936	<10	
	952	<10	
	961	<10	
	968	<10	
	974	<10	
	974 Lab Dup	<10	
	975	<10	
	977	34.5	Aroclor 1242
	997	<10	
D-9	1056	<10	
D-10	1048	<10	
D-11	1129	<10	
	OH-1	<10	
	OH-2	<10	
	OH-3	<10	
	OH-4	<10	
	OH-5	<10	
	OH-6	<10	
	OH-6 Lab Dup	<10	

Table 2: Results of PAH Analyses (mg/kg dry wt.)

	D-1		D-3						D-4					
	11	15	81	85	95	115	130	144	144DUP	174	179	179DUP	194	194 Lab Dup
Naphthalene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.09
Perylene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthylene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluorene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Phenanthrene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.11	0.14
Anthracene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluoranthene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.24	0.3
Pyrene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.29	0.34
Benz[a]anthracene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.11	0.16
Chrysene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.11	0.16
Benzo[b&k]fluoranthene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.11	0.14
Benzo[a]pyrene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.12
Indeno[1,2,3-cd]pyrene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Dibenz[a,h]anthracene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo[ghi]perylene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Sum of 16 PAH**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	1.33	1.59

(**Note: For cases where all results were less than the minimum detection limit, that value was used (i.e., <0.05); for cases where detectable concentrations were reported for some compounds and not for others, ½ of the minimum quantifiable amount was used (i.e., 0.025) in determining the sum and the project mean and 95% upper confidence level).

Table 2: Continued (mg/kg dry wt.)

	D-4													
	198	207	259	265	272	291	308	320	340	348	348LDu	360	368	368DUP
Naphthalene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Perylene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthylene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluorene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Phenanthrene	<0.05	<0.05	<0.05	0.09	<0.05	0.24	<0.05	0.08	0.12	0.1	<0.05	<0.05	<0.05	<0.05
Anthracene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluoranthene	<0.05	<0.05	<0.05	0.2	0.09	0.26	0.11	<0.05	0.1	<0.05	<0.05	<0.05	<0.05	<0.05
Pyrene	<0.05	<0.05	<0.05	0.38	<0.05	0.22	0.11	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benz[a]anthracene	<0.05	<0.05	<0.05	0.12	<0.05	0.12	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chrysene	<0.05	<0.05	<0.05	0.14	<0.05	0.19	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo[b&k]fluoranthene	<0.05	<0.05	<0.05	0.11	<0.05	0.09	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo[a]pyrene	<0.05	<0.05	<0.05	0.09	<0.05	0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno[1,2,3-cd]pyrene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Dibenz[a,h]anthracene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo[ghi]perylene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Sum of 16 PAH**	<0.05	<0.05	<0.05	1.35	0.46	1.44	0.57	0.46	0.57	0.48	<0.05	<0.05	<0.05	<0.05

(**Note: For cases where all results were less than the minimum detection limit, that value was used (i.e., <0.05); for cases where detectable concentrations were reported for some compounds and not for others, ½ of the minimum quantifiable amount was used (i.e., 0.025) in determining the sum and the project mean and 95% upper confidence level).

Table 2: Continued (mg/kg dry wt.)

	D-4 393	D-5 412	442	511Alt	D-7 557	D-8 578	D-8 578DUP	610	610DUP	617	626	636	663	689
Naphthalene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.12
Perylene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthylene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluorene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Phenanthrene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.12	0.12	0.11	<0.05	0.13	<0.05	<0.05
Anthracene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluoranthene	<0.05	<0.05	<0.05	<0.05	<0.05	0.14	<0.05	0.23	0.17	0.19	<0.05	0.19	<0.05	0.11
Pyrene	<0.05	<0.05	<0.05	<0.05	<0.05	0.19	<0.05	0.22	0.15	0.17	<0.05	0.16	<0.05	0.1
Benz[a]anthracene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.12	<0.05	<0.05	<0.05	0.07	<0.05	<0.05
Chrysene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.12	<0.05	<0.05	<0.05	0.07	<0.05	<0.05
Benzo[b&k]fluoranthene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.11	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo[a]pyrene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.09	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno[1,2,3-cd]pyrene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Dibenz[a,h]anthracene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo[ghi]perylene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Sum of 16 PAH**	<0.05	<0.05	<0.05	<0.05	<0.05	0.7	<0.05	1.56	0.76	0.80	<0.05	0.9	<0.05	0.6

(**Note: For cases where all results were less than the minimum detection limit, that value was used (i.e., <0.05); for cases where detectable concentrations were reported for some compounds and not for others, ½ of the minimum quantifiable amount was used (i.e., 0.025) in determining the sum and the project mean and 95% upper confidence level).

Table 2: Continued (mg/kg dry wt.)

	D-8 689DUP	695	703	707	735	735LDu	737	847	859	865	868	916	918	936
Naphthalene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.1	<0.05	<0.05	0.08	<0.05
Perylene	<0.05	<0.05	<0.05	<0.05	0.09	<0.05	0.10	<0.05	<0.05	<0.05	<0.05	0.07	<0.05	<0.05
Acenaphthylene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluorene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.08	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Phenanthrene	<0.05	<0.05	<0.05	<0.05	0.09	0.07	0.31	0.17	<0.05	0.08	<0.05	0.11	0.11	<0.05
Anthracene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.69	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluoranthene	0.17	0.1	0.09	<0.05	0.22	0.22	0.26	0.23	0.19	0.12	0.09	0.24	0.21	0.12
Pyrene	0.14	0.1	<0.05	<0.05	0.33	0.3	0.20	0.19	0.18	0.29	0.17	0.26	0.47	0.12
Benz[a]anthracene	<0.05	<0.05	<0.05	<0.05	0.1	0.1	0.34	<0.05	<0.05	0.08	<0.05	0.16	0.11	<0.05
Chrysene	<0.05	<0.05	<0.05	<0.05	0.09	0.07	0.77	<0.05	<0.05	0.08	0.07	0.14	0.11	<0.05
Benzo[b&k]fluoranthene	<0.05	<0.05	<0.05	<0.05	0.1	0.1	0.30	<0.05	<0.05	0.07	<0.05	0.14	0.15	<0.05
Benzo[a]pyrene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.30	<0.05	<0.05	<0.05	<0.05	0.14	0.1	<0.05
Indeno[1,2,3-cd]pyrene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.13	<0.05	<0.05	<0.05	<0.05	0.07	<0.05	<0.05
Dibenz[a,h]anthracene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo[ghi]perylene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.11	<0.05	<0.05	<0.05	<0.05	0.07	<0.05	<0.05
Sum of 16 PAH**	0.66	0.55	0.44	<0.05	1.16	0.96	3.69	0.92	0.72	1.04	0.66	1.55	1.54	0.59

(**Note: For cases where all results were less than the minimum detection limit, that value was used (i.e., <0.05); for cases where detectable concentrations were reported for some compounds and not for others, ½ of the minimum quantifiable amount was used (i.e., 0.025) in determining the sum and the project mean and 95% upper confidence level).

Table 2: Continued (mg/kg dry wt.)

	D-8								D-9	D-10	D-11
	952	961	968	974	974LDu	975	977	997	1056	1048	1129
Naphthalene	<0.05	<0.05	0.11	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Perylene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthylene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluorene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Phenanthrene	0.09	<0.05	0.12	<0.05	<0.05	<0.05	<0.05	<0.05	0.1	<0.05	<0.05
Anthracene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluoranthene	0.20	<0.05	0.18	<0.05	<0.05	<0.05	0.07	0.1	0.1	<0.05	0.16
Pyrene	0.21	<0.05	0.42	<0.05	<0.05	<0.05	0.1	0.1	0.1	<0.05	0.21
Benz[a]anthracene	0.09	<0.05	0.11	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.08
Chrysene	0.09	<0.05	0.1	<0.05	<0.05	<0.05	0.07	<0.05	<0.05	<0.05	0.08
Benzo[b&k]fluoranthene	0.08	<0.05	0.12	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo[a]pyrene	0.08	<0.05	0.08	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.07
Indeno[1,2,3-cd]pyrene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Dibenz[a,h]anthracene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo[ghi]perylene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Sum of 16 PAH**	1.07	0.4	1.44	<0.05	<0.05	<0.05	0.56	0.62	0.62	<0.05	0.88

(**Note: For cases where all results were less than the minimum detection limit, that value was used (i.e., <0.05); for cases where detectable concentrations were reported for some compounds and not for others, ½ of the minimum quantifiable amount was used (i.e., 0.025) in determining the sum and the project mean and 95% upper confidence level).

Table 2: *Continued* (mg/kg dry wt.)

	OH-1	OH-2	OH-3	OH-4	OH-5	OH-6	OH-6Lab Dup
Naphthalene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Perylene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthylene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluorene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Phenanthrene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Anthracene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluoranthene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Pyrene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benz[a]anthracene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chrysene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo[b&k]fluoranthene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo[a]pyrene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno[1,2,3-cd]pyrene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Dibenz[a,h]anthracene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo[ghi]perylene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Sum of 16 PAH**	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

(**Note: For cases where all results were less than the minimum detection limit, that value was used (i.e., <0.05); for cases where detectable concentrations were reported for some compounds and not for others, ½ of the minimum quantifiable amount was used (i.e., 0.025) in determining the sum and the project mean and 95% upper confidence level).

Table 3: Results of Total Organic Carbon Analyses

	Block	Total Organic Carbon (g/kg)		Block	Total Organic Carbon (g/kg)
D-1	11	2.9		617	10
	15	5.4		626	10
D-3	81	5.1		636	8.6
	85	3.2		663	1.8
	95	4.1		689	6.4
	115	6.6		689 DUP	7
	130	1.4		695	12
	144	3.9		703	8.5
	144 DUP	2.2		707	3.8
D-4	174	2.1		735	7.7
	179	3.1		735 Lab dup	8.1
	179 DUP	4.2		737	15
	194	8		847	14
	194 Lab dup	6.4		859	7.1
	198	4.9		865	9
	207	2.1		868	5.7
	259	4.6		916	7.5
	265	7.2		918	9.8
	272	4.3		931	7.3
	291	9.1		952	9.5
	308	3.7		961	6.2
	320	4.6		968	6.3
	340	4.4		974	5.8
	348	3.7		974 Lab dup	5.8
	348 Lab dup	3.6		975	6
	360	5.2		977	6.3
	368	4.5		997	5.3
	368 DUP	3.4	D-9	1056	3.8
	393	4.4	D-10	1048	1.3
D-5	412	3.2	D-11	1129	7.8
	442	4.5		OH-1	1.1
	511Alt	5.2		OH-2	6.3
D-7	557	2.1		OH-3	4
D-8	578	7		OH-4	0.7
	578 DUP	5		OH-5	4.6
	610	12		OH-6	0.9
	610 DUP	13		OH-6 Lab dup	0.9

Table 4: Results of Analyses for Major Sediment Categories
(see particle size distribution graphs in Appendix D)

	Block	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
D-1	11	<0.1	35.1	57.7	7.1
	15	27.7	17.9	44.8	9.6
D-3	81	<0.1	17	68.2	14.8
	85	<0.1	18.8	71.3	9.9
	95	<0.1	19	68.8	12.2
	115	<0.1	18.2	65.1	16.7
	130	<0.1	22.3	62.9	14.8
	144	<0.1	24.7	63.9	11.4
	144 DUP	<0.1	24.7	64.1	11.2
D-4	174	<0.1	21.9	71.8	6.3
	179	<0.1	27.3	62.3	10.5
	179 DUP	<0.1	6.4	80	13.6
	194	<0.1	42.2	40.5	17.3
	194 DUP	<0.1	40.6	42.3	17.2
	198	<0.1	31.4	53.9	14.7
	207	<0.1	33.2	59.7	7
	259	0.3	25.4	59	15.4
	265	38.5	18.8	31.9	10.9
	272	1.2	18.8	70.7	9.8
	291	<0.1	20.1	68.7	11.2
	308	<0.1	33.3	59.9	6.8
	320	<0.1	14.9	71.3	13.8
	340	<0.1	22.5	64.5	13
	348	<0.1	33.4	54.8	11.8
	348 DUP	<0.1	32.9	55.1	12.0
	360	<0.1	19.9	65.6	14.4
	368	<0.1	28.8	61.1	10.1
	368 DUP	<0.1	6.1	85.3	8.6
	393	<0.1	26.7	63.2	10.2
D-5	412	<0.1	12.8	77.8	9.4
	442	<0.1	31.2	55.2	13.6
	511Alt	<0.1	19.7	68.3	12
D-7	557	14.2	80.7	2.7	2.4
D-8	578	2.2	9.4	75.1	13.2
	578 DUP	0.3	23	66	10.7

Table 4 Continued

	Block	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
	610	1.5	27.6	53.3	17.5
	610 DUP	<0.1	22.6	57.9	19.5
	617	1.2	34	52	12.8
	626	<0.1	13.1	63.5	23.5
	636	0.1	22.6	60.4	17
	663	0.5	90.6	7.7	1.2
	689	16.5	50.9	23.8	8.8
	689 DUP	14.1	39.6	34.2	12.1
	695	3.5	19.2	55.9	21.4
	703	<0.1	29.4	56.2	14.4
	707	<0.1	30.9	58.3	10.8
	735	17	15.9	45.5	21.6
	735 DUP	14.5	17.5	49.4	18.8
	737	0.9	22	62	15.1
	847	16.2	24	47.6	12.1
	859	6.9	26.9	52.5	13.7
	865	14.5	33.6	41.9	9.9
	868	9.4	33.1	44.4	13.2
	916	15.6	30.4	38.5	15.5
	918	6.6	30.6	42.1	20.6
	931	11.7	41.1	31.4	15.9
	952	6.4	32.4	18.4	0.03
	961	1.4	18.5	67	13.1
	968	6.6	36.1	41	16.3
	974	1.1	19.5	66.3	13.1
	975	2.1	21.6	59.1	17.2
	977	5.2	31.7	46.5	16.5
	997	15.2	22.7	48.5	13.6
D-9	1056	<0.1	26.9	58.6	14.5
D-10	1048	1.4	78.6	17.4	2.5
D-11	1129	27.4	27.4	29	16.2
	OH-1	8.2	79.2	10.3	2.3
	OH-2	1.1	8.4	68.1	22.4
	OH-3	0.3	20.4	62	17.3
	OH-4	<0.1	72.1	25.8	2.1
	OH-5	<0.1	15.8	67	17.2
	OH-6	<0.1	76.7	19.6	3.8

6. DISCUSSION

The objective of the study was to use the sediment characterization process, described in Environment Canada (1995) for any dredged material evaluation study, as the method for evaluating the scope and extent of PCB and PAH contamination of the Saint John Harbour Black Pt. Disposal Site. Based on approximately 550,000 sq m of Disposal Site area and assuming a uniform depth of 1 m, yielded a determination of 551 grid blocks of which 29 should be sampled. Assuming a uniform distribution of contaminants and materials, the 29 blocks can be selected on a truly random basis. Following standard quality assurance requirements, 10% or 3 blocks were randomly selected to be sampled in duplicate. Based on approximately 1,913,062 sq m of Slump Area and assuming a uniform depth of 0.3 m, yielded a determination of 574 grid blocks of which 29 should be sampled. Assuming a uniform distribution of contaminants and materials, the 29 blocks can be selected on a truly random basis. 10% or 3 blocks were randomly selected to be sampled in duplicate.

The results of the analyses were tested using *SYSTAT V.8*, a statistical evaluation software, to determine the mean and upper 95% confidence interval. The statistical results are summarized in Table 5 (n=57) and presented graphically in Figures 3 (PCB), 4 (sum of PAH), 5 (total organic carbon) and 6 (for four major particle size categories). The "A" figure provides a distribution plot for each of PCB, sum of PAH and TOC; the "B" figure provides a graphical presentation of the mean and 95% confidence interval.

In the field, block 511 was substituted for 484 due to presence of rock and hard gravel at the latter site. In any table of results, 511 is so denoted with the comment "alt". Inadvertently, site 480 was not sampled. Inserting values of "non-detect" for the missing sample did not significantly affect the statistical results and therefore it was excluded.

The criteria for evaluation of the PCB and sum of PAH was set at the Ocean Disposal Permit guidelines of 100 ug/kg and 2.5 mg/kg, respectively with the upper 95% confidence level having to be less than the applicable Ocean Disposal Permit criterion.

As the mean and upper 95% confidence concentrations for PCB and sum PAH were less than their respective Ocean Disposal Permit guideline values, it is concluded the Black Pt. Disposal Site (including the Slump Area) sediments meet the Ocean Disposal Permit requirements.

Table 5: Summary of statistics

Substance	Mean (n=57)	Upper 95% confidence value
Total Organic Carbon (g/kg)	6.07	6.89
Polychlorinated biphenyls (ug/kg)	8.2	10.3
Sum of 16 polycyclic aromatic hydrocarbons (mg/kg)	0.67	0.78

Notes:
1. All duplicate and Outer Harbour samples were excluded from the calculation.
2. For PCB, all sites with values of <10 ug/kg (MDL), were taken as 5 ug/kg for purposes of calculation of the project mean and 95% upper confidence level.
3. For sum of PAH, only 16 compounds were used.
4. For sum of PAH, where all results were less than the minimum detection limit, the sum was <0.05; for cases where detectable concentrations were reported for some compounds and not for others, ½ of the minimum quantifiable amount was used for the non-detectable compounds (i.e., 0.025) in determining the sum and therefore the project mean and 95% upper confidence level.

The presence of PCB and PAH in samples is often closely correlated with total organic carbon. To test this theory with this suite of samples, a linear correlation test was applied. The r^2 value for the TOC-sum of PAH is 0.57; for TOC-PCB, it is 0.30. However, examination of the graphs showed a wide spread of points, indicating the statistical relationships are highly affected by the large number of "less than quantification" values for both PCB and sum of PAH. Therefore, the relationship could not be determined.

Using *SURFER V.6*, a contouring and surface mapping software, the results of analyses were plotted on a geographical scale, as presented in Figures 7 to 13 inclusive. On each of these plots are noted the nominal position of the Disposal Site marker buoy (45° 12.50'N 66° 00.9' W) (note: the Permit requirement was to dump within 200 m of the marker) and a line through 45° 12.5' N, which nominally defines the edge of the Disposal Area from the Slump Area (see Figure 2A).

Quality Control/Quality Assurance

The Laboratory is CAEAL-certified for these analyses.

Concurrently with the preparation and determination of the trace organic contaminants in the "unknowns", several Certified Reference Materials (purchased from the National Research Council of Canada) were analyzed. The results of these analyses are provided in Tables 6, 7 and 8 and are deemed by the laboratory as "acceptable".

In the field 10% of the samples were randomly selected and provided to the Laboratory. in duplicate. The Laboratory also randomly selected and concurrently analyzed 10% of the samples as "laboratory duplicates". These results are included in Tables 1 to 4 and are deemed "acceptable" by the laboratory.

Quality Control Data Sheet for QC's, HS-1 and HS-2 for Soils

Date: Apr-06-01

ANALYTE	EVENT #	ACCURACY QC-1 (%)	ACCURACY QC-2 (%)	HS-1 (%)	HS-2 (%)	BLANK (ug/g)
PCB's Aroclor 1254	EB08	102	98	114	100	<0.01
	EB10	88	88	83	73	<0.01
	EB12	104	100	122	87	<0.01
	EB14	105	103	99	93	<0.01

TABLE 6

QC target value 0.25ug/g

HS-1 target value 21.8ug/kg

HS-2 target value 111.8ug/kg

LAND & SEA
ENVIRONMENTAL CONSULTANTS LTD.

Quality Control Data for PAH in Sediment.

Certified Reference Material HS-4B

April 2001

Event Number

Analyte	Target (µg/g)	EB-07 (ug/g)	EB-09 (ug/g)	EB-11 (ug/g)	EB-13 (ug/g)
Naphthalene	0.22 +/- 0.02	0.11	0.10	0.16	0.13
1-Methyl naphthalene	0.16 +/- 0.02	0.09	0.07	0.14	0.09
Acenaphthylene	0.30 +/- 0.10	<0.05	<0.05	<0.05	0.11
Acenaphthene	0.09 +/- 0.02	0.06	0.06	0.06	0.05
Fluorene	0.16 +/- 0.04	0.09	0.09	0.10	0.09
Phenanthrene	1.91 +/- 0.08	1.6	1.40	1.6	1.2
Anthracene	0.46 +/- 0.06	0.22	0.20	0.24	0.25
Fluoranthene	3.33 +/- 0.11	3.0	2.7	3.0	2.4
Pyrene	2.55 +/- 0.10	2.3	2.0	2.3	1.7
Benzo (a) anthracene	1.46 +/- 0.09	1.2	1.1	1.2	0.99
Chrysene	1.76 +/- 0.11	1.5	1.4	1.6	1.3
Benzo (b,k) fluoranthene*	3.32 +/- 0.12	2.7	2.5	2.9	2.1
Benzo (a) pyrene	1.55 +/- 0.15	1.2	1.1	1.3	0.92
Dibenz (ah) anthracene	0.34 +/- 0.04	0.19	0.19	0.24	0.12
Benzo (ghi) perylene	1.23 +/- 0.15	0.82	0.81	0.99	0.71
d-8 Acenaphthylene		*120%*	*102%*	*115%*	*89%*
d-10 Anthracene		*114%*	*102%*	*115%*	*89%*
d-12 Perylene		*112%*	*102*	*114*	*77%*
d-12 Terphenylene		*115%*	*104%*	*116%*	*79%*

* Repor[illegible] as the sum of Benzo (b) fluoranthene and Benzo (k) fluoranthene.

TABLE 7

LAND & SEA
ENVIRONMENTAL CONSULTANTS LTD.

Quality Control Data for PAH in Sediment.

Certified Reference Material HS-5

April 2001

Event Number

Analyte	Target (µg/g) (µg)	EB-07 (ug/g)	EB-09 (ug/g)	EB-11 (ug/g)	EB-13 (ug/g)
Naphthalene	0.25 +/- 0.07	<0.14	<0.13	0.22	<0.16
Acenaphthylene	0.15	<0.05	<0.05	<0.05	<0.08
Acenaphthene	0.23 +/- 0.10	<0.05	<0.05	<0.05	<0.05
Fluorene	0.4 +/- 0.1	<0.08	<0.08	<0.11	0.09
Phenanthrene	5.2 +/- 1.0	<3.1	<3.0	4.5	<3.0
Anthracene	0.38 +/- 0.15	<0.13	<0.16	<0.17	<0.18
Fluoranthene	8.4 +/- 2.6	<5.5	<5.2	7.7	5.8
Pyrene	5.8 +/- 1.8	<2.9	<2.7	4.1	<2.7
Benzo (a) anthracene	2.9 +/- 1.2	<0.95	<0.98	<1.4	<0.96
Chrysene	2.8 +/- 0.9	<1.80	<1.8	2.5	<1.6
Benzo (b) fluoranthene	2.0 +/- 1.0	1.2	1.2	1.6	1.1
Benzo (k) fluoranthene	1.0 +/- 0.4	1.2	1.2	<1.6	1.1
Benzo (a) pyrene	1.7 +/- 0.8	0.61	0.64	0.88	0.57
Indeno (123-cd) pyrene	1.3 +/- 0.7	0.58	0.57	0.82	0.45
Dibenz (ah) anthracene	0.2 +/- 0.1	0.12	0.13	0.17	<0.09
Benzo (ghi) perylene	1.3 +/- 0.3	<0.49	<0.50	<0.70	<0.44
d-8 Acenaphthylene		*92%*	*87%*	*120%*	*89%*
d-10 Anthracene		*93%*	*91%*	*124%*	*89%*
d-10 Pyrene		*89%*	*85%*	*123%*	*78%*
d-12 Terphenylene		*88%*	*85%*	*124%*	*78%*

TABLE 8

LAND & SEA
ENVIRONMENTAL CONSULTANTS LTD.

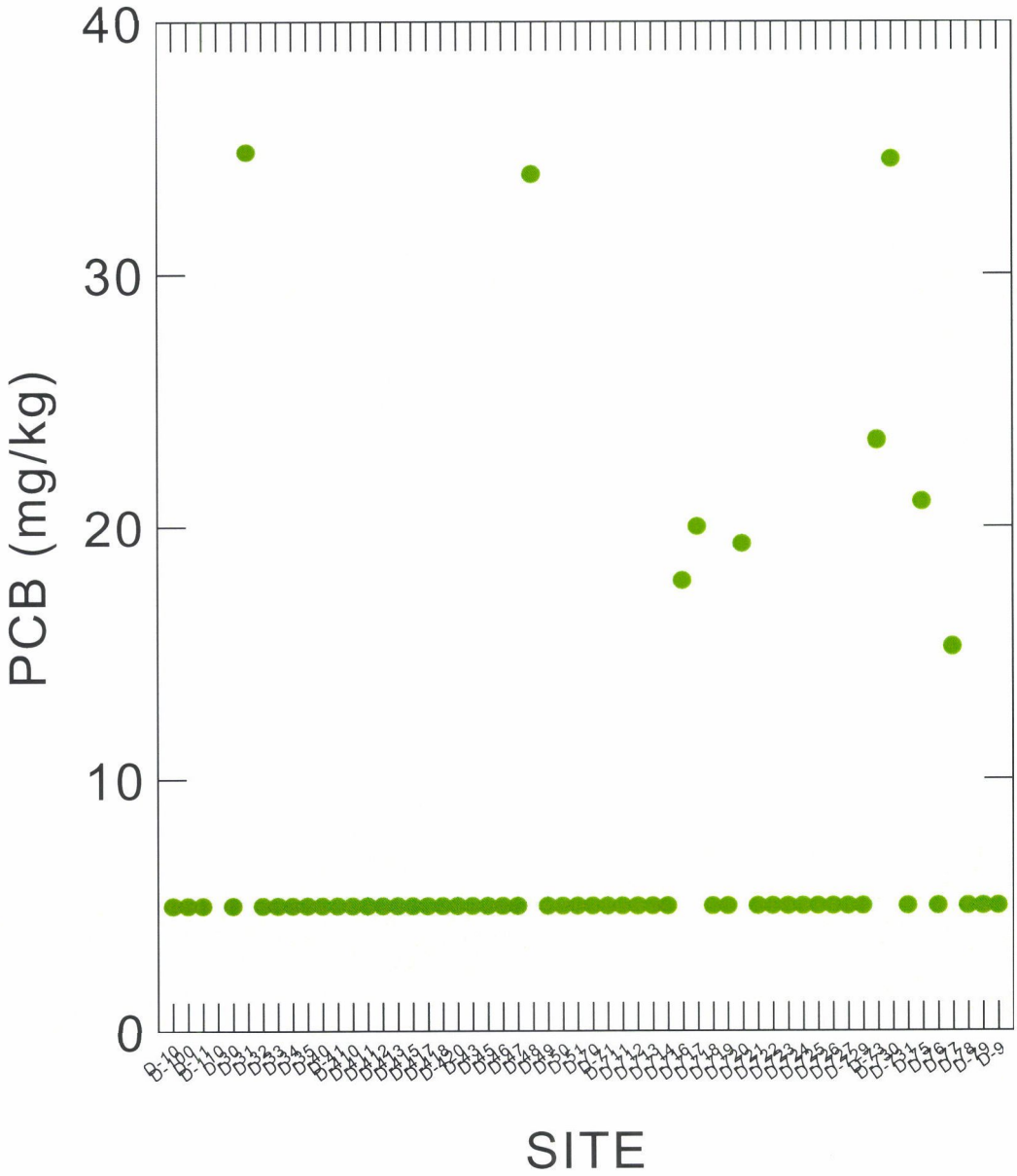


Figure 3A

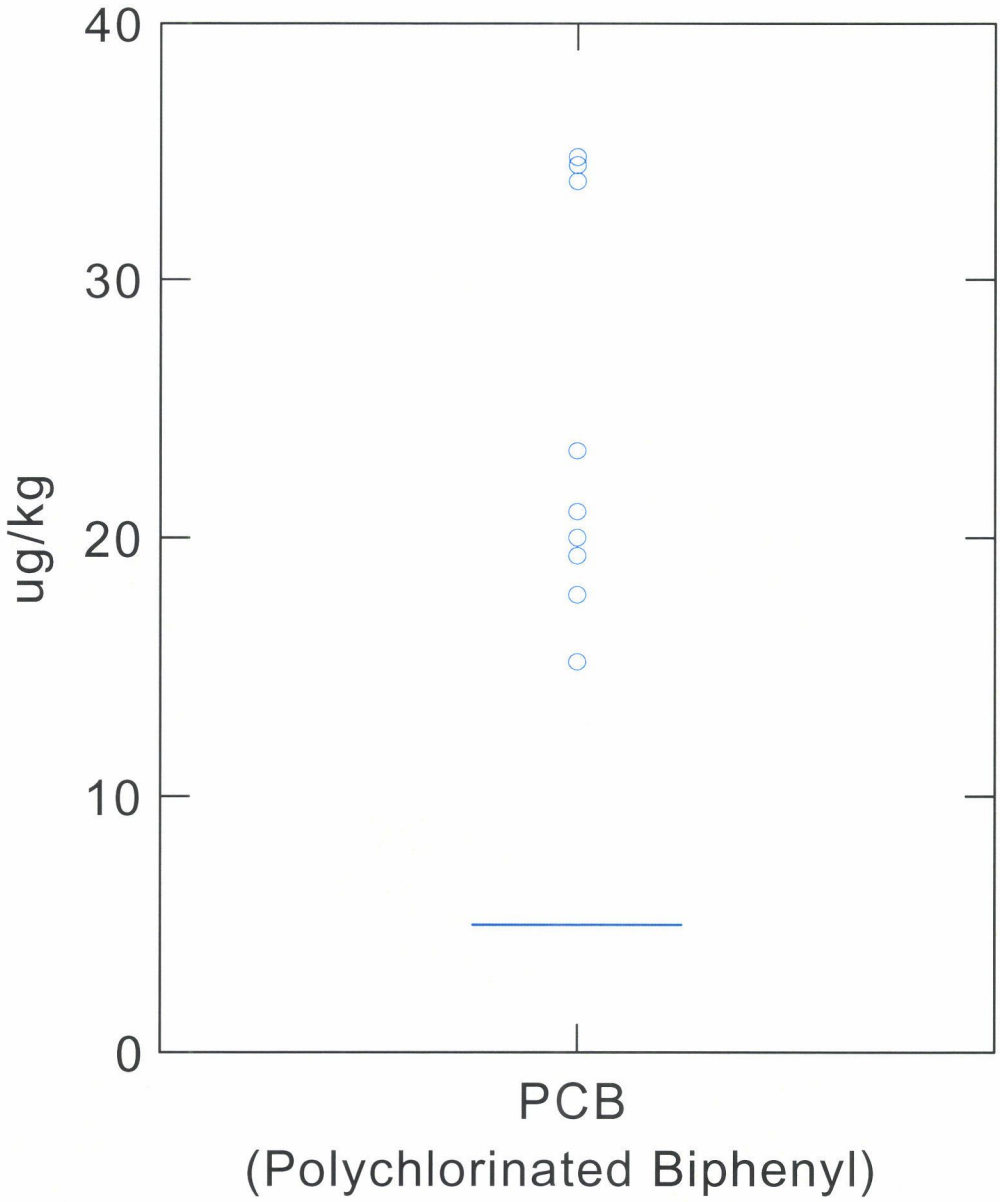


Figure 3B

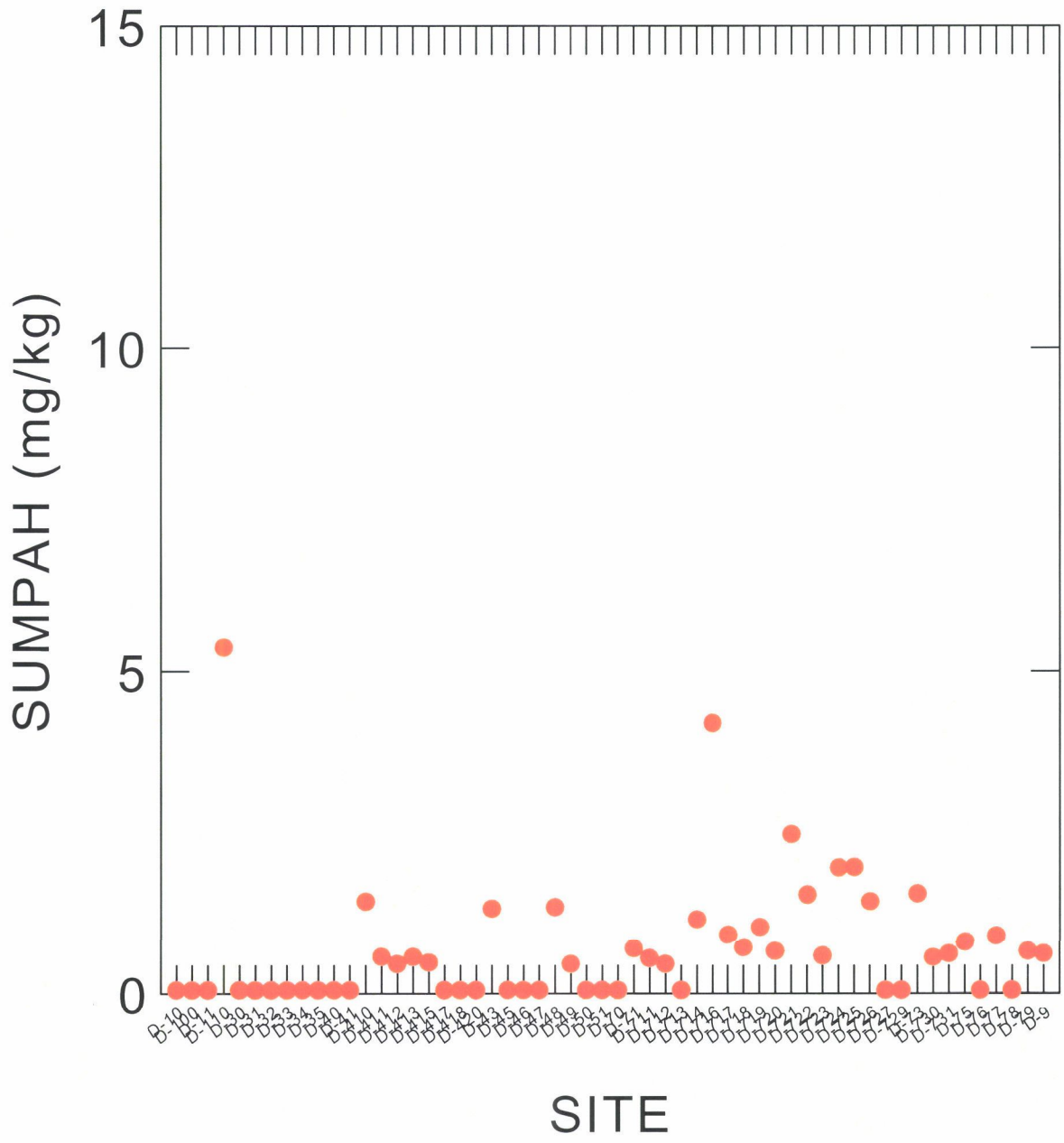
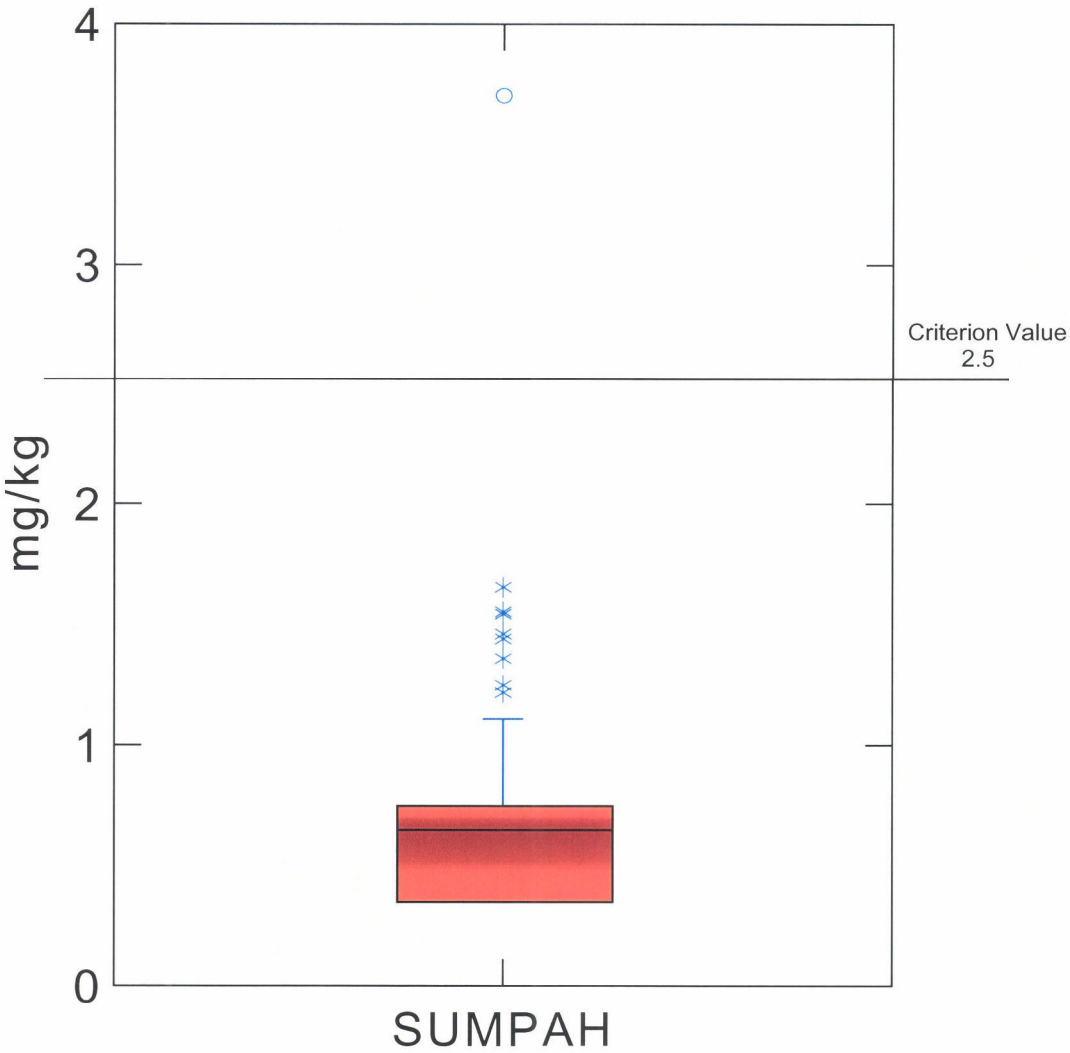


Figure 4A



(Sum of 16 Polycyclic Aromatic Hydrocarbons)

Figure 4B

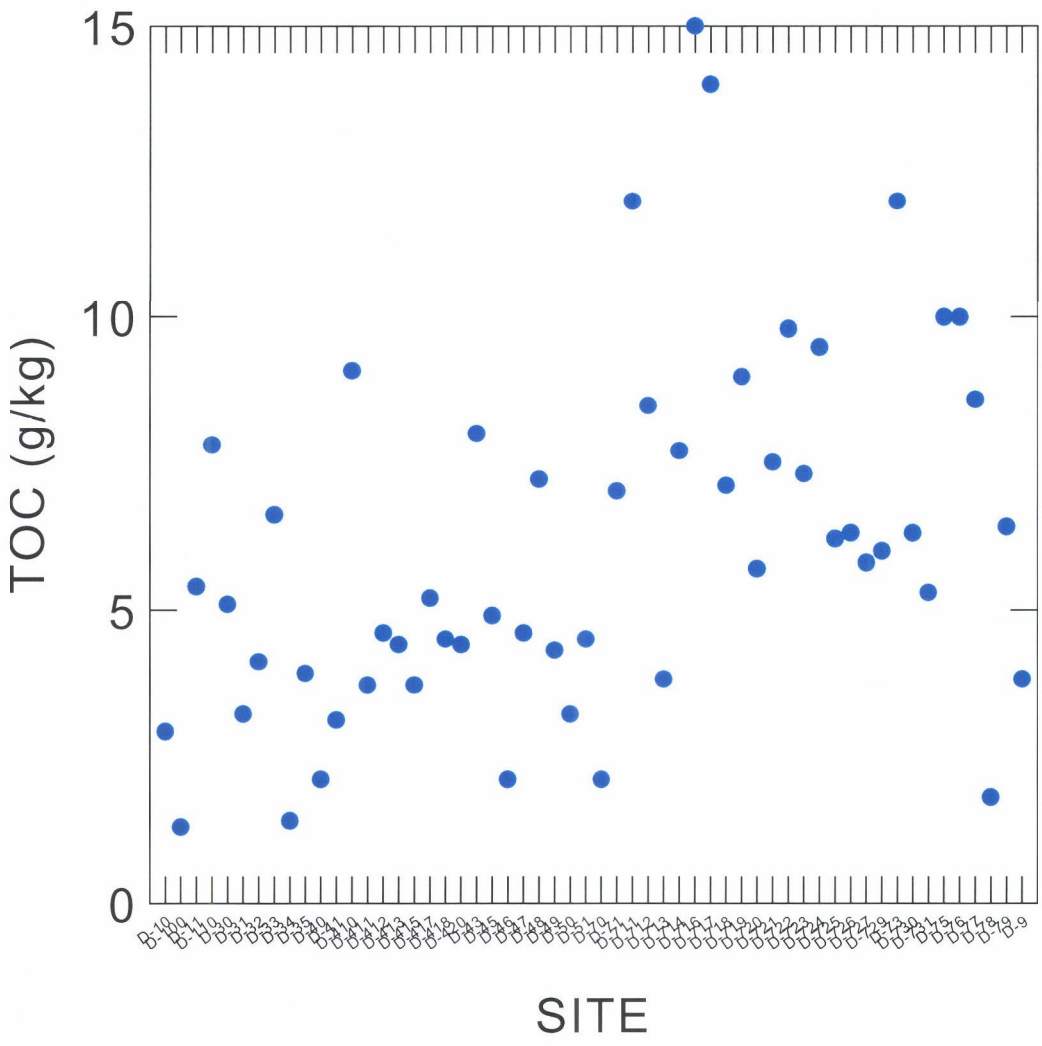


Figure 5A

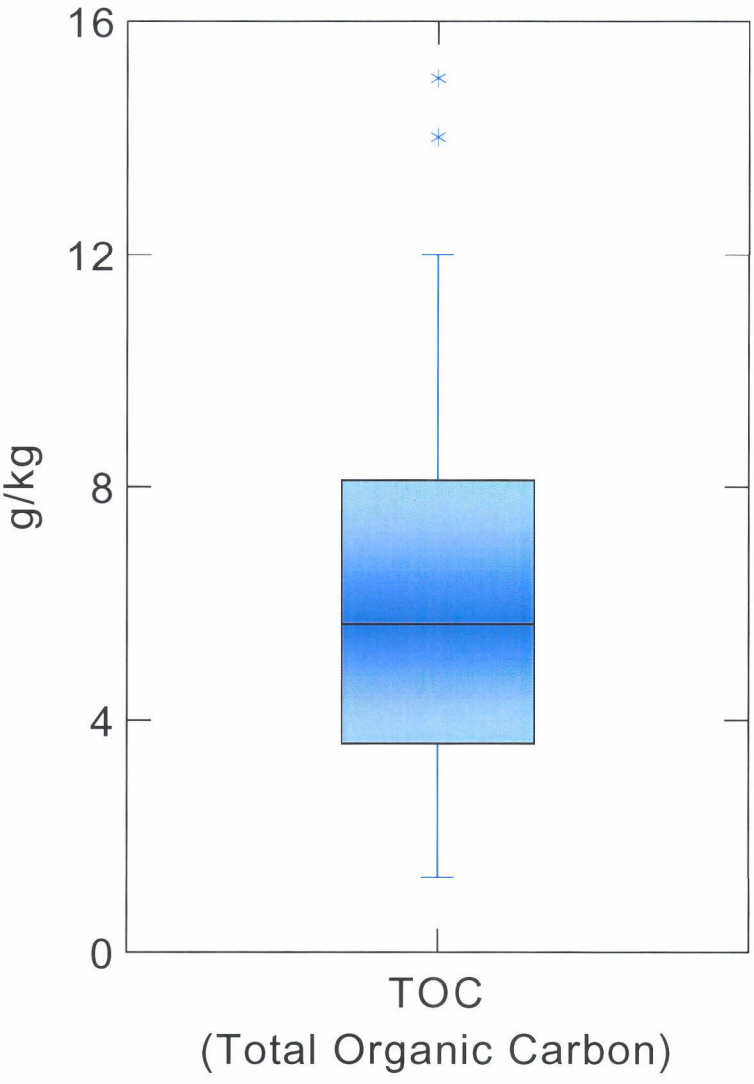


Figure 5B

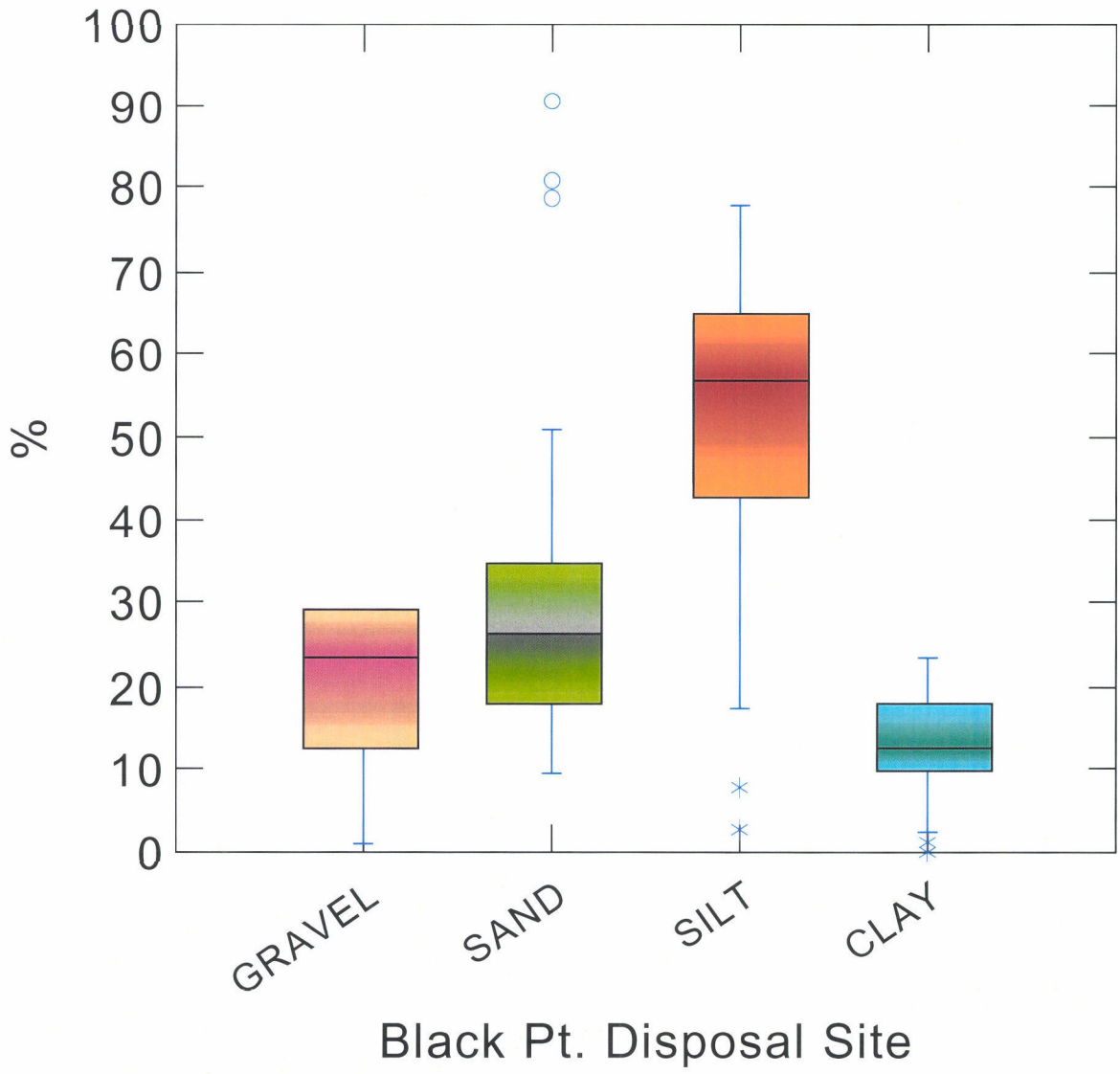
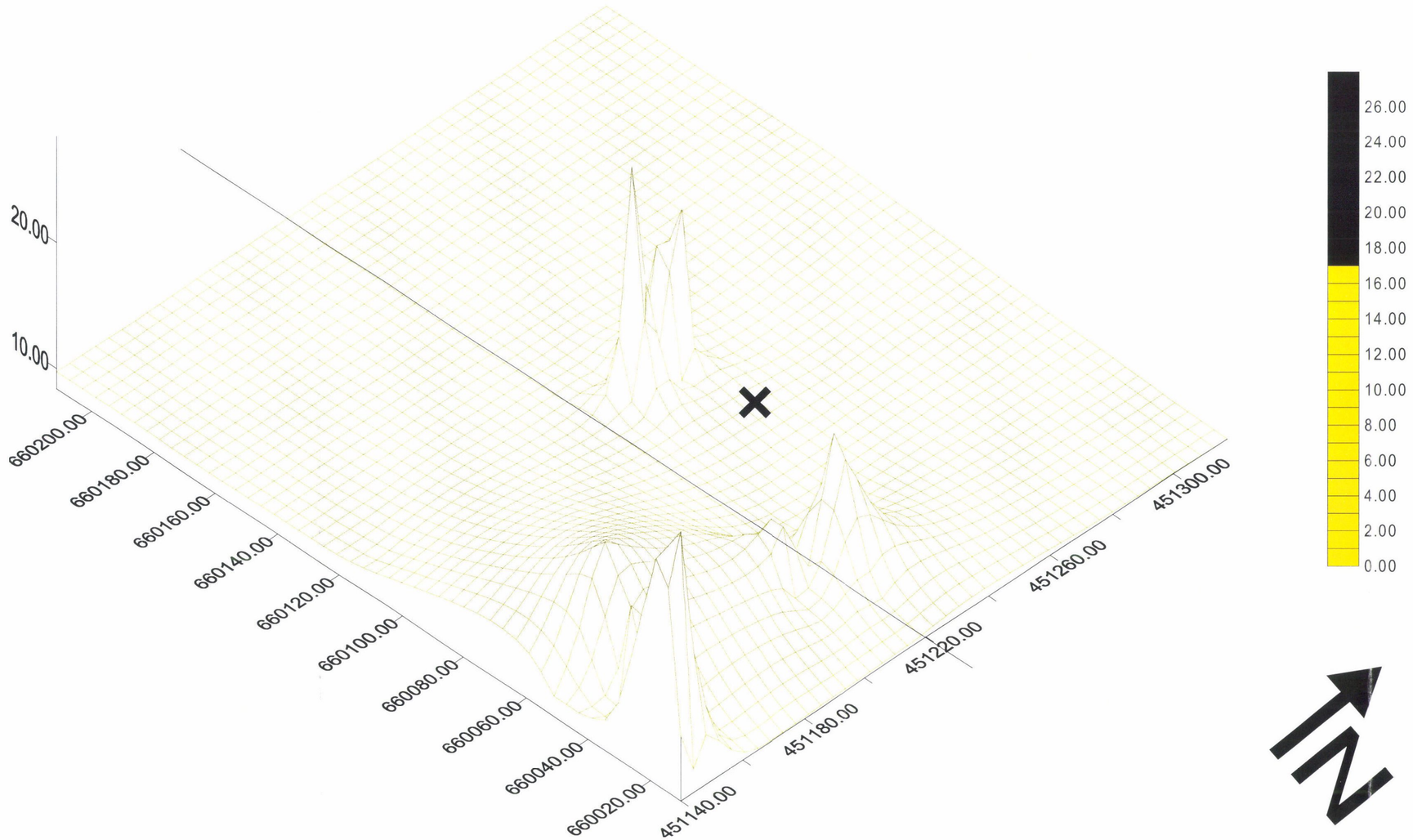

100
90
80
70
60
50
40
30
20
10
0
%
GRAVEL
SAND
SILT
CLAY
Black Pt. Disposal Site

Figure 6

FIGURE 7
PCB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660040.00
660020.00
451140.00
451180.00
451220.00
451260.00
451300.00

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6.00
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2.00
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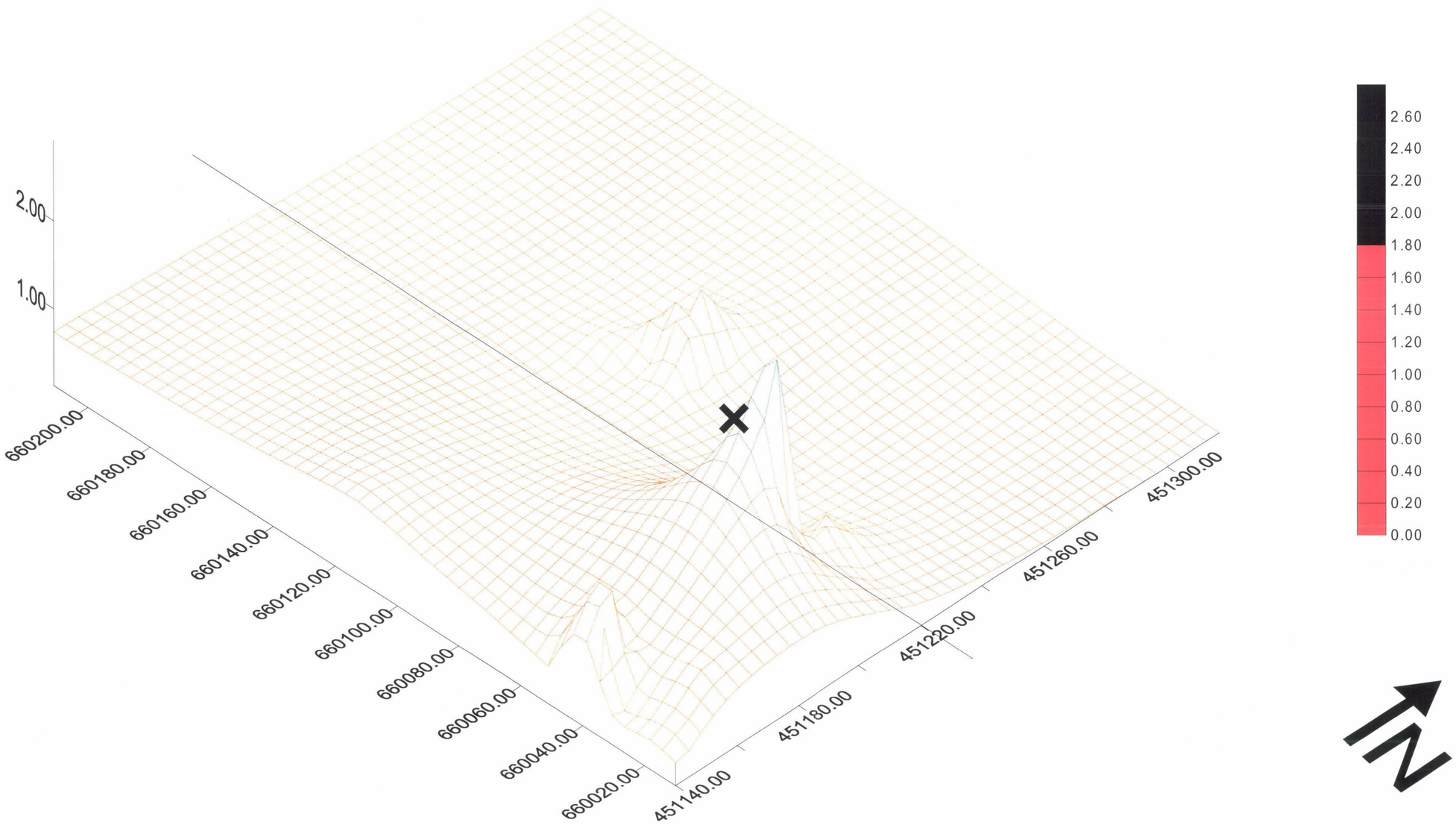
N

FIGURE 8
PAH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451180.00
451220.00
451260.00
451300.00

2.60
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1.20
1.00
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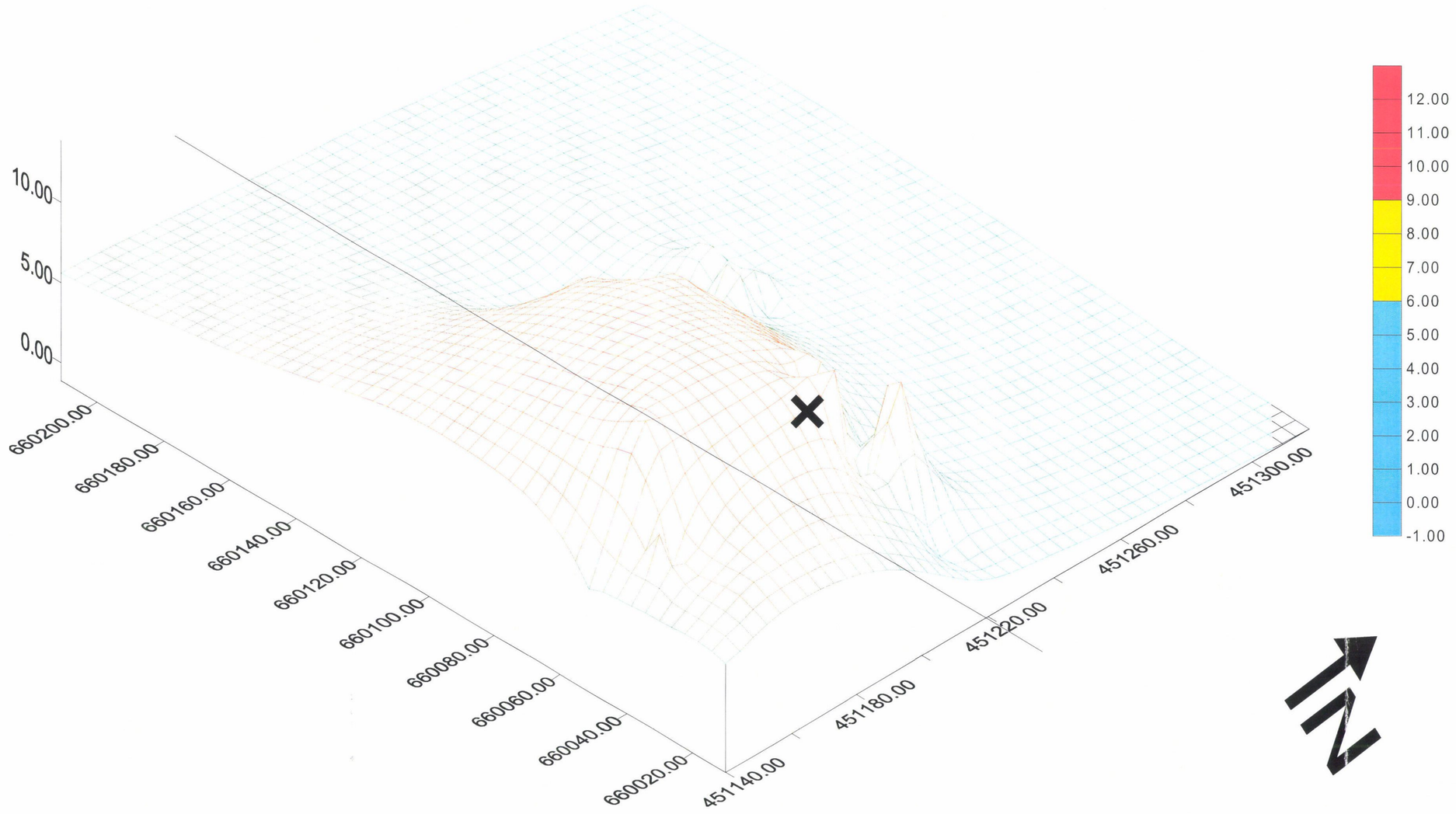
0.60
0.40
0.20
0.00

N

FIGURE 9
TOC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660100.00
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660040.00
660020.00
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451180.00
451220.00
451260.00
451300.00
12.00
11.00
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
-1.00
N

FIGURE 10
Gravel

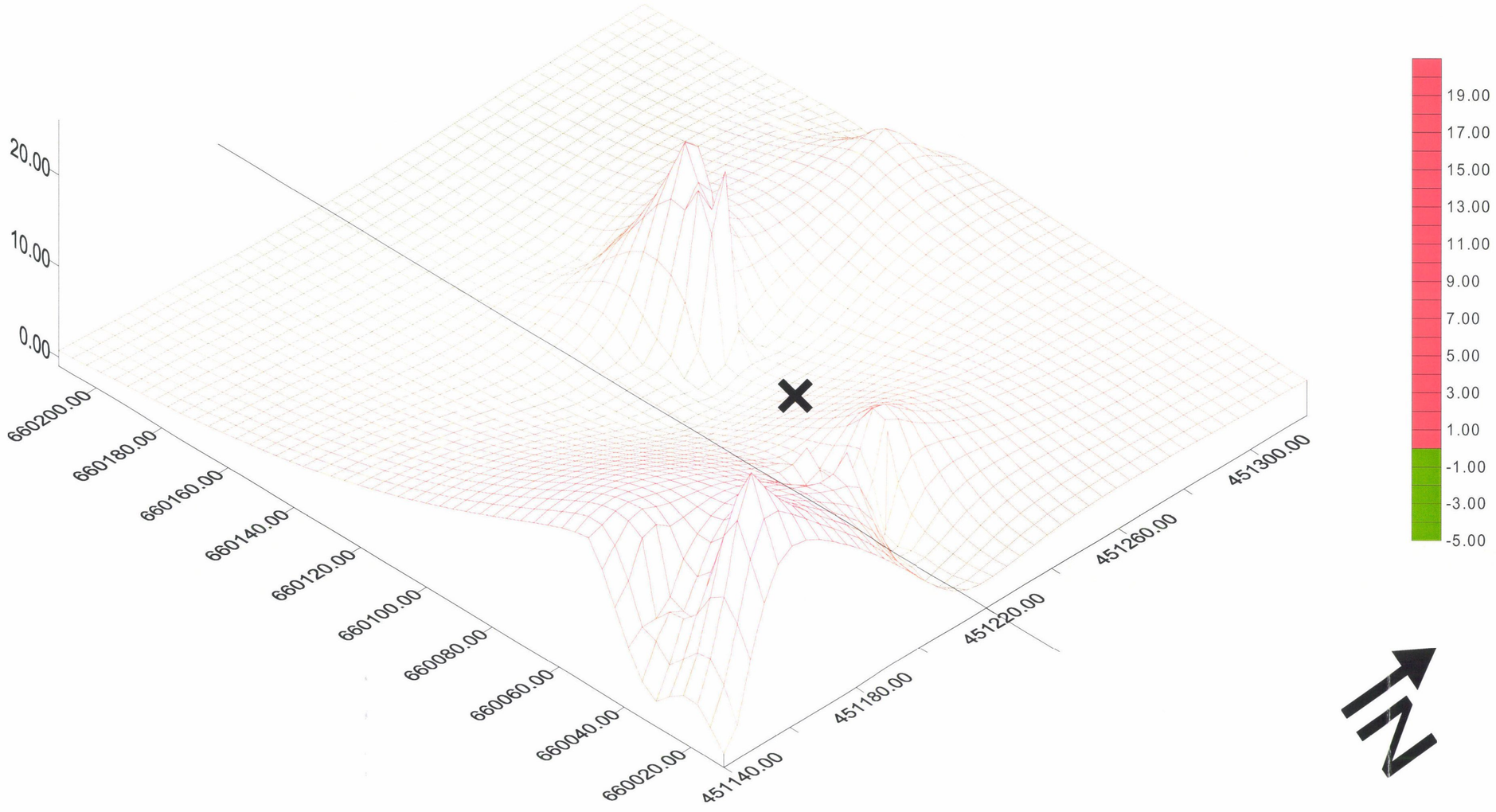


FIGURE 11
Sand

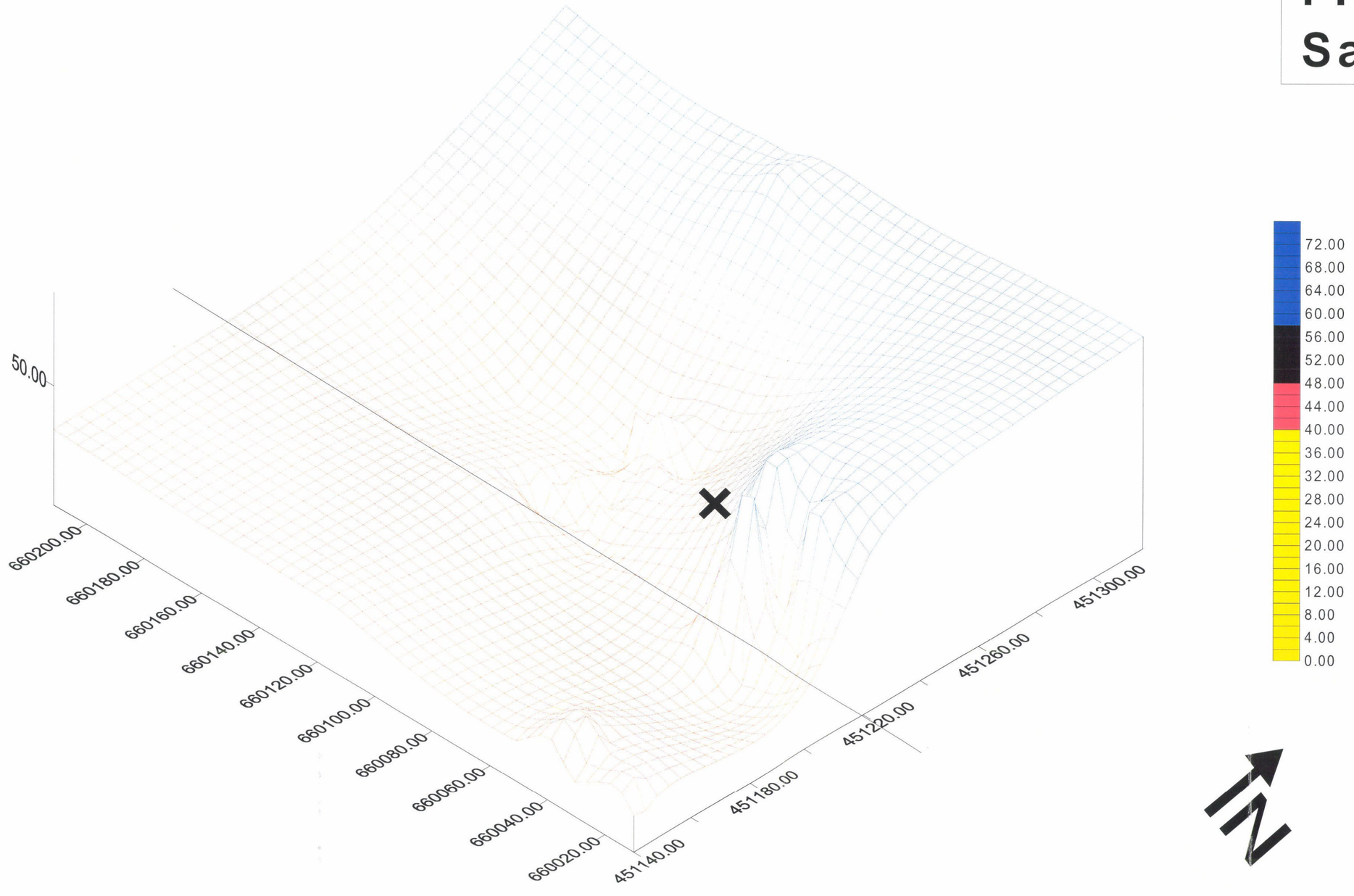


FIGURE12
Silt

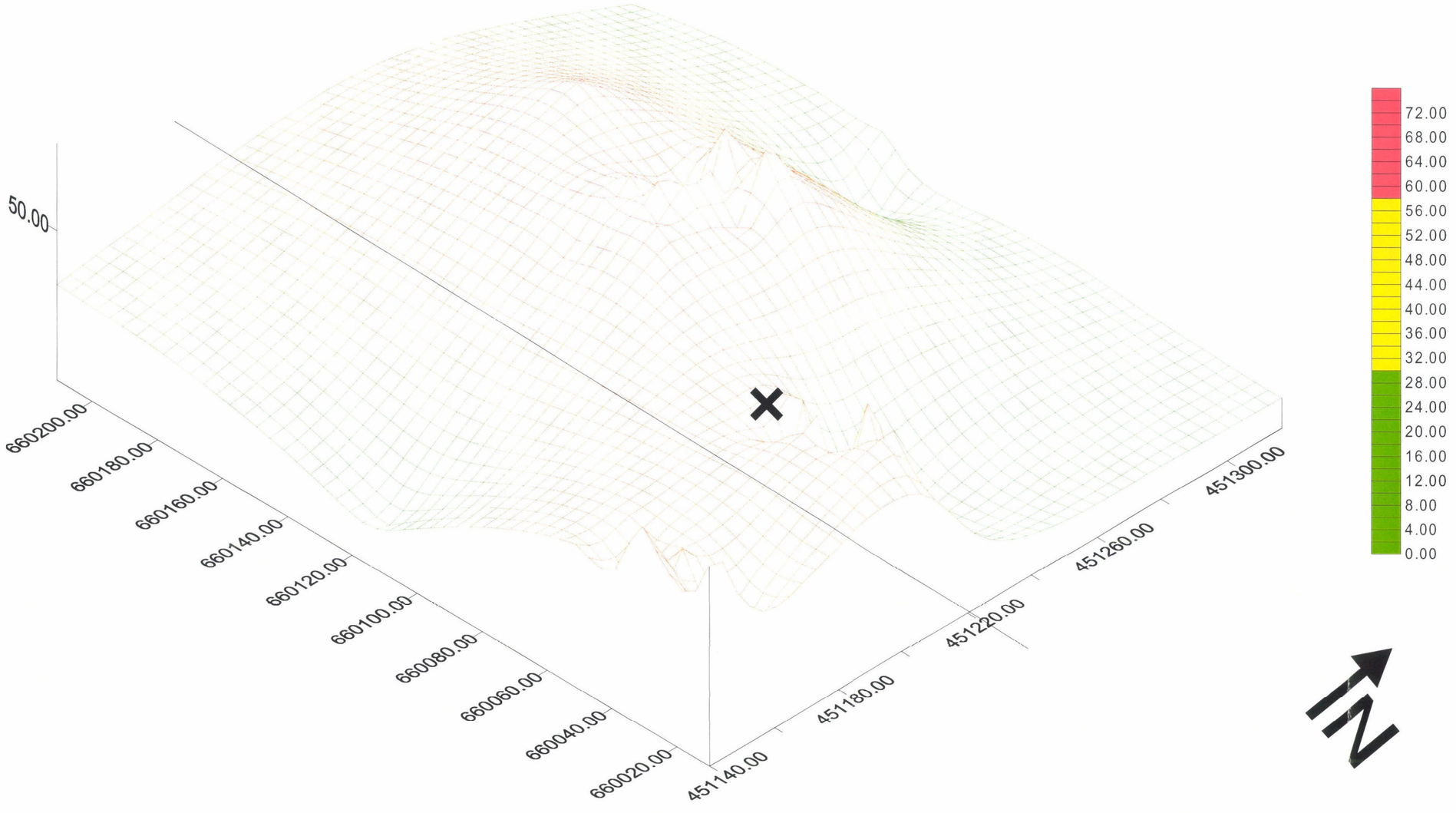
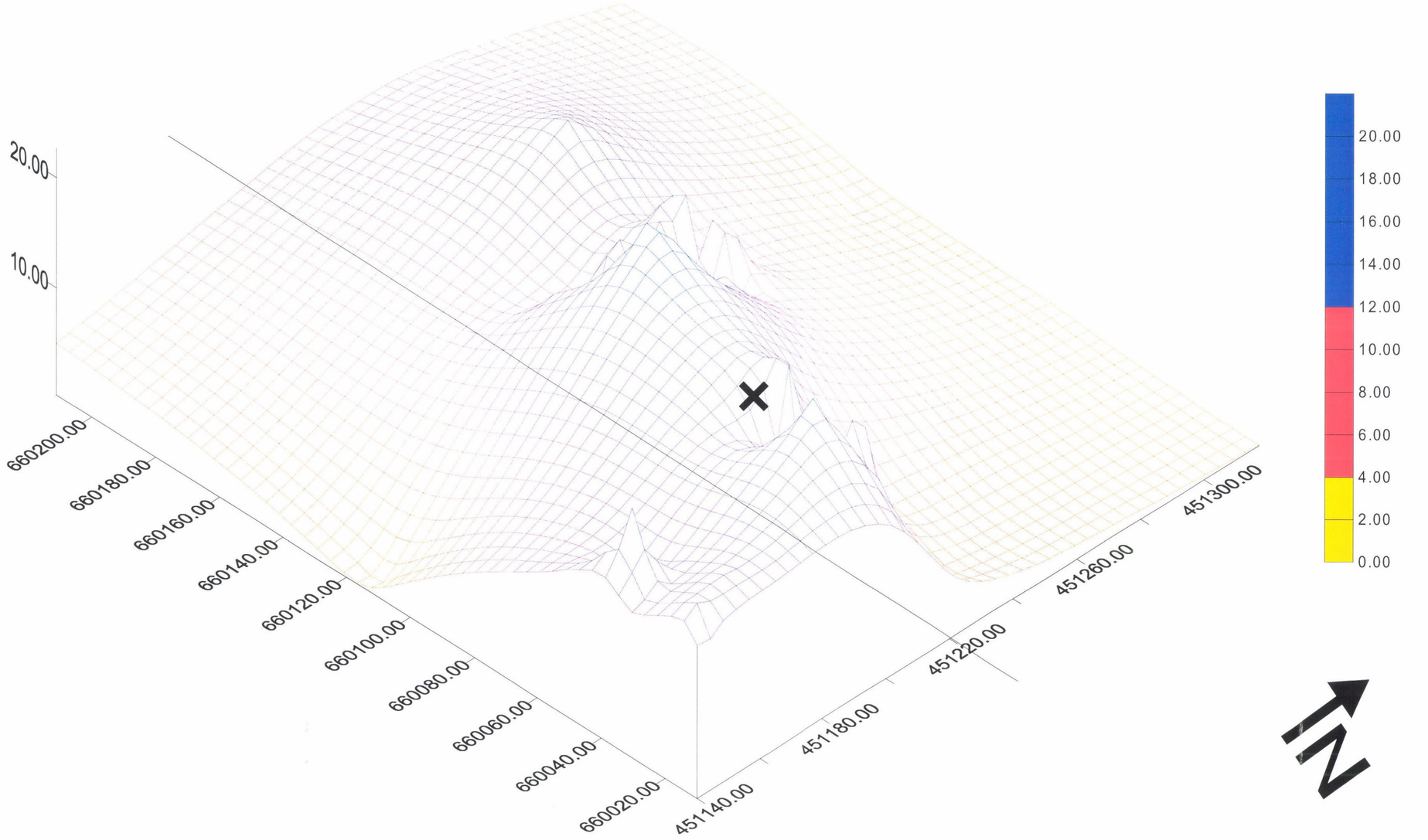


FIGURE 13
Clay



APPENDIX A

19-21 MARCH 2001 BLACK PT. DISPOSAL SITE SAMPLING GRID (7266)

TIME (AST)		Block	Latitude (N)	Longitude (W)	Actual Latitude	Actual Longitude
20 March 2001						
0700	D-1	11	45° 12' 47"	66° 01' 17'	45° 12' 47"	66° 01' 17'
0715		15	45 12 45	66 01 20	45 12 45	66 01 21
	D-2	NONE				
0730	D-3	81	45 12 30	66 01 21	45 12 28	66 01 21
0745		85	45 12 28	66 01 15	45 12 27	66 01 14
0800		95	45 12 27	66 01 17	45 12 27	66 01 17
0815		115	45 12 25	66 01 19	45 12 25	66 01 19
0835		130	45 12 23	66 01 21	45 12 22	66 01 20
0850		144 DUP	45 12 21	66 01 25	45 12 21	66 01 25
0905	D-4	174	45 12 50	66 01 16	45 12 50	66 01 16
0920		179 DUP	45 12 49	66 01 19	45 12 49	66 01 19
0945		194	45 12 48	66 01 10	45 12 48	66 01 09
1010		198	45 12 47	66 01 16	45 12 47	66 01 16
1030		207	45 12 46	66 01 07	45 12 46	66 01 06
1045		259	45 12 44	66 01 13	45 12 45	66 01 14
1100		265	45 12 41	66 01 13	45 12 42	66 01 14
1115		272	45 12 39	66 01 10	45 12 40	66 01 10
1130		291	45 12 38	66 01 07	45 12 39	66 01 07
1145		308	45 12 36	66 01 10	45 12 36	66 01 10
1200		320	45 12 34	66 01 10	45 12 34	66 01 10
1215		340	45 12 30	66 01 22	45 12 29	66 01 22
1230		348	45 12 28	66 01 16	45 12 27	66 01 16
1245		360	45 12 25	66 01 16	45 12 25	66 01 16
1300		368 DUP	45 12 24	66 01 10	45 12 23	66 01 08

TIME (AST)		Block	Latitude (N)	Longitude (W)	Actual Latitude	Actual Longitude
1315		393	45 12 22	66 01 07	45 12 22	66 01 06
1335	D-5	412	45 12 47	66 01 02	45 12 48	66 01 02
1345		442	45 12 40	66 01 01	45 12 39	66 01 02
1405		480	45 12 33	66 00 58	xx	xx
1425		511Alt			45 12 21	66 01 06
	D-6	NONE				
1440	D-7	556	45 12 21	66 00 45	45 12 22	66 00 44

TIME (AST)		Block	Latitude (N)	Longitude (W)	Actual Latitude	Actual Longitude
1500	D-8	578 DUP	45° 12' 19"	66° 01' 20"	45° 12' 19"	66° 01' 21"
1520		610 DUP	45 12 17	66 00 35	45 12 17	66 00 35
1530		617	45 12 17	66 00 39	45 12 18	66 00 40
1510		626	45 12 17	66 01 00	45 12 16	66 01 00
1535		636	45 12 14	66 00 36	45 12 14	66 00 36
1545		663	45 12 11	66 00 39	45 12 10	66 00 40
1610		689 DUP	45 12 08	66 00 41	45 12 08	66 00 50
21 March 2001						
0830		695	45 12 08	66 00 51	45 12 09	66 00 51
0845		703	45 12 08	66 01 20	45 12 08	66 01 20
0855		707	45 12 08	66 01 29	45 12 08	66 01 29
0920		735	45 12 03	66 00 35	45 12 03	66 00 37
0940		737	45 12 03	66 00 39	45 12 03	66 00 39
0955		847	45 11 55	66 00 50	45 11 55	66 00 50
1005		859	45 11 52	66 00 31	45 11 52	66 00 31
1015		865	45 11 52	66 00 41	45 11 52	66 00 41
1210		868	45 11 52	66 00 39	45 11 52	66 00 40
1200		916	45 11 49	66 00 41	45 11 49	66 00 42
1045		918	45 11 49	66 00 39	45 11 49	66 00 39
1055		936	45 11 46	66 00 33	45 11 46	66 00 33
1145		952	45 11 46	66 01 14	45 11 45	66 01 14
1025		961	45 11 43	66 00 33	45 11 43	66 00 32
1035		969	45 11 43	66 00 39	45 11 43	66 00 39

TIME (AST)		Block	Latitude (N)	Longitude (W)	Actual Latitude	Actual Longitude
1100		974	45 11 43	66 01 10	45 11 43	66 00 10
1110		975	45 11 43	66 01 12	45 11 43	66 00 12
1125		977	45 11 43	66 01 14	45 11 43	66 00 14
1130		997	45 11 40	66 00 51	45 11 40	66 00 51
1230	D-9	1056	45 12 10	66 00 22	45 12 10	66 00 22
1240	D-10	1048	45 12 18	66 00 25	45 12 18	66 00 25
1220	D-11	1129	45 11 54	66 00 19	45 11 55	66 00 19

OUTER HARBOUR SAMPLES

TIME (AST)			Latitude (N)	Longitude (W)	Actual Latitude	Actual Longitude
19 March 2001						
1930		OH-1			45 13 06	66 01 26
1945		OH-2			45 12 44	66 01 19
2000		OH-3			45 12 34	66 01 14
2010		OH-4			45 13 16	66 01 32
21 March 2001						
1255		OH-5			45 12 43	66 01 54
1305		OH-6			45 13 17	66 02 11

APPENDIX B

PHILIP SERVICES

METHOD SUMMARY

Title: Total Carbon / Organic Carbon in Soils and Sediments

SOP #: 4055
Reference: Total Carbon and Organic Carbon in Sludges - LECO
Effective Date: January, 1995 **Revision Date:** July, 1997

1. Scope and Application

This method is designed for the analysis of total carbon and organic carbon in soil and sediment samples by LECO EC-12 Carbon Analyzer as referenced in Application #130 from LECO Equipment Corp. The LOQ for this procedure is 0.1 %.

2. Summary of Method

A known quantity of air dried and sieved sample is is introduced into the instrument with the addition of copper accelerator. An induction furnace releases all carbon in the sample as CO_2 which is swept away with the sparging gas. The CO_2 is then scrubbed out of the gas stream and quantified at the detector as total carbon.
Organic carbon is measured by pre-treating the sample in order to remove the inorganic carbon. The sample is digested with hydrochloric acid in order to drive off all carbonates, then dried prior to the above analysis.

3. Quality Assurance

A minimum of one reagent blank, one duplicate and one certified reference material (usually MESS-1) is analyzed for each set of samples. A total QC effort of 10 % should be maintained.

PHILIP SERVICES

METHOD SUMMARY

Title: Polychlorinated Biphenyls in Sludge

SOP #: 8050
Reference: USEPA Method 8080 and 8081
Effective Date: April 1, 1996 **Revision Date:** July, 1997

1. Scope and Application

This method is applicable to the determination of polychlorinated biphenyls (PCBs) in sludge (tarpond) samples. The reporting limit for PCBs in sludge is 1.0 mg/kg. The following compounds can be determined using this method:

Polychlorinated Biphenyls

Aroclors 1016, 1242, 1248, 1254, 1260

2. Summary of Method

Ten grams of sludge sample is extracted by shaking for 2 hours with 50 mL of acetone/hexane on a paint shaker. A portion of the extract is diluted and cleaned up on a Florisil column. The extract is then concentrated by nitrogen evaporation and exchanged into iso-octane. The extracts are analyzed on a gas chromatograph equipped with dual capillary columns and dual electron capture detectors.

The areas of the individual peaks are integrated and automatic data analysis routines within the instrument software are used to prepare the calibration curves. The components in the samples are identified using the retention time criteria obtained on two GC columns (with different phases). After being detected, the individual peaks are then integrated and quantified. Total PCBs are quantified by comparing to the nearest Aroclor or mix of Aroclors.

3. Quality Assurance

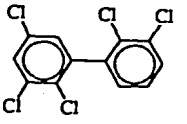
A glassware blank is analyzed at a frequency of 1 every 14 samples or sample batch (whichever is smaller) to monitor for possible contamination. A sample replicate is run at the same frequency to check precision. A quality control standard, PS-97, a process spike and a matrix spike are run every 14 samples or sample batch (whichever is smaller). Instrumental calibrations are checked by analyzing mid-range PCB calibration standards at the same frequency as the above quality assurance tests.

PHILIP SERVICES

Technical Data Sheet
February 1999

Polychlorinated Biphenyls (PCB)

Polychlorinated biphenyls consist of biphenyl molecules which have from one to ten chlorine atoms present. There are 209 possible combinations or congeners.



A pentachloro-biphenyl congener

These compounds have very high chemical, thermal and biological stability and have been used as heat transfer fluids, hydraulic fluids and dielectrics. They have been found throughout the world in water, soil, sediments and biota.[1]

CCME remediation criteria for PCBs in soil range from 0.5 mg/kg (agricultural) to 50 mg/kg (commercial/industrial). The CCME guideline for water is 0.001 µg/L (freshwater aquatic life).[2]

Analysis

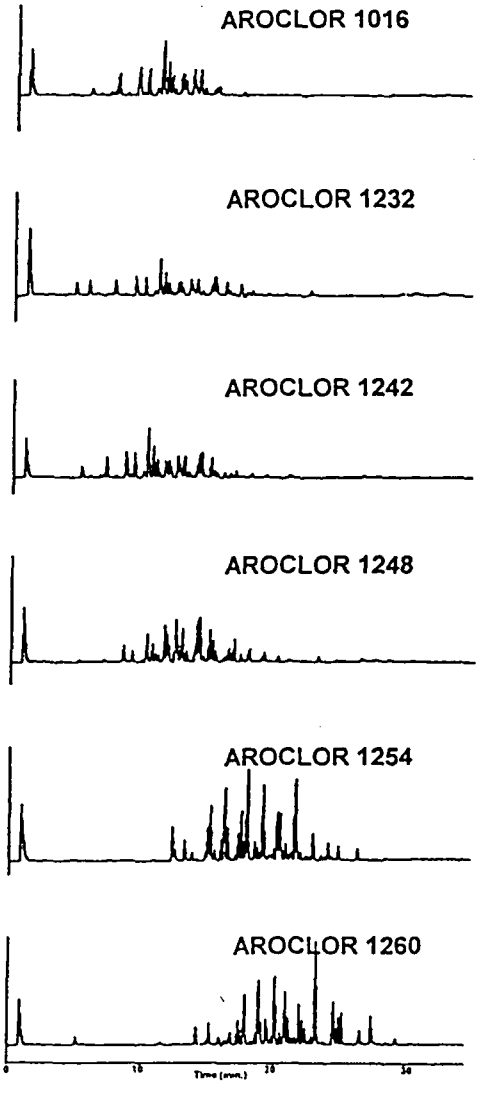
PCBs can be determined in transformer and waste oils, soils, sediments, water, biota and on surfaces (swabs). The analytical protocols are based on U.S. EPA methods 508 and 608 (water), 8080 (soil) and 3620 (oil). Samples are extracted with an appropriate solvent and a column clean-up procedure is used to remove interferences. The extract is analysed by capillary column gas chromatography with either an electron capture detector (GC/ECD) for maximum sensitivity or a mass spectrometer (GC/MS) for maximum selectivity. Depending on the instrumental method, PCB concentrations are reported as Aroclor equivalents or as individual congeners.

Precision and accuracy are ensured through the evaluation of duplicate samples and matrix spikes. Quality assurance data accompany sample results.

Sampling

Water samples should be collected in duplicate in clean one litre amber glass bottles fitted with Teflon cap liners. **A 2 cm headspace should be left in the 1 L bottle** to avoid breakage due to possible expansion of the sample. At least 100 grams of soil or sediment should be collected in a clean glass soil jar fitted with a Teflon cap liner. A small quantity (~10 g) of oil should be placed in a 40 mL purge and trap vial. Swabs, used for wiping 10 x 10 cm surfaces (100 cm^2), are supplied by the laboratory and should be returned in the original container. Samples should be kept cold (4°C) during shipment to the laboratory. Clean sample containers can be supplied upon request.

The figure shows gas chromatograms obtained for various Aroclors.



Detection Limits

Detection limits are evaluated using U.S. EPA protocols. The reporting limits for PCBs are: soil and sediment - 0.05 mg/kg; water - 0.05 µg/L; oil - 1.0 mg/kg; swabs - 5 µg/swab.

1) Stanley E. Manahan, *Environmental Chemistry*, fifth edition, Lewis Publishers, Inc., Michigan, 1991.

2) Review and Recommendations for Canadian Interim Environmental Quality Criteria for Contaminated Sites. Environment Canada Scientific Series No. 197, Inland Waters Directorate, Water Quality Branch, Ottawa, Ontario, 1991.

PHILIP ANALYTICAL SERVICES CORPORATION
5595 FENWICK STREET, SUITE 200, HALIFAX, NOVA SCOTIA, CANADA B3H 4M2 TEL (902) 420-0203 FAX (902) 420-8612

PHILIP SERVICES

METHOD SUMMARY

Title: Polycyclic Aromatic Hydrocarbons in Soils and Sediments

SOP #: 7010
Reference: USEPA Method 8270A
Effective Date: January 17, 1996 **Revision Date:** June, 1998

1. Scope and Application

This method is applicable to the determination of polycyclic aromatic hydrocarbons (PAHs) in soils and sediments with a reporting limit of 0.05 mg/kg. The following compounds are routinely determined:

Analyte	Analyte
Naphthalene	Benz[*a*]anthracene
1-Methylnaphthalene	Chrysene
2-Methylnaphthalene	Benzo[*b*]fluoranthene
Acenaphthylene	Benzo[*k*]fluoranthene
Acenaphthene	Benzo[*a*]pyrene
Fluorene	Perylene
Phenanthrene	Indeno[*1,2,3-cd*]pyrene
Anthracene	Dibenz[*a,h*]anthracene
Fluoranthene	Benzo[*ghi*]perylene
Pyrene	

Other PAHs can be analyzed by this method provided appropriate standards are available.

2. Summary of Method

A 10 gram portion of wet soil or sediment is weighed out and spiked with 4 deuterated surrogate PAH compounds (these compounds represent a range of volatilities and are used to monitor the efficiency of the sample preparation steps). The sample is mixed with sodium sulphate and then extracted by vigorous shaking with a n-pentane/dichloromethane mixture. If required, an aliquot of the extract is removed and interfering compounds are eliminated using a silica gel column clean-up procedure. The extract is then solvent exchanged into isooctane and analyzed by gas chromatography/mass spectrometry (GC/MS) using selected ion monitoring mode.

The GC/MS system is calibrated at least once per week with PAH standards of known concentration. The areas of the individual peaks are integrated and automatic data analysis routines within the instrument software are used to store the mass spectra of the various peaks and to prepare the calibration curves. Calibration accuracy is verified by analyzing an independent reference standard. The day-to-day stability of the calibration is confirmed by analyzing calibration check solutions with each batch of samples. The components in the samples are identified using retention time criteria and qualifier ion ratios. After being detected, the individual peaks are integrated and quantified. The wet weight concentrations are converted to a dry weight basis using the moisture content of the sample obtained by gravimetric analysis.

3. Quality Assurance

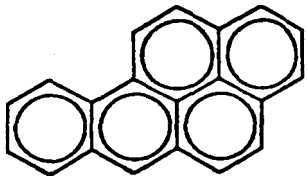
A National Research Council reference sediment (HS-6), containing 20% added moisture, is extracted and analyzed with each batch of samples. Process spikes, method blanks and duplicate samples are also prepared and analyzed. The results of these evaluations, along with the deuterated surrogate recoveries, are provided with the sample results.

PHILIP SERVICES

Technical Data Sheet
January 1999

Polycyclic Aromatic Hydrocarbons (PAH)

Polycyclic aromatic hydrocarbons consist of condensed ring aromatic molecules.



Benzo[a]pyrene

These compounds are formed mainly through the combustion of organic materials such as wood, coal and petroleum hydrocarbons.[1] PAHs are human carcinogens and are associated with soot. These compounds can be found in soil, sediment, water and biota. The main route to the environment is via atmospheric emissions and subsequent fallout.[2]

The Canadian Council of Ministers of the Environment's (CCME) remediation criteria for PAHs range from 0.1 mg/kg (agricultural) to 10-100 mg/kg (commercial/industrial). The water remediation criteria list benzo[a]pyrene at 0.01 µg/L (drinking water).[3]

Analysis

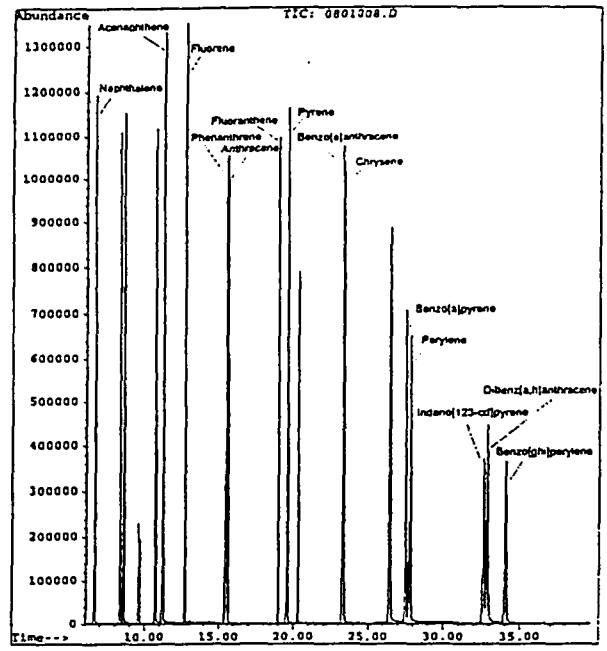
The PAH method is based on U.S. EPA method 8270 and involves solvent extraction of the components and chromatographic column clean-up to remove interferences. The extract is then analysed by capillary column gas chromatography/ mass spectrometry (GC/MS). Prior to extraction, four deuterated surrogate PAH compounds are added to the sample. These compounds represent a range of volatilities and are used to monitor the efficiency of the sample preparation steps.

Precision and accuracy are enhanced through the use of the deuterated surrogates, internal standards, critical confirmation ions, ion ratios, retention time criteria, certified reference materials, method blank spikes and matrix spikes.

Sampling

Water samples for determination of PAH should be collected in duplicate in clean one litre amber glass bottles fitted with Teflon cap liners. **A 2 cm headspace should be left in the 1 L bottle** to avoid breakage due to possible expansion of the sample. At least 100 grams of soil or sediment should be collected in a clean glass soil jar fitted with a Teflon cap liner. All samples should be protected from light and kept cold (4°C) and delivered to the lab as quickly as possible. Clean sample containers are supplied upon request.

A capillary column GC/MS chromatogram showing PAH components and internal standards.



Polycyclic Aromatic Hydrocarbons routinely reported:

Acenaphthene	Benzo[*a*]pyrene	2-Methylnaphthalene
Acenaphthylene	Chrysene	Naphthalene
Anthracene	Dibenz[*a,h*]anthracene	Perylene
Benz[*a*]anthracene	Fluoranthene	Phenanthrene
Benzo[*b*]fluoranthene	Fluorene	Pyrene
Benzo[*k*] fluoranthene	Indeno[1,2,3-*cd*]pyrene	
Benzo[*ghi*]perylene	1-Methylnaphthalene	

Note: Additional PAH compounds can be analysed upon request.

Surrogates and Internal Standards

Acenaphthene-d10	Chrysene-d12	Pyrene-d10
Acenapthylene-d8	Naphthalene-d8	p-Terphenylene-d14
Anthracene-d10	Phenanthrene-d10	

Detection Limits

Detection limits are evaluated using U.S. EPA protocols. The reporting limit for individual PAH compounds in soil is 0.05 mg/kg and 0.01 to 0.2 µg/L in water. Quality assurance data, including surrogate recoveries and reference material results, are provided with the sample results.

1) John Cary Stewart, *Drinking Water Hazards*, Envirographics, Hiram, Ohio, 1990.
2) Eaton, P.B., et.al., *Environmental Quality in the Atlantic Region*, Environment Canada, Environmental Protection Service, Atlantic Region, 1985.
3) Review and Recommendations for Canadian Interim Environmental Quality Criteria for Contaminated Sites. Environment Canada Scientific Series No. 197, Inland Waters Directorate, Water Quality Branch, Ottawa, Ont., 1991.

APPENDIX C

ANALYTICAL SERVICES

Prepared For:
ironment Canada

Date Generated
26-Jun-01
Spreadsheet File Name
0103074H.XLS

Parameters	Method	EQL	Units	Client ID:	D-1 11 Black Pt.	D-1 15 Black Pt.	D-3 81 Black Pt.	D-3 85 Black Pt.	D-3 95 Black Pt.	D-3 115 Black Pt.	D-3 130 Black Pt.	D-3 144 Black Pt.	D-3 144 Dup Black Pt.	D-4 174 Black Pt.	D-4 179 Black Pt.	D-4 179 Dup Black Pt.	D-4 194 Black Pt.	D-4 194 Dup Black Pt.	D-4 198 Black Pt.
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				Philip ID:	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
				Matrix:														01-H012469	
				Duplicate of:															
				Date Sampled:															
				Client Description:															
< 12.5 mm	Grav.	0.1	%		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
< 9.5 mm	Grav.	0.1	%		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
< 4.75 mm	Grav.	0.1	%		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
< PHI -1 (2 mm)	Grav.	0.1	%		100	72.3	100	100	100	100	100	100	100	100	100	100	100	100	100
< PHI 0 (1 mm)	Grav	0.1	%		99.9	69.2	99.9	99.9	100	99.8	99.9	100	99.9	99.9	99.9	99.9	99.2	99.1	99.9
< PHI +1 (1/2 mm)	Grav.	0.1	%		99.8	66.3	99.7	99.9	99.9	99.6	99.8	99.9	99.8	99.8	99.9	99.8	97.9	97.2	99.7
< PHI +2 (1/4 mm)	Grav.	0.1	%		99.6	63.5	99.2	99.8	99.6	98.8	99.2	99.7	99.7	99.8	99.6	99.7	91.1	91.4	99.3
< PHI +3 (1/8 mm)	Grav.	0.1	%		99.5	60.6	97.5	98.7	99.5	96.9	96.3	98.9	98.6	99.6	99	97.6	90.5	89	96.9
< PHI +4 (1/16 mm)	Grav.	0.1	%		64.9	54.4	83	81.2	81	81.8	77.7	75.3	75.3	78.1	72.7	93.6	57.8	59.4	68.6
< PHI +5 (1/32 mm)	Grav.	0.1	%		19.2	26.5	52.4	31.1	40.6	58.7	48.9	37.1	35.4	21.2	39	43.9	38.5	37.2	42.3
< PHI +6 (1/64 mm)	Grav.	0.1	%		12.2	16.6	28.7	16.8	22.2	34.7	29	21.5	21	10.2	23.8	25.3	28.9	28.4	26.8
< PHI +7 (1/128 mm)	Grav.	0.1	%		8.2	10.9	17.4	11.2	14.3	20.2	17.8	13.6	13.1	7	13.5	15.8	19.9	19.6	17.1
< PHI +8 (1/256 mm)	Grav.	0.1	%		7.1	9.6	14.8	9.9	12.2	16.7	14.8	11.4	11.2	6.3	10.5	13.6	17.3	17.2	14.7
< PHI +9 (1/512 mm)	Grav.	0.1	%		4.8	6.6	9.5	7	7.6	9.8	9	6.9	6.5	4.7	5.1	8.3	10.6	10.9	10.2
Gravel	Wentworth	0.1	%		< 0.1	27.7	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Sand	Wentworth	0.1	%		35.1	17.9	17	18.8	19	18.2	22.3	24.7	24.7	21.9	27.3	6.4	42.2	40.6	31.4
Silt	Wentworth	0.1	%		57.7	44.8	68.2	71.3	68.8	65.1	62.9	63.9	64.1	71.8	62.3	80	40.5	42.3	53.9
Clay	Wentworth	0.1	%		7.1	9.6	14.8	9.9	12.2	16.7	14.8	11.4	11.2	6.3	10.5	13.6	17.3	17.2	14.7
Polychlorinated Biphenyl	GC/ECD	10	ug/Kg		< 10	< 10	< 10	34.8	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Total Organic Carbon	LECO	0.1	g/kg		2.9	5.4	5.1	3.2	4.1	6.6	1.4	3.9	2.2	2.1	3.1	4.2	8	6.4	4.9
PCB Comments	Comment		Text					Aroclor 1254											
Naphthalene	GC/MS	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.09	< 0.05
Perylene	GC/MS	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	GC/MS	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	GC/MS	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	GC/MS	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	GC/MS	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.11	0.14	< 0.05
Anthracene	GC/MS	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	GC/MS	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.24	0.3	< 0.05
Pyrene	GC/MS	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.29	0.34	< 0.05
Benz[a]anthracene	GC/MS	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.11	0.16	< 0.05
Chrysene	GC/MS	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.11	0.16	< 0.05
Benzo[b]fluoranthene	GC/MS	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.11	0.14	< 0.05
Benzo[k]fluoranthene	GC/MS	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.11	0.14	< 0.05
Benzo[a]pyrene	GC/MS	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.12	< 0.05
Indeno[1,2,3-cd]pyrene	GC/MS	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibenz[a,h]anthracene	GC/MS	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo[ghi]perylene	GC/MS	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

All results expressed on a dry weight basis for soils and a wet weight (as received) basis for tissues.

PSC ANA
SER

Date Generated	D-4 207 Black Pt.	D-4 259 Black Pt.	D-4 265 Black Pt.	D-4 272 Black Pt.	D-4 291 Black Pt.	D-4 308 Black Pt.	D-4 320 Black Pt.	D-4 340 Black Pt.	D-4 348 Black Pt.	D-4 348 Dup Black Pt.	D-4 360 Black Pt.	D-4 368 Black Pt.	D-4 368 Dup Black Pt.	D-4 393 Black Pt.	D-5 412 Black Pt.	D-5 442 Black Pt.	D-5 511 Alt Black Pt.
26-Jun-01	01-H012472	01-H012473	01-H012474	01-H012475	01-H012476	01-H012477	01-H012478	01-H012479	01-H012480	01-H012481	01-H012482	01-H012483	01-H012484	01-H012485	01-H012486	01-H012487	01-H012488
Spreadsheet File Name	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
0103074H.XLS										01-H012480							
Parameters																	
< 12.5 mm	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
< 9.5 mm	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
< 4.75 mm	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
< PHI -1 (2 mm)	100	99.7	61.5	98.8	100	100	100	100	100	100	100	100	100	100	100	100	100
< PHI 0 (1 mm)	100	99.2	56.7	98.4	99.9	100	99.9	99.9	100	99.9	99.9	99.9	99.9	99.9	100	99.9	99.9
< PHI +1 (1/2 mm)	100	98.9	51.9	98.1	99.3	99.9	99.8	99.8	99.9	99.9	99.8	99.8	99.9	99.8	99.9	99.9	99.8
< PHI +2 (1/4 mm)	99.7	98.1	47	97.5	97.5	99.5	99.6	99.7	99.7	99.8	99.6	99.4	99.8	99.5	99.8	99.7	99.5
< PHI +3 (1/8 mm)	99.6	95.2	46.7	97	97.4	97.4	98.8	98.7	99.6	98.2	99.4	96.6	98.9	99.5	97.8	98.5	98.5
< PHI +4 (1/16 mm)	66.8	74.4	42.8	80.5	79.9	66.7	85.1	77.5	66.6	67.1	80.1	71.2	93.9	73.3	87.2	68.8	80.3
< PHI +5 (1/32 mm)	17.3	44.8	31.7	38	51	29.7	53	40.3	32.8	33.2	42.5	38.9	32.9	33	28.5	38.2	45.6
< PHI +6 (1/64 mm)	11.1	27.9	24.3	20	22.2	11.5	28.5	26.7	20.6	20.7	27.4	19.5	15.1	19.1	18.3	27.3	27.1
< PHI +7 (1/128 mm)	7.6	17.7	14.6	11.4	13.1	7.4	17.2	17.4	14.1	14	18.1	12.6	9.5	12	12.3	17.4	16.5
< PHI +8 (1/256 mm)	7	15.4	10.9	9.8	11.2	6.8	13.8	13	11.8	12	14.4	10.1	8.6	10.2	9.4	13.6	12
< PHI +9 (1/512 mm)	5.2	9.5	4.3	5.9	7	4.7	6.3	6	5.5	5.9	6.4	4.8	5.3	4.8	4.3	6.6	5.9
Gravel	< 0.1	0.3	38.5	1.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Sand	33.2	25.4	18.8	18.3	20.1	33.3	14.9	22.5	33.4	32.9	19.9	28.8	6.1	26.7	12.8	31.2	19.7
Silt	59.7	59	31.9	70.7	68.7	59.9	71.3	64.5	54.8	55.1	65.6	61.1	85.3	63.2	77.8	55.2	68.3
Clay	7	15.4	10.9	9.8	11.2	6.8	13.8	13	11.8	12	14.4	10.1	8.6	10.2	9.4	13.6	12
Polychlorinated Biphenyl	< 10	< 10	33.9	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Total Organic Carbon	2.1	4.6	7.2	4.3	9.1	3.7	4.6	4.4	3.7	3.6	5.2	4.5	3.4	4.4	3.2	4.5	5.2
PCB Comments			Aroclor 1242														rogate. Reprep s
Naphthalene	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Perylene	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	< 0.05	< 0.05	0.09	< 0.05	0.24	< 0.05	0.08	0.12	0.1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Anthracene	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	< 0.05	< 0.05	0.2	0.09	0.26	0.11	< 0.05	0.1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Pyrene	< 0.05	< 0.05	0.38	< 0.05	0.22	0.11	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benz[a]anthracene	< 0.05	< 0.05	0.12	< 0.05	0.12	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Chrysene	< 0.05	< 0.05	0.14	< 0.05	0.19	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo[b]fluoranthene	< 0.05	< 0.05	0.11	< 0.05	0.09	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo[k]fluoranthene	< 0.05	< 0.05	0.11	< 0.05	0.09	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo[a]pyrene	< 0.05	< 0.05	0.09	< 0.05	0.1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Indeno[1,2,3-cd]pyrene	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibenz[a,h]anthracene	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo[ghi]perylene	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

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Date Generated	D-7 557 Black Pt.	D-8 578 Black Pt.	D-8 578 Dup Black Pt.	D-8 610 Black Pt.	D-8 610 Dup Black Pt.	D-8 617 Black Pt.	D-8 626 Black Pt.	D-8 636 Black Pt.	D-8 663 Black Pt.	D-8 689 Black Pt.	D-8 689 Dup Black Pt.	D-8 695 Black Pt.	D-8 703 Black Pt.	D-8 707 Black Pt.	D-8 735 Black Pt.	D-8 735 Dup Black Pt.	D-8 737 Black Pt.
26-Jun-01	01-H012489	01-H012490	01-H012491	01-H012492	01-H012493	01-H012494	01-H012495	01-H012496	01-H012497	01-H012498	01-H012499	01-H012500	01-H012501	01-H012502	01-H012503	01-H012504	01-H012505
Spreadsheet File Name	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil 01-H012503	Soil
0103074H.XLS																	
Parameters																	
< 12.5 mm	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
< 9.5 mm	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
< 4.75 mm	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
< PHI -1 (2 mm)	85.8	97.8	99.7	98.4	100	98.8	100	99.9	99.5	83.5	85.9	96.5	100	100	83	85.5	99.1
< PHI 0 (1 mm)	64.4	96.1	99	97.4	99.5	96.8	99.7	99.5	98.1	79.3	83.5	93.4	99.8	99.9	80.6	81.9	97.3
< PHI +1 (1/2 mm)	26.4	93.6	97.9	94.5	98.6	90.5	99.2	98.4	93.3	70	77.6	91.2	99.3	99.8	78	78.7	95
< PHI +2 (1/4 mm)	7.7	91.9	97.1	85.7	96.2	76.8	98.5	95.6	57.8	51.3	64.8	87.7	98.1	99.6	74.2	74.7	92.5
< PHI +3 (1/8 mm)	7.1	88.6	97.1	79.2	95.8	76	98.2	92.4	28.2	45.8	60.9	86.4	95.4	98.2	71.8	73.9	92.1
< PHI +4 (1/16 mm)	5.1	88.4	76.7	70.8	77.4	64.8	86.9	77.3	8.9	32.6	46.2	77.2	70.6	69.1	67.1	68	77.1
< PHI +5 (1/32 mm)	3.9	51.4	43.9	55.2	58.5	48.5	62.8	57	3.5	23.1	33	58.6	46.4	37.9	59.8	57.8	61.2
< PHI +6 (1/64 mm)	3.1	32.9	30.2	34.5	37.5	33.3	41.1	35.5	2.6	15.9	21.8	40.5	29.3	22.3	45.5	45.6	40.5
< PHI +7 (1/128 mm)	2.5	19.8	19.2	20.9	22.8	20.2	26.4	20.8	1.9	11	14.2	26.2	18.3	13.8	29.4	28.9	20.9
< PHI +8 (1/256 mm)	2.4	13.2	10.7	17.5	19.5	12.8	23.5	17	1.2	8.8	12.1	21.4	14.4	10.8	21.6	18.5	15.1
< PHI +9 (1/512 mm)	1.3	5.3	5	8.6	13.3	5.8	13.6	7.9	1	3.4	5.4	11	7.2	5.5	6.9	6.2	6.9
Gravel	14.2	2.2	0.3	1.5	< 0.1	1.2	< 0.1	0.1	0.5	16.5	14.1	3.5	< 0.1	< 0.1	17	14.5	0.9
Sand	80.7	9.4	23	27.6	22.6	34	13.1	22.6	90.6	50.9	39.6	19.2	29.4	30.9	15.9	17.5	22
Silt	2.7	75.1	66	53.3	57.9	52	63.5	60.4	7.7	23.8	34.2	55.9	56.2	58.3	45.5	49.4	62
Clay	2.4	13.2	10.7	17.5	19.5	12.8	23.5	17	1.2	8.8	12.1	21.4	14.4	10.8	21.6	18.5	15.1
Polychlorinated Biphenyl	< 10	< 10	< 10	23.4	19.5	21	< 10	15.2	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	17.8
Total Organic Carbon	2.1	7	5	12	13	10	10	8.6	1.8	6.4	7	12	8.5	3.8	7.7	8.1	15
PCB Comments				Aroclor 1254	Aroclor 1254	Aroclor 1242		Aroclor 1242									Aroclor 1254
Naphthalene	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.12	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Perylene	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.09	< 0.05	0.1
Acenaphthylene	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.08
Phenanthrene	< 0.05	< 0.05	< 0.05	0.12	0.12	0.11	< 0.05	0.13	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.09	0.07	0.3
Anthracene	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.67
Fluoranthene	< 0.05	0.14	< 0.05	0.23	0.17	0.19	< 0.05	0.19	< 0.05	0.11	0.17	0.1	0.09	< 0.05	0.22	0.22	0.25
Pyrene	< 0.05	0.19	< 0.05	0.22	0.15	0.17	< 0.05	0.16	< 0.05	0.1	0.14	0.1	< 0.05	< 0.05	0.33	0.3	0.19
Benz[a]anthracene	< 0.05	< 0.05	< 0.05	0.12	< 0.05	< 0.05	< 0.05	0.07	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.1	0.1	0.33
Chrysene	< 0.05	< 0.05	< 0.05	0.12	< 0.05	< 0.05	< 0.05	0.07	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.09	0.07	0.75
Benzo[b]fluoranthene	< 0.05	< 0.05	< 0.05	0.11	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.1	0.1	0.29
Benzo[k]fluoranthene	< 0.05	< 0.05	< 0.05	0.11	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.1	0.1	0.29
Benzo[a]pyrene	< 0.05	< 0.05	< 0.05	0.09	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.29
Indeno[1,2,3-cd]pyrene	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.1
Dibenz[a,h]anthracene	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo[ghi]perylene	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.11

All results expressed on a dry weight basis for soils and a wet weight (as received) basis for tissues.

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Date Generated	D-8 847 Black Pt.	D-8 859 Black Pt.	D-8 865 Black Pt.	D-8 868 Black Pt.	D-8 916 Black Pt.	D-8 918 Black Pt.	D-8 931 Black Pt.	D-8 952 Black Pt.	D-8 961 Black Pt.	D-8 968 Black Pt.	D-8 974 Black Pt.	D-8 974 Dup Black Pt.	D-8 975 Black Pt.	D-8 977 Black Pt.	D-8 997 Black Pt.	D-9 1056 Black Pt.	D-10 1048 Black Pt.
26-Jun-01	01-H012506	01-H012507	01-H012508	01-H012509	01-H012510	01-H012511	01-H012512	01-H012513	01-H012514	01-H012515	01-H012516	01-H012517	01-H012518	01-H012519	01-H012520	01-H012521	01-H012522
Spreadsheet File Name	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil 01-H012516	Soil	Soil	Soil	Soil	Soil
0103074H.XLS																	
Parameters																	
< 12.5 mm	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
< 9.5 mm	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
< 4.75 mm	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
< PHI -1 (2 mm)	83.8	93.1	85.5	90.6	84.4	93.4	88.3	93.6	98.6	93.4	98.9	89.8	97.9	94.8	84.8	100	98.6
< PHI 0 (1 mm)	81.6	89.5	78.7	87.3	81.3	90	82.5	89.8	96.7	89.6	98.4	89.1	97.4	93	82.3	99.8	97.3
< PHI +1 (1/2 mm)	79.5	84.2	72	84.4	76.4	86.8	77.4	86	95.3	86.1	97.9	88.3	96.8	90.9	80.1	99.4	94.3
< PHI +2 (1/4 mm)	76.3	77.7	64.9	80.6	69.1	81.5	68.2	79.5	92.6	80.4	96.9	86.6	95.8	87.9	76.9	98.4	54.9
< PHI +3 (1/8 mm)	72.5	76.2	53.6	77.4	60.3	79	55.4	76	90.6	78.9	93.7	86.4	89.7	75.8	76.6	85.8	53.3
< PHI +4 (1/16 mm)	59.8	66.2	51.9	57.5	54	62.7	47.2	61.2	80.2	57.3	79.4	81	76.3	63	62.2	73.1	20
< PHI +5 (1/32 mm)	49.8	51.6	36.3	41	43.4	51.9	39.1	48.5	61.6	43.9	57.3	49.3	52.4	43.6	43	53.3	6
< PHI +6 (1/64 mm)	32.5	34.6	26.4	26.3	30	36.3	28.7	32.4	32.5	30.4	36.5	31.4	33.5	28.1	25.1	28.6	3.6
< PHI +7 (1/128 mm)	17.7	19.7	16.5	17.4	19.4	24	19.3	21.7	17.8	19.7	19.1	20.7	21.2	19.1	15.8	16.6	2.7
< PHI +8 (1/256 mm)	12.1	13.7	9.9	13.2	15.5	20.6	15.9	18.4	13.1	16.3	13.1	17.1	17.2	16.5	13.6	14.5	2.5
< PHI +9 (1/512 mm)	5	5.7	3.9	4.5	6.2	10.6	6.1	8.1	5.5	5.8	6.2	8.4	9.5	9	9.5	9.5	2.2
Gravel	16.2	6.9	14.5	9.4	15.6	6.6	11.7	6.4	1.4	6.6	1.1	10.2	2.1	5.2	15.2	< 0.1	1.4
Sand	24	26.9	33.6	33.1	30.4	30.6	41.1	32.4	18.5	36.1	19.5	8.8	21.6	31.7	22.7	26.9	78.6
Silt	47.6	52.5	41.9	44.4	38.5	42.1	31.4	42.9	67	41	66.3	63.9	59.1	46.5	48.5	58.6	17.4
Clay	12.1	13.7	9.9	13.2	15.5	20.6	15.9	18.4	13.1	16.3	13.1	17.1	17.2	16.5	13.6	14.5	2.5
Polychlorinated Biphenyl	20	< 10	< 10	19.3	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	34.5	< 10	< 10	< 10
Total Organic Carbon	14	7.1	9	5.7	7.5	9.8	7.3	9.5	6.2	6.3	5.8	5.8	6	6.3	5.3	3.8	1.3
PCB Comments	Aroclor 1254			Aroclor 1242										Aroclor 1242			
Naphthalene	< 0.05	< 0.05	0.1	< 0.05	< 0.05	0.08	< 0.05	< 0.05	< 0.05	0.11	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Perylene	< 0.05	< 0.05	< 0.05	< 0.05	0.07	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	0.17	< 0.05	0.08	< 0.05	0.11	0.11	< 0.05	0.1	< 0.05	0.12	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.1	< 0.05
Anthracene	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	0.23	0.19	0.12	0.09	0.23	0.21	0.12	0.21	< 0.05	0.18	< 0.05	< 0.05	< 0.05	0.07	0.1	0.1	< 0.05
Pyrene	0.19	0.18	0.29	0.17	0.25	0.47	0.12	0.22	< 0.05	0.42	< 0.05	< 0.05	< 0.05	0.1	0.1	0.1	< 0.05
Benz[a]anthracene	< 0.05	< 0.05	0.08	< 0.05	0.15	0.11	< 0.05	0.1	< 0.05	0.11	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Chrysene	< 0.05	< 0.05	0.08	0.07	0.14	0.11	< 0.05	0.1	< 0.05	0.1	< 0.05	< 0.05	< 0.05	0.07	< 0.05	< 0.05	< 0.05
Benzo[b]fluoranthene	< 0.05	< 0.05	0.07	< 0.05	0.14	0.15	< 0.05	0.08	< 0.05	0.12	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo[k]fluoranthene	< 0.05	< 0.05	0.07	< 0.05	0.14	0.15	< 0.05	0.08	< 0.05	0.12	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo[a]pyrene	< 0.05	< 0.05	< 0.05	< 0.05	0.14	0.1	< 0.05	0.08	< 0.05	0.08	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Indeno[1,2,3-cd]pyrene	< 0.05	< 0.05	< 0.05	< 0.05	0.07	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibenz[a,h]anthracene	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo[ghi]perylene	< 0.05	< 0.05	< 0.05	< 0.05	0.07	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

All results expressed on a dry weight basis for soils and a wet weight (as received) basis for tissues.

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Date Generated	D-11 1129 Black Pt.	Control 1 Black Pt.	Control 2 Black Pt.	Control 3 Black Pt.	Control 4 Black Pt.	Control 5 Black Pt.	Control 6 Black Pt.	Control 6 Dup Black Pt.
26-Jun-01	01-H012523	01-H012524	01-H012525	01-H012526	01-H012527	01-H012528	01-H012529	01-H012530
Spreadsheet File Name	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
0103074H.XLS								01-H012529
Parameters								
< 12.5 mm	100	100	100	100	100	100	100	100
< 9.5 mm	100	100	100	100	100	100	100	100
< 4.75 mm	100	100	100	100	100	100	100	100
< PHI -1 (2 mm)	72.6	91.8	98.9	99.7	100	100	100	100
< PHI 0 (1 mm)	68.5	82	96.8	99.7	100	99.9	99.9	100
< PHI +1 (1/2 mm)	64.9	71	95.5	99.6	100	99.8	99.9	100
< PHI +2 (1/4 mm)	60	49.8	93.1	99.4	99.9	99.6	99.7	99.9
< PHI +3 (1/8 mm)	58.5	25.1	92.9	99.3	99.9	99.5	94.5	96.4
< PHI +4 (1/16 mm)	45.2	12.6	90.5	79.4	27.9	84.2	23.3	19.1
< PHI +5 (1/32 mm)	36.7	4.5	58.6	52.1	5.6	52.8	7.6	6.3
< PHI +6 (1/64 mm)	27	3	38.9	30.5	2.7	31.5	5.1	4.3
< PHI +7 (1/128 mm)	18.4	2.5	25.5	20.5	2.1	20.7	4	3.3
< PHI +8 (1/256 mm)	16.2	2.3	22.4	17.3	2.1	17.2	3.8	3.1
< PHI +9 (1/512 mm)	11.2	2.1	12.1	8.3	2	9	3.7	2.7
Gravel	27.4	8.2	1.1	0.3	< 0.1	< 0.1	< 0.1	< 0.1
Sand	27.4	79.2	8.4	20.4	72.1	15.8	76.7	80.9
Silt	29	10.3	68.1	62	25.8	67	19.6	16
Clay	16.2	2.3	22.4	17.3	2.1	17.2	3.8	3.1
Polychlorinated Biphenyl	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Total Organic Carbon	7.8	1.1	6.3	4	0.7	4.6	0.9	0.9
PCB Comments								
Naphthalene	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Perylene	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Anthracene	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	0.17	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Pyrene	0.23	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benz[a]anthracene	0.09	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Chrysene	0.09	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo[b]fluoranthene	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo[k]fluoranthene	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo[a]pyrene	0.07	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Indeno[1,2,3-cd]pyrene	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibenz[a,h]anthracene	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo[ghi]perylene	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

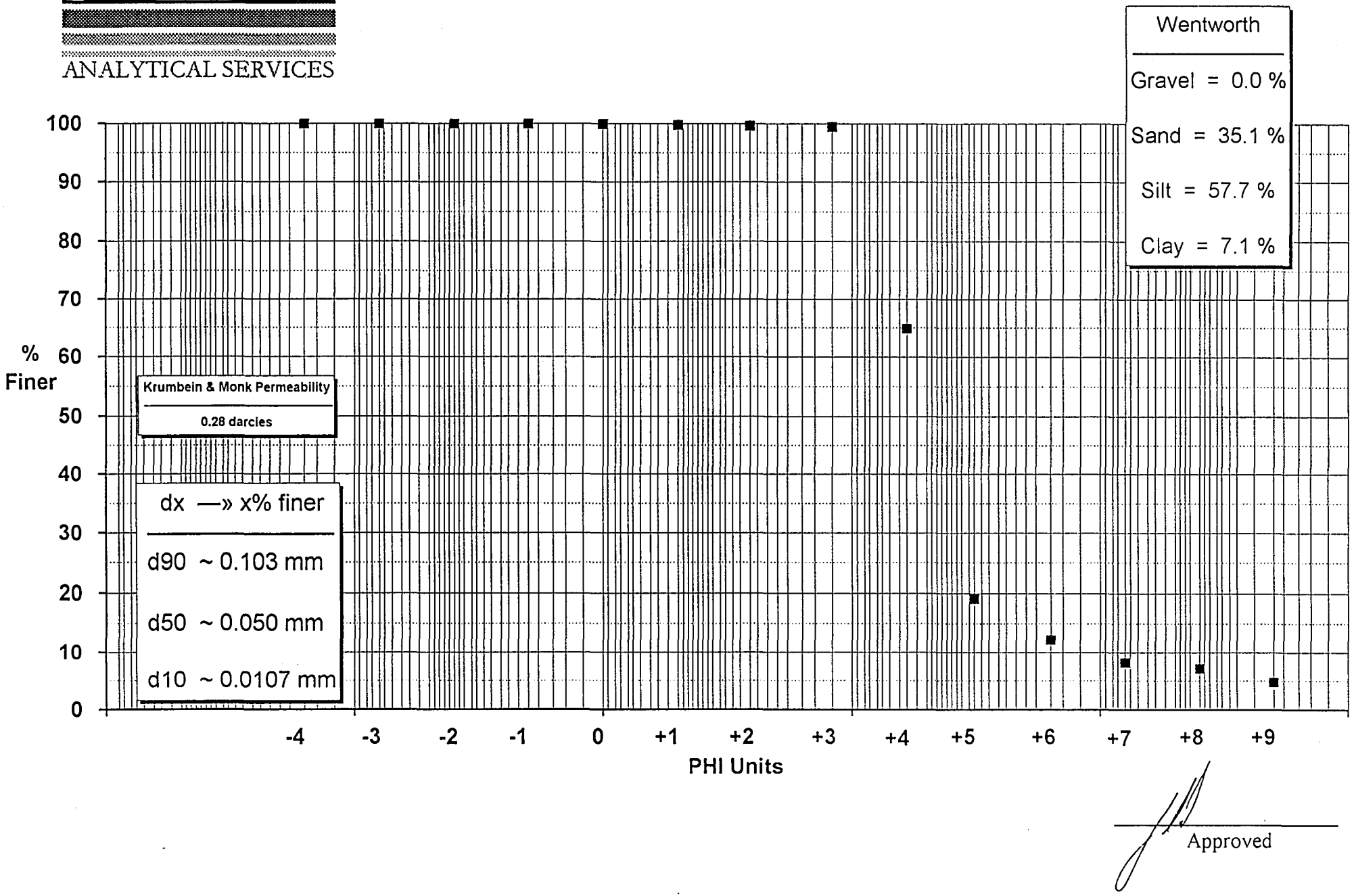
All results expressed on a dry weight basis for soils and a wet weight (as received) basis for tissues.

APPENDIX D

PSC ID: 01-H012457

D-1 11

ANALYTICAL SERVICES

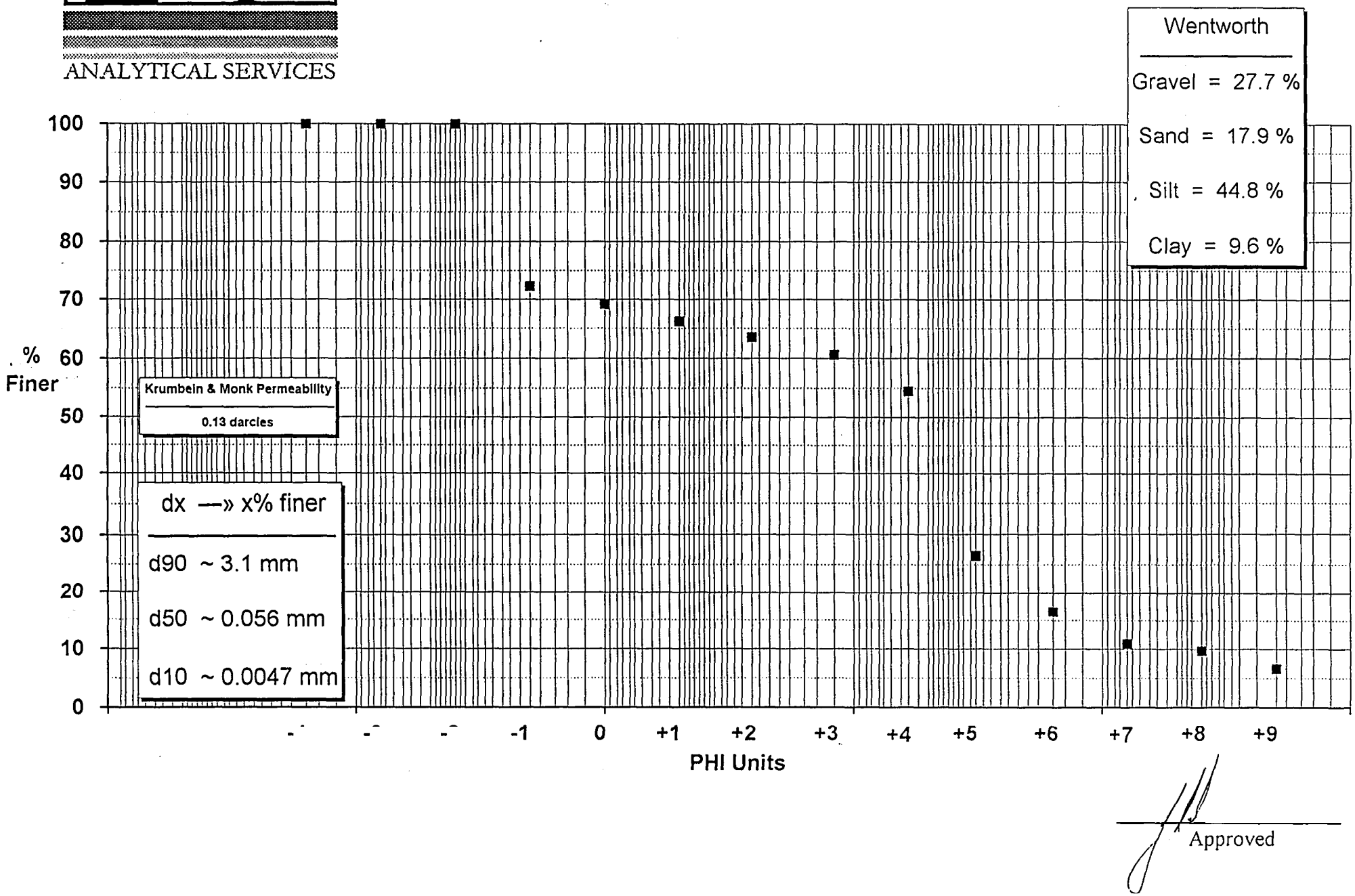


Approved

PSC ID: 01-H012458

PSC
ANALYTICAL SERVICES

D-1 15

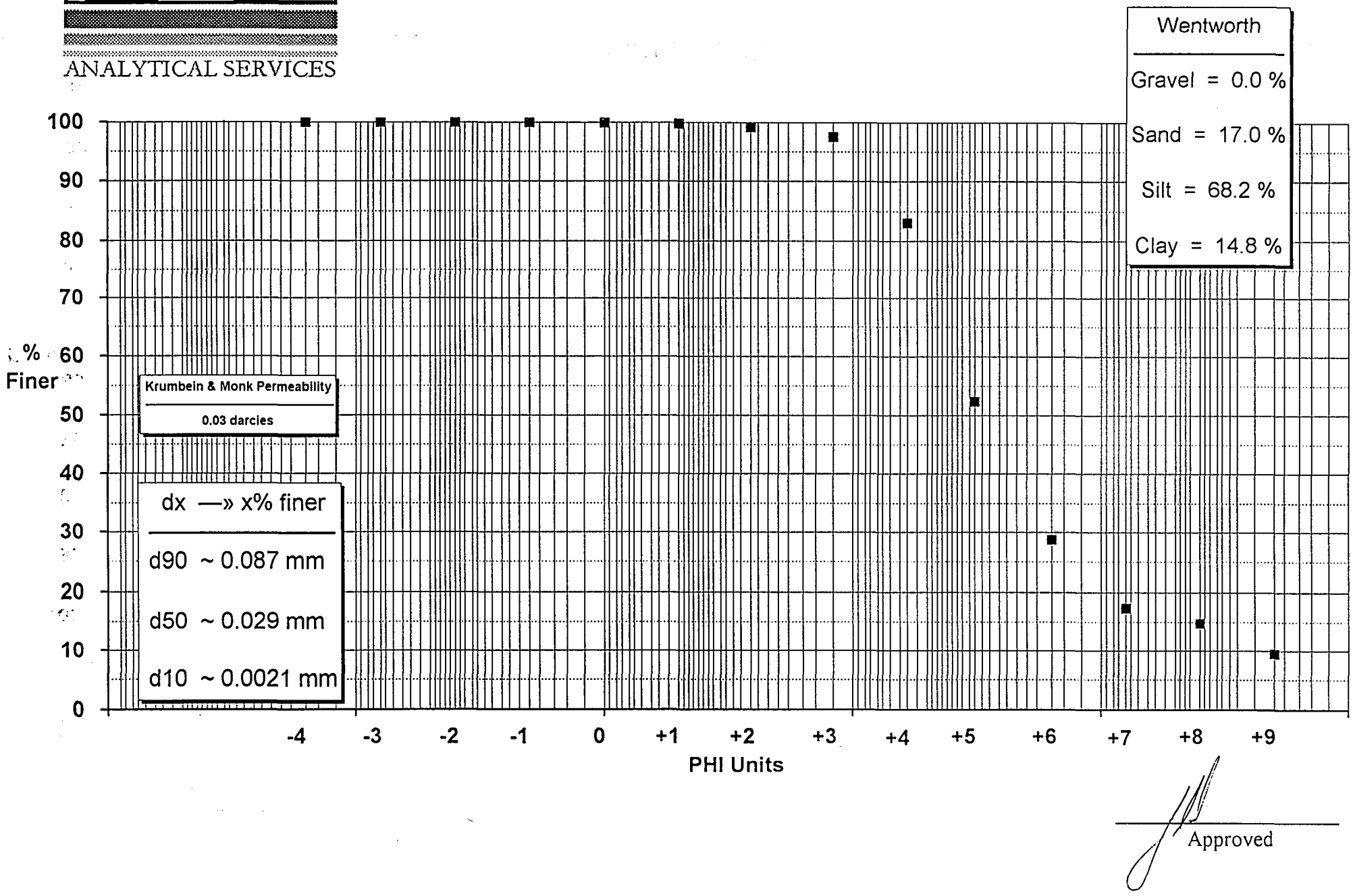


Approved

PSC ID: 01-H012459

D-3 81

PSC ANALYTICAL SERVICES



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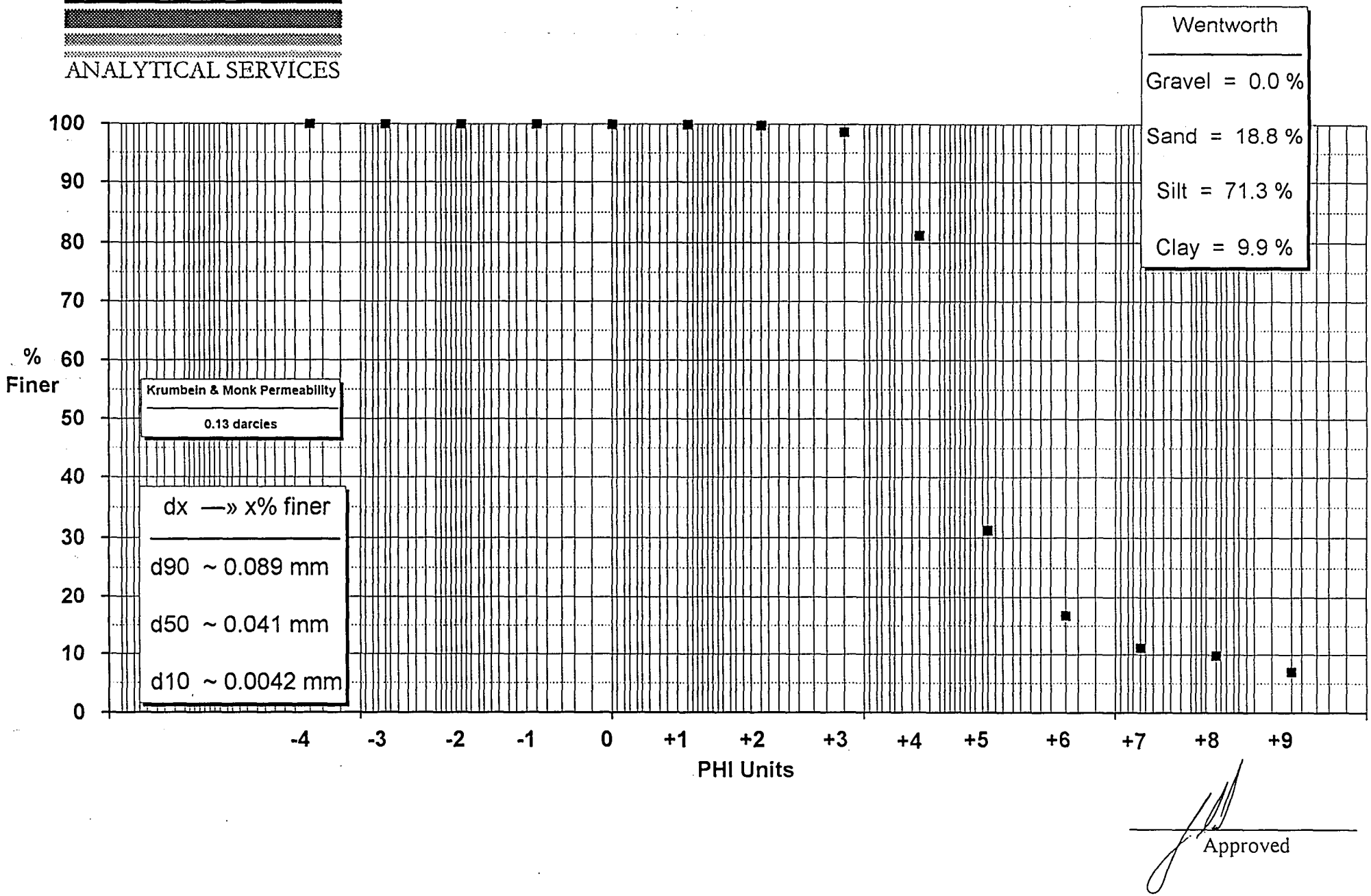
PSC ID: 01-H012460

PSC
ANALYTICAL SERVICES

D-3 85



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PSC ID: 01-H012461

D-3 95

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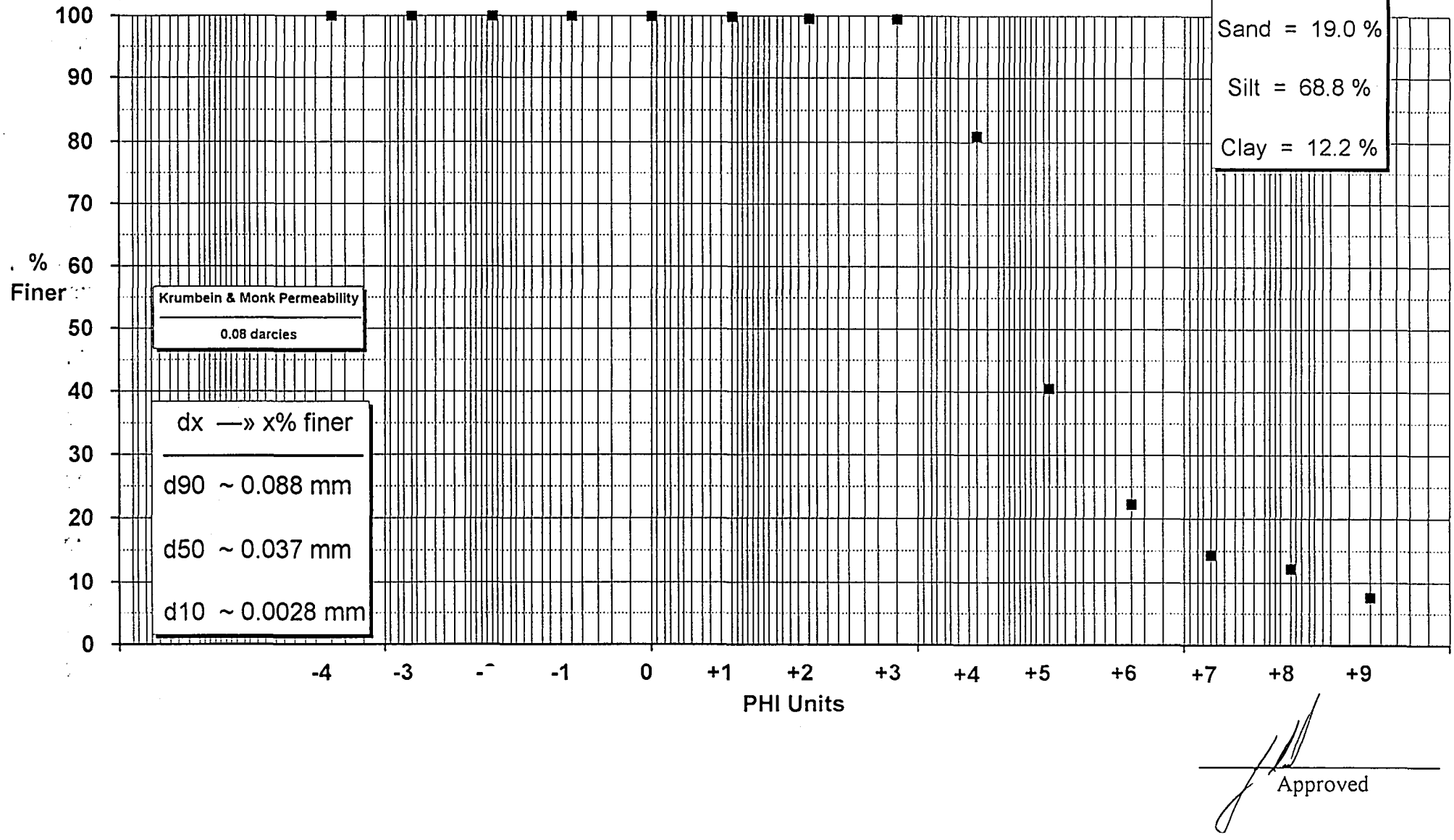

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PSC ID: 01-H012462

D-3 115

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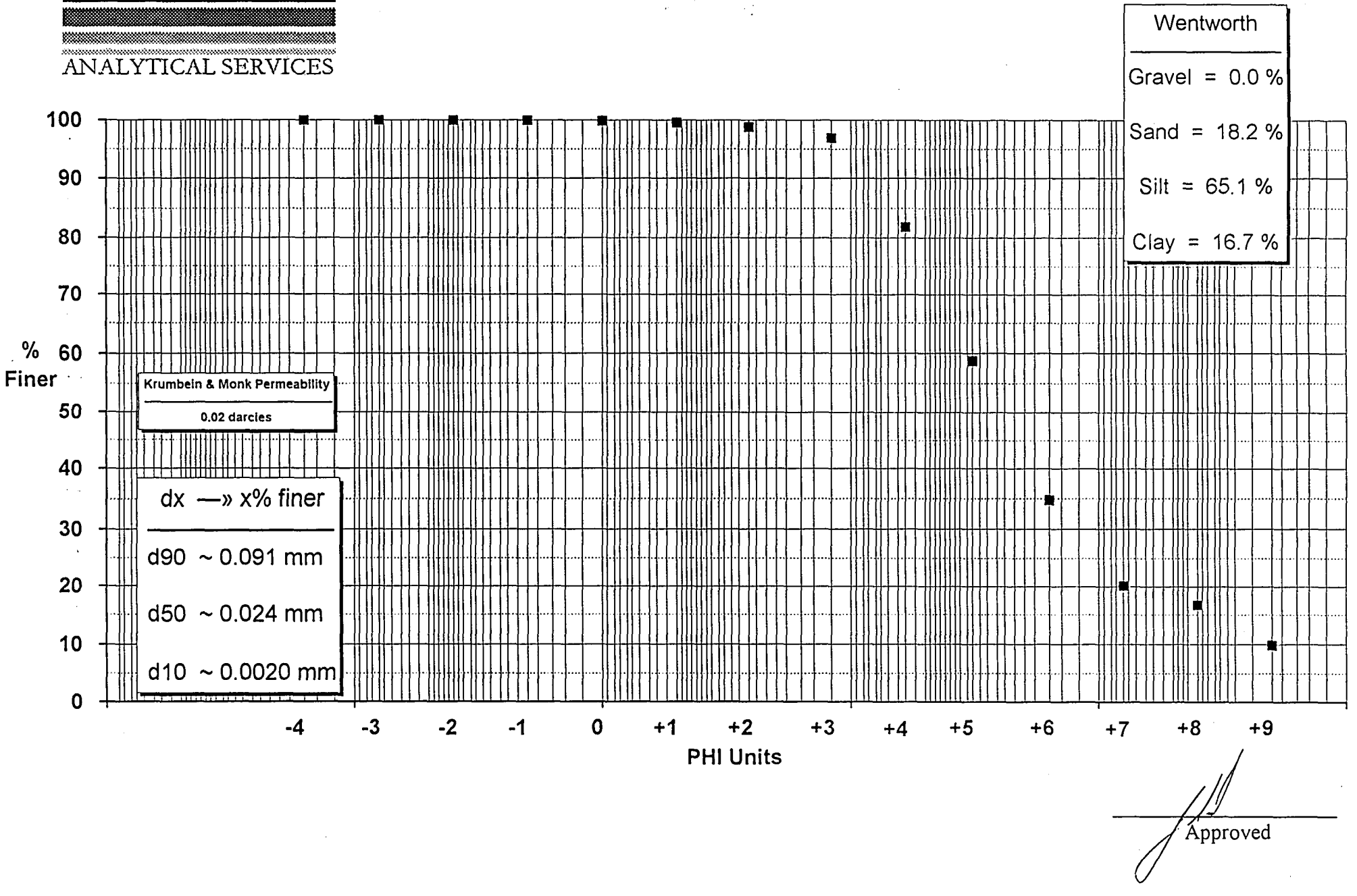

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PSC ID: 01-H012463

D-3 130

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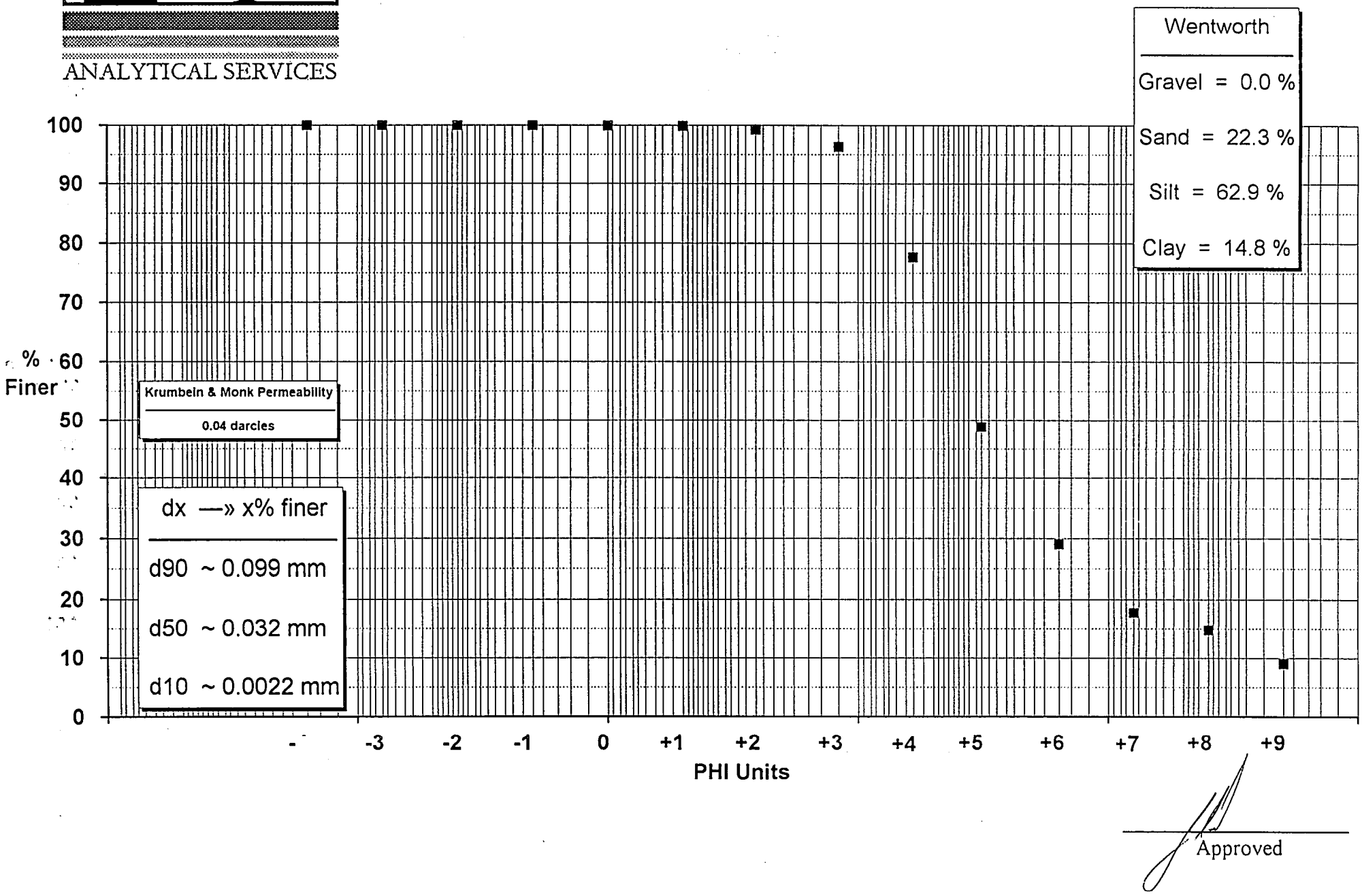

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PSC ID: 01-H012464

D-3 144

PSC
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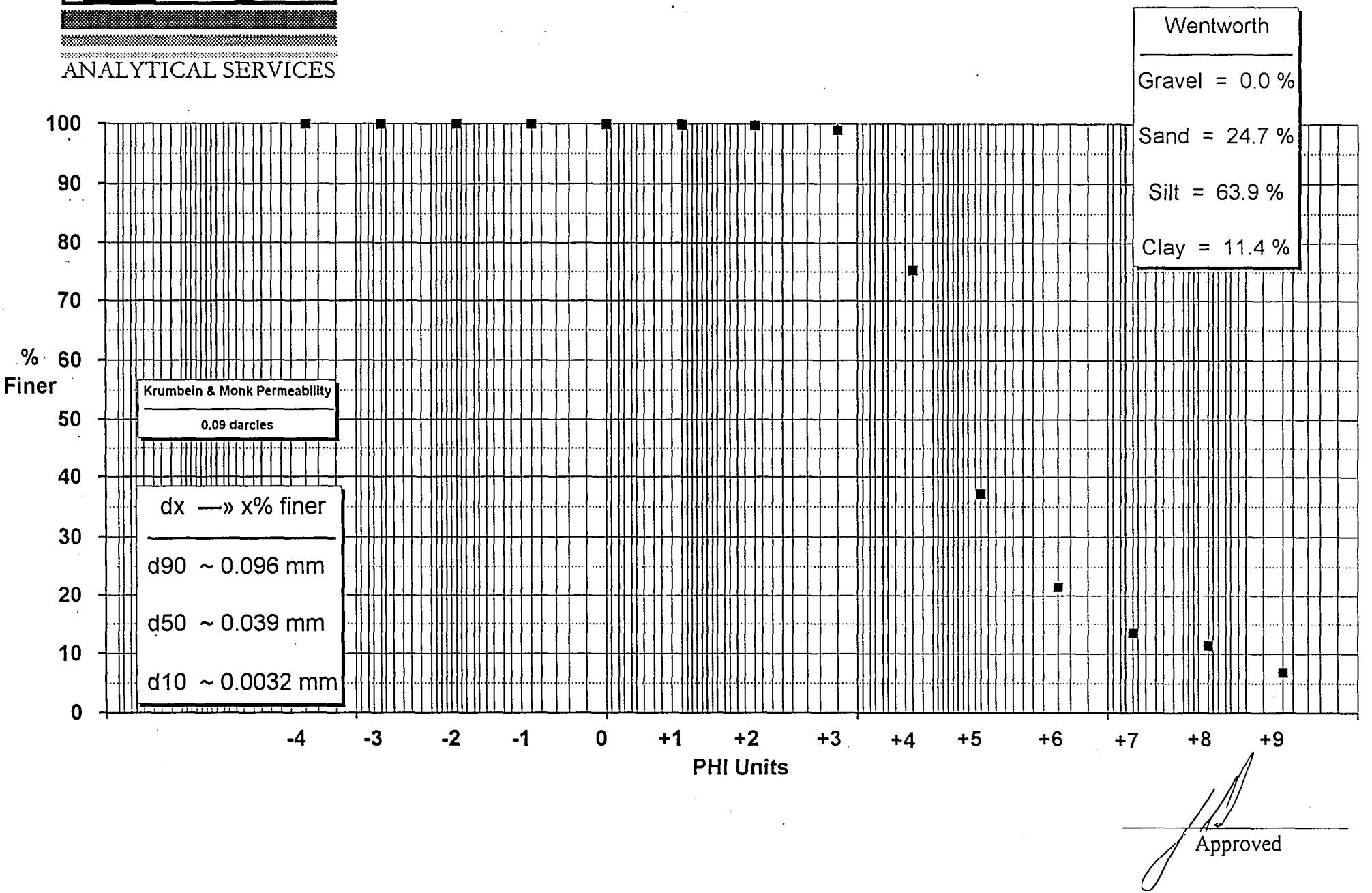

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PSC ID: 01-H012465

D-3 144 Dup

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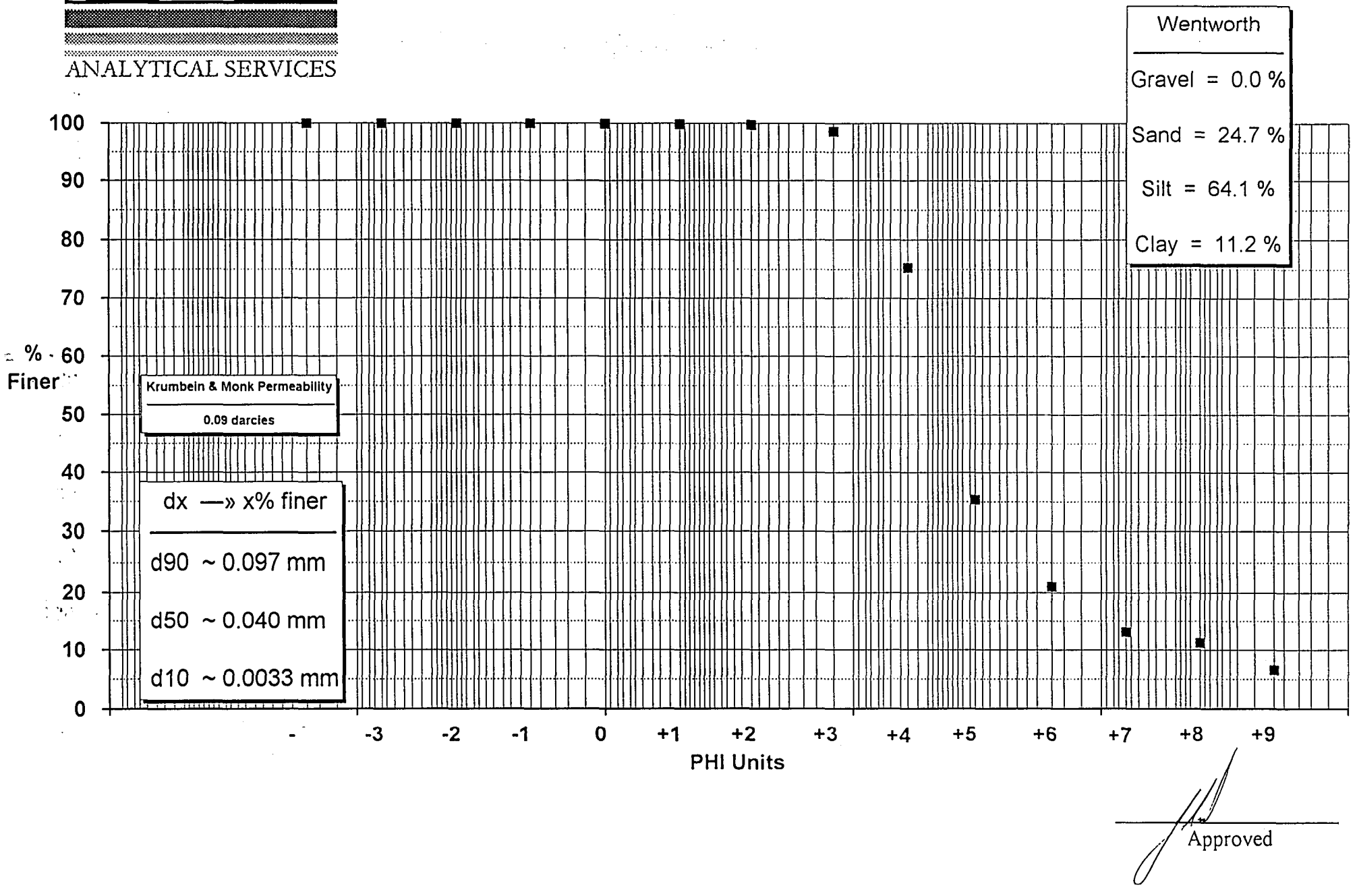

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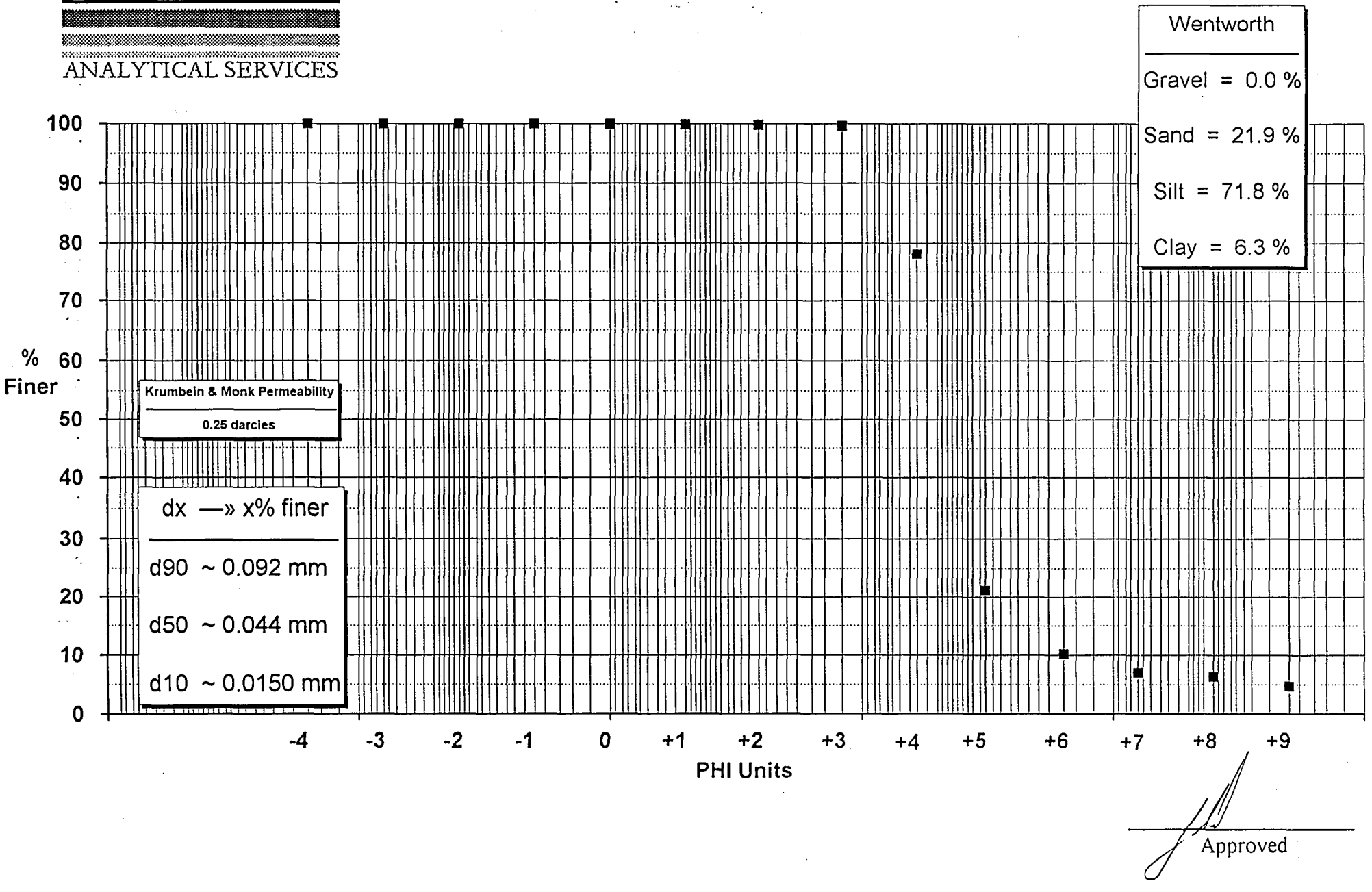
PSC ID: 01-H012466

PSC
ANALYTICAL SERVICES

D-4 174



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PSC ID: 01-H012467

D-4 179

PSC
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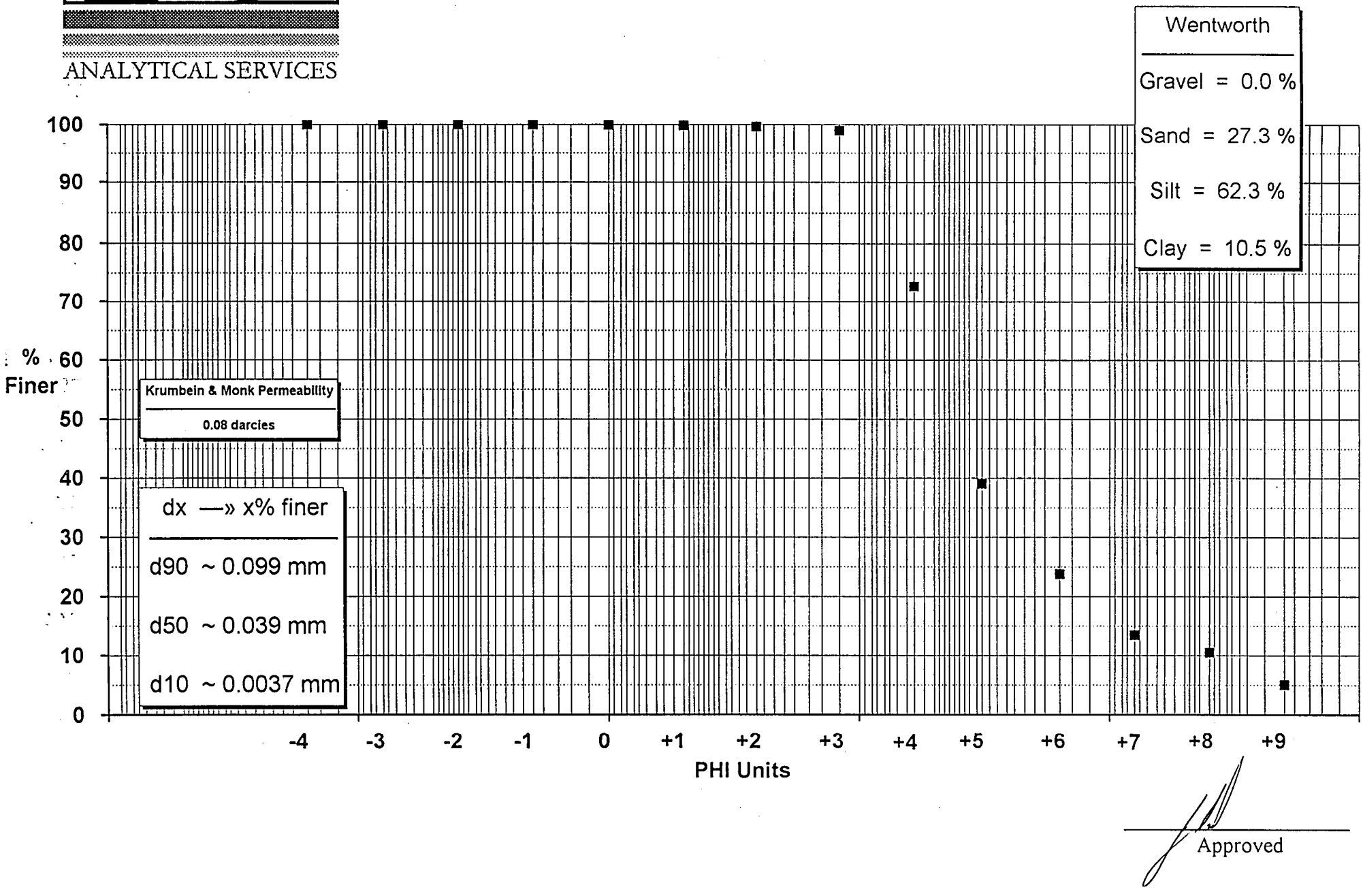

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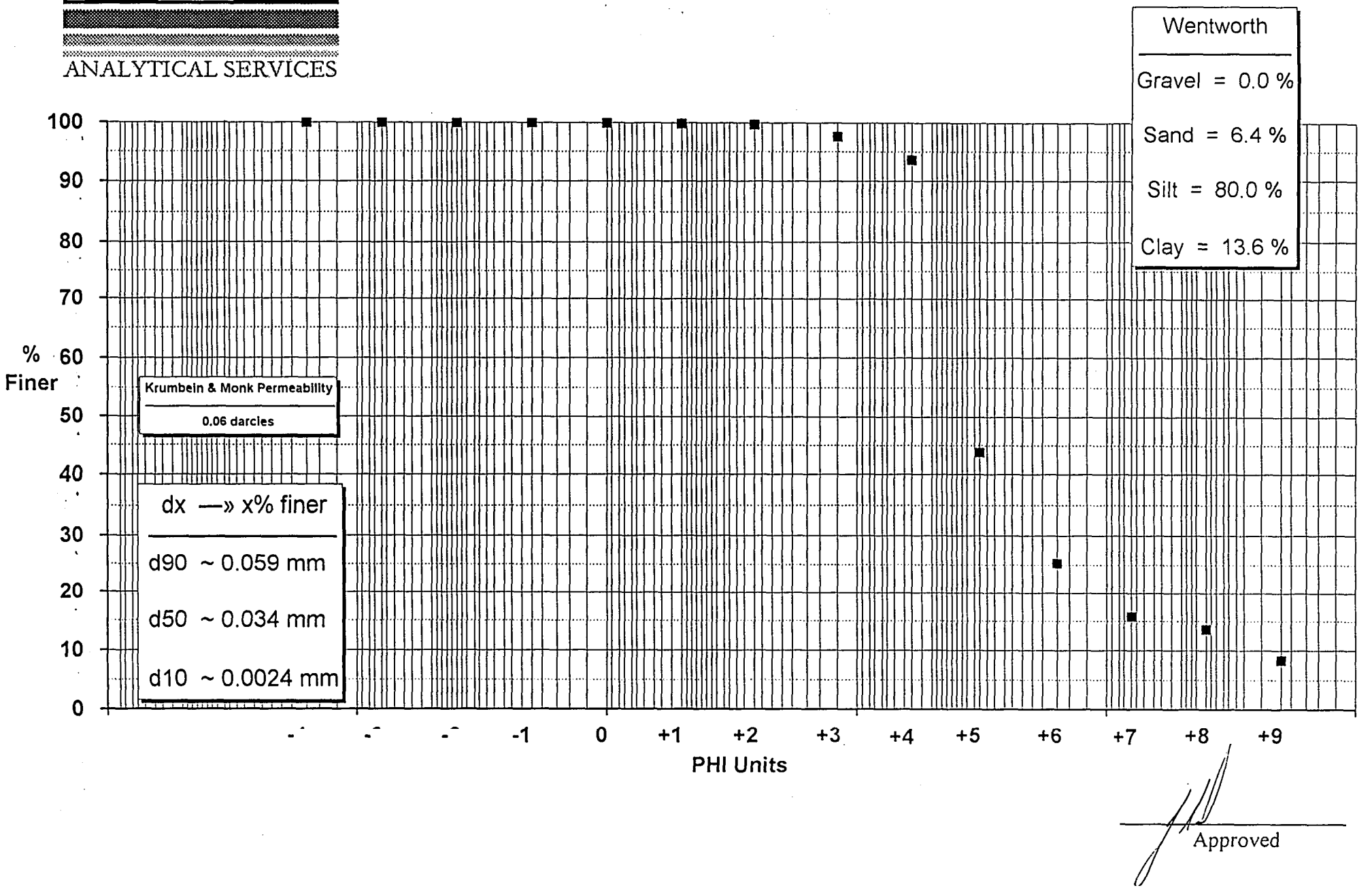
PSC ID: 01-H012468

PSC
ANALYTICAL SERVICES

D-4 179 Dup



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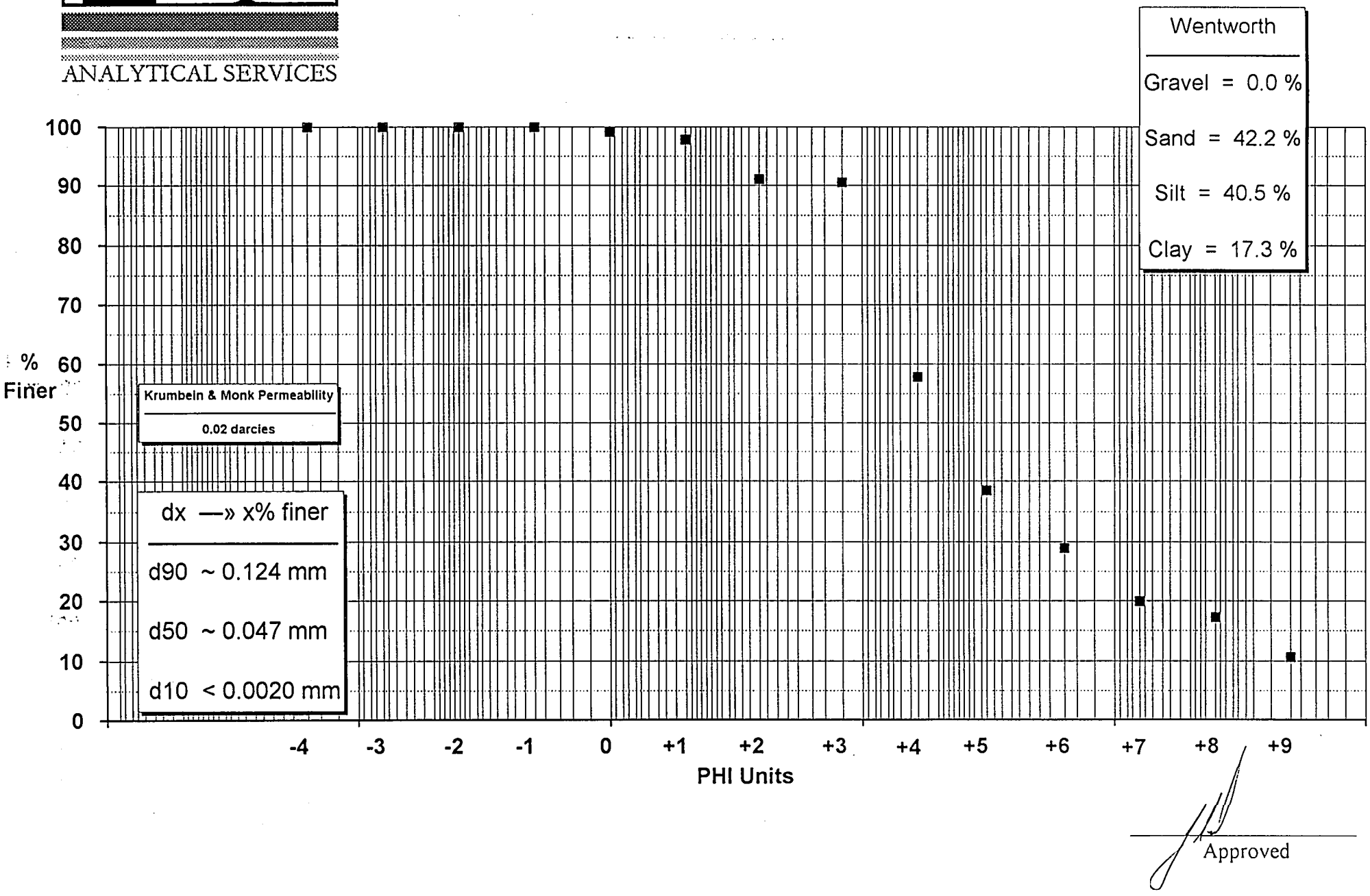
PSC ID: 01-H012469

D-4 194

PSC ANALYTICAL SERVICES



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PSC ID: 01-H012470

D-4 194 Dup

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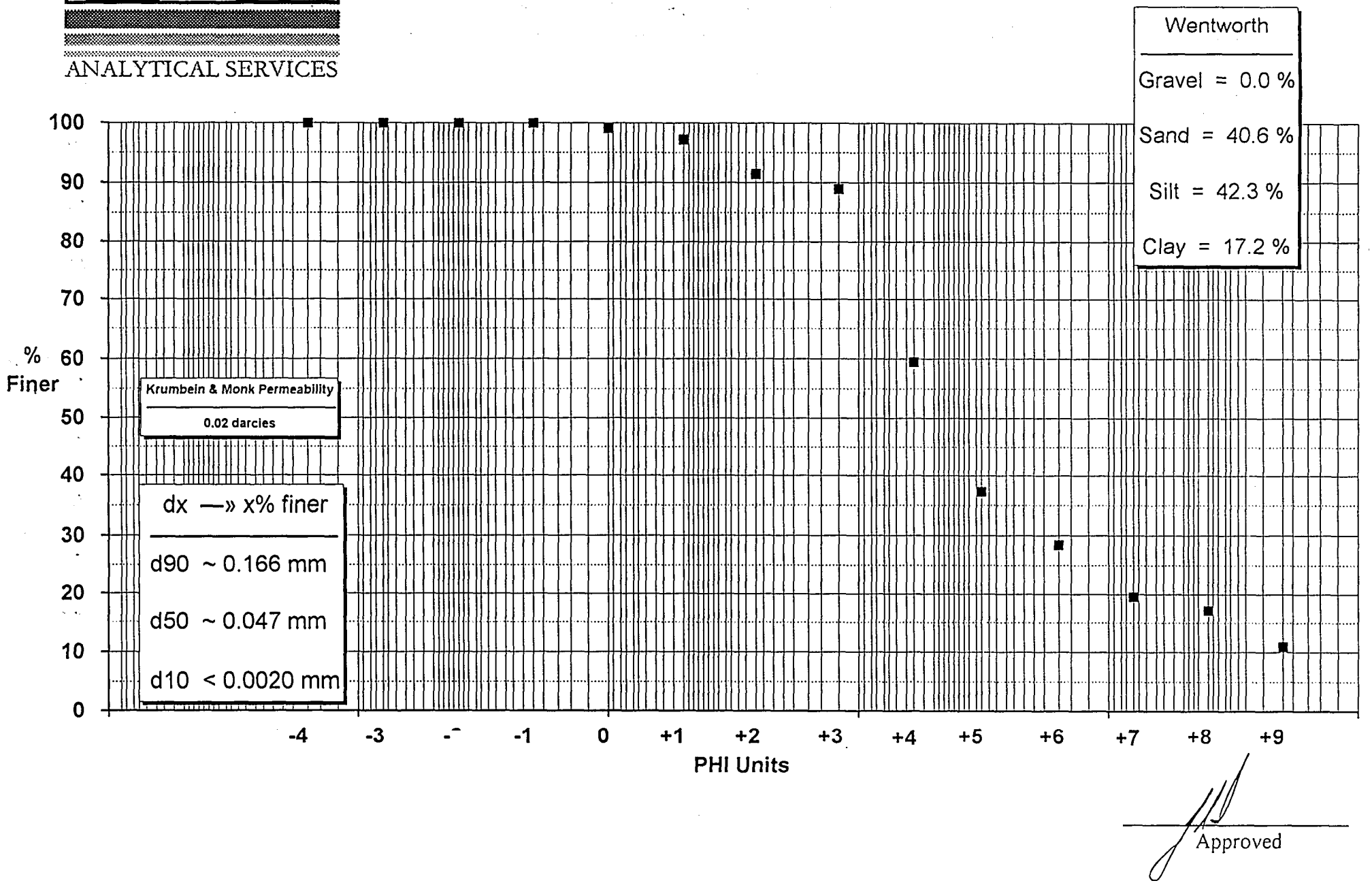

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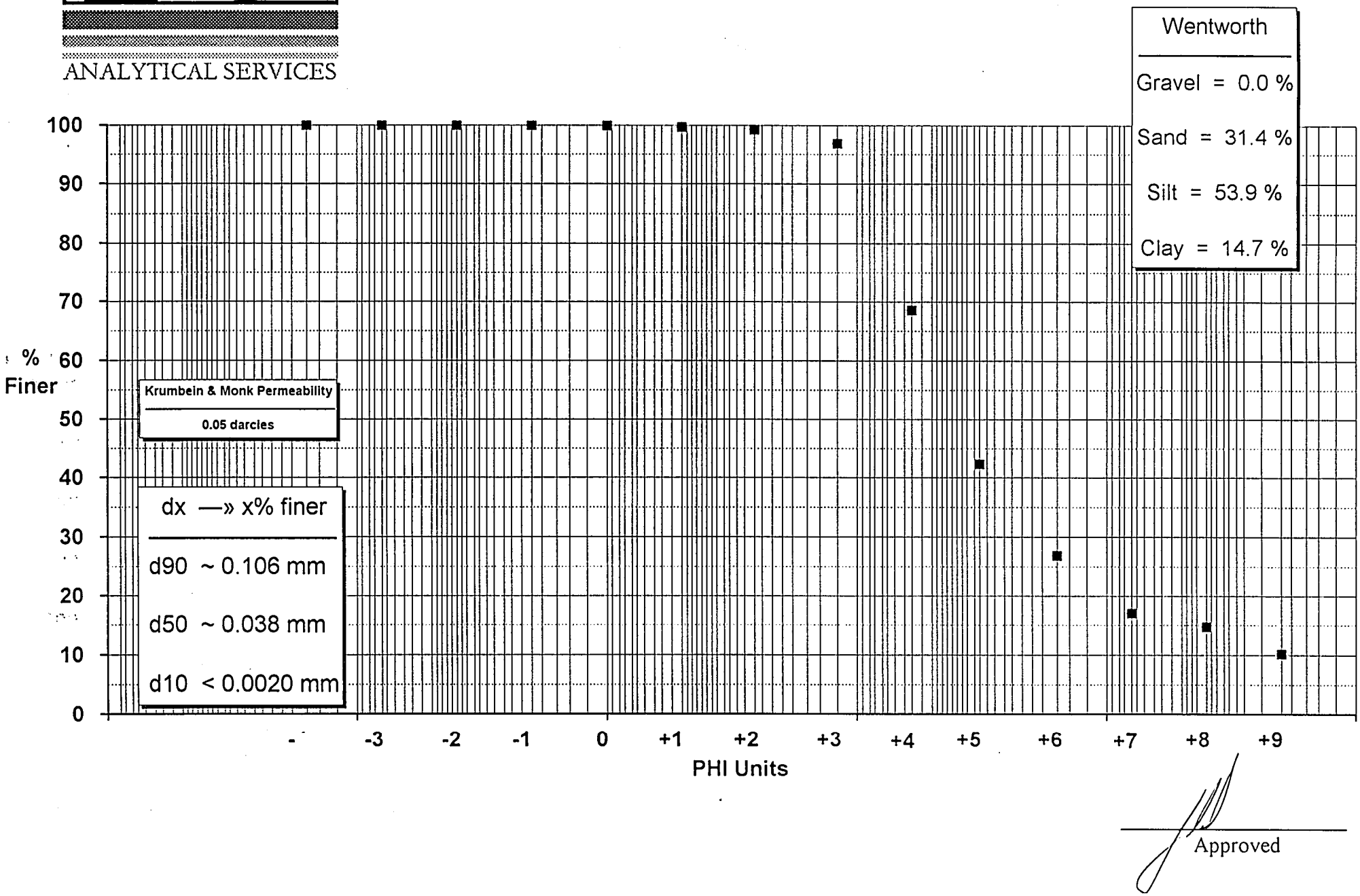
PSC ID: 01-H012471

D-4 198

PSC
ANALYTICAL SERVICES



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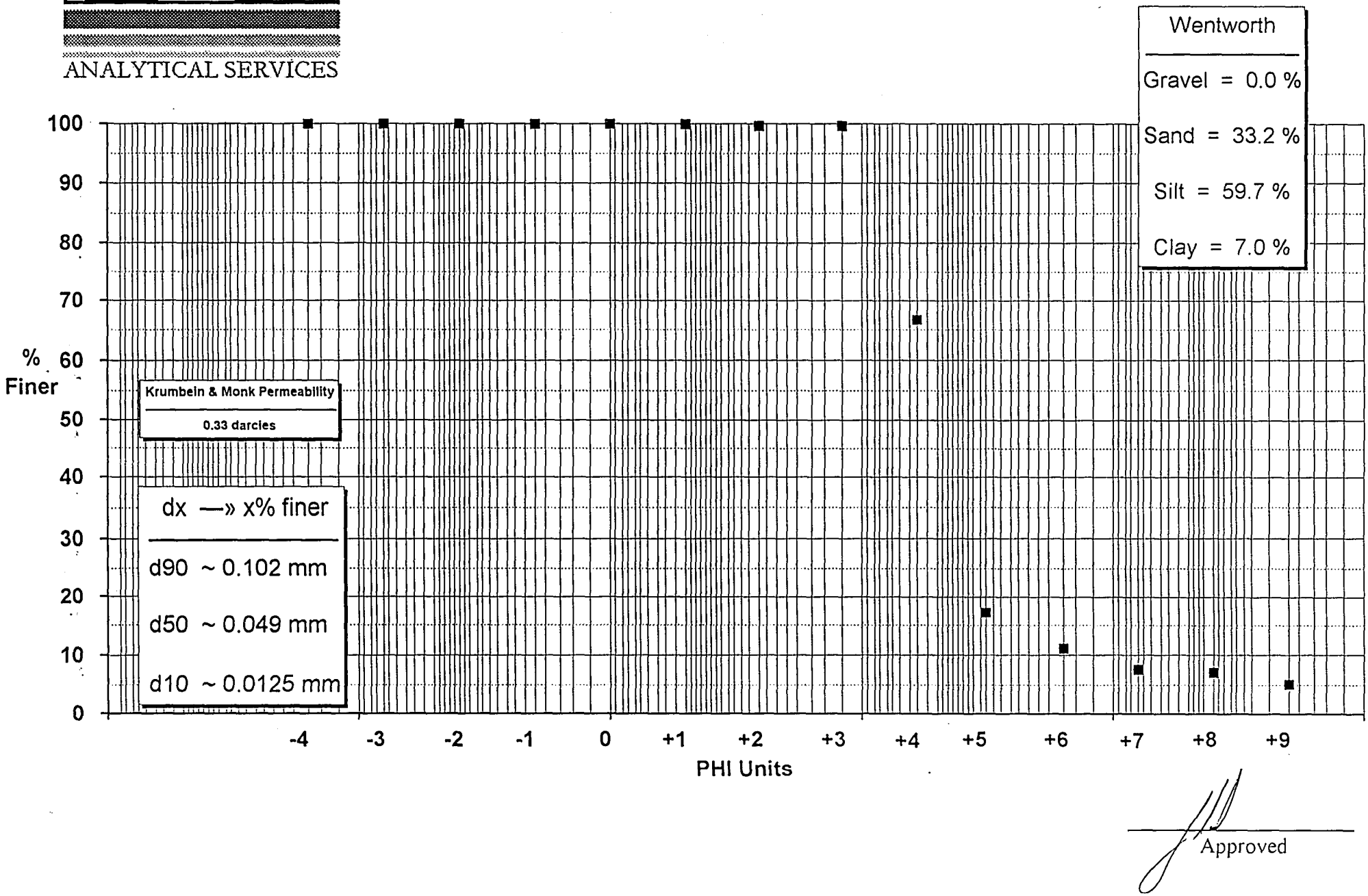
PSC ID: 01-H012472

D-4 207

PSC ANALYTICAL SERVICES



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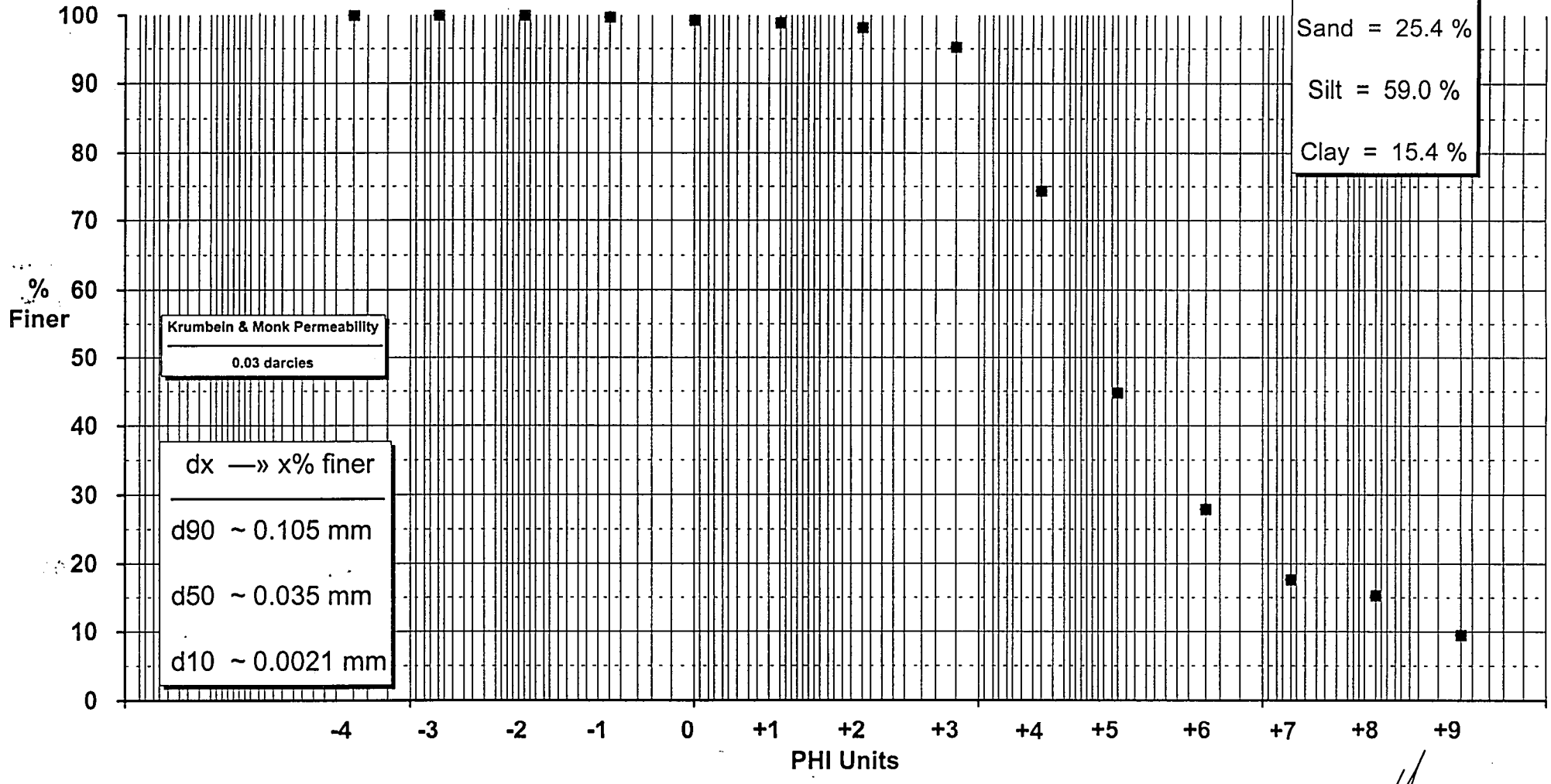
PSC ID: 01-H012473

D-4 259

PSC
ANALYTICAL SERVICES



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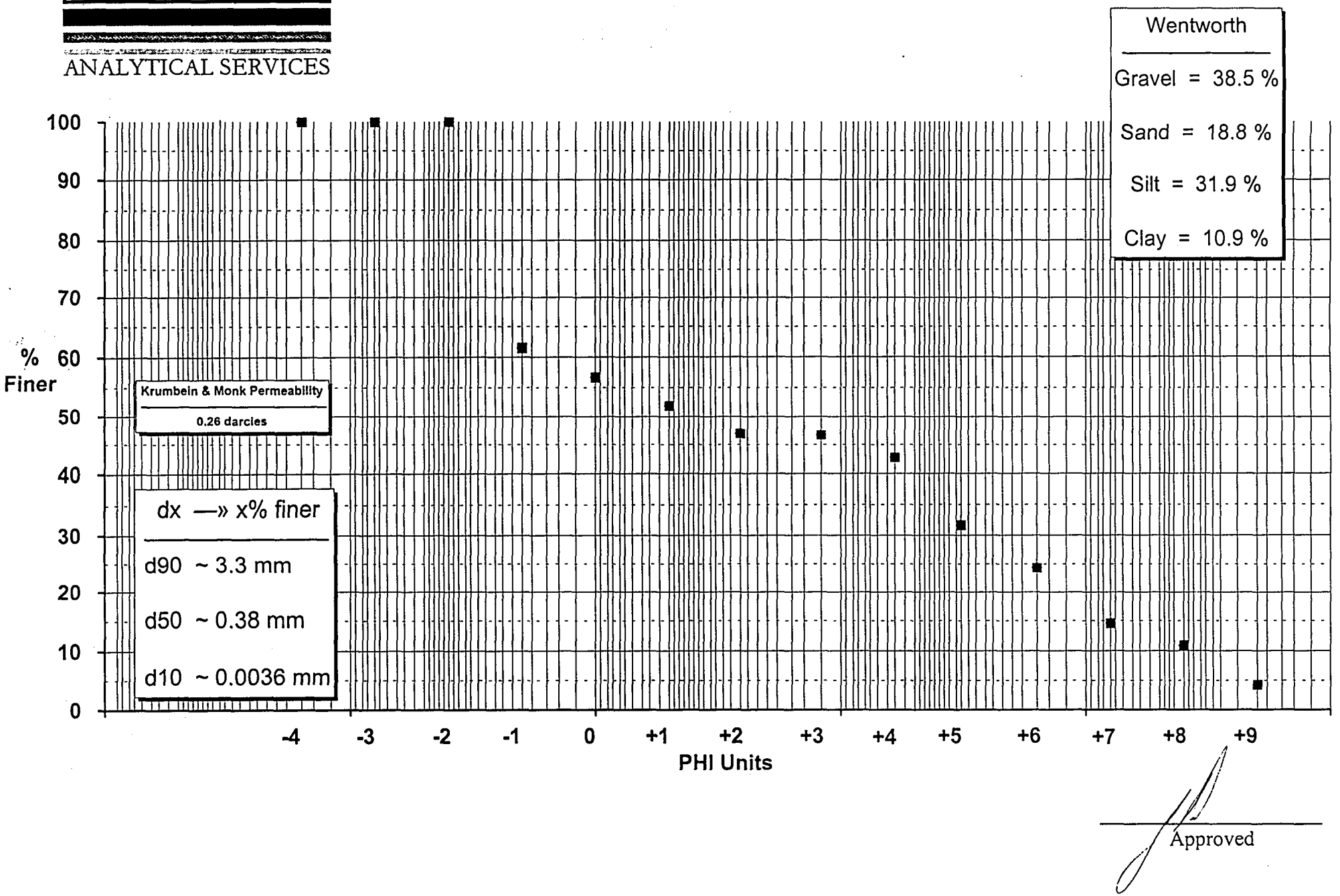
PSC ID: 01-H012474

ANALYTICAL SERVICES

D-4 265



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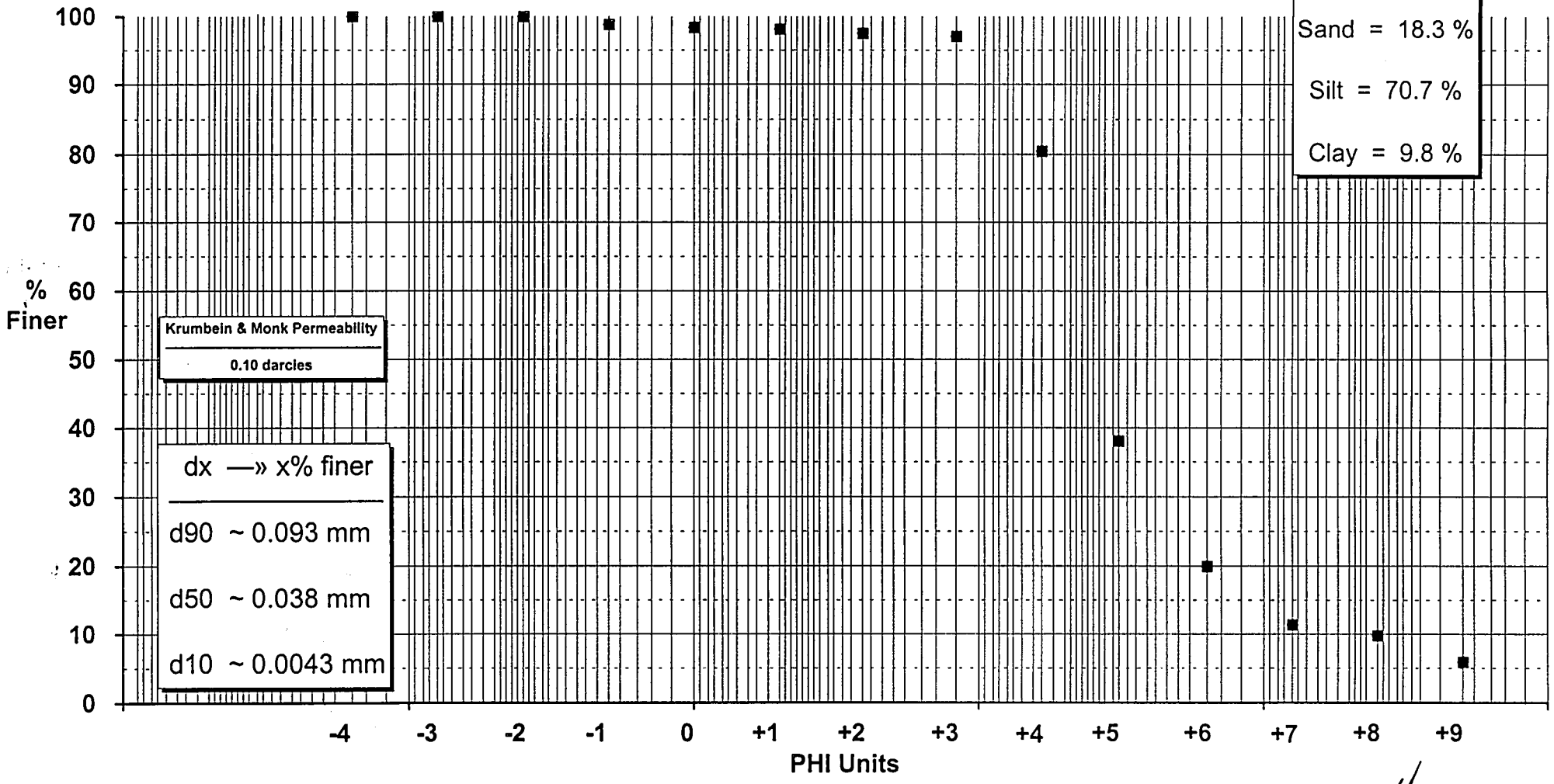
PSC ID: 01-H012475

D-4 272

PSC
ANALYTICAL SERVICES



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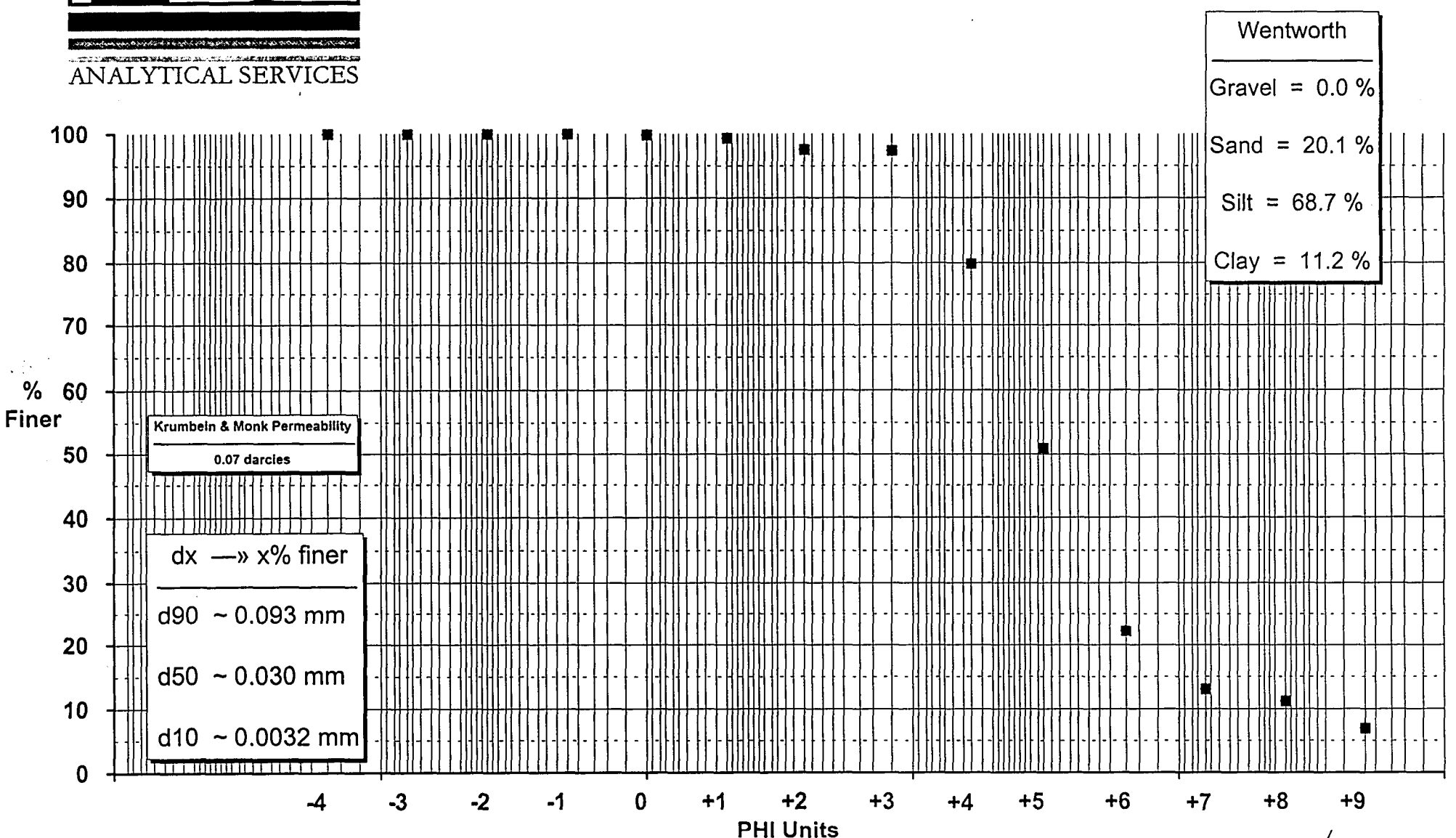
PSC ID: 01-H012476

PSC
ANALYTICAL SERVICES

D-4 291



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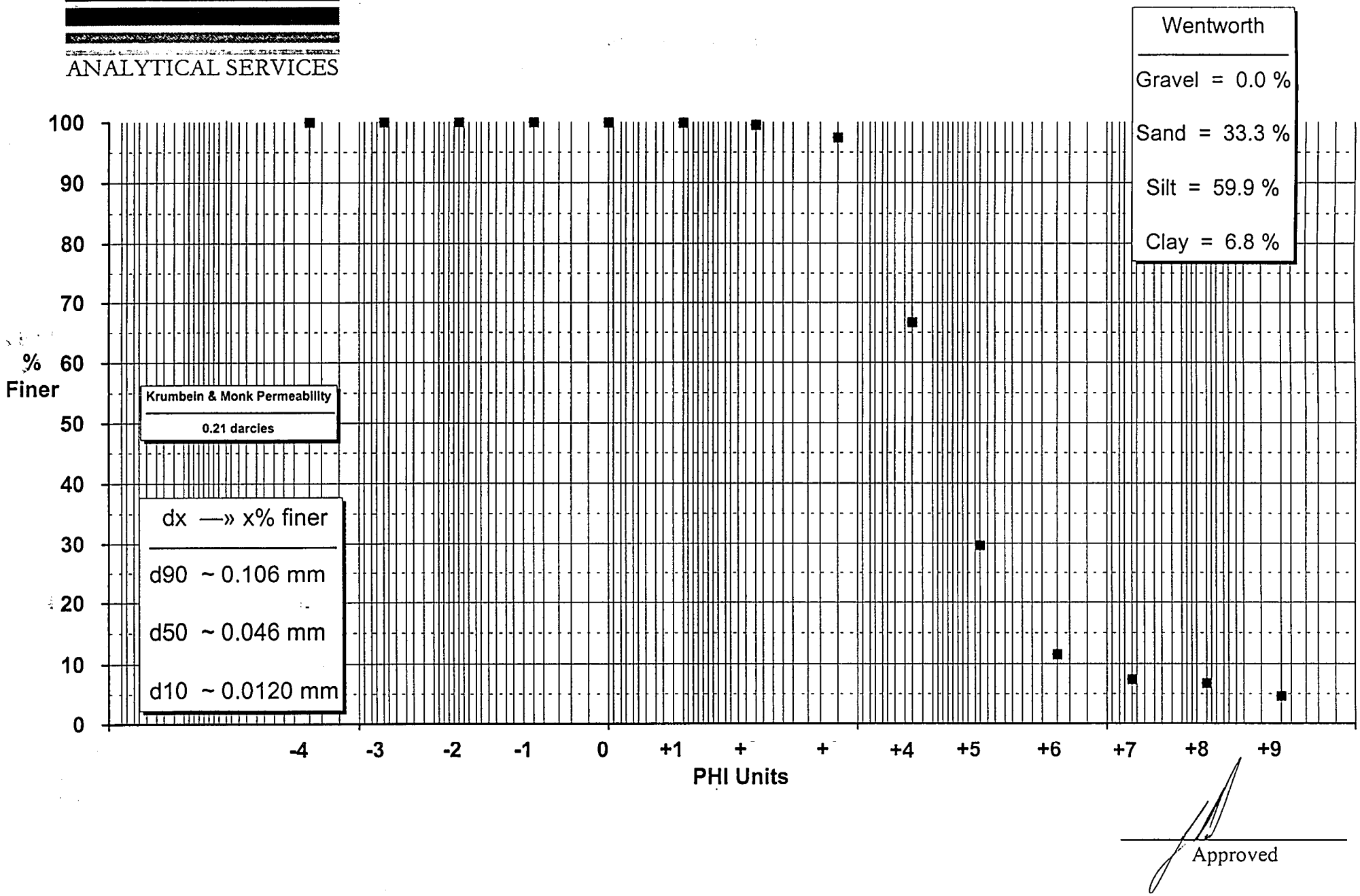
PSC ID: 01-H012477

D-4 308

PSC
ANALYTICAL SERVICES



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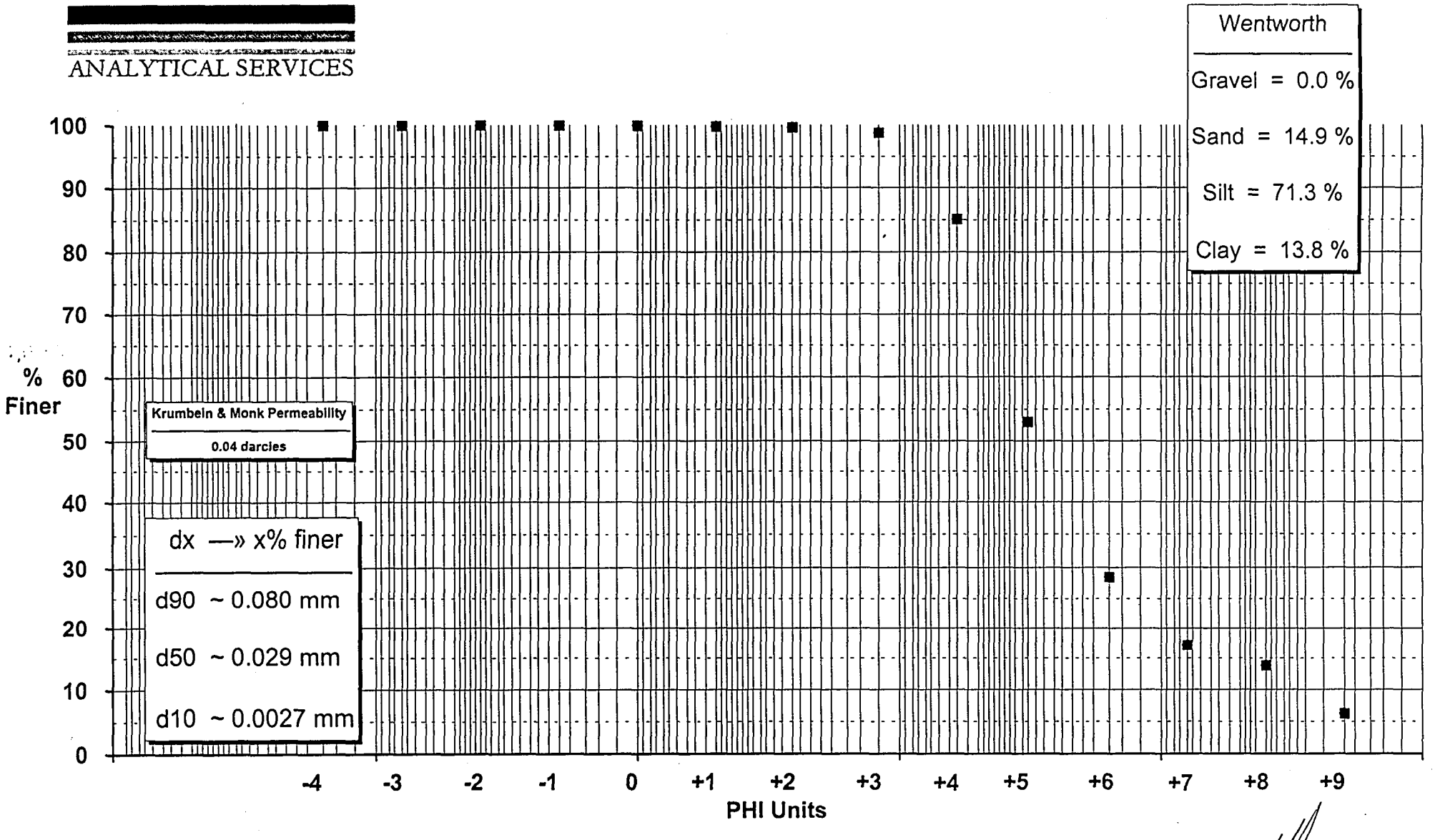
PSC
ANALYTICAL SERVICES

D-4 320



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PSC ID: 01-H012479

D-4 340

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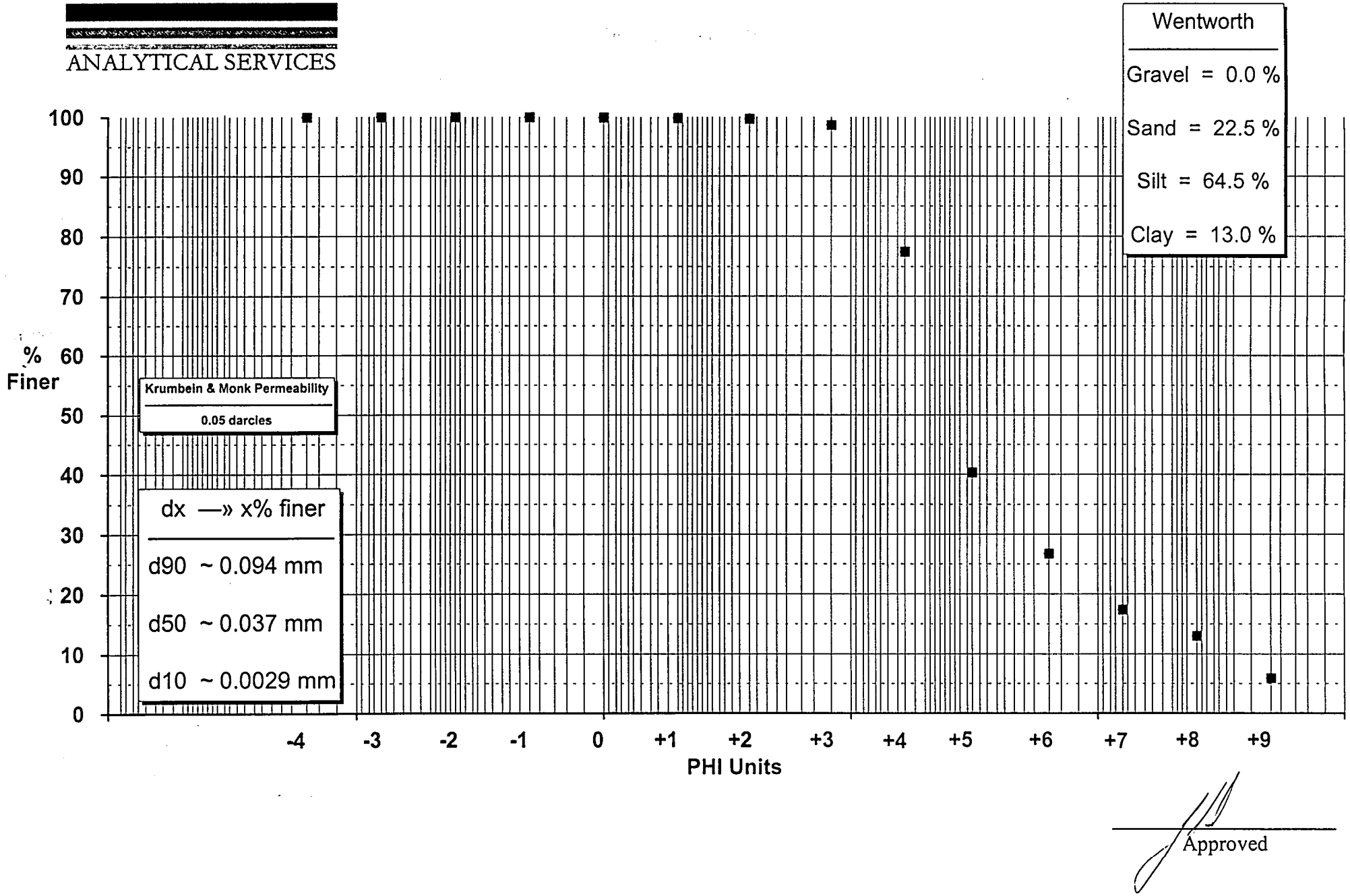

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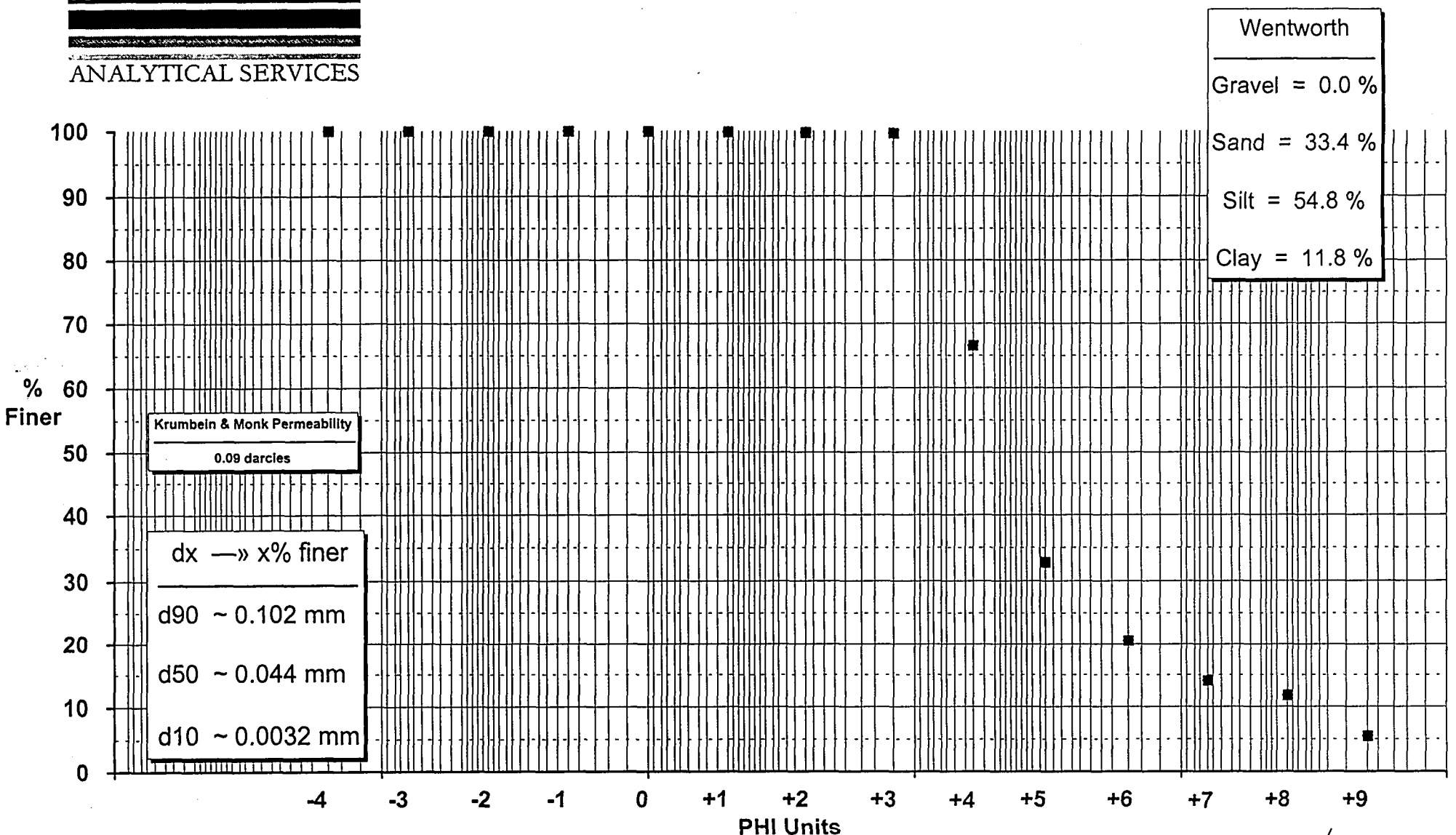
PSC ID: 01-H012480

D-4 348

PSC
ANALYTICAL SERVICES



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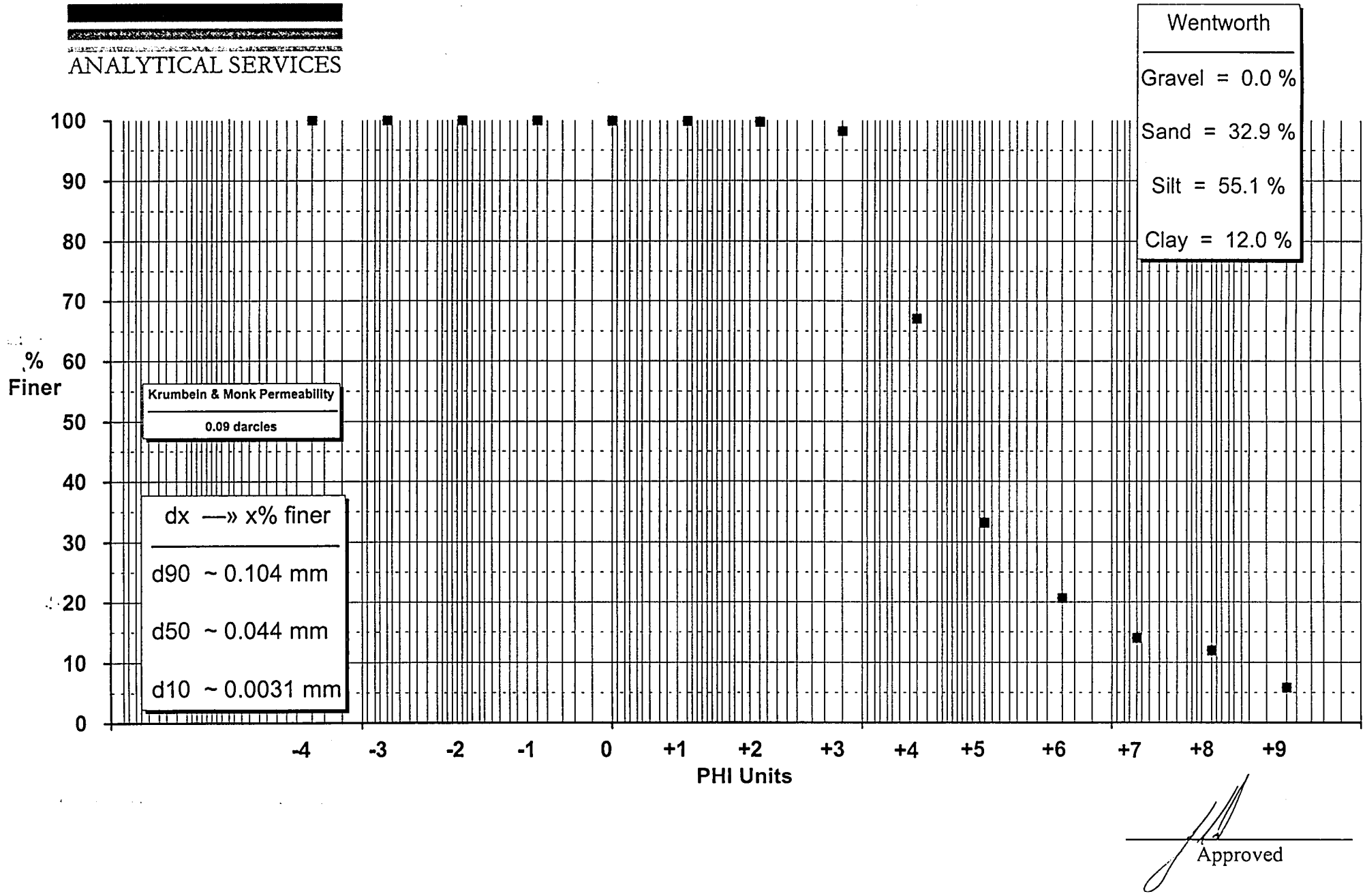
PSC ID: 01-H012481

ANALYTICAL SERVICES

D-4 348 Dup

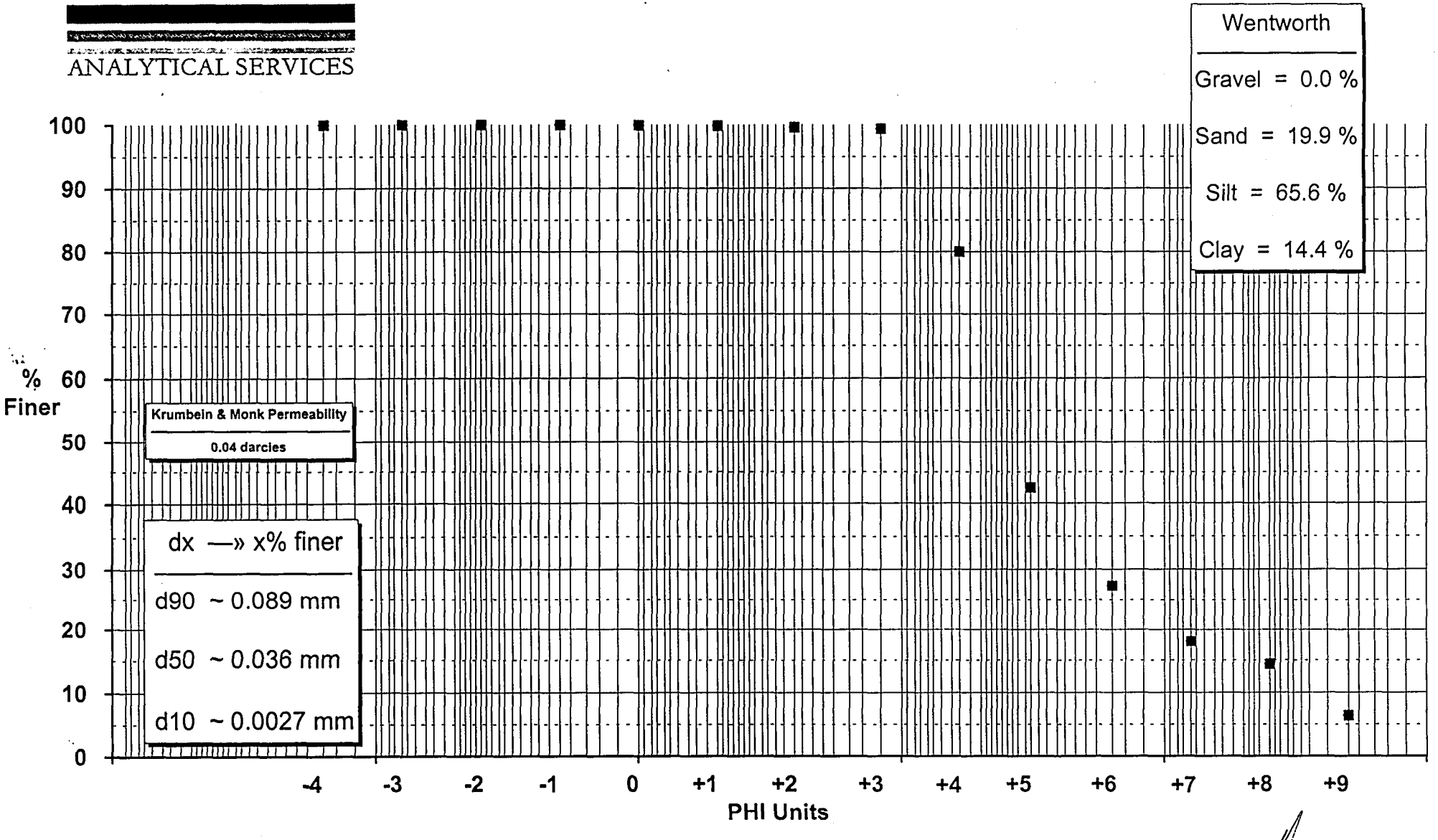


Approved

PSC ID: 01-H012482

PSC
ANALYTICAL SERVICES

D-4 360



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PSC ID: 01-H012483

D-4 368

PSC
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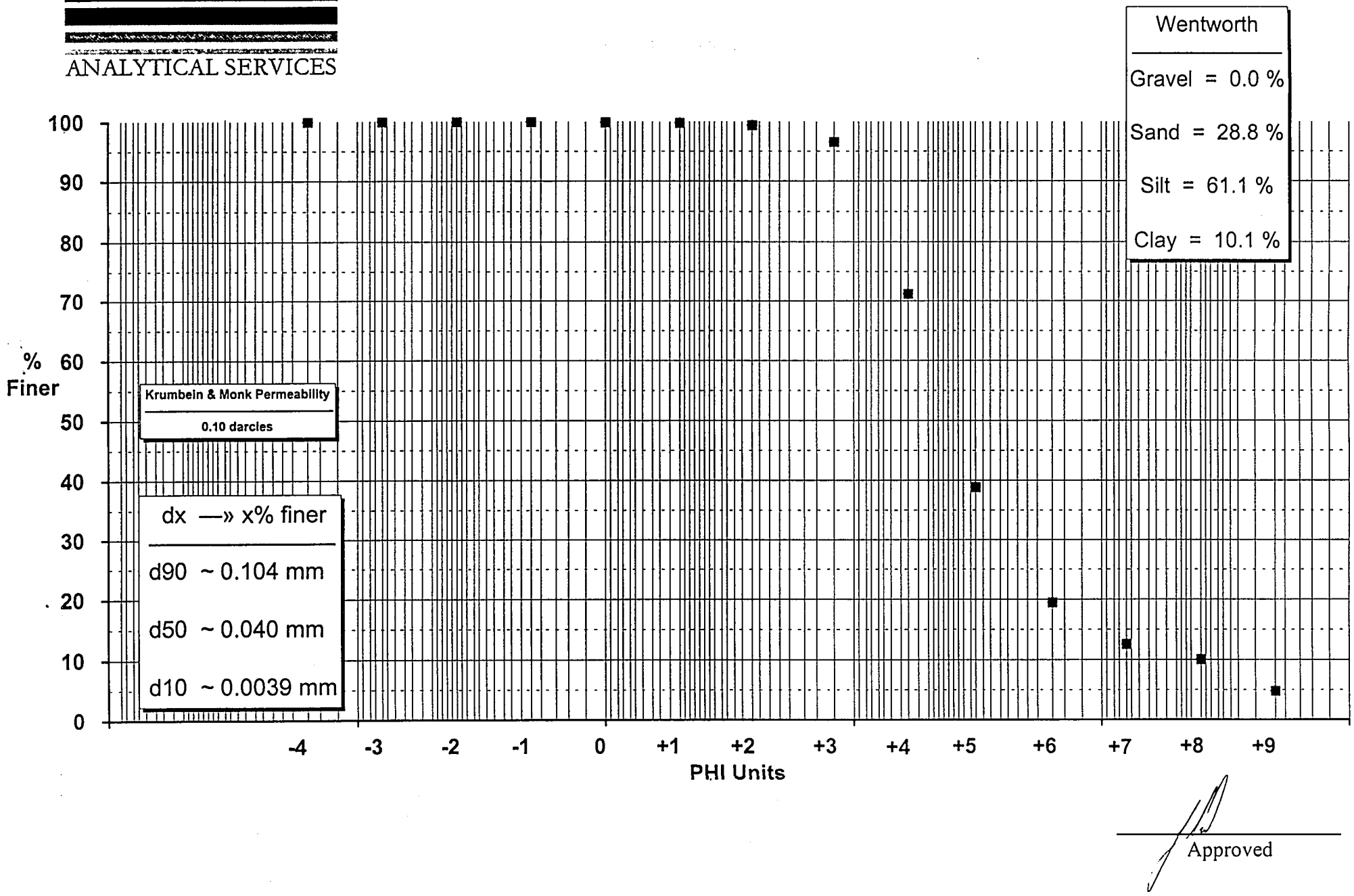

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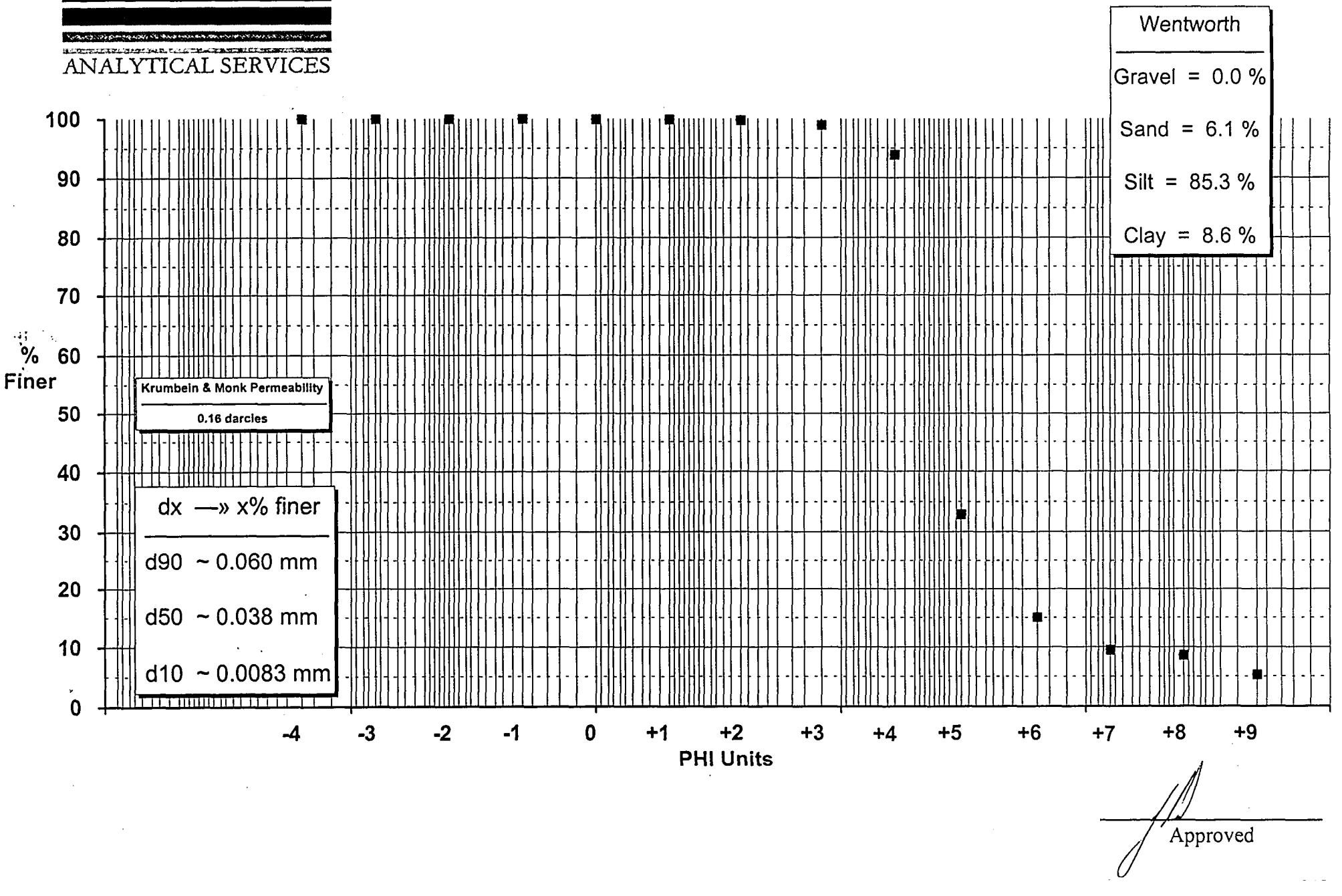
PSC ID: 01-H012484

ANALYTICAL SERVICES

D-4 368 Dup



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PSC ID: 01-H012485

D-4 393

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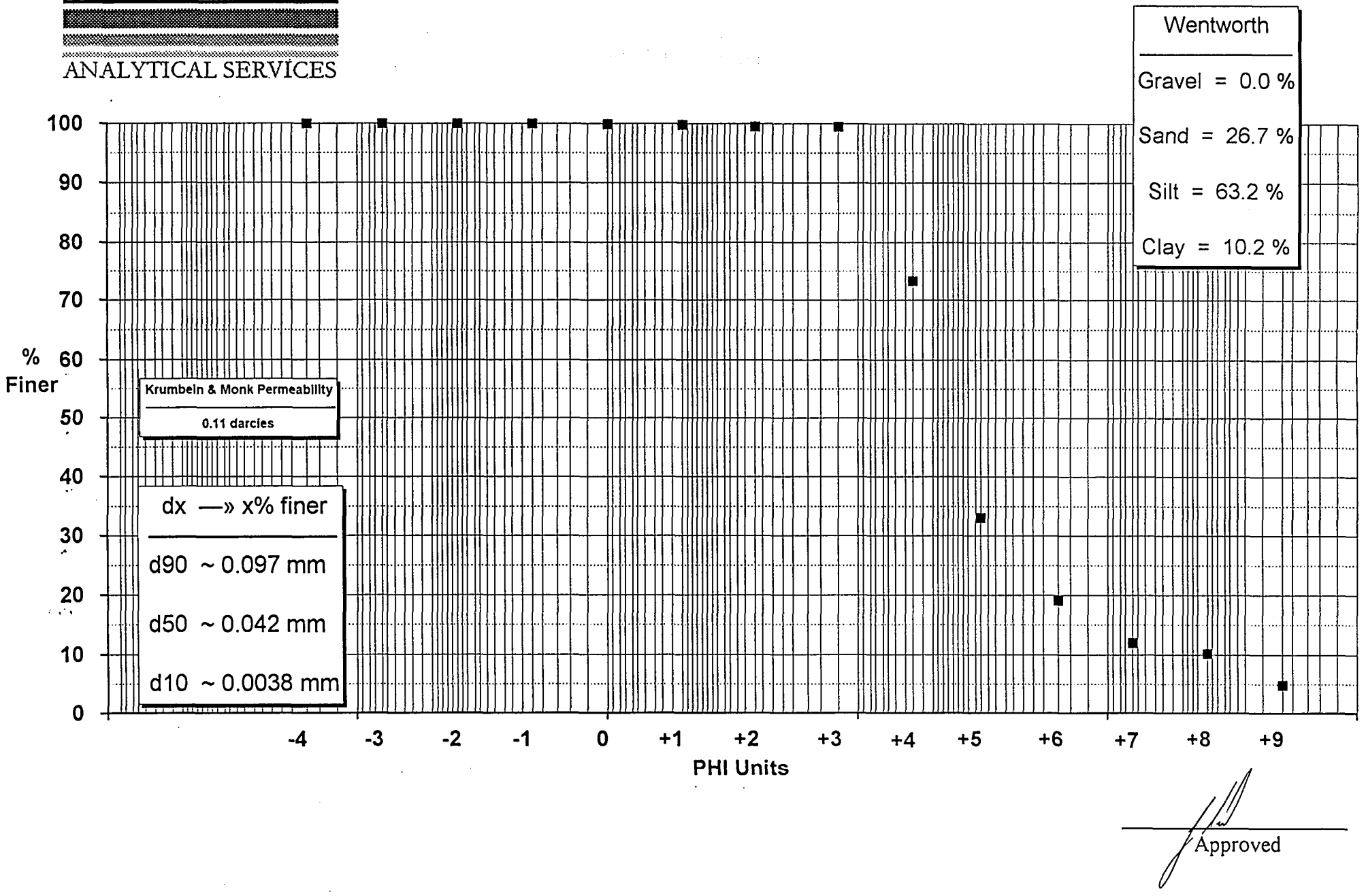

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PSC ID: 01-H012486

D-5 412

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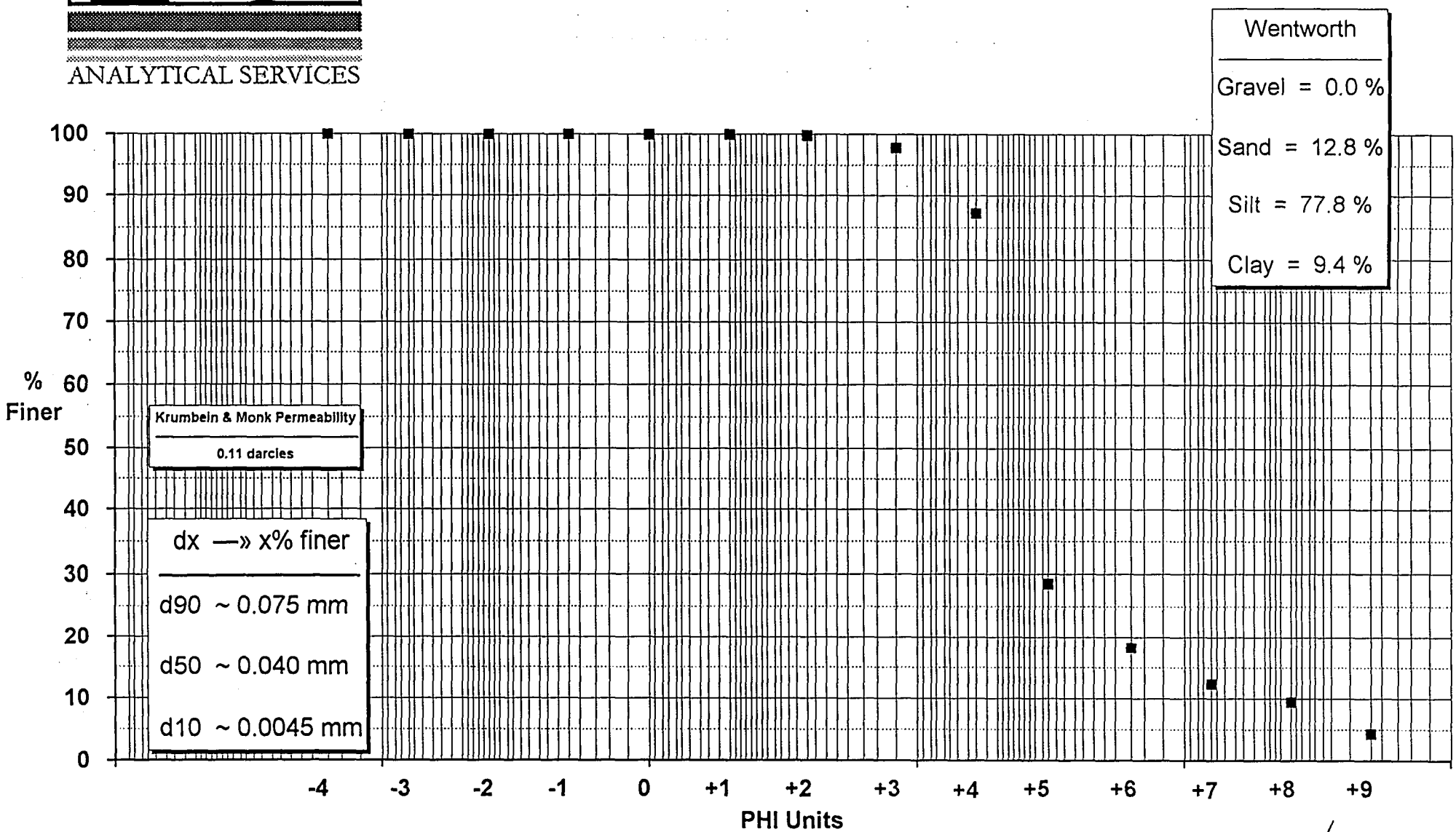

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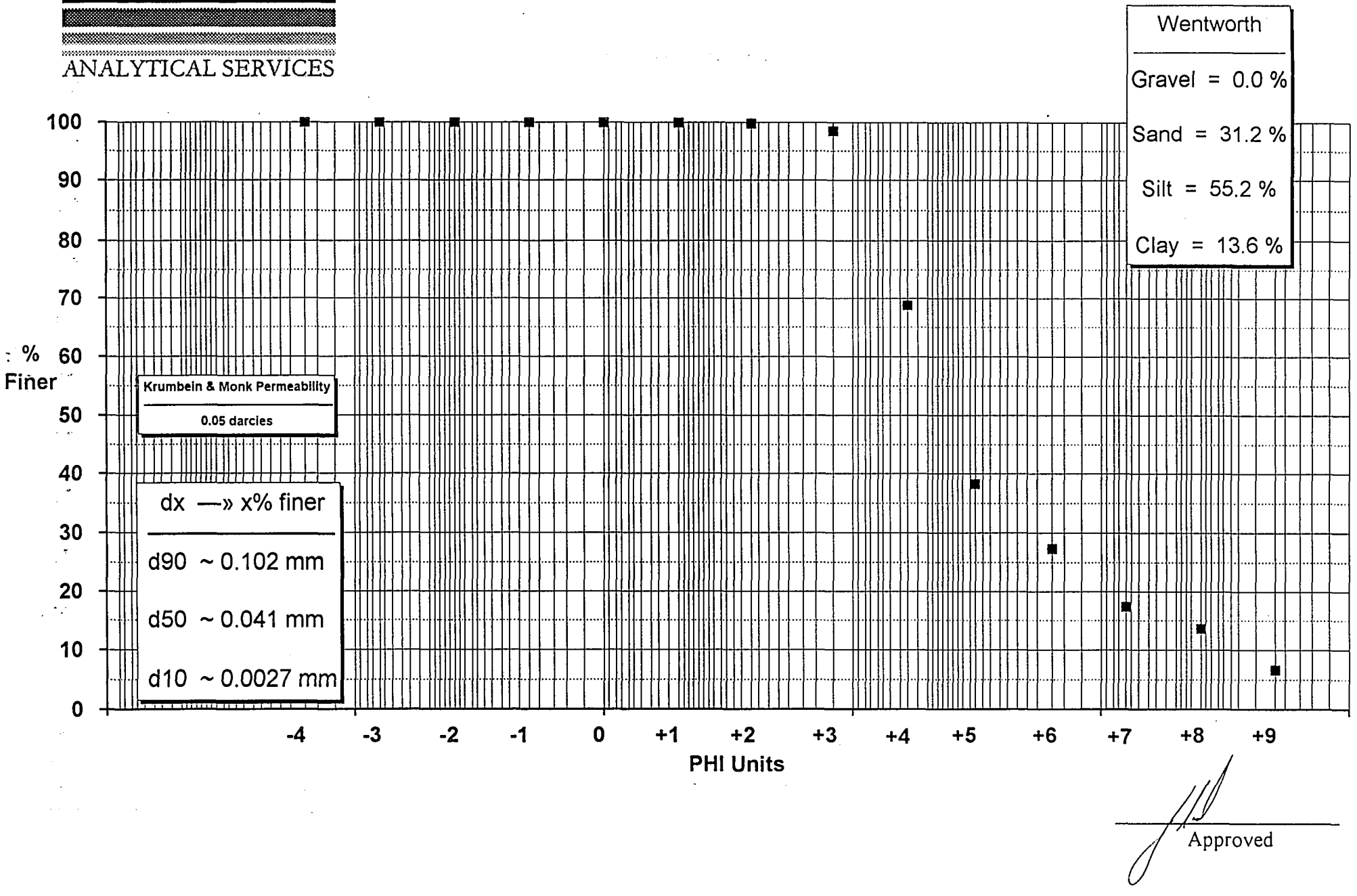
PSC ID: 01-H012487

D-5 442

PSC ANALYTICAL SERVICES



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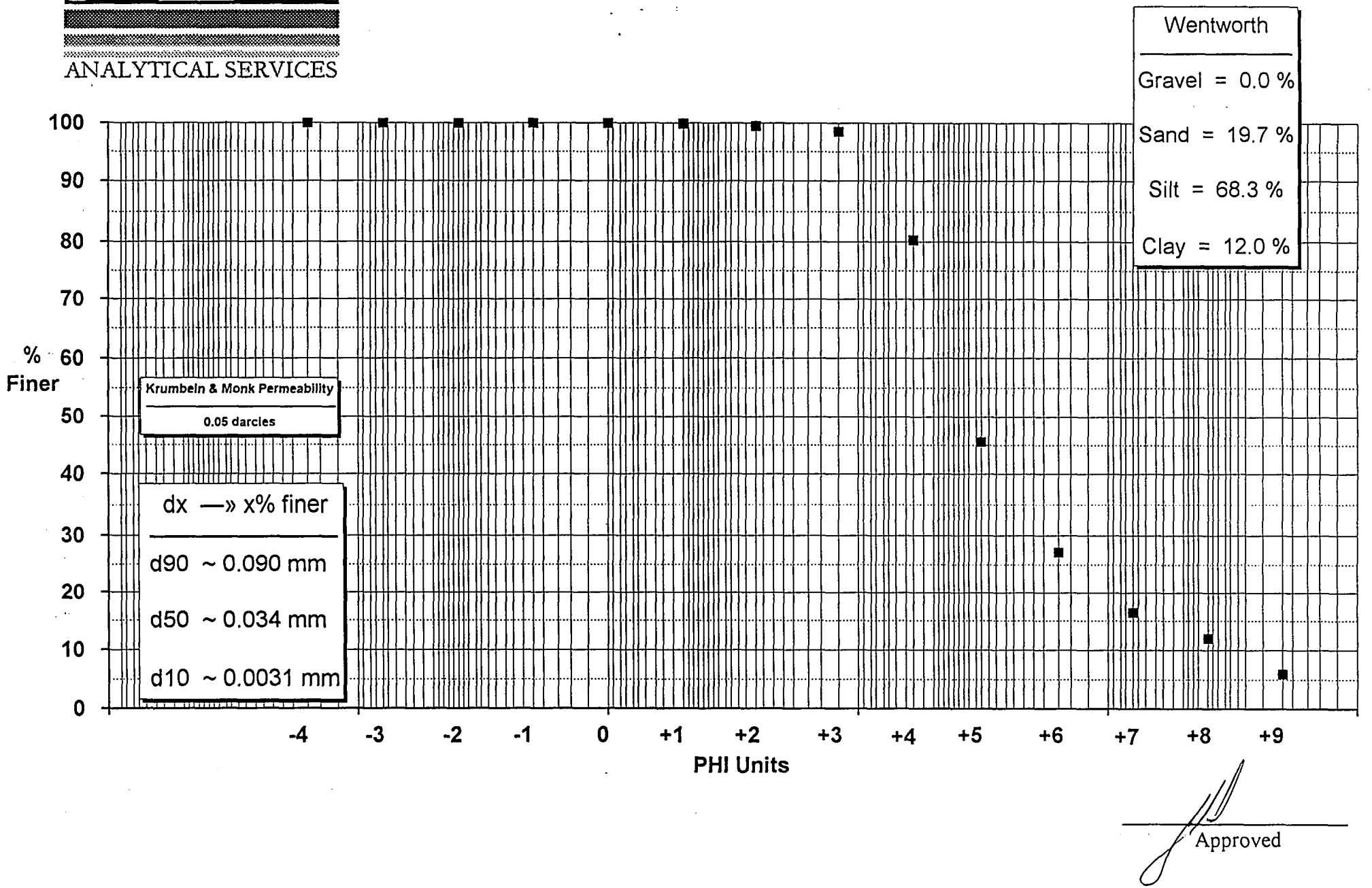
PSC ID: 01-H012488

D-5 511 Act

ANALYTICAL SERVICES



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PSC ID: 01-H012489

D-7 557

PSC
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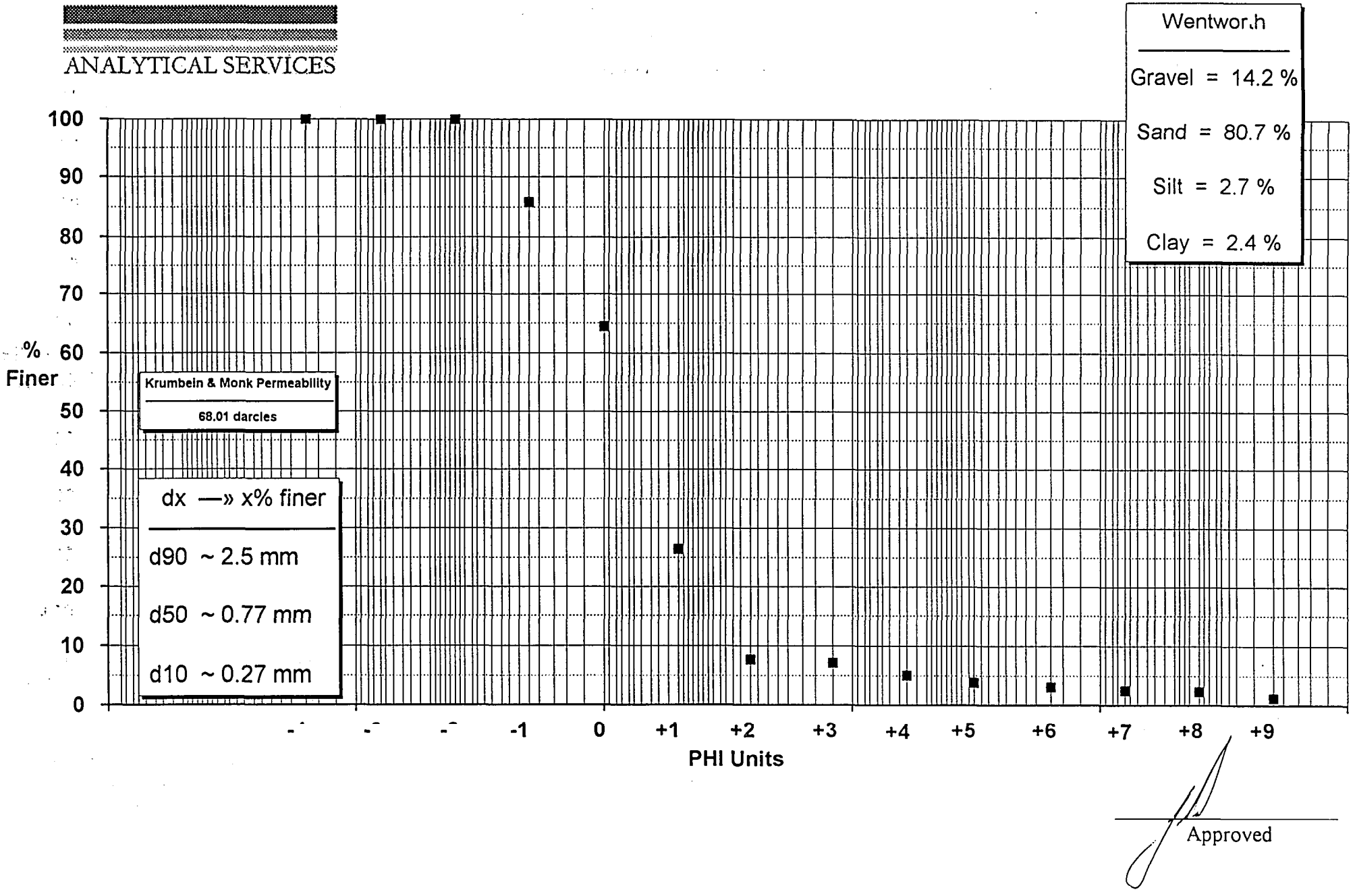

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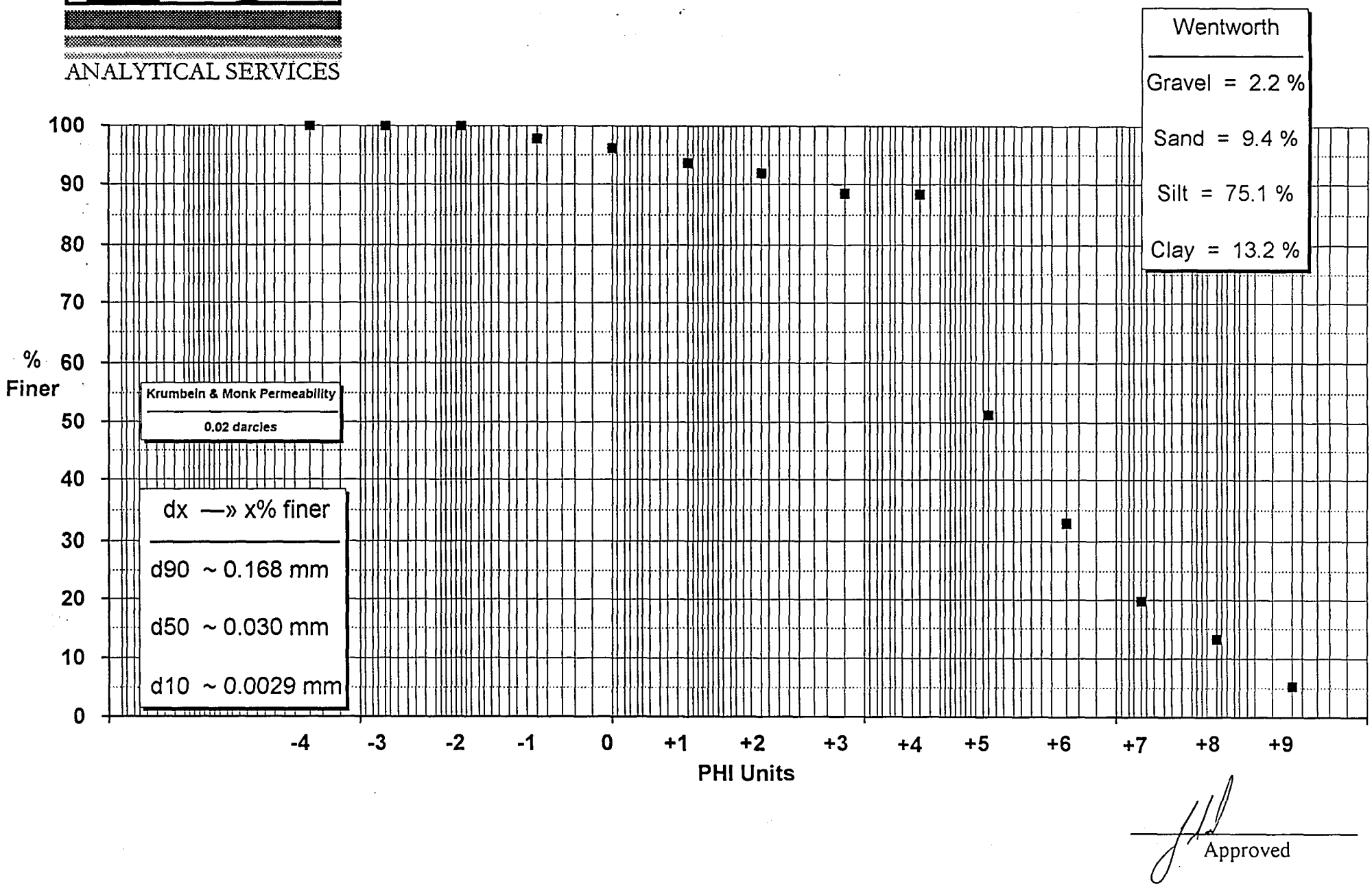
PSC ID: 01-H012490

D-8 578

PSC ANALYTICAL SERVICES



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PSC ID: 01-H012491

D-8 578 Dup

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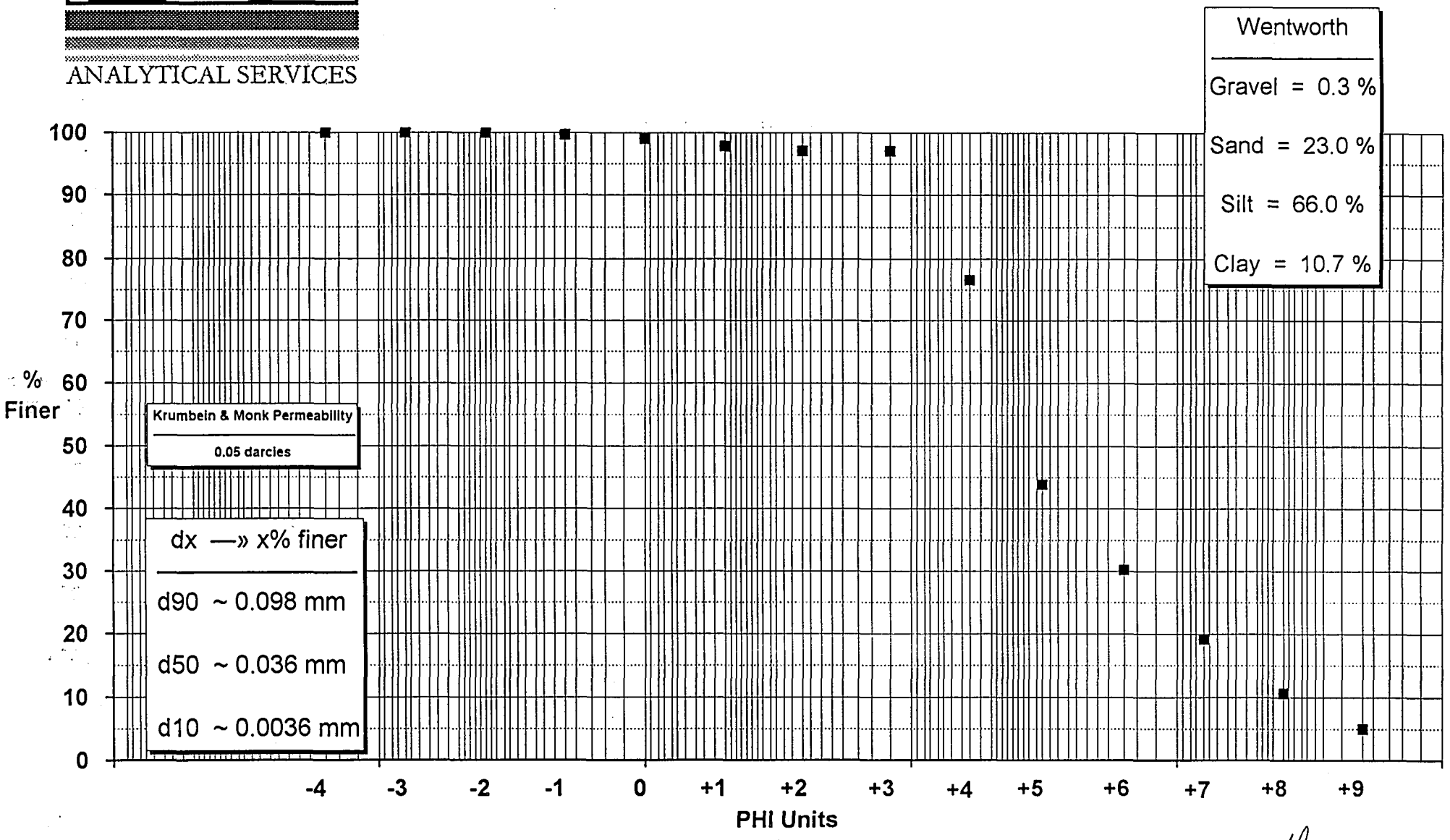

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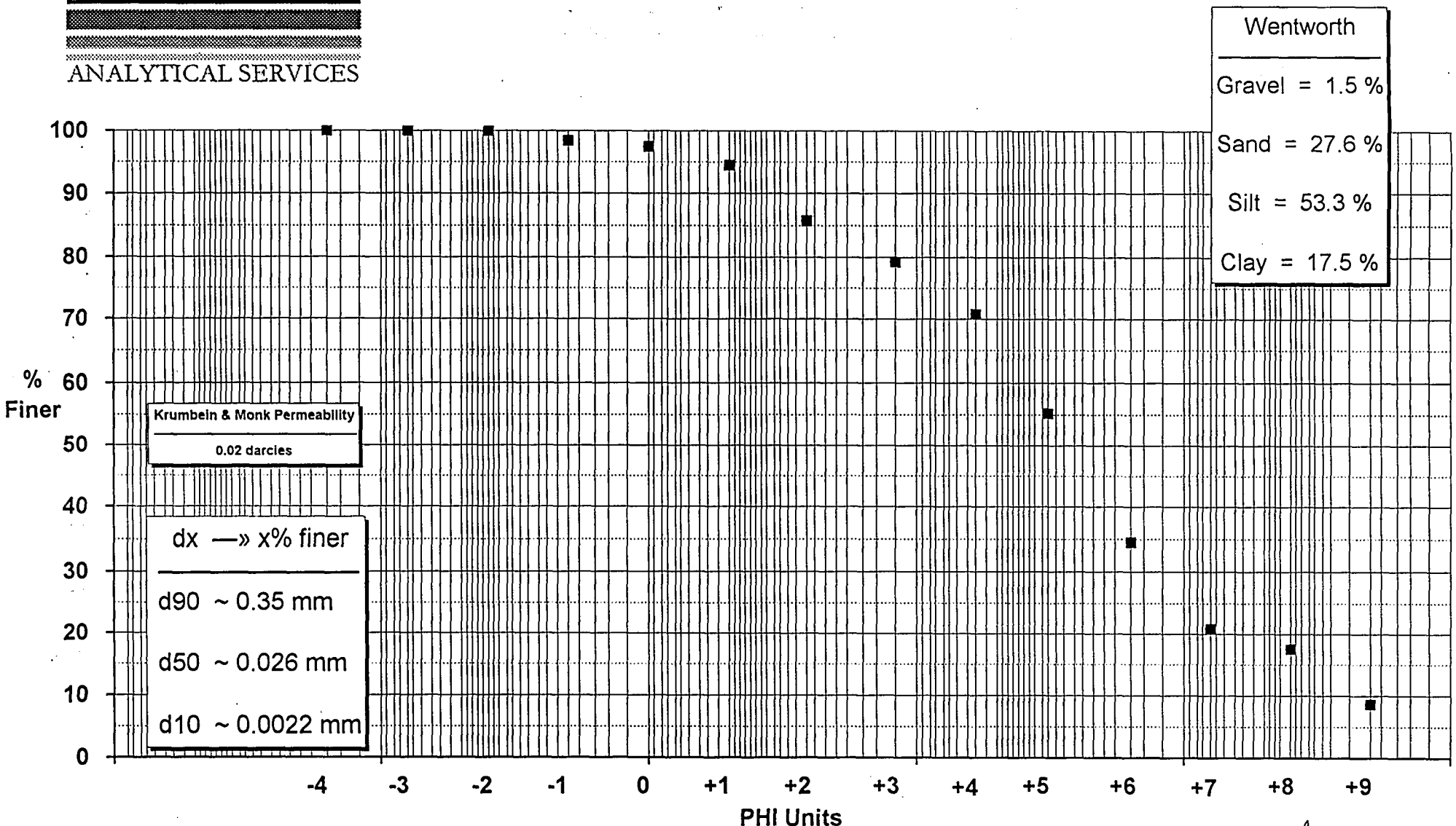
PSC ID: 01-H012492

PSC
ANALYTICAL SERVICES

D-8 610



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D-8 610 Dup

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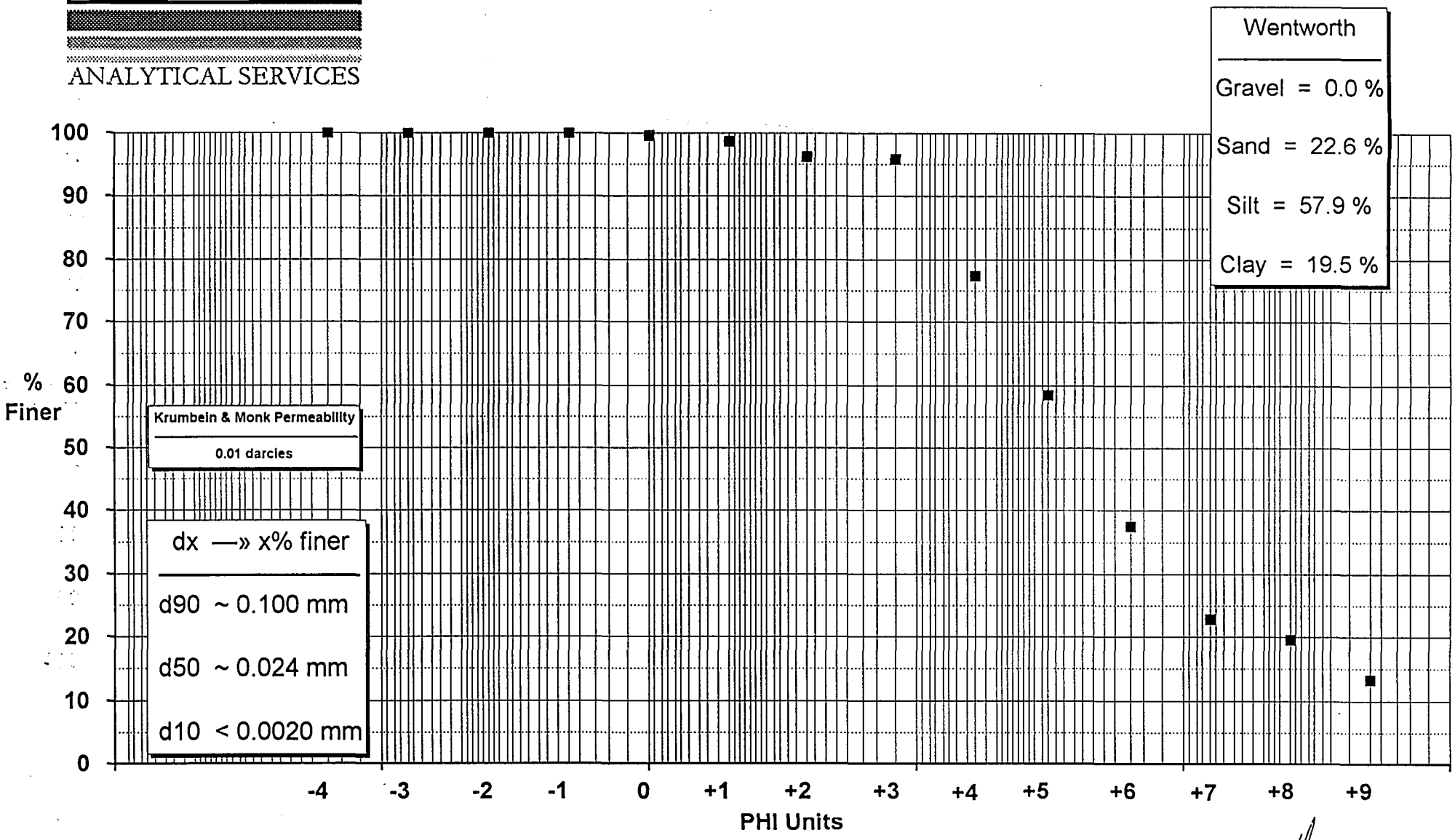

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PSC ID: 01-H012494

D-8 617

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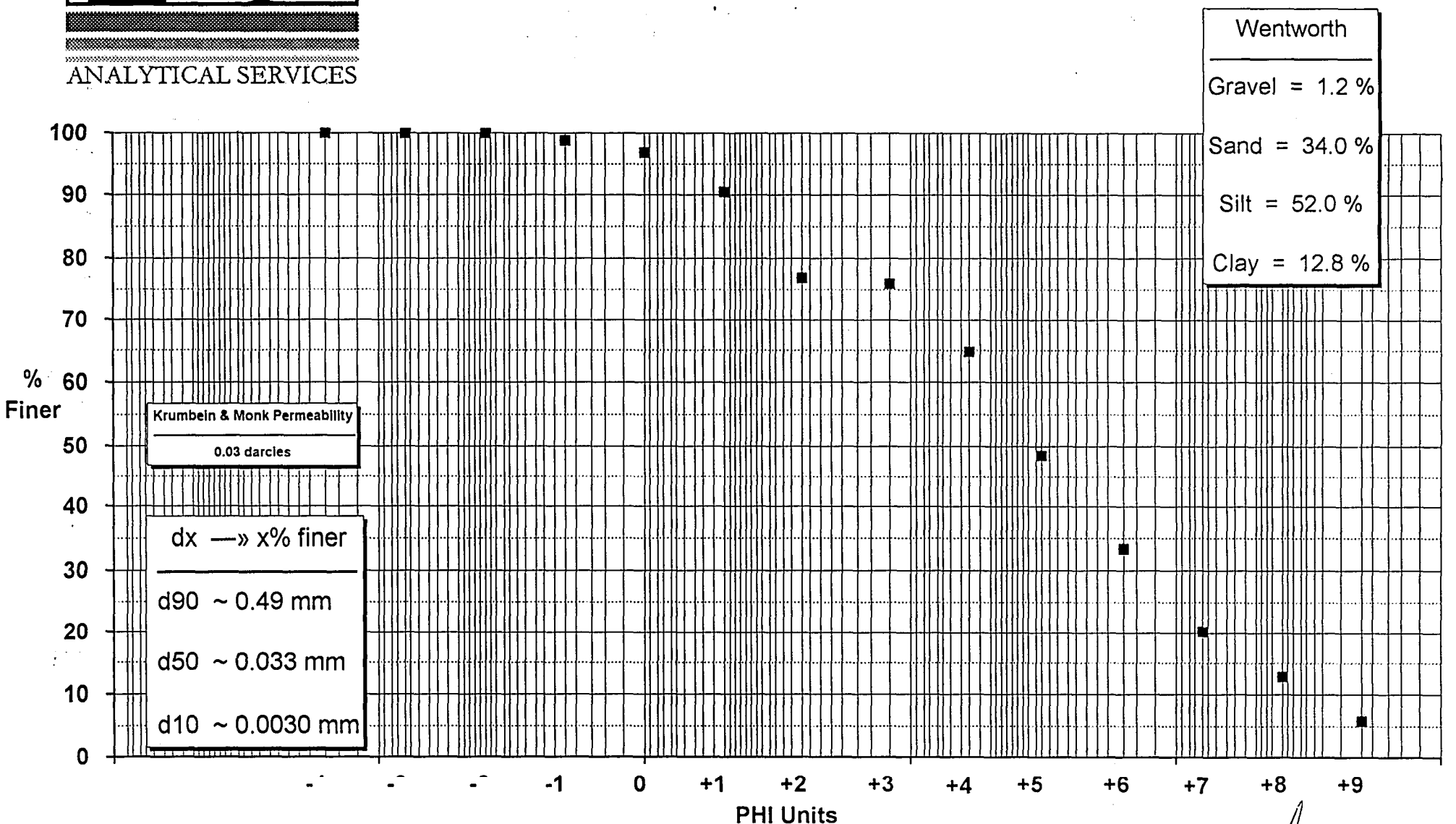

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PSC ID: 01-H012495

D-8 626

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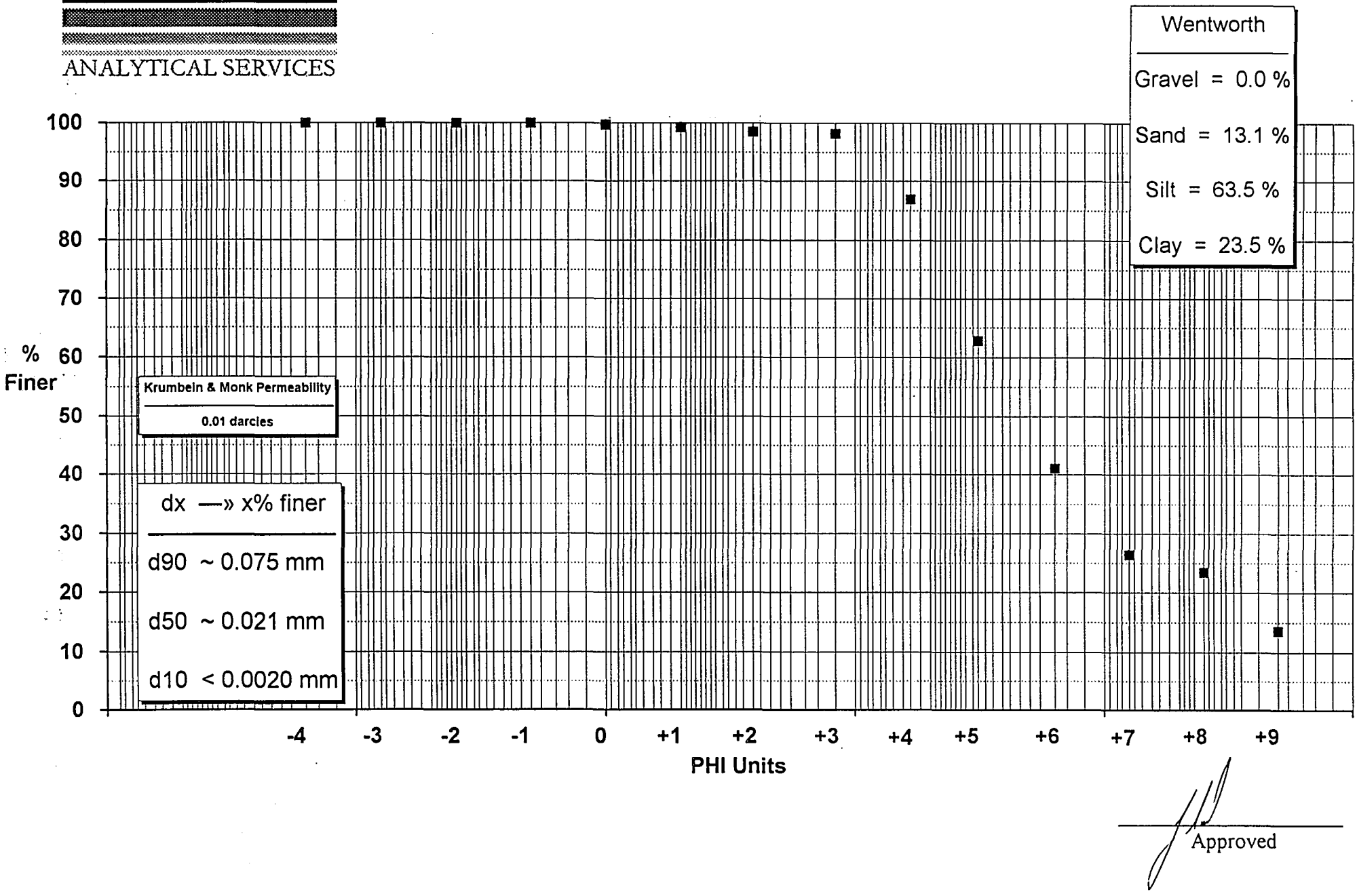

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PSC ID: 01-H012496

D-8 636

PSC
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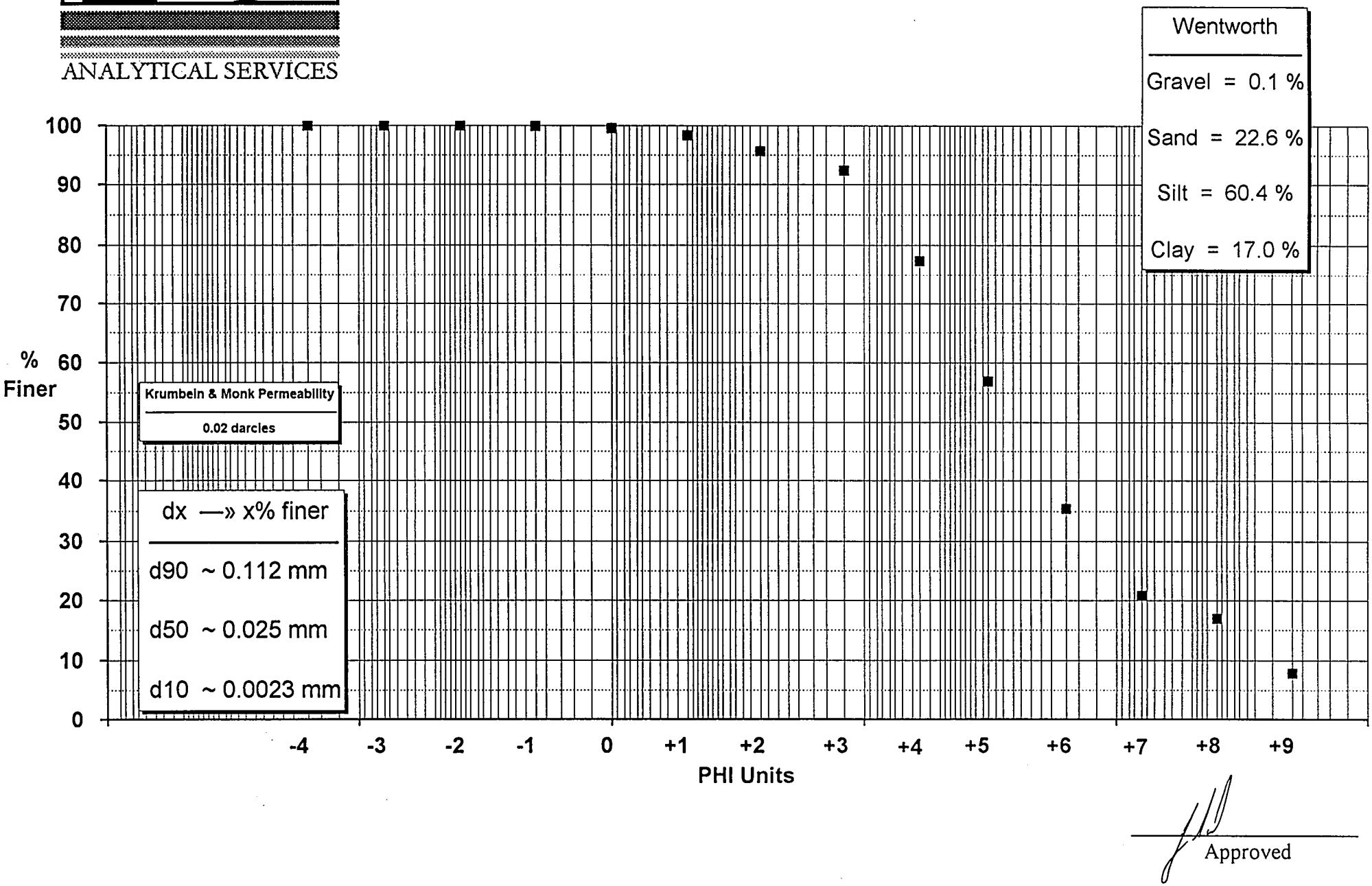

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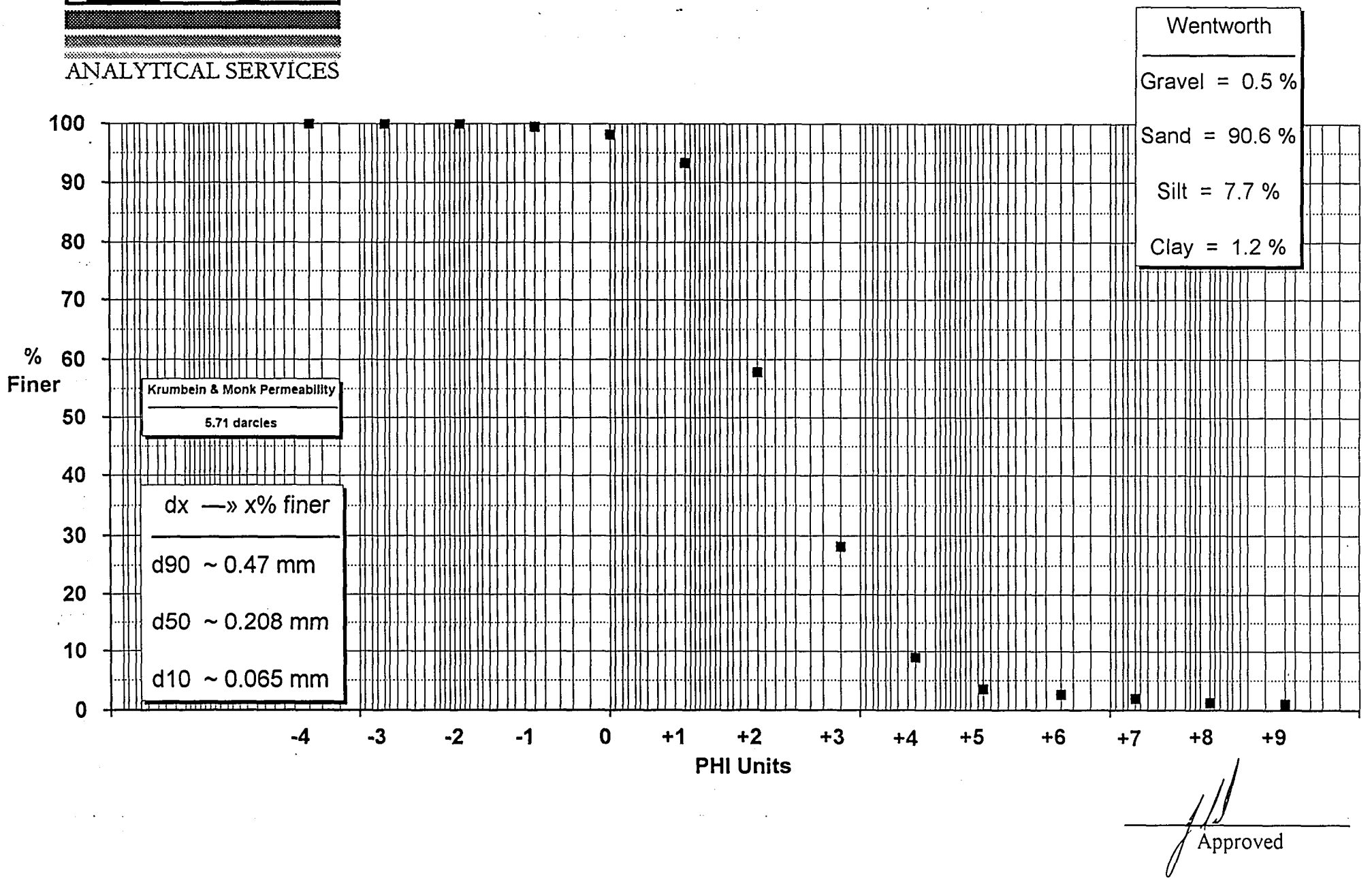
PSC ID: 01-H012497

D-8 663

ANALYTICAL SERVICES



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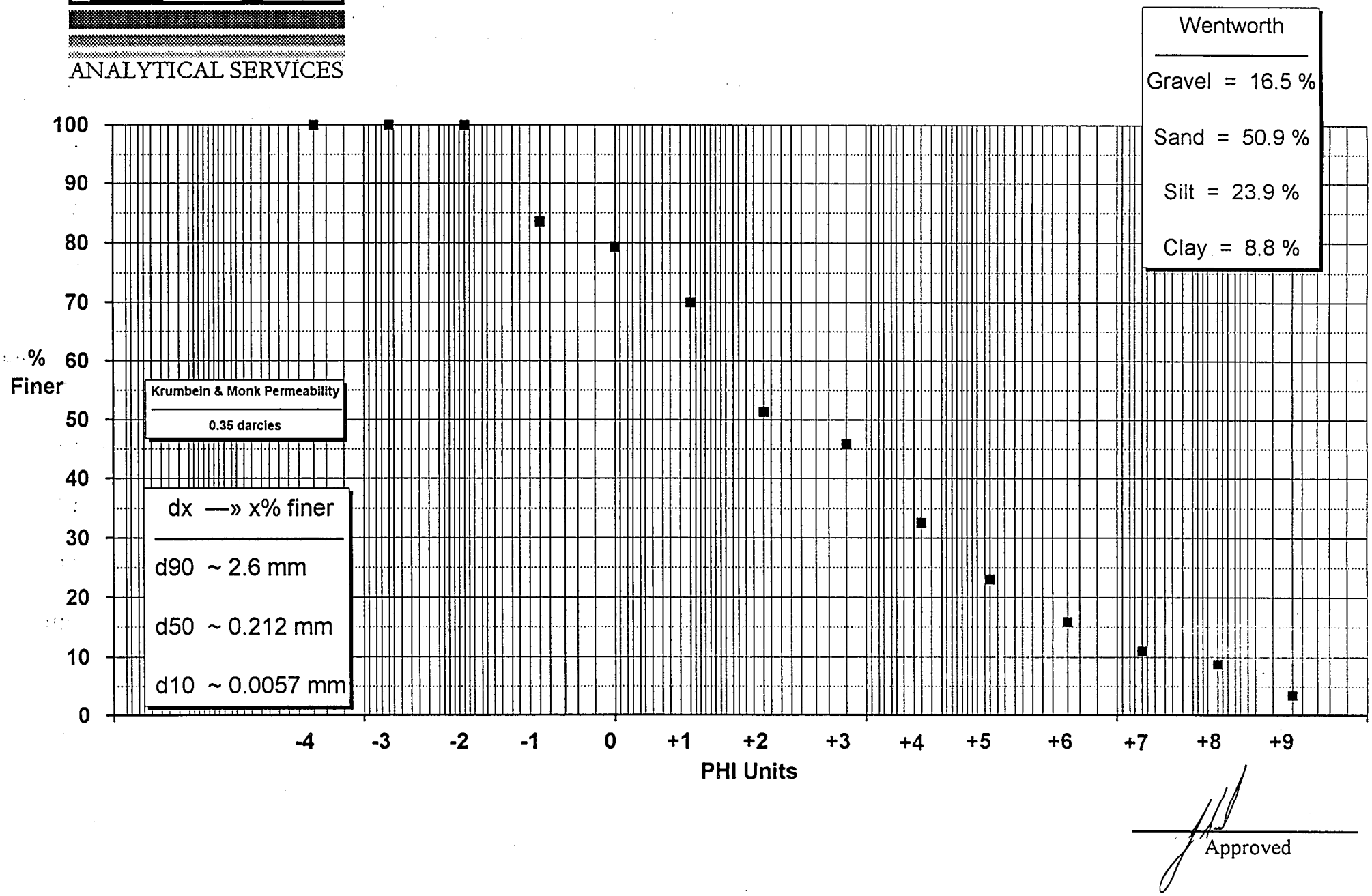
PSC ID: 01-H012498

D-8 689

ANALYTICAL SERVICES

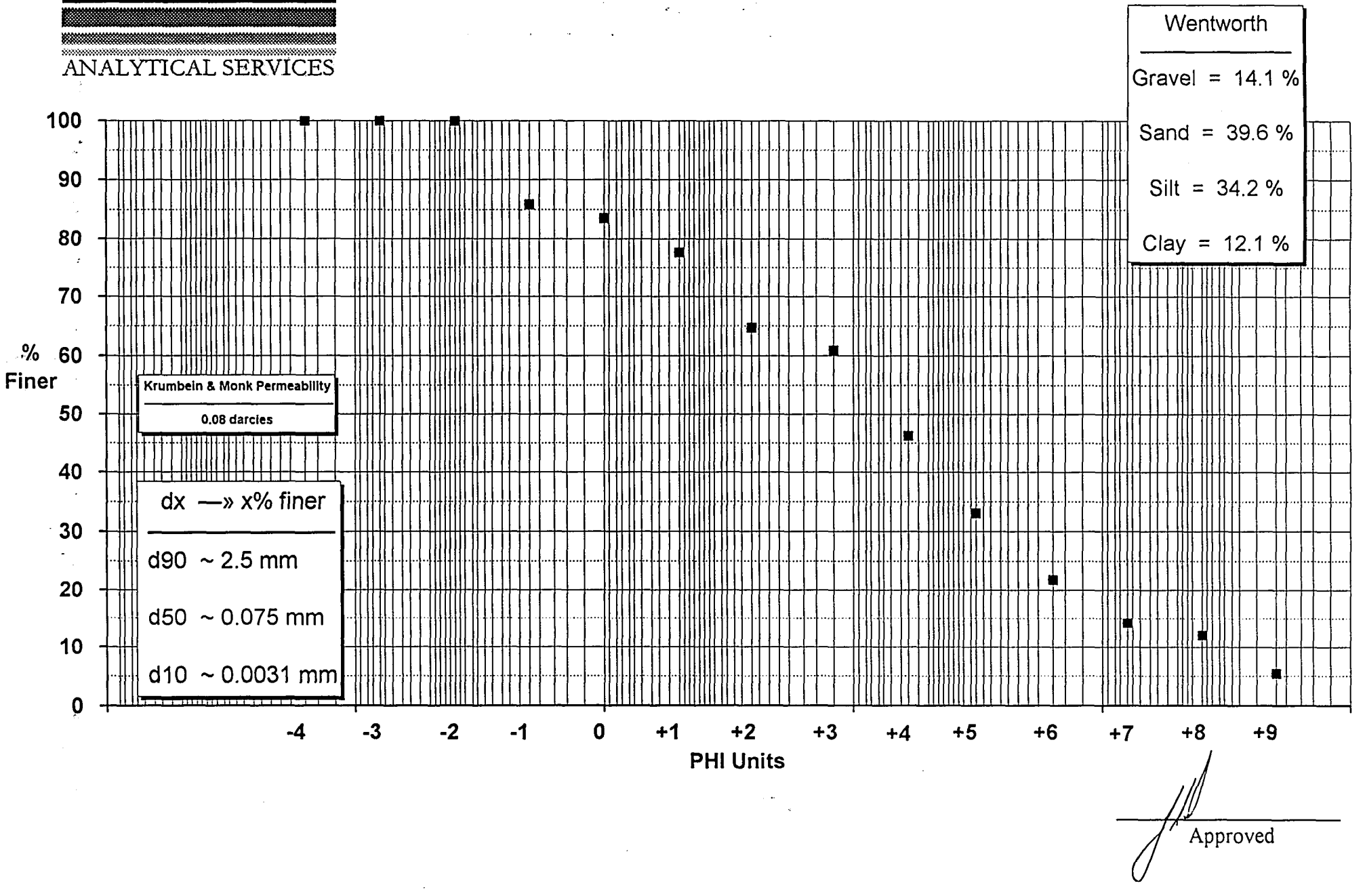


Approved

PSC ID: 01-H012499

PSC
ANALYTICAL SERVICES

D-8 689 Dup



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PSC ID: 01-H012500

D-8 695

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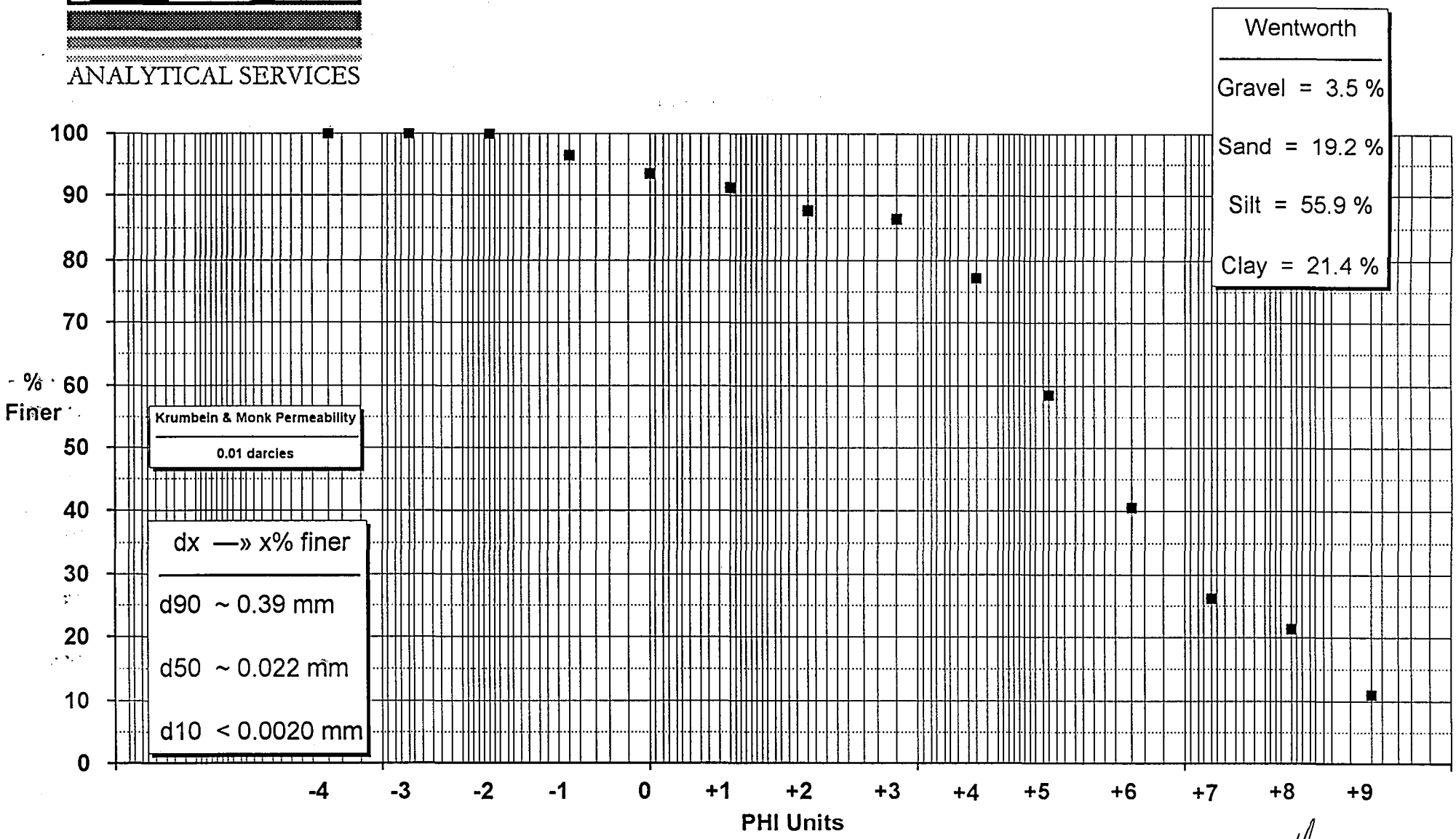

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PSC ID: 01-H012501

D-8 703

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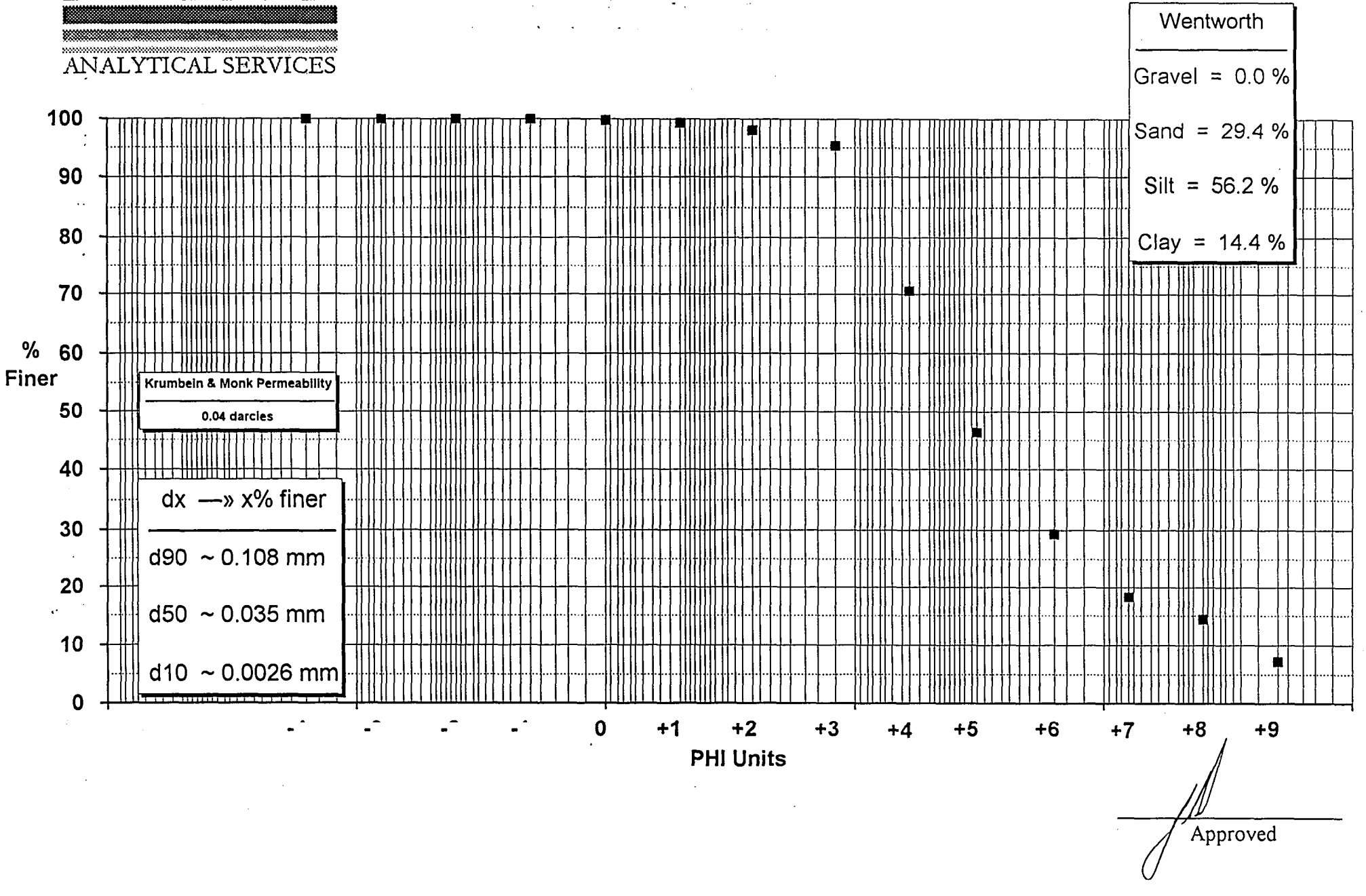
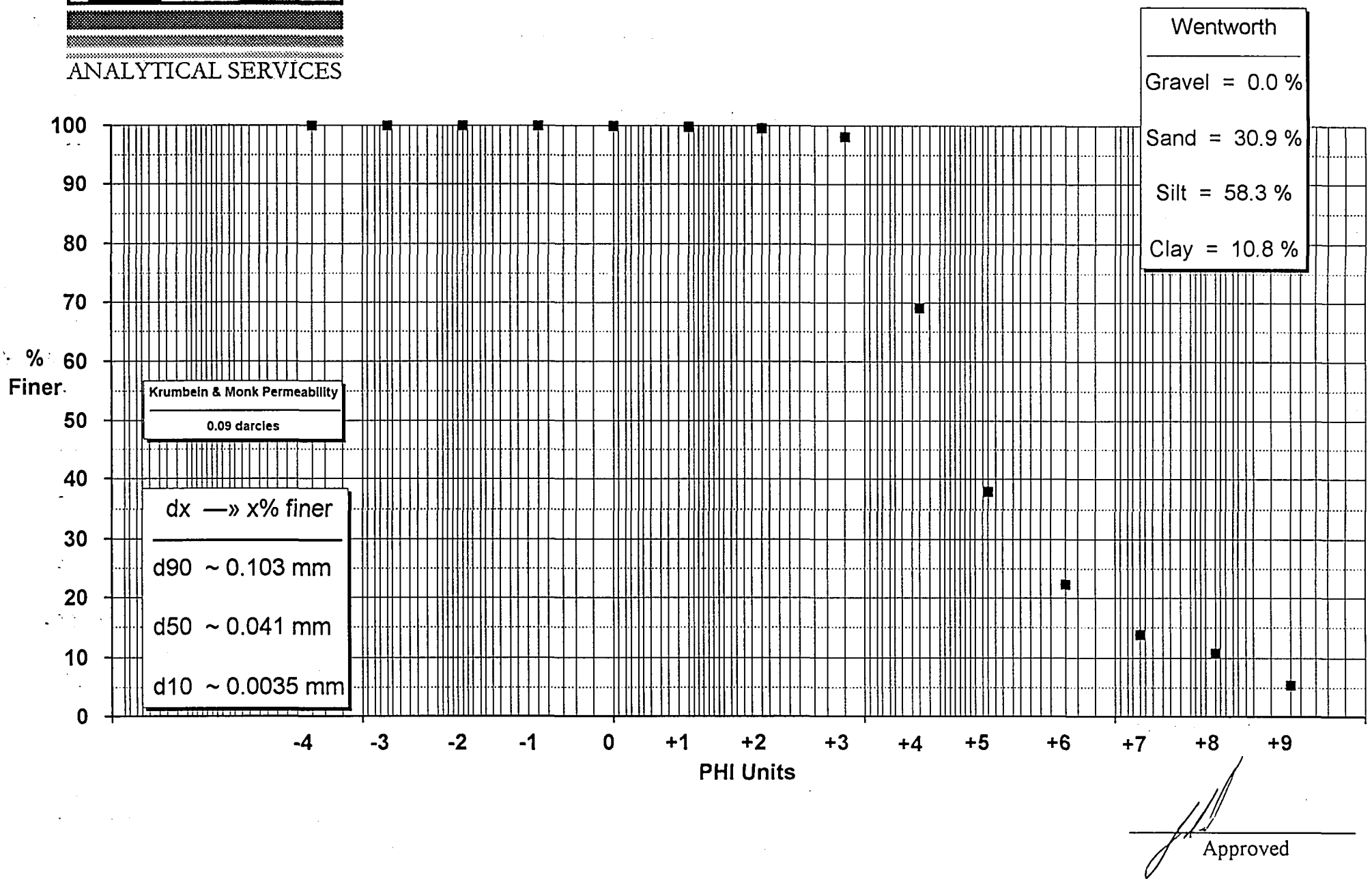


Approved

PSC ID: 01-H012502

D-8 707

ANALYTICAL SERVICES

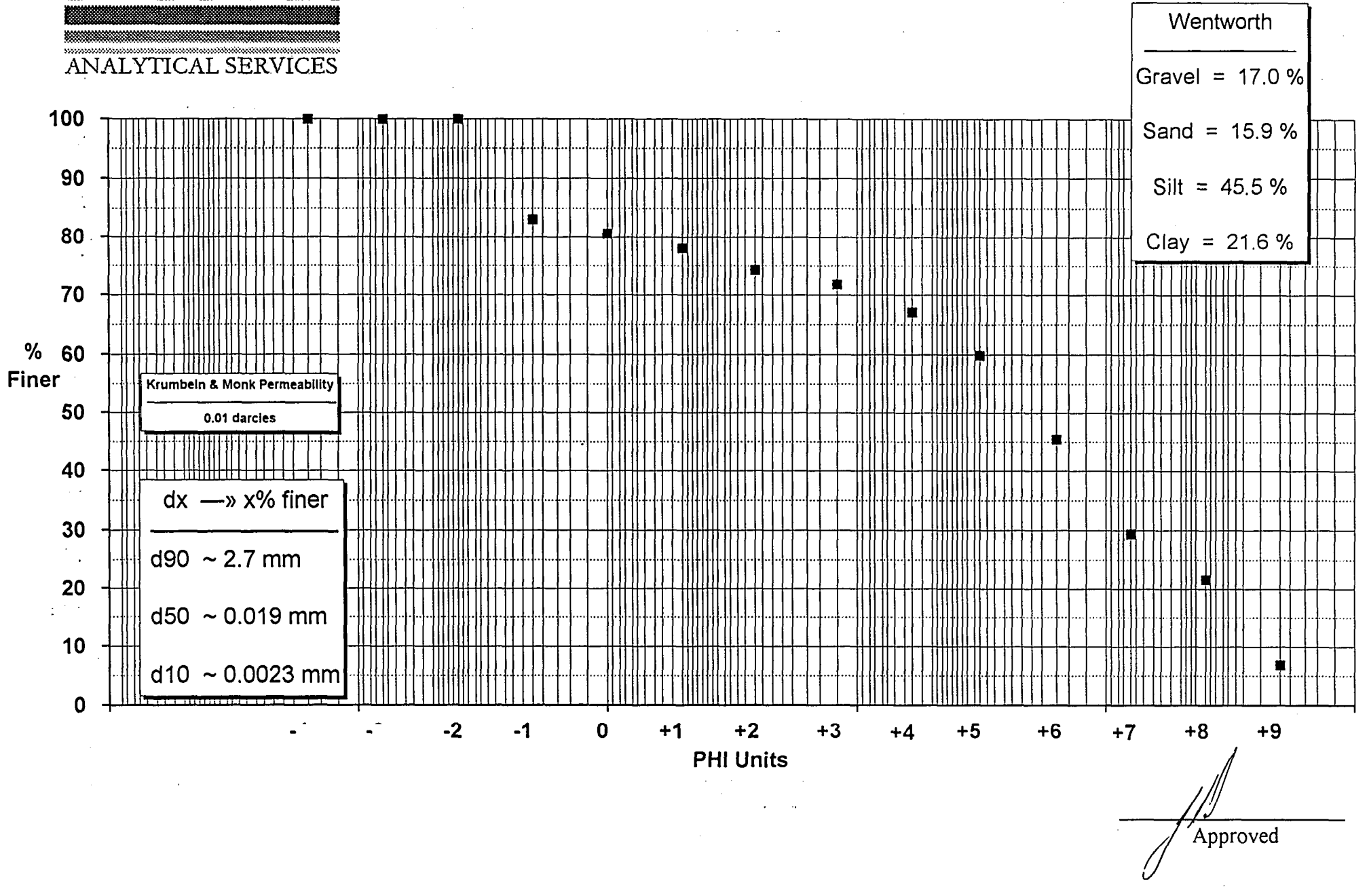


Approved

PSC ID: 01-H012503

D-8 735

PSC ANALYTICAL SERVICES

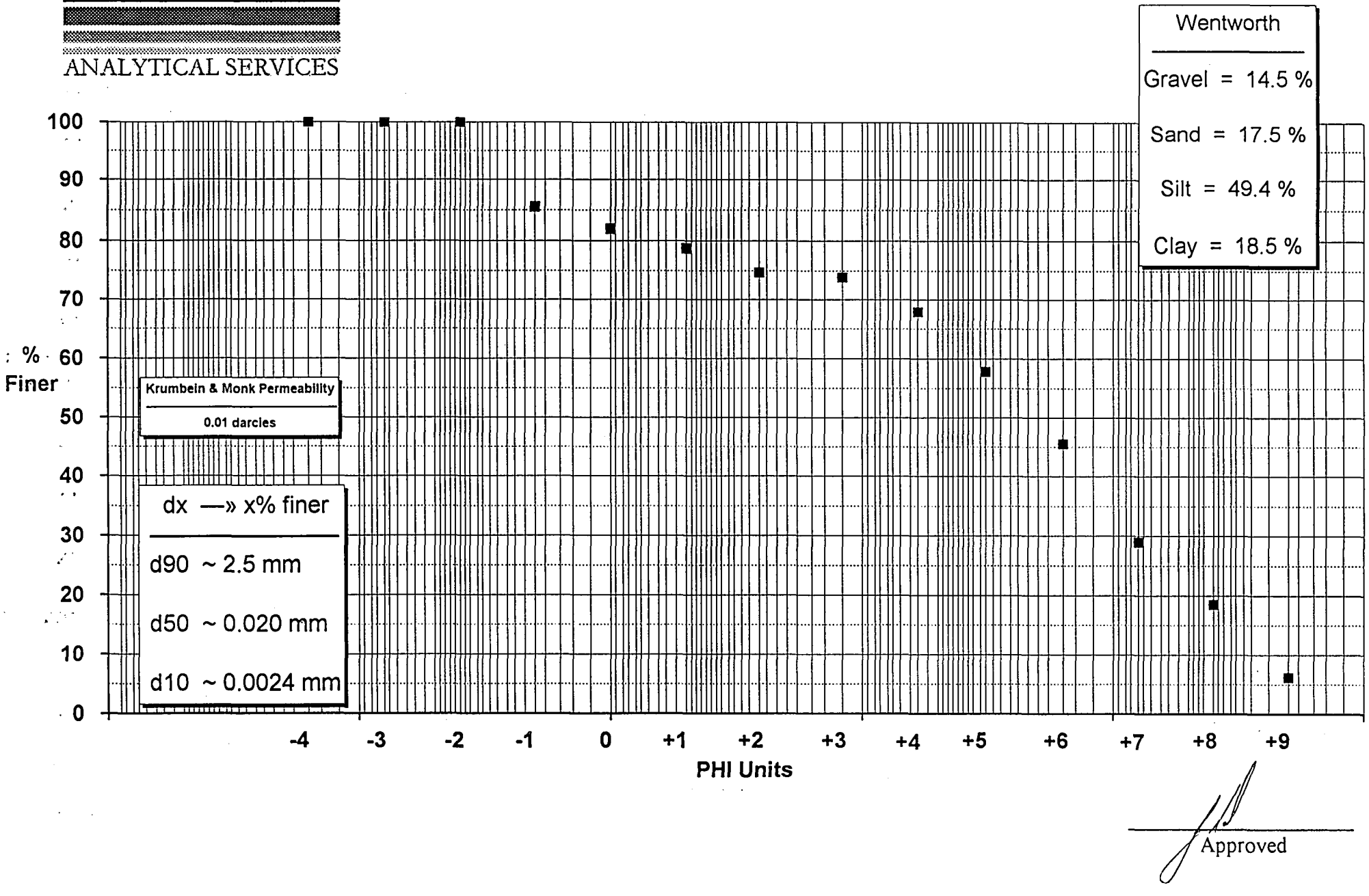


Approved

PSC ID: 01-H012504

D-8 735 Dup

PSC
ANALYTICAL SERVICES



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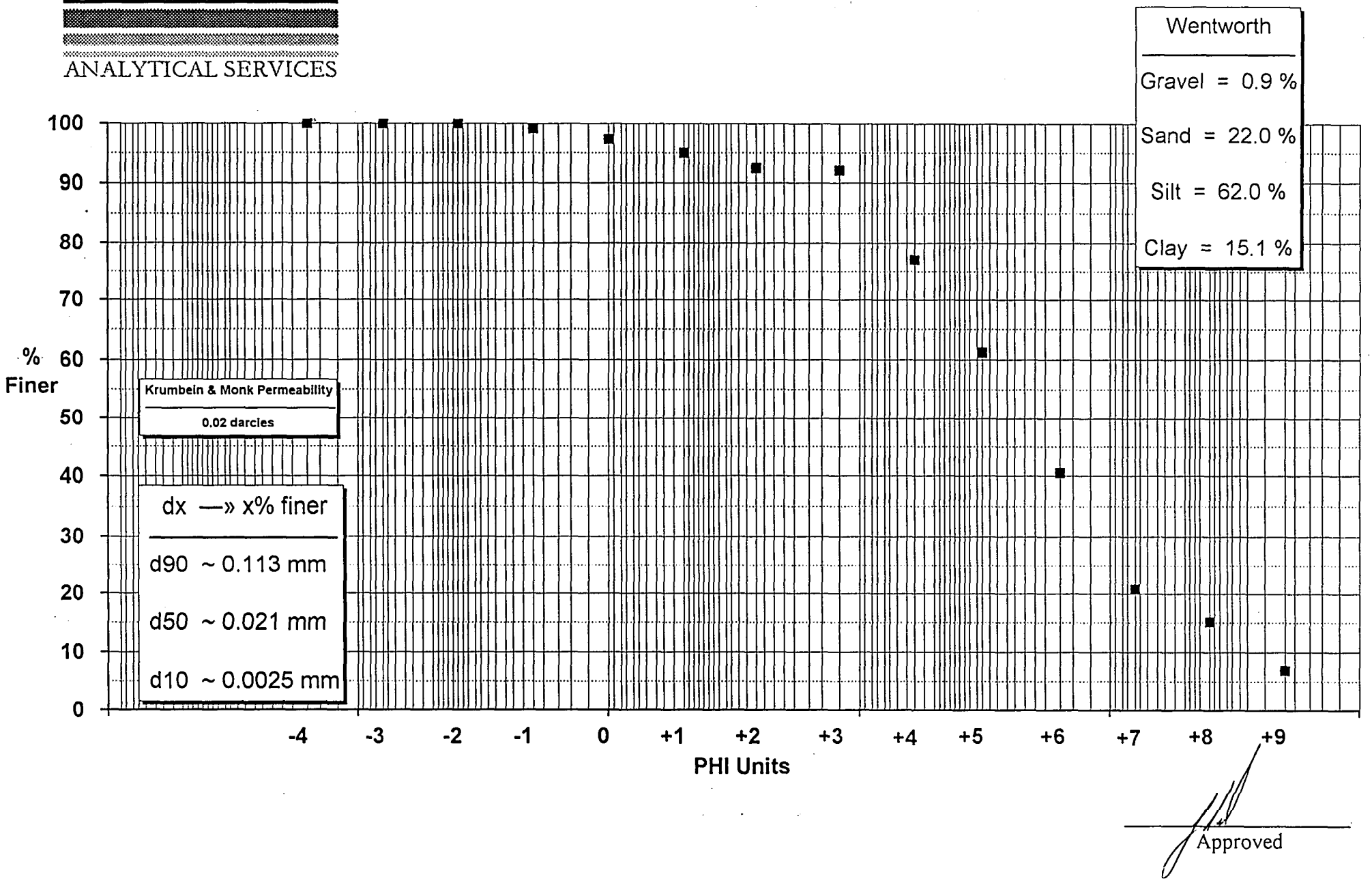
PSC ID: 01-H012505

D-8 737

PSC ANALYTICAL SERVICES

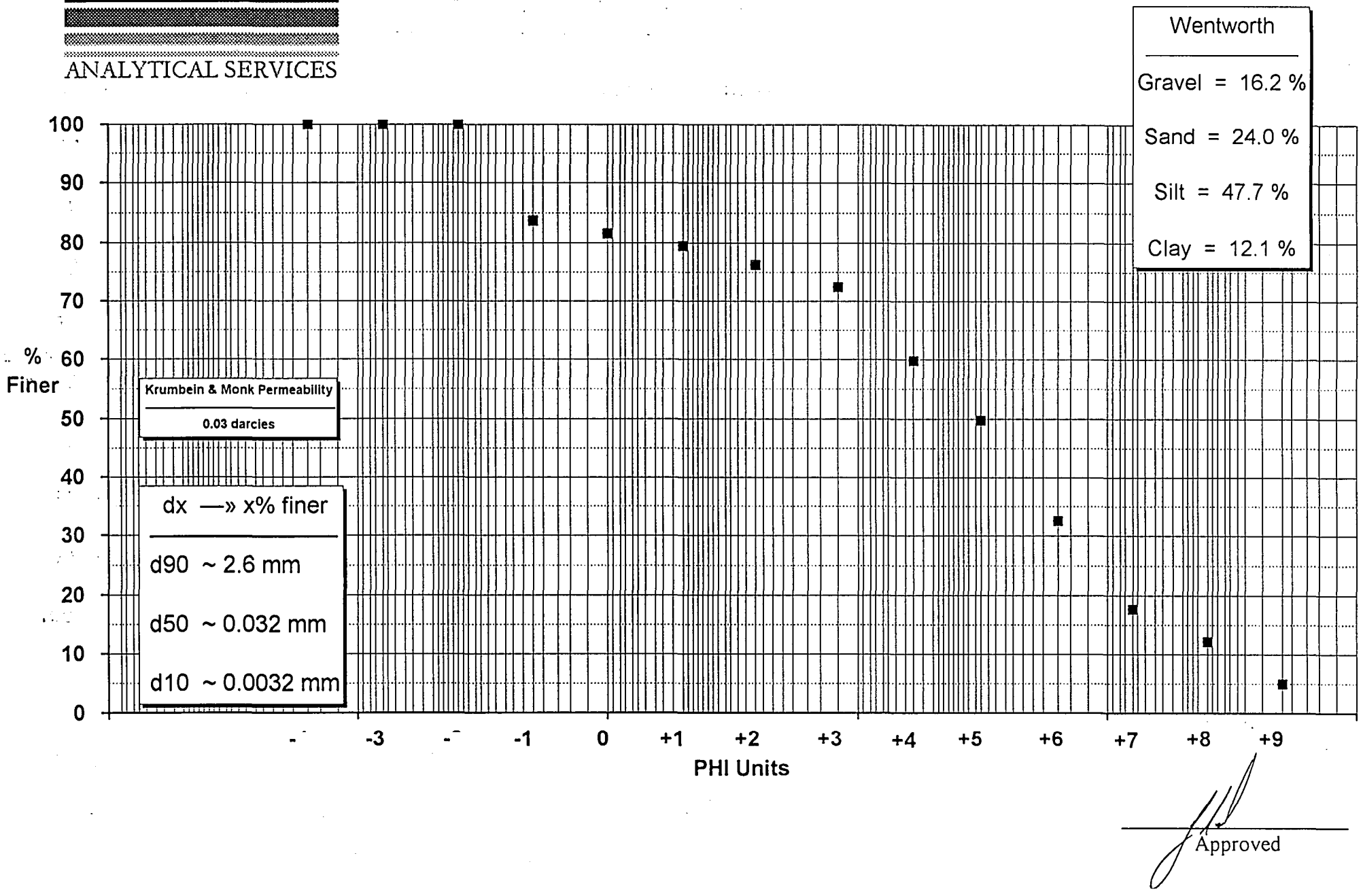


Approved

PSC ID: 01-H012506

D-8 847

ANALYTICAL SERVICES

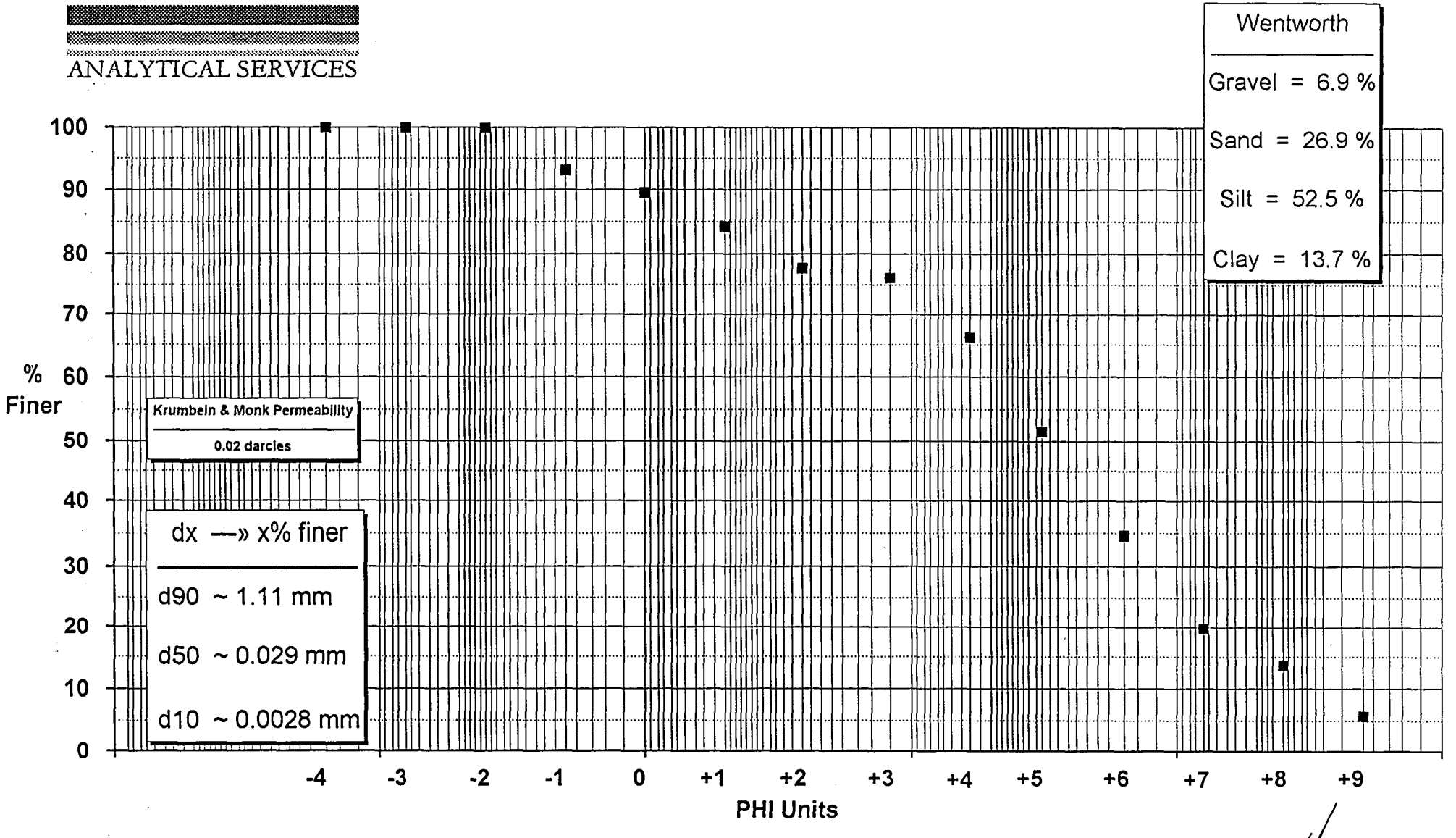


Approved

PSC ID: 01-H012507

D-8 859

ANALYTICAL SERVICES

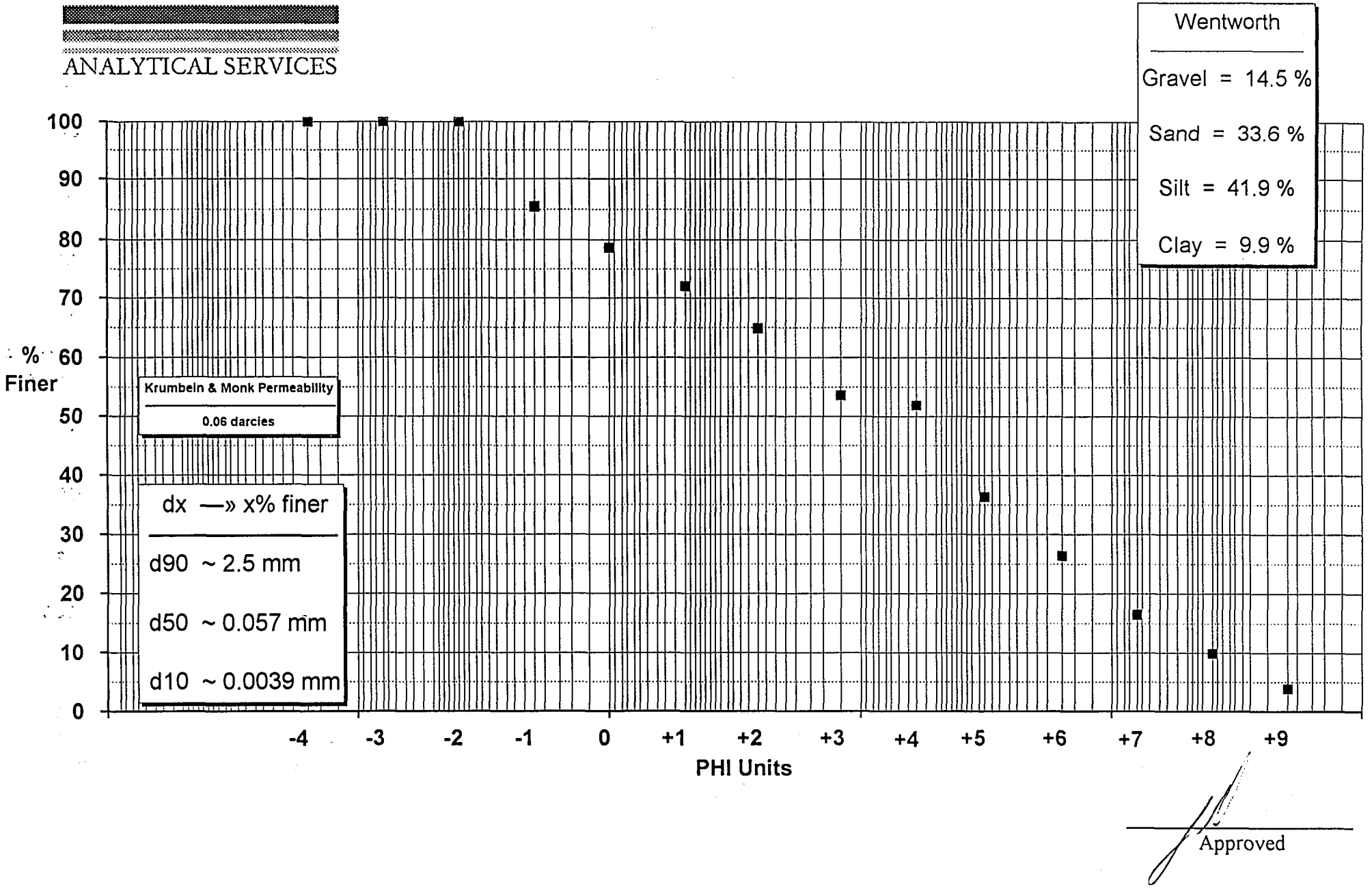


Approved

PSC ID: 01-H012508

D-8 865

ANALYTICAL SERVICES

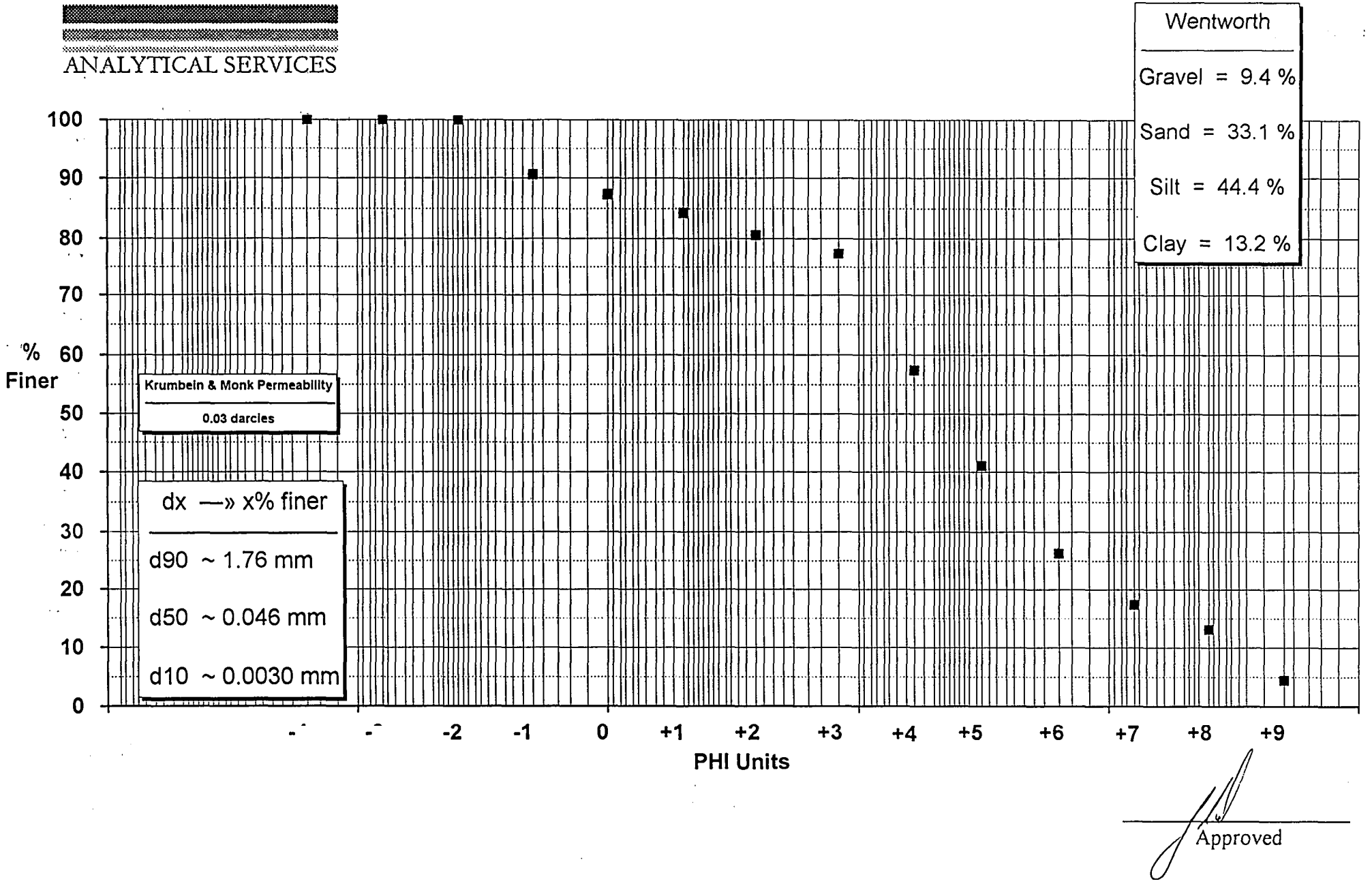


Approved

PSC ID: 0 -H0125 9

D-8 868

ANALYTICAL SERVICES

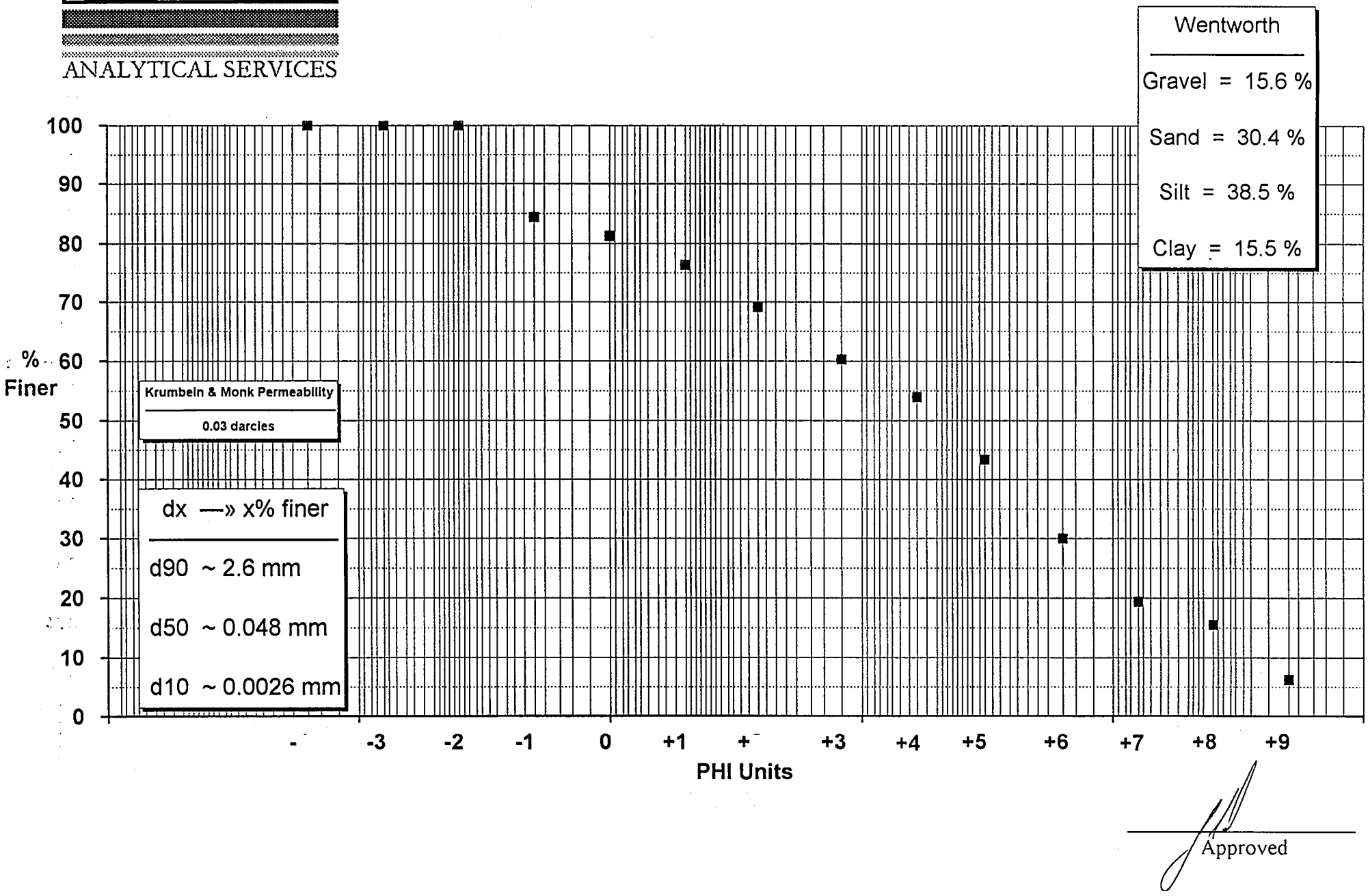


Approved

PSC ID: 01-H012510

D-8 916

PSC ANALYTICAL SERVICES

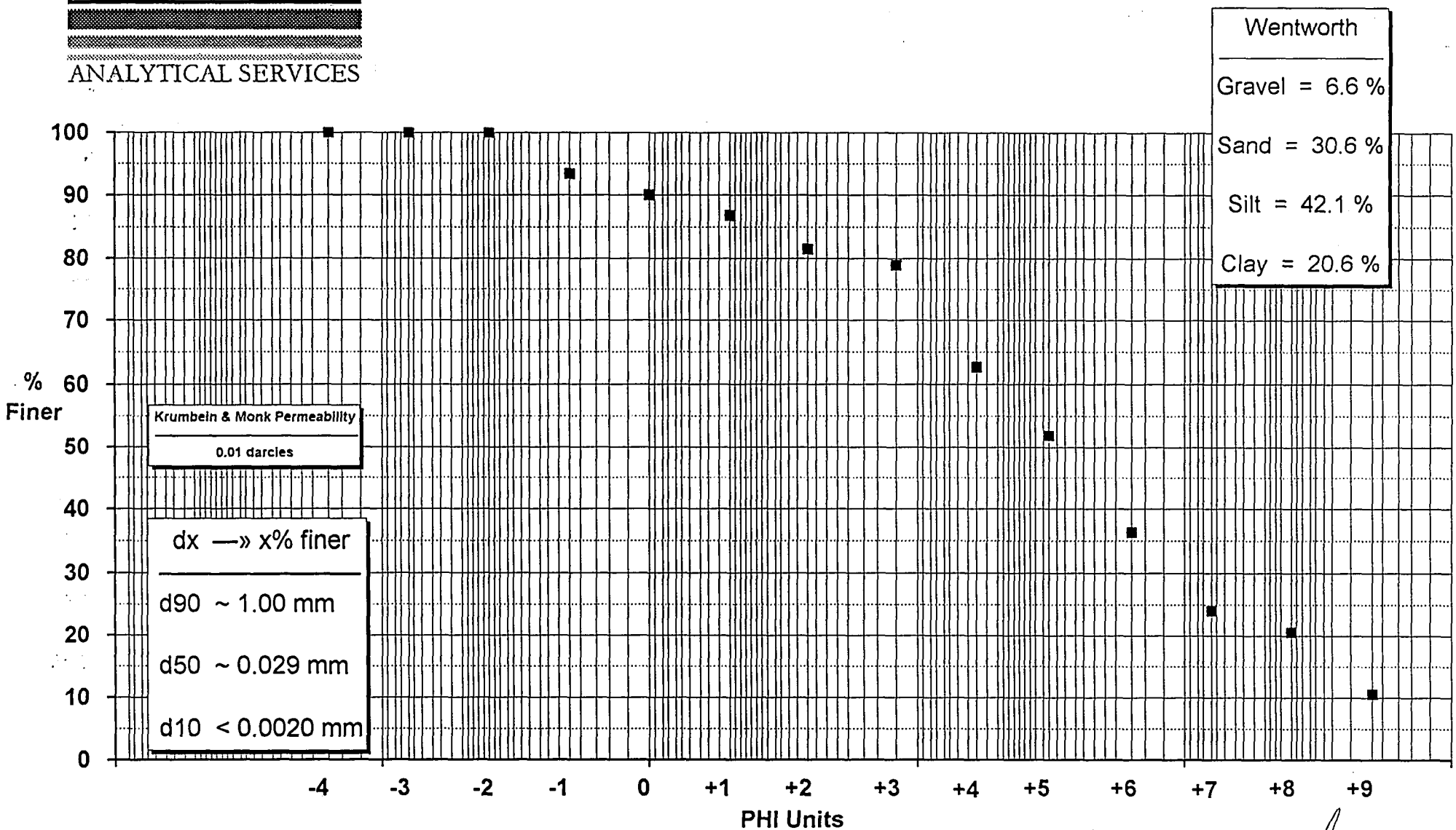


Approved

PSC ID: 01-H012511

D-8 918

ANALYTICAL SERVICES

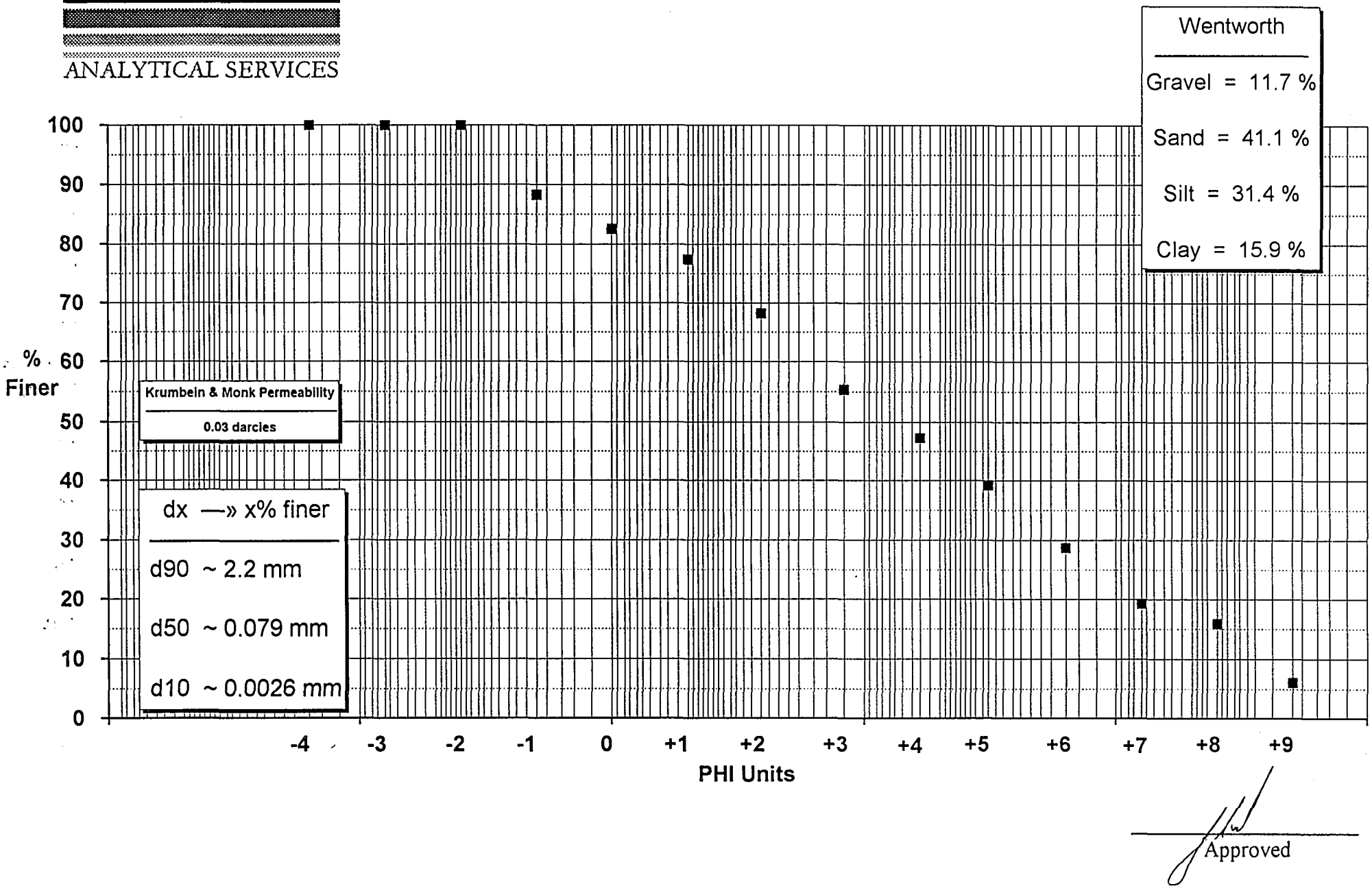


Approved

PSC ID: 01-H012512

D-8 931

PSC
ANALYTICAL SERVICES



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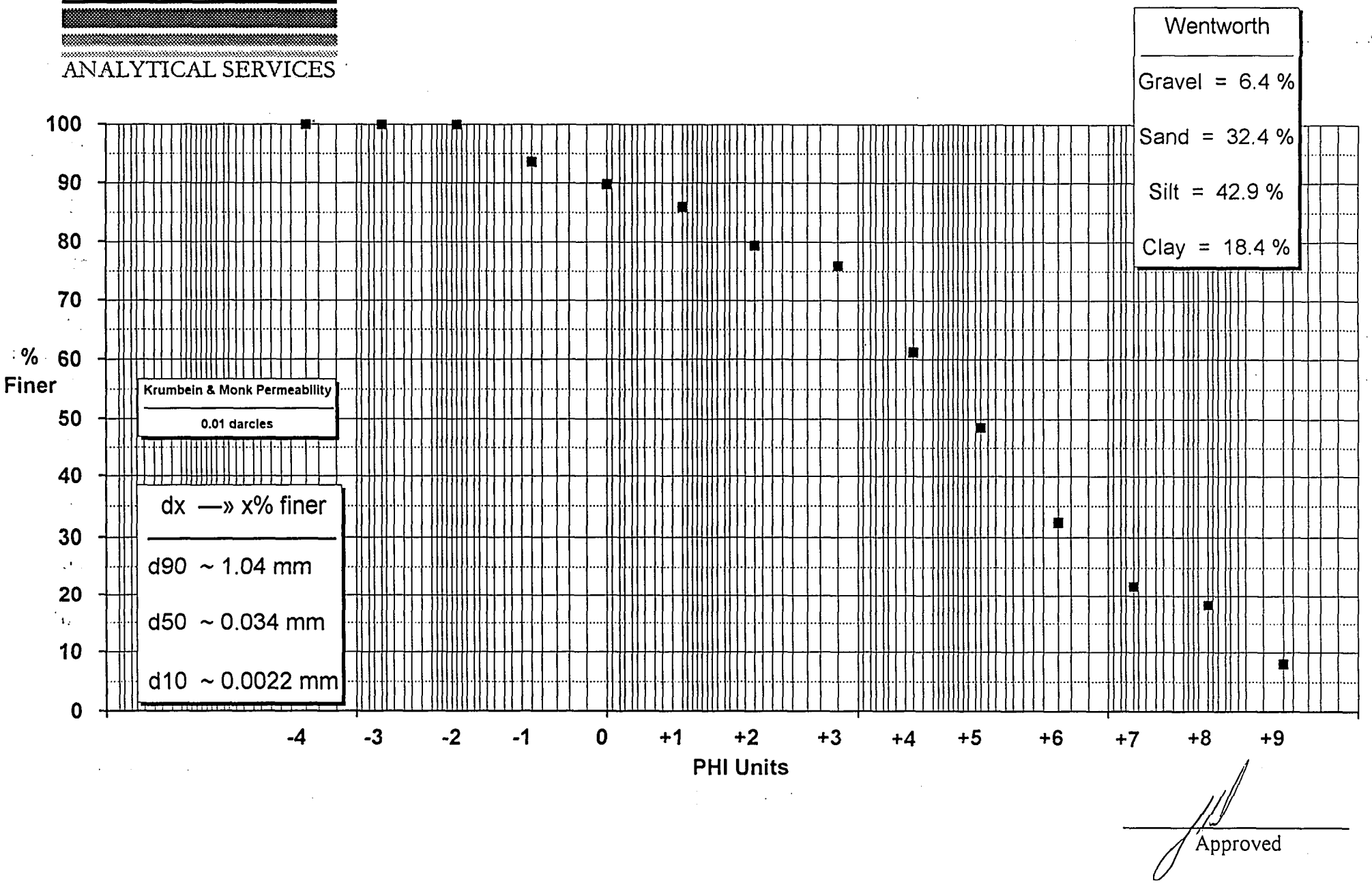
PSC ID: 01-H012513

D-8 952

PSC ANALYTICAL SERVICES

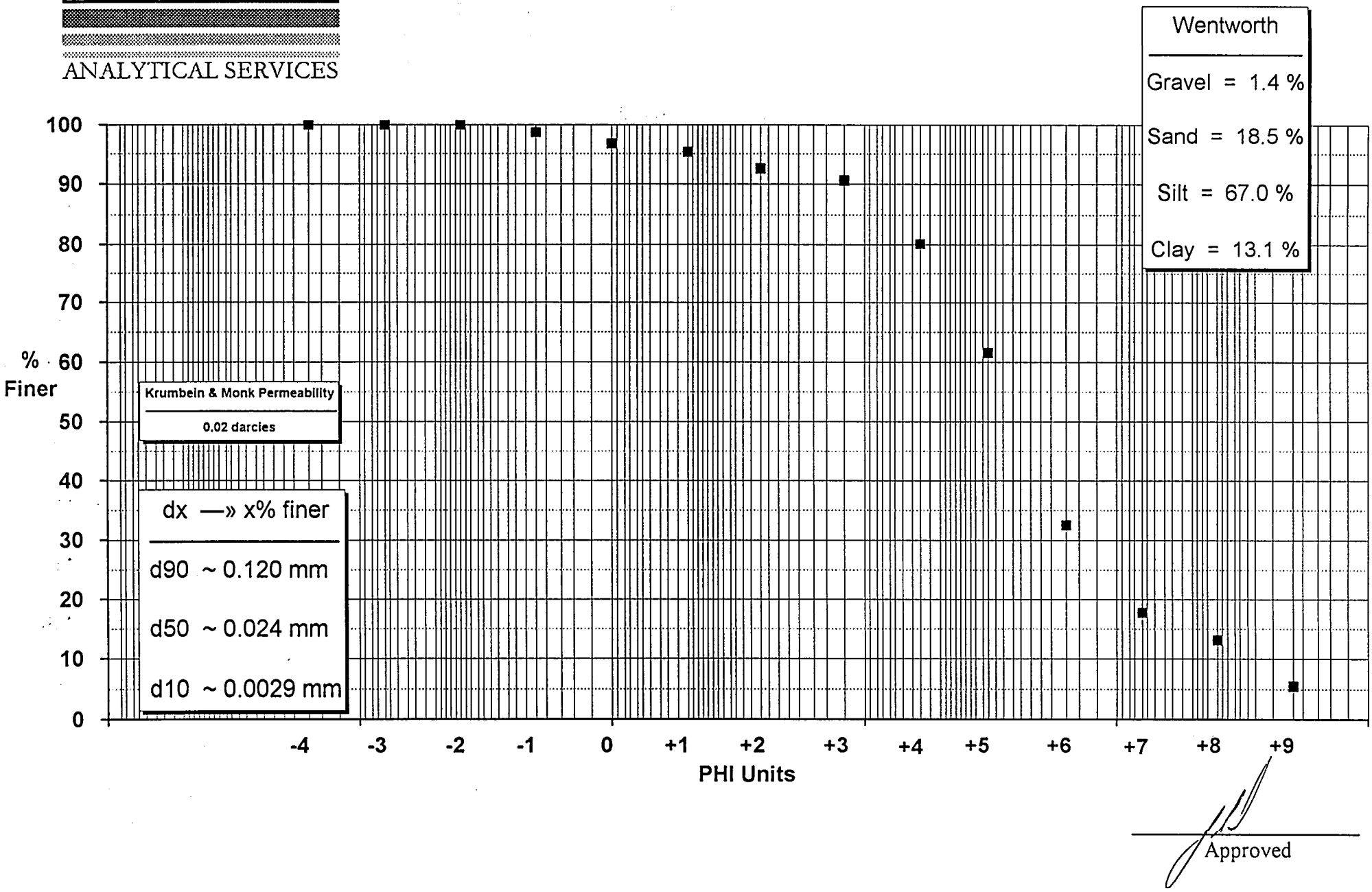


Approved

PSC ID: 01-H012514

D-8 961

ANALYTICAL SERVICES

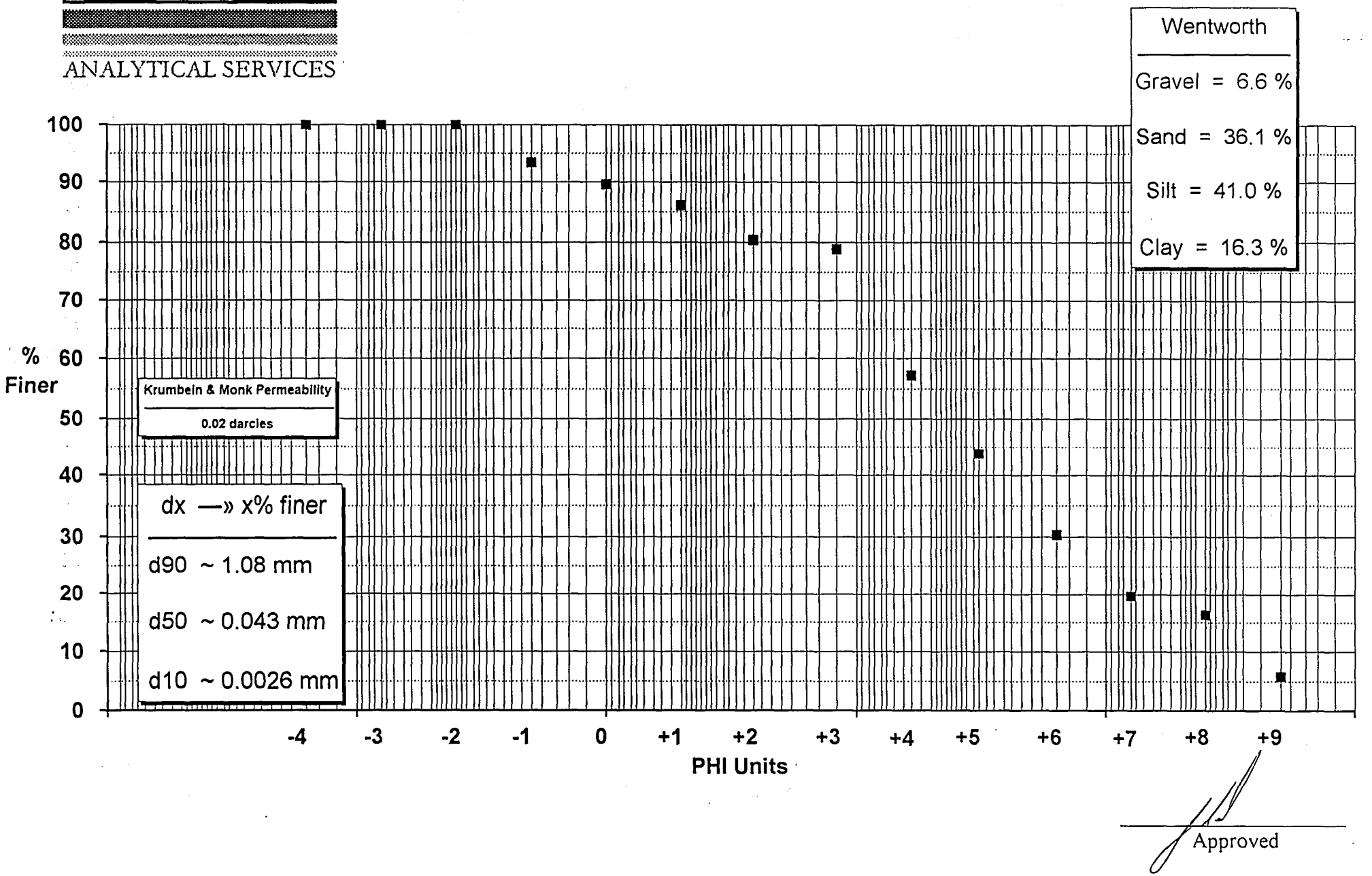


Approved

PSC ID: 01-H012515

D-8 968

PSC ANALYTICAL SERVICES



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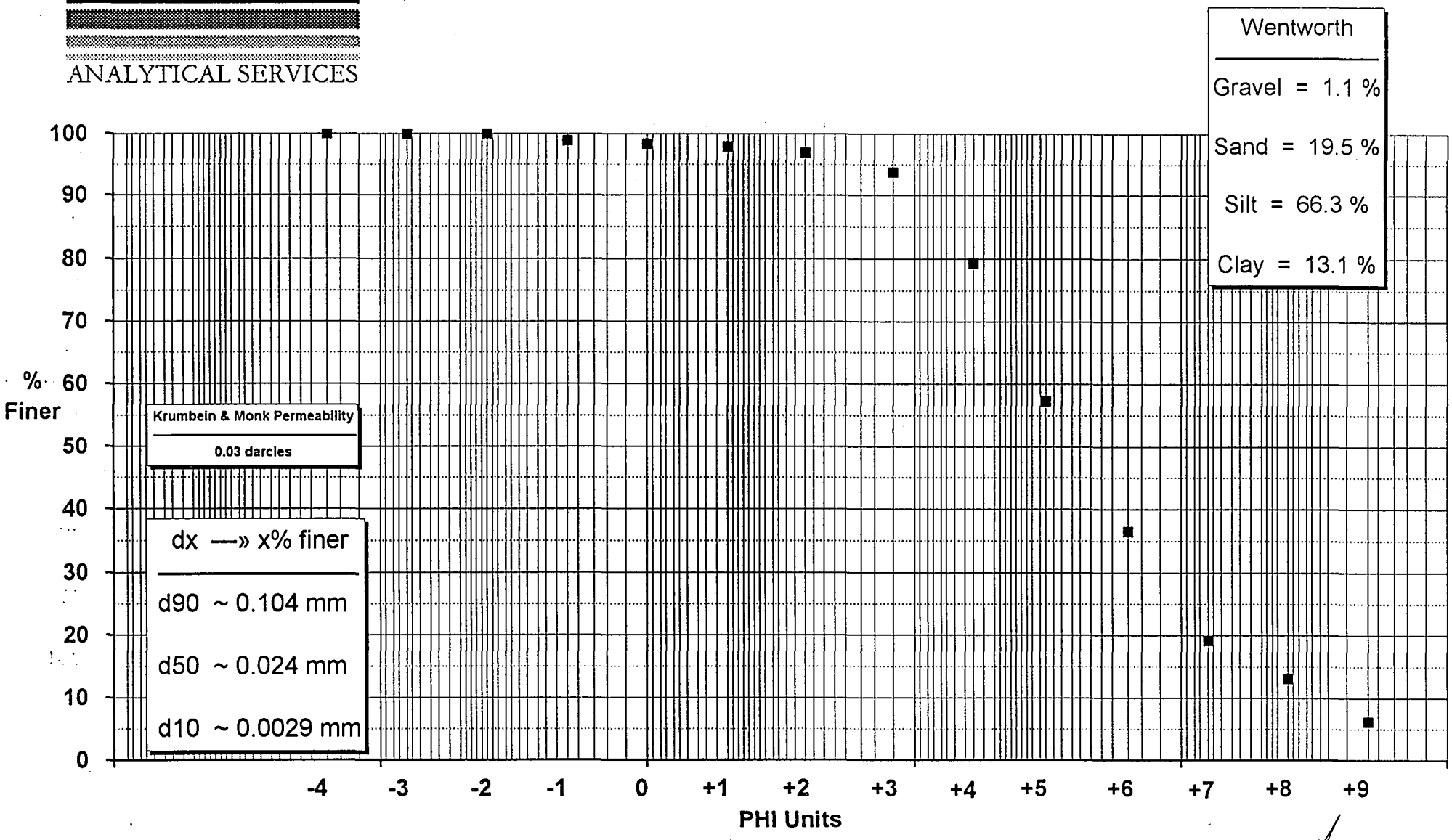
PSC ID: 01-H012516

D-8 974

ANALYTICAL SERVICES

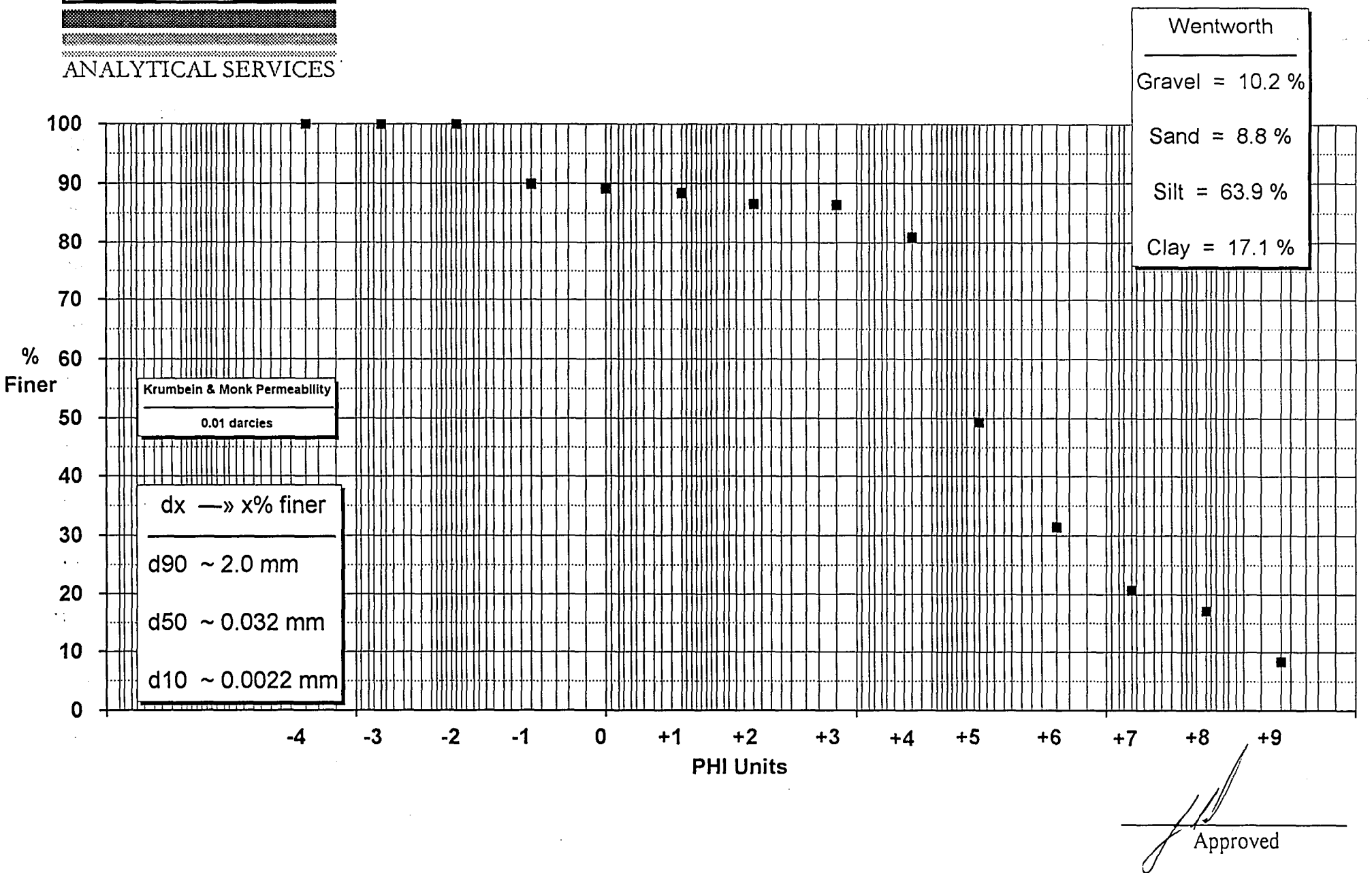


Approved

PSC ID: 01-H012517

D-8 974 Dup

PSC ANALYTICAL SERVICES



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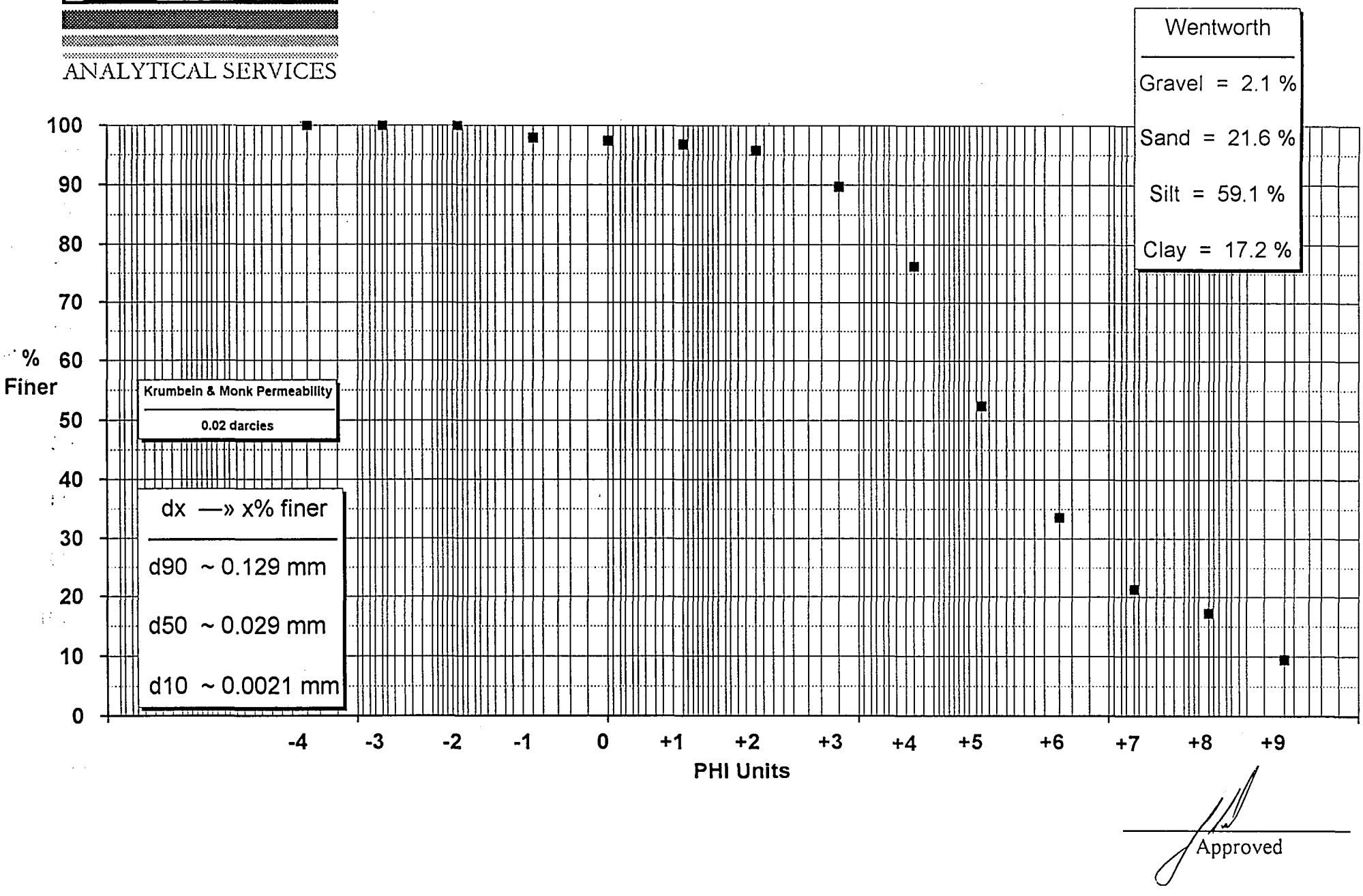
PSC ID: 01-H012518

D-8 975

PSC
ANALYTICAL SERVICES



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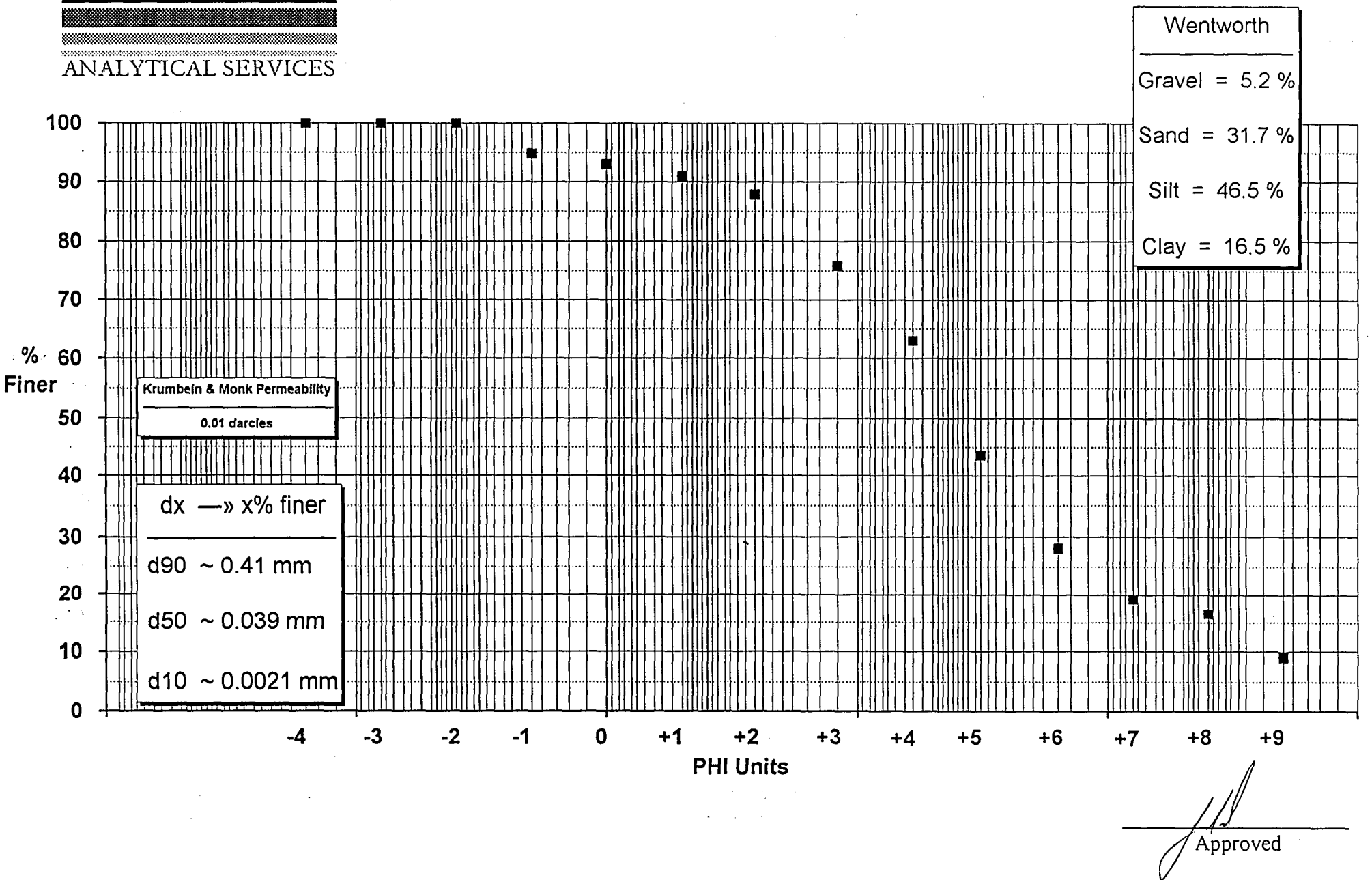
PSC ID: 01-H012519

D-8 977

PSC
ANALYTICAL SERVICES



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PSC ID: 01-H012520

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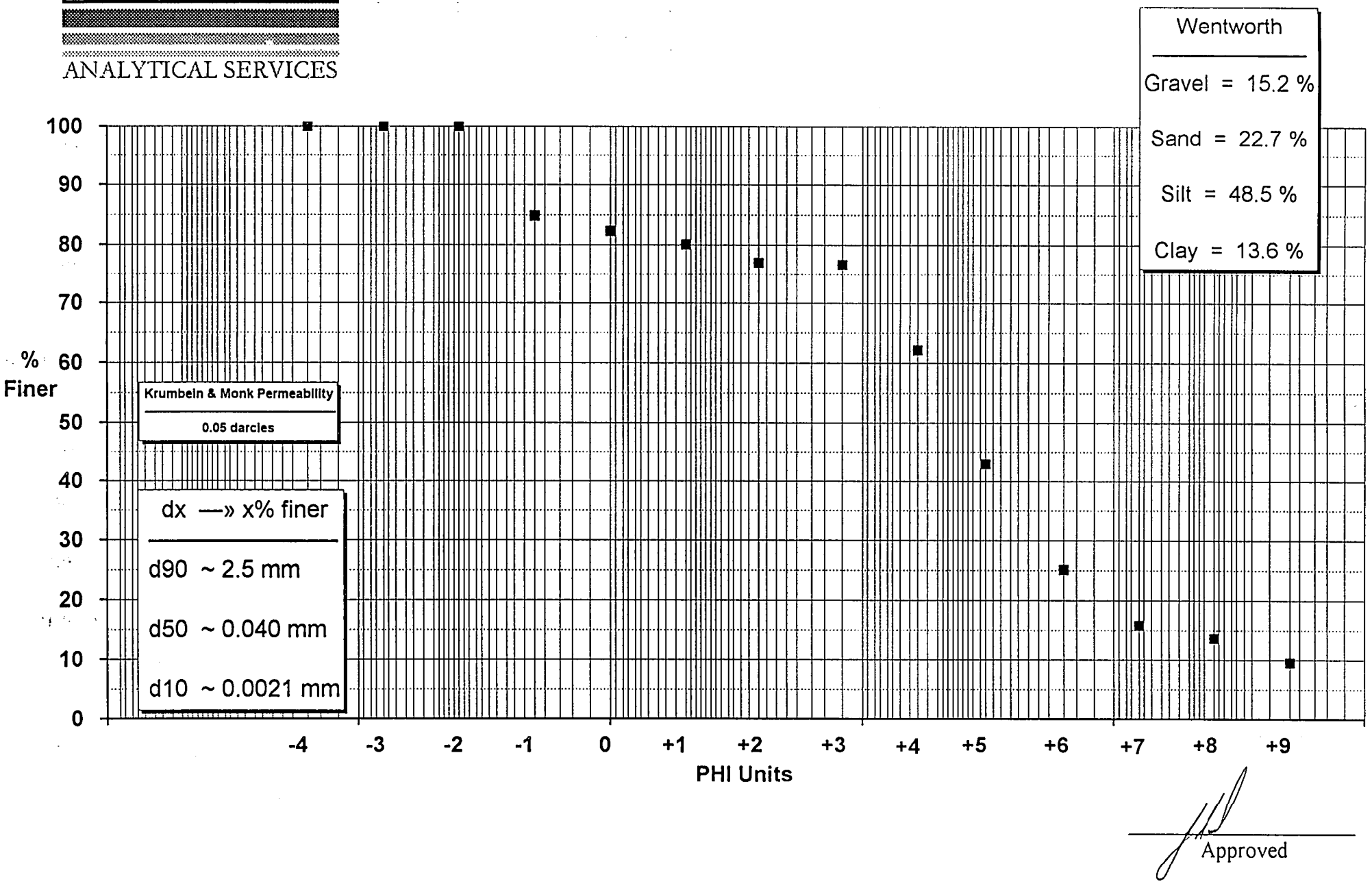
ANALYTICAL SERVICES



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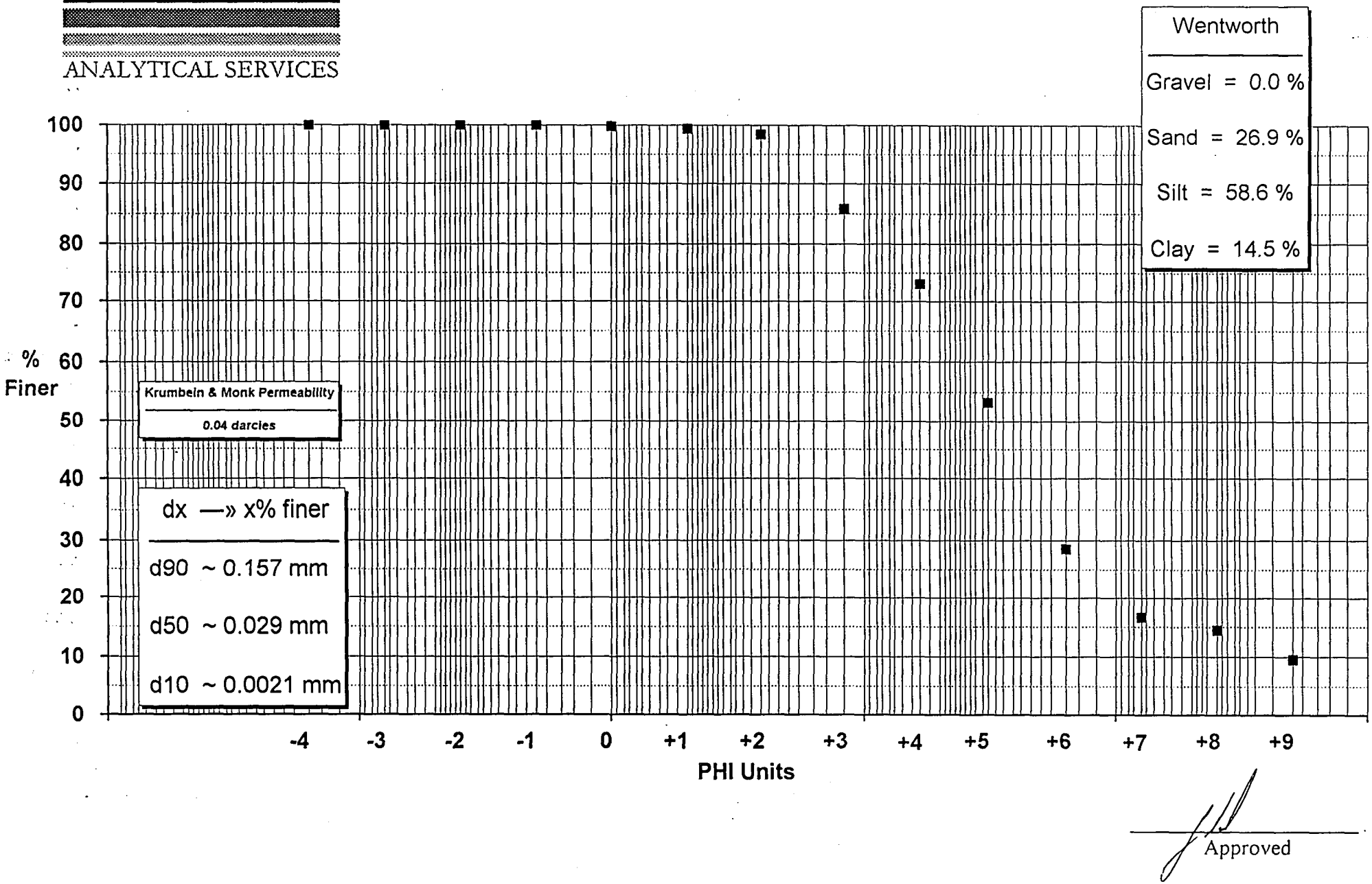
PSC ID: 01-H012521

D9-1056

ANALYTICAL SERVICES

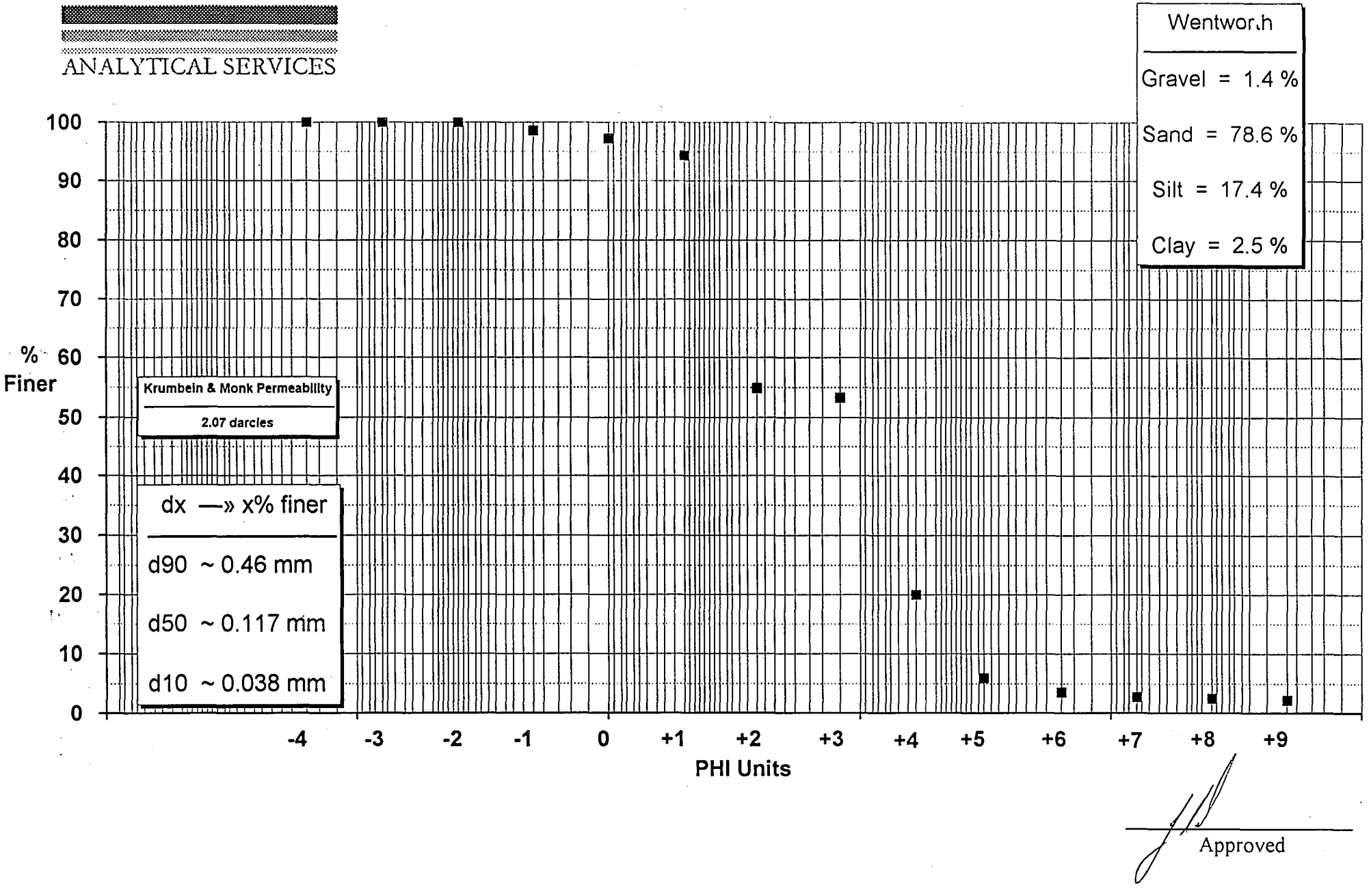


Approved

PSC ID: 01-H012522

D-10 1048

ANALYTICAL SERVICES



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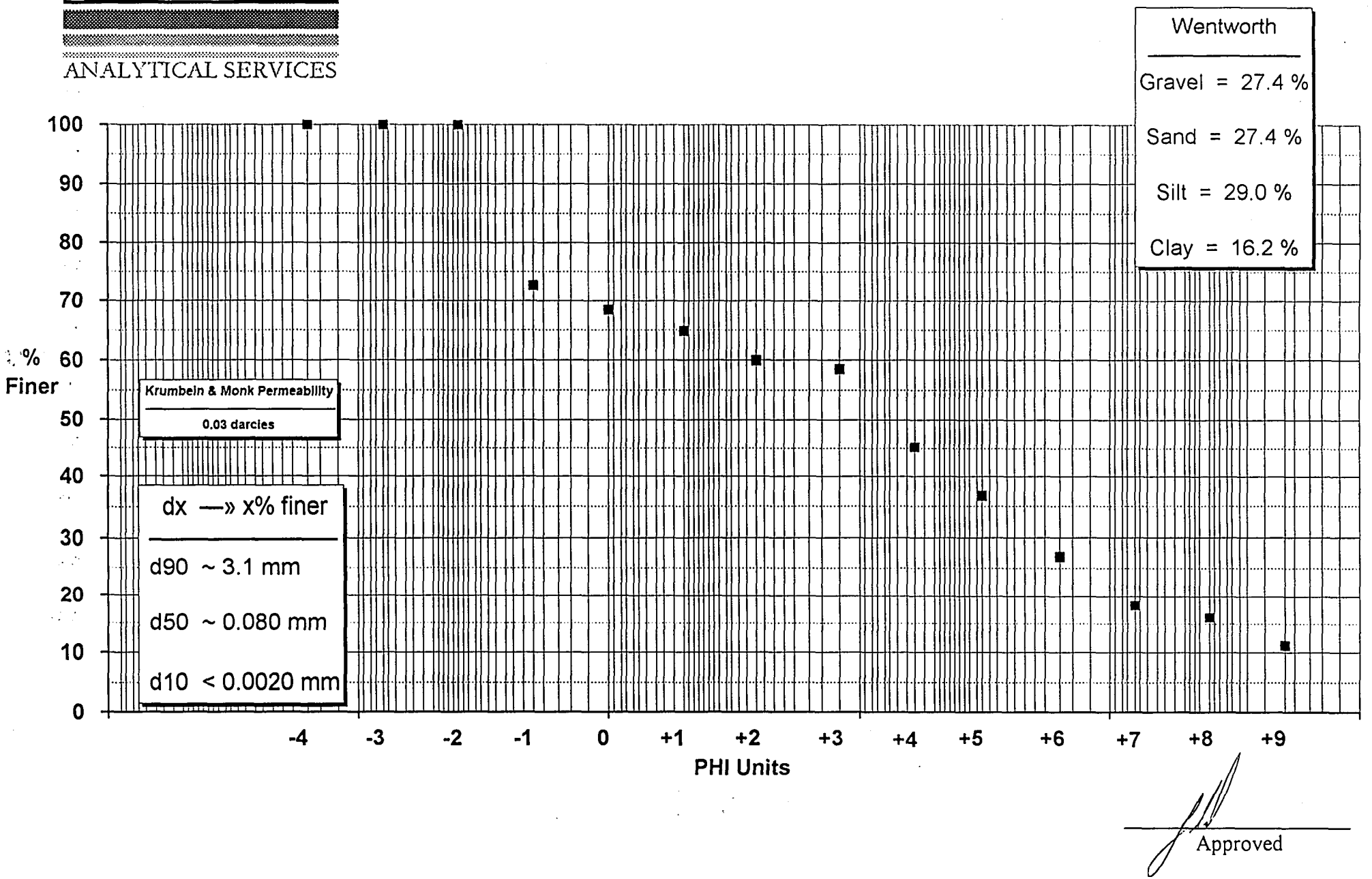
PSC ID: 01-H012523

D-11 1129

ANALYTICAL SERVICES

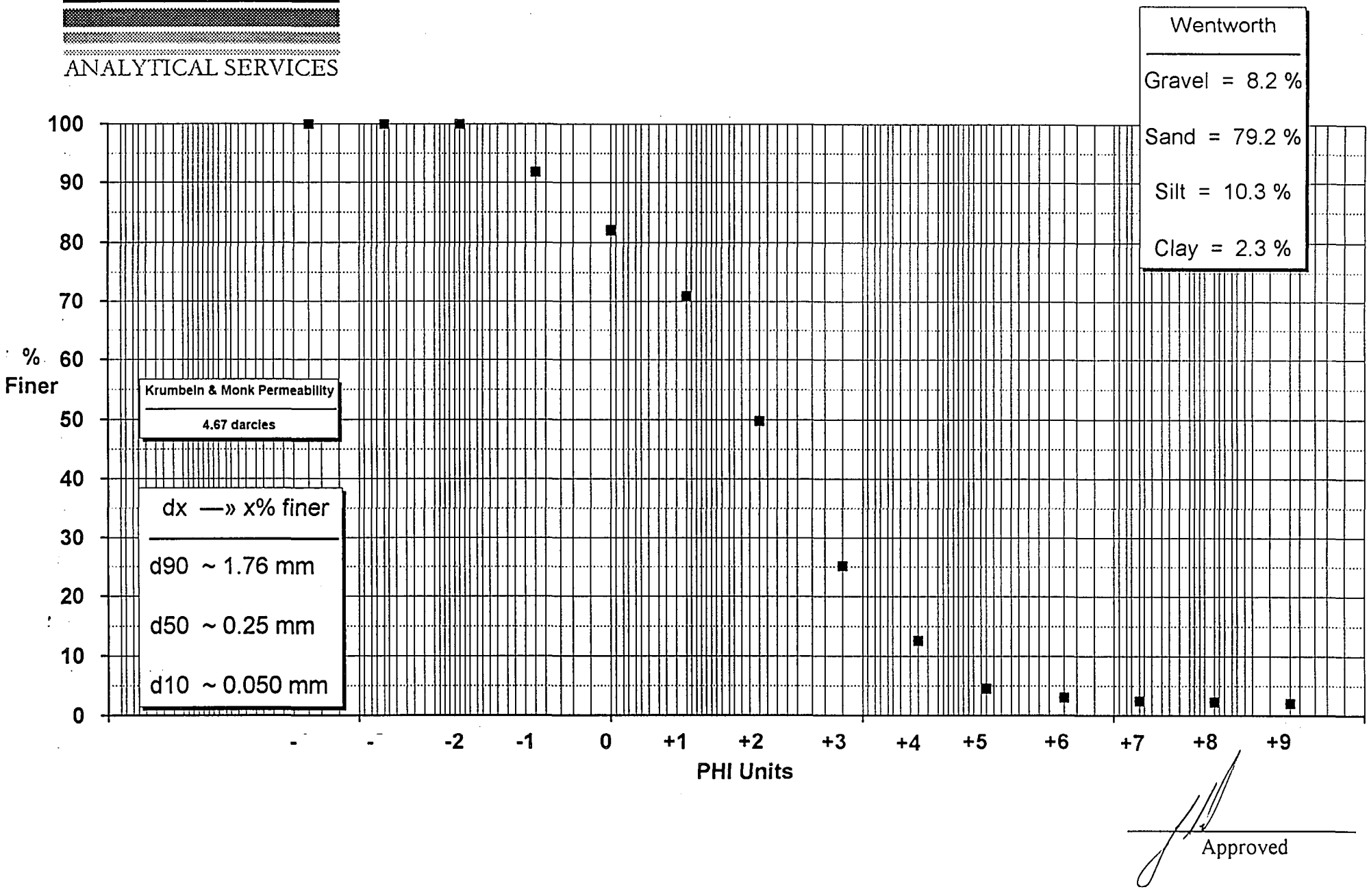


Approved

PSC ID: 01-H012524

Control 1

ANALYTICAL SERVICES

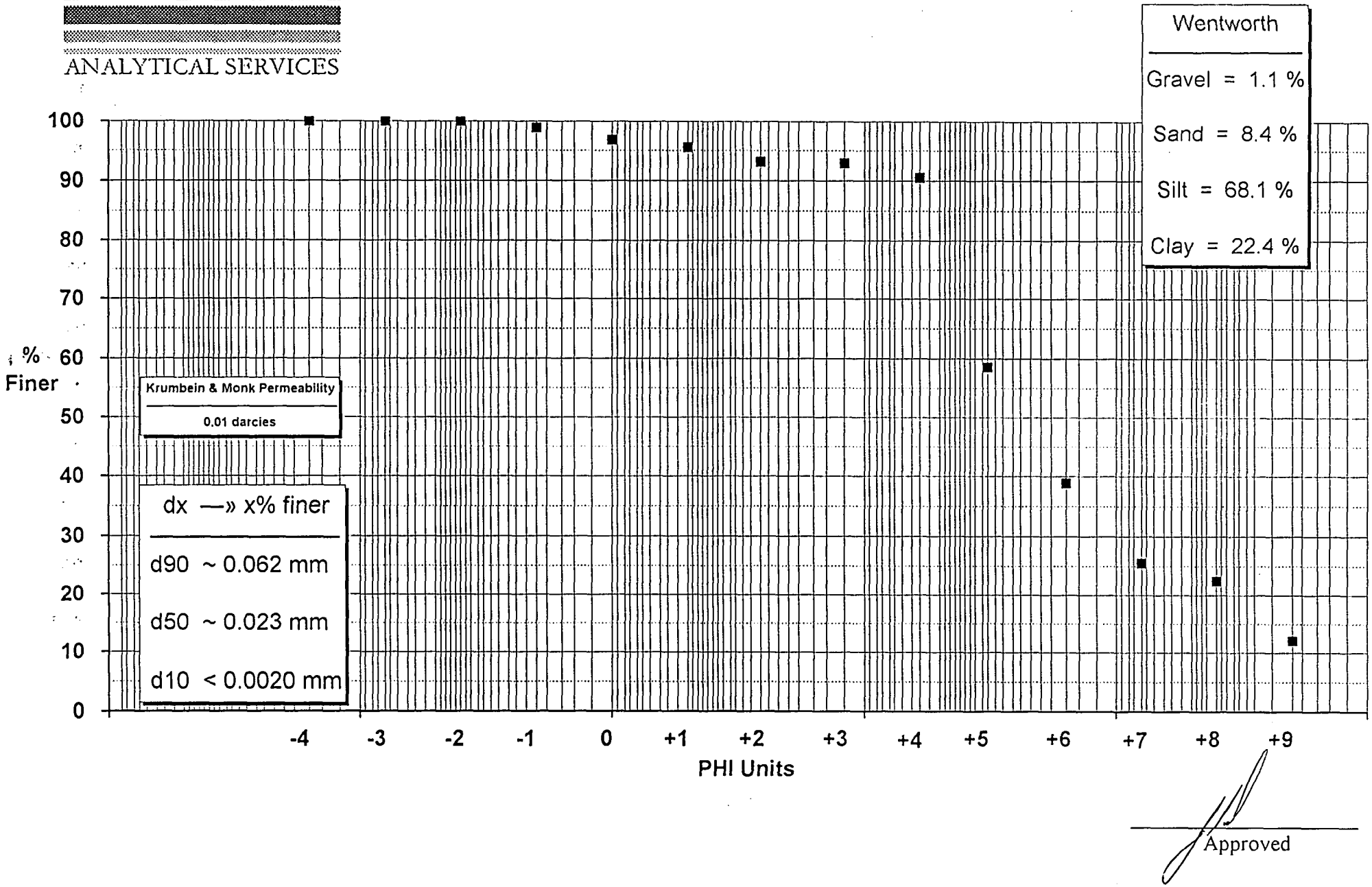


Approved

PSC ID: 01-H012525

PSC
ANALYTICAL SERVICES

Control 2

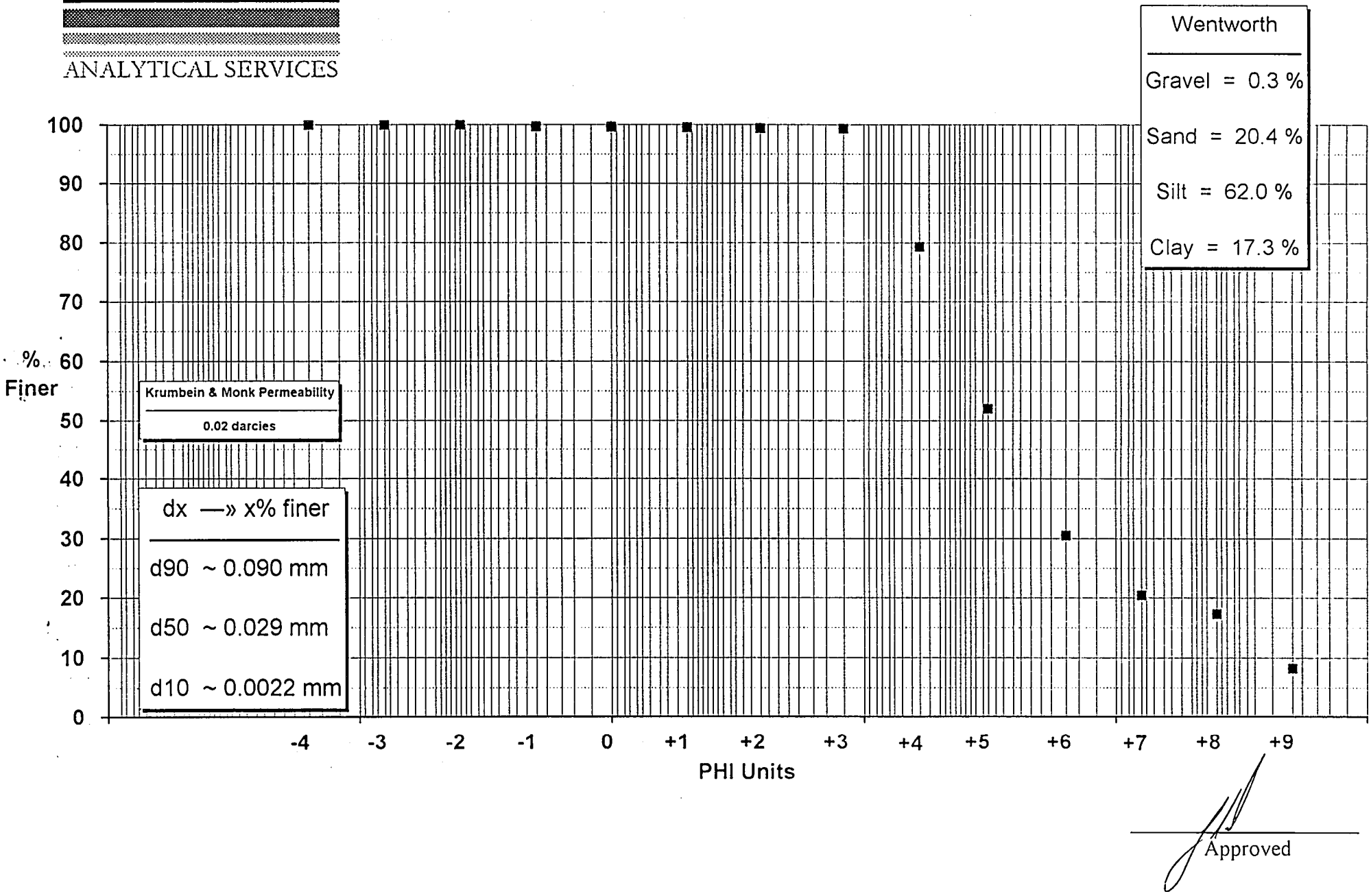


Approved

PSC ID: 01-H012526

PSC
ANALYTICAL SERVICES

Control 3

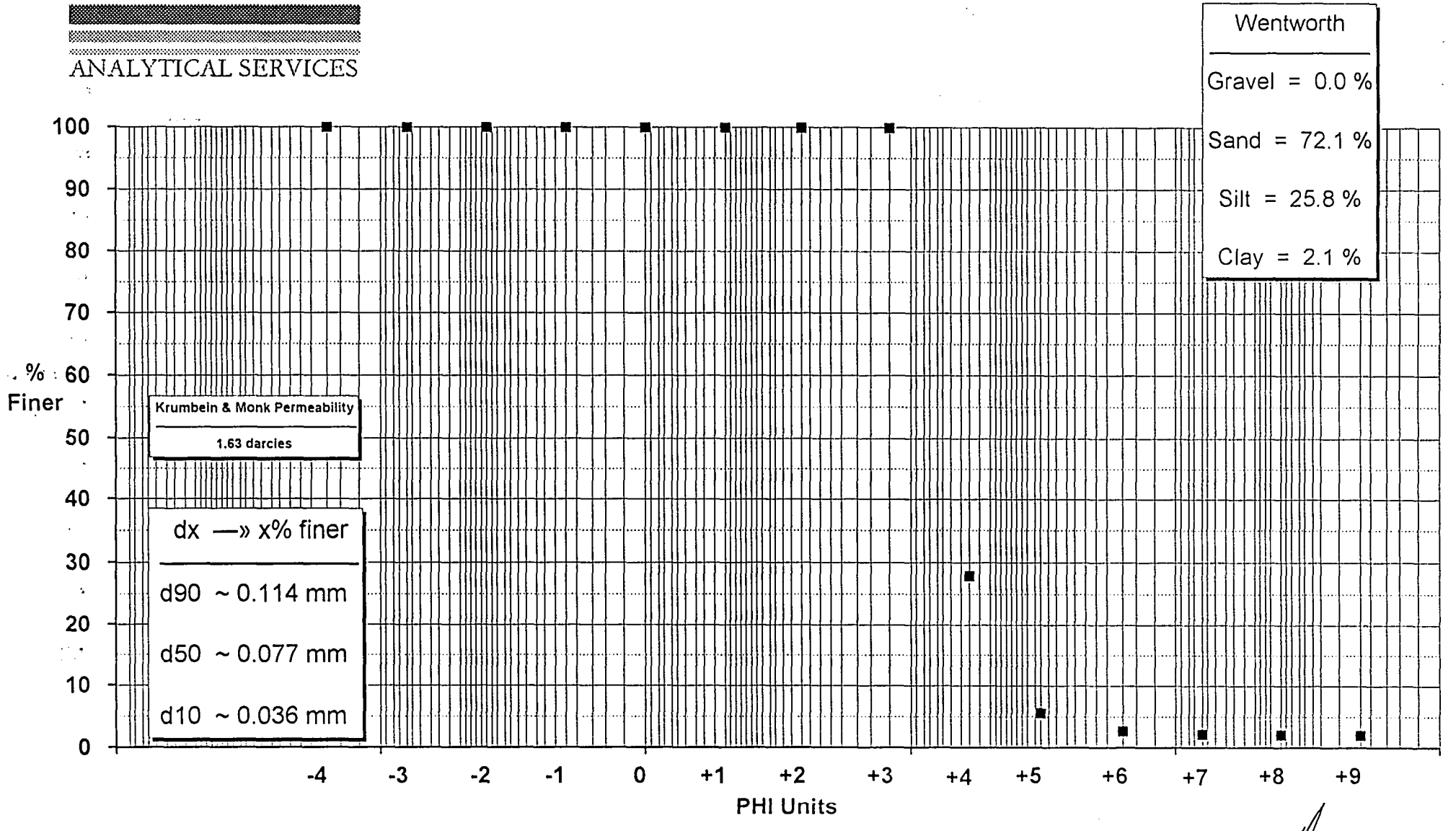


Approved

PSC ID: 01-H012527

ANALYTICAL SERVICES

Control 4

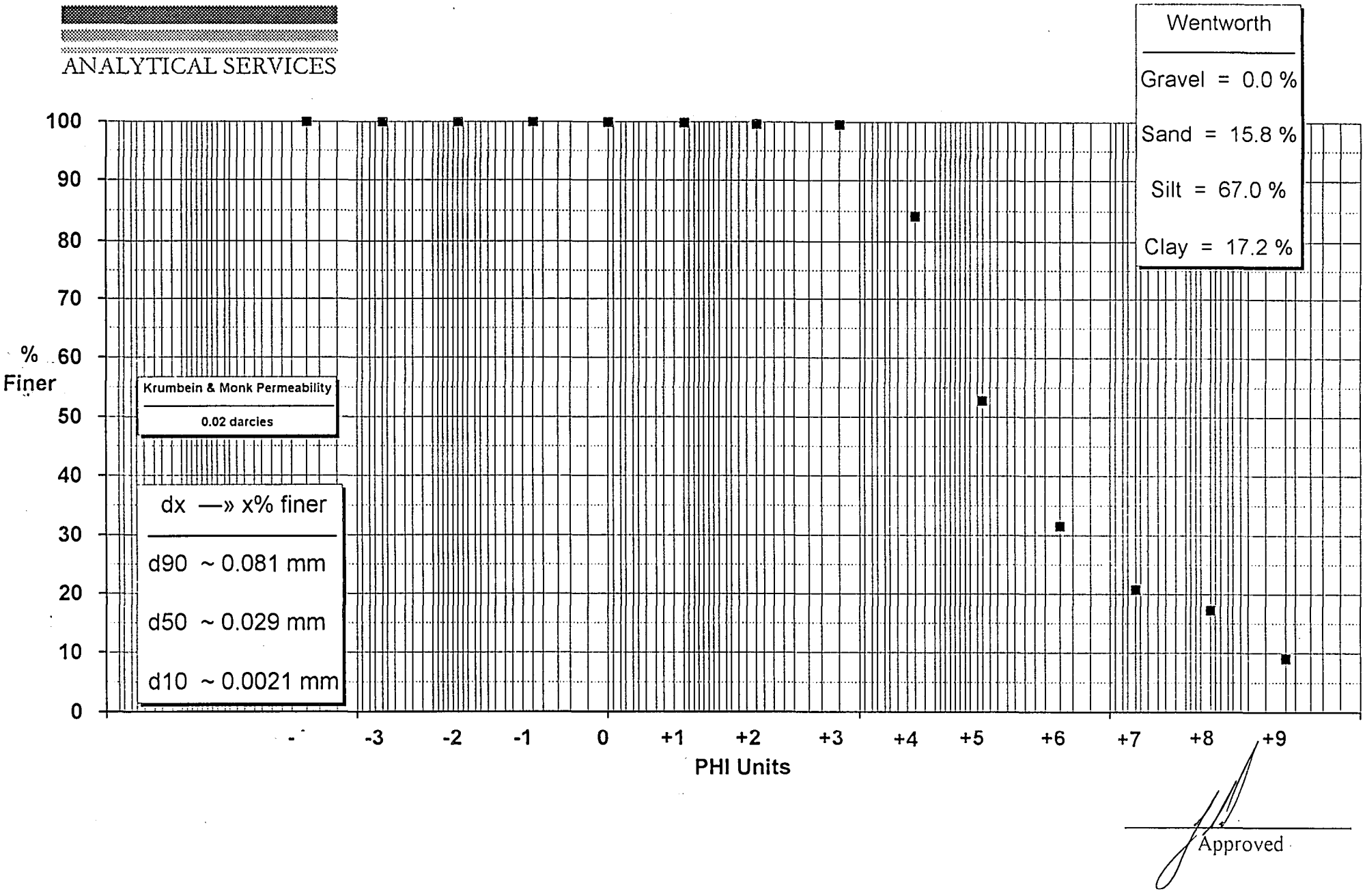


Approved

PSC ID: 01-H012528

ANALYTICAL SERVICES

Control 5

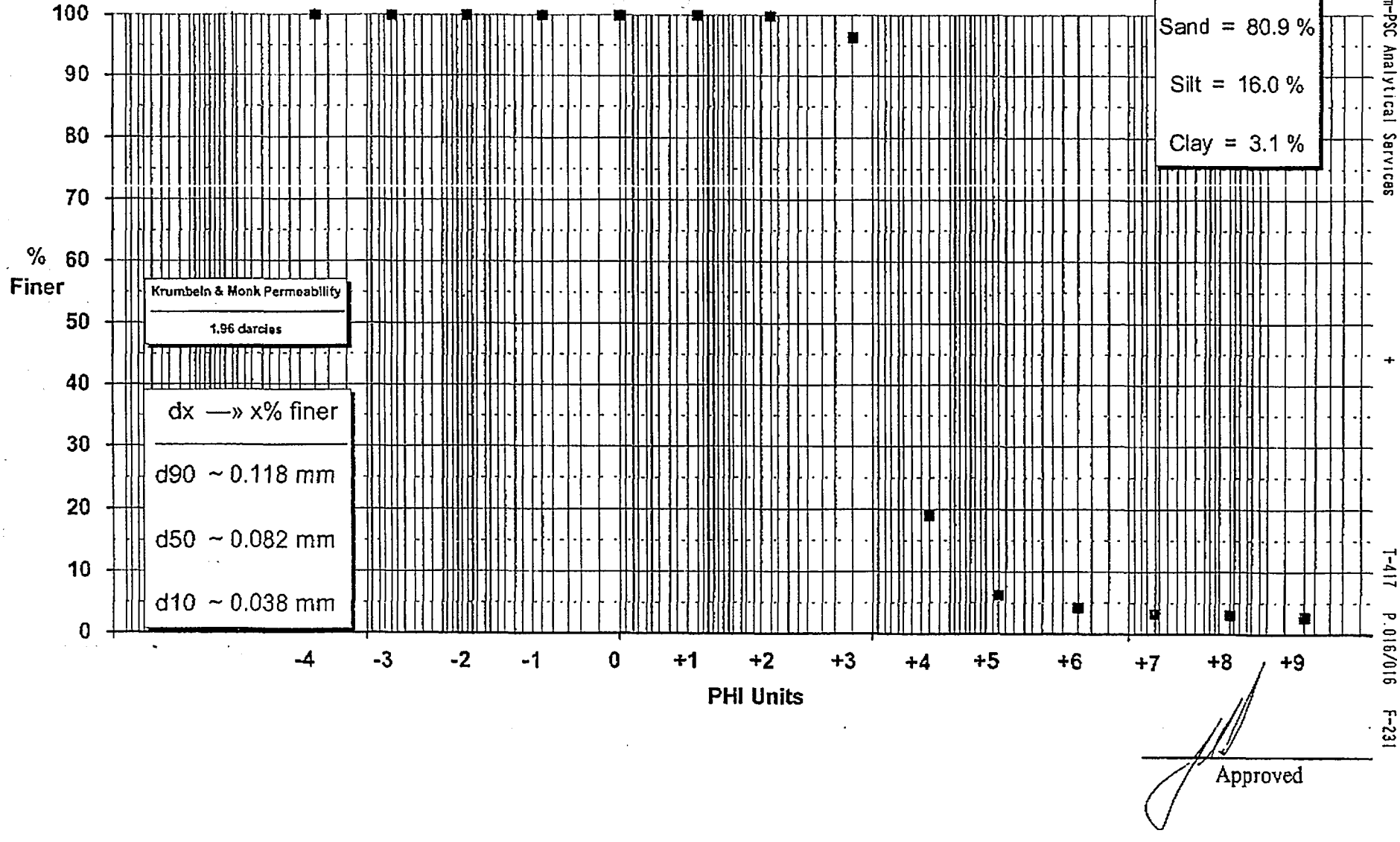


Approved

PSC ID: 01-H012530

ANALYTICAL SERVICES

Control 6 Dup



Approved