MARYS LIBRARY DREDGING FILE

US Army Corps
of Engineers
New York District
26 Federal Plaza
New York, N.Y. 10278
ATTN: Regulatory Branch

Public Notice

In replying refer to:

Public Notice No. 14516-86-939-OD

Published: 3 DEC 91 Expires: 2 JAN 92

TO WHOM IT MAY CONCERN:

The New York District Corps of Engineers has received an application for a Department of the Army permit pursuant to Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403), Section 404 of the Clean Water Act (33 U.S.C. 1344) and Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972, as amended (33 U.S.C. 1413).

APPLICANT: **Celanese Chemical Company, Inc.**
354 Doremus Avenue
Newark, New Jersey 07105

WORK: **Maintenance dredging with ocean disposal and barge overflow**

WATERWAY: **Passaic River**

LOCATION: **City of Newark, Essex County, New Jersey**

A detailed description and plans of the applicant's activity are enclosed to assist in your review.

The decision whether to issue a permit will be based on an evaluation of the probable impact including cumulative impacts of the activity on the public interest. That decision will reflect the national concern for both protection and utilization of important resources. The benefit which reasonably may be expected to accrue from the activity must be balanced against its reasonably foreseeable detriments. All factors which may be relevant to the activity will be considered including the cumulative effects thereof; among those are conservation, economics, aesthetics, general environmental concerns, wetlands, cultural values, fish and wildlife values, flood hazards, flood plain values, land use, navigation, shoreline erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food production and, in general, the needs and welfare of the people.

The Corps of Engineers is soliciting comments from the public; Federal, state, and local agencies and officials; Indian Tribes; and other interested parties in order to consider and evaluate the impacts of this proposed activity. Any comments received will be considered by the Corps of Engineers to determine whether to issue, modify, condition or deny a permit for this proposal. To make this decision, comments are used to assess impacts on endangered species, historic properties, water quality, general environmental effects, and the other public interest factors listed above. Comments are used in the preparation of an Environmental Assessment and/or an Environmental Impact Statement pursuant to the National Environmental Policy Act. Comments are also used to determine the need for a public hearing and to determine the overall public interest of the proposed activity.

ALL COMMENTS REGARDING THE PERMIT APPLICATION MUST BE PREPARED IN WRITING AND MAILED TO REACH THIS OFFICE BEFORE THE EXPIRATION DATE OF THIS NOTICE, otherwise, it will be presumed that there are no objections to the activity.

Any person may request, in writing, before this public notice expires, that a public hearing be held to collect information necessary to consider this application. Requests for public hearings shall state, with particularity, the reasons why a public hearing should be held.

It should be noted that information submitted by mail is considered just as carefully in the permit decision process and bears the same weight as that furnished at a public hearing.

Pursuant to Section 7 of the Endangered Species Act (16 U.S.C. 1531) and based upon a review of the latest published version of the threatened and endangered species listing, a preliminary determination is that the activity under consideration will not affect those species listed or their critical habitat.

Based upon a review of the latest published version of the National Register of Historic Places, there are no known sites eligible for, or included in, the Register within the permit area. Presently unknown archaeological, scientific, prehistorical or historical data may be lost by work accomplished under the required permit.

Reviews of activities pursuant to Section 404 of the Clean Water Act will include application of the guidelines promulgated by the Administrator, U.S. Environmental Protection Agency, under authority of Section 404(b) of the Clean Water Act and the applicant will obtain a water quality certificate or waiver from the appropriate state agency in accordance with Section 401 of the Clean Water Act prior to a permit decision.

Pursuant to section 307(c) of the Coastal Zone Management Act of 1972 as amended (16 U.S.C. 1456(c)), for activities under consideration that are located within the coastal zone of a state which has a federally approved coastal zone management program, the applicant has certified in the permit application that the activity complies with, and will be conducted in a manner that is consistent with, the approved state coastal zone management program. By this public notice, we are requesting the state's concurrence with, objection to, or waiver of the applicant's certification. No permit decision will be made until one of these actions occur. For activities within the coastal zone of New Jersey, the applicant's certification and accompanying information is available from the New Jersey Department of Environmental Protection, Division of Coastal Resources, P.O. Box 1889, Trenton, New Jersey 08625, Telephone No. (609) 292-0060. Any comments on the applicant's certification should be addressed to this state office.

In addition to any required water quality certificate and coastal zone management program concurrence, the applicant has obtained or requested the following governmental authorization for the activity under consideration:

Waterfront Development Permit from the New Jersey Department of Environmental Protection

It is requested that you communicate the foregoing information concerning the activity to any persons known by you to be interested and who did not receive a copy of this notice.

If you have any questions concerning this application, you may contact this office at (212) 264-0184 and ask for Mr. Mark Roth.

FOR THE DISTRICT ENGINEER:

Joseph J. Seebode
Chief, Regulatory Branch

Enclosures

CENAN-OP-RW
APPLICATION NO. 86-0939-OD
PUBLIC NOTICE NO. 14516-86-0939-OD

DESCRIPTION OF WORK

The applicant, the Celanese Chemical Company Inc., proposes to maintenance dredge by clamshell bucket, with barge overflow, approximately 25,000 cubic yards of material in the Passaic River, in the City of Newark, Essex County, New Jersey, to a maximum depth of 28 feet below the plane of mean low water with two feet of allowable overdredge as shown on the attached drawings.

The proposal includes ocean disposal of 25,000 cubic yards of dredged material.

The purpose of the project is to permit the continued use of an existing petrochemical onloading/offloading facility. The permit for the proposed work, if issued, will authorize, on an initial basis only, the dredging as specified in this notice. Any subsequent maintenance dredging during the life of the permit will require that the dredged material comply with the appropriate criteria in effect at that time, and will be dependent upon the availability of an approved disposal site. Consideration is being given to issuance of a three year permit for the dredging with review of compliance with the criteria in effect prior to each disposal.

The dredged material would be transported by dump scows and deposited by bottom dumping process at the Mud Dump Site as designated by the U.S. Environmental Protection Agency (USEPA), as shown on the attached maps. The Mud Dump Site has an area of 2 square miles and an average depth of 72 feet, having its corner points located at:

LATITUDE			LONGITUDE		
40°	23'	48" North	73°	51'	28" West
40°	21'	48" North	73°	50'	00" West
40°	21'	48" North	73°	51'	28" West
40°	23'	48" North	73°	50'	00" West

This site has been used for disposal of dredged material since 1914 and has disposal depths within the site ranging from 50 to 100 feet below mean low water. The U.S. Coast Guard conducts surveillance of ocean dumping at the Mud Dump Site.

It is estimated that since 1976 approximately 7.0 million cubic yards of material have been dumped annually at the present disposal site. The disposal of dredged material has created a mound of sediment at the site which, between 1936 and 1986, has resulted in an accumulation of about 44 feet of material.

Based upon analyses of 10 sediment samples submitted by the applicant, the character of the dredged material is as follows: 3.2% sand, 65.0% silt and 31.8% clay.

EPA Region II under the authority of 40 CFR Section 225.2(b) has requested that liquid phase chemical analysis be performed for mercury, cadmium, PCBs, and petroleum hydrocarbons. The results of this analysis are shown in Table 1.

TABLE 1

Liquid Phase Chemical Analysis Results (ppb)

CONSTITUENTS	D.L.	ELUTRIATE	SITE WATER
Mercury	(0.2)	N.D.	N.D.
Cadmium	(0.1)	N.D.	N.D.
PCB	(0.1)	N.D.	N.D.
Petroleum hydrocarbons	(50.0)	N.D.	N.D.

D.L. - Detection Limits
ppb - parts per billion
N.D. - Not Detected

Bioassay Results: In accordance with EPA's Ocean Dumping Regulations, published in the Register on 11 January 1977, suspended particulate and solid phase bioassays are required for the proposed dredged material utilizing the test species as discussed below.

The suspended particulate phase is considered to be the supernatant remaining after one hour of undisturbed settling of the mixture resulting from a vigorous 30 minute agitation of one part bottom sediment from the dredging site with four parts water collected from the dredging site or the disposal site, as appropriate for the type of dredging operation. The solid phase is considered to be all material settling to the bottom within one hour. For this permit application, natural seawater was substituted for disposal site water in the solid phase bioassay. This substitution conforms with the procedures in the Implementation Manual for the Ecological Evaluation of Proposed Discharge of Dredged Material Into Ocean Waters.

For the suspended particulate phase bioassay, lethal concentrations (LC50s), those concentrations of suspended particulate phase resulting in 50% mortality, were determined for the animal species Acartia tonsa, Mysidopsis bahia and Menidia menidia.

Based on these values, the LPC (Limiting Permissible Concentration) values are determined by applying a safety factor of 100 (0.01 times the critical EC50 or LC50). The material can be considered for disposal only if the concentration of the disposal water in both liquid and suspended particulate phases is diluted to below that of the LPC after 4 hours of initial mixing.

For the suspended particulate phase, Acartia tonsa, was the most sensitive of the three species examined. The LC50 was determined to be 10.8% of the 100% suspended particulate phase after 96 hours. The resulting LPC was therefore determined to be 0.11%.

The dilution of the proposed dredged material after disposal at the Mud Dump Site has been evaluated by use of the Tetra Tech computer model. A description of the model has been published as Technical Report D-78-47 of the Corps' Dredged Material Research Program, and is entitled Evaluation and Calibration of the Tetra Tech Dredged Material Disposal Models Based on Field Data. The New York District requested that a study be conducted which would give example dilutions resulting from typical disposal operations and dredged materials found in the New York District. This study has been completed and is entitled Discussion of Dredged Material Disposal Models and Their Application for the New York District.

Using the constraints in this study most closely approximating those of the disposal operation for this proposed dredged material, the dilution after four hours would be 0.0043%.

The dilution after four hours of 0.0043% is below the LPC of 0.11% for the suspended particulate phases, respectively. Therefore, no constraints on the point disposal or non-point disposal of the dredged material appears warranted.

For the solid phase bioassay, the results are evaluated for biological and statistically significant differences in mortality between test organisms subjected to both proposed dredged sediment and a reference sediment. The reference sediment represents existing background conditions in the vicinity of the dumpsite, but away from the influence of any disposal operation. The Implementation Manual for the Ecological Evaluation of Proposed Discharge of Dredged Material into Ocean Waters, published by USEPA and the Corps of Engineers in July 1977, specifies that differences in survival of the test organisms in the reference and test treatments be evaluated either individually by species or on a pooled community basis. In addition, the Manual has defined the LPC for the solid phase to be exceeded when the difference in mortality between animals in the reference and test sediments is statistically significant and greater than 10 percent.

As indicated in Table 2, differences in mortality between reference and test organisms subjected to the proposed dredged sediment were neither statistically significant at the 95% confidence level nor greater than 10%, on an individual species basis for Mercenaria mercenaria and Nereis virens and on a pooled community basis. There was a statistically significant difference in Paleomonetes pugio mortality, but it was less than 10%.

Body burden analyses of the solid phase organisms surviving the 10 day test to estimate bioaccumulation potential were made for mercury, cadmium, PCBs, and petroleum hydrocarbons. Mean levels for each constituent occurring in the test animals exposed to the proposed dredged material and to the reference sediment are shown in Table 3 below (reference values are in parentheses). Body burden analysis was performed on the test worm Nereis virens surviving the 28 day bioassay. Mean levels of 2, 3, 7, 8-TCDD (dioxin) are also shown in Table 3. Detection limits are shown for each of the chemical constituents analyzed.

TABLE NUMBER 2: BIOASSAY RESULTS APPLICATION NUMBER: 86-0939-OD

Suspended particulate phase (96 Hour Test)

	LC 50 (critical)	LPC after 4 hours	Dilution after 4 hours
Acartia tonsa	10.8%	0.11%	0.0043
Mysidopsis bahia	>100%	1.00%	0.0043
Menidia beryllina	>100%	1.00%	0.0043

Solid Phase (10 days)

	% Survival in reference	% Survival in test	Difference (Reference-Test)	Is difference statistically significant? (p-0.05)
Palaemonetes pugio	96.8	89.2	7.6	YES
Mercenaria mercenaria	100.0	100.0	0.0	NO
Nereis virens	98.0	91.0	7.0	NO
TOTAL COMMUNITY	98.3	93.4	4.9	NO

LC 50-Lethal Concentration resulting in 50% mortality
LPC-Limiting Permissible Concentration (0.01 times the critical LC 50)

TABLE 3

Body Burden Levels (ppm) in Test Species
Ten day test

Constituents	(D.L.)	Palaemonetes pugio	Nereis virens	Mercenaria mercenaria
Mercury	(0.20)	N.D.(N.D.)	N.D.(N.D.)	N.D.(N.D.)
Cadmium	(0.25)	N.D.(N.D.)	N.D.(N.D.)	N.D.(N.D.)
PCB	(0.04)	N.D.(N.D.)	N.D.(N.D.)	N.D.(N.D.)
Petroleum hydrocarbons	(0.10)	N.D.(N.D.)	N.D.(N.D.)	N.D.(N.D.)

Body Burden Levels (pptr)* in Test Species
28 day test

Dioxin (2, 3, 7, 8-TCDD)	(1.00)		17.02(1.08)

ppm - parts per million
*-parts per trillion
D.L. - Detection Limits
N.D. - Not detected

The data listed for the analysis of petroleum hydrocarbons include petroleum compounds plus natural body lipids within the organism. As a result, the values indicated for the test are environmentally conservative.

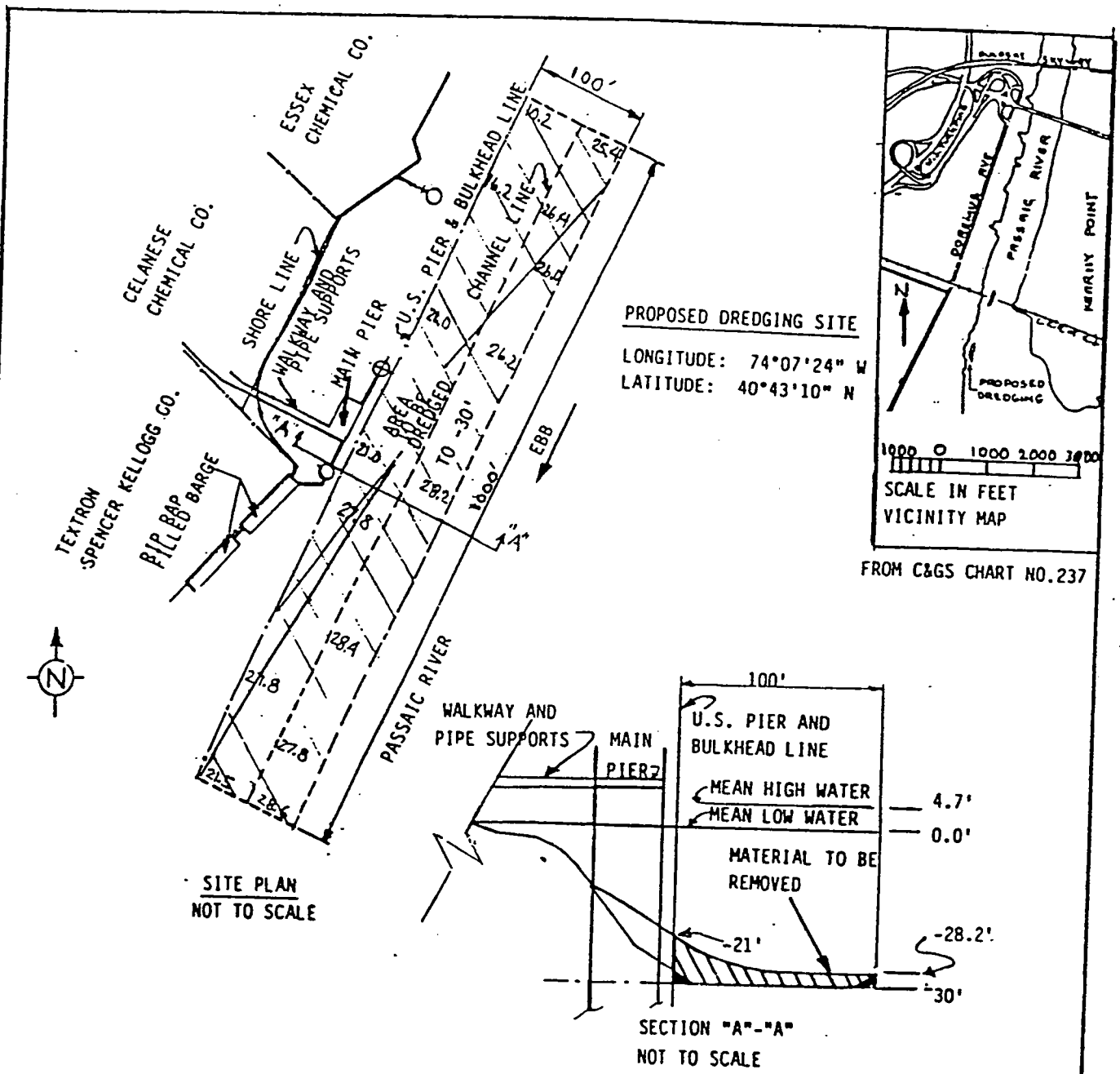
No statistically significant differences in uptake between test and reference species were found for mercury, cadmium, PCBs or petroleum hydrocarbons.

Dioxin was detected in all ten sediment samples in concentrations greater than 1 pptr. Results of the 28 day bioaccumulation testing for the worm, Nereis virens indicate a statistically significant uptake of dioxin by organisms tested in test sediment when compared to worms tested in the reference sediment. An average content of 17.02 pptr was found in test sediment organisms, as opposed to 1.08 pptr in reference organisms.

In summary, the proposed dredged material does not exceed the LPC for the solid phase as defined in the Ocean Dumping Criteria. Interim guidelines have been established which would require de facto capping of the proposed dredged material resulting in up to 25 pptr dioxin in test organism tissue.

The applicant has demonstrated the need for the proposed ocean dumping based on the availability of practicable alternative methods of disposal. As stated in the Criteria (40 CFR 227.16(b)) "...alternative methods of disposal are practicable when they are available at reasonable incremental cost and energy expenditures which need not be competitive with the costs of ocean dumping, taking into account the environmental impacts associated with the use of alternatives to ocean dumping...." The New York District has evaluated the practicability of potential disposal alternatives in a report entitled "Dredged Material Disposal Within the New York District." The alternatives considered include land disposal, use as sanitary landfill cover, disposal in subaqueous borrow pits (and possible capping with clean material), creation of islands and/or wetlands, disposal on beaches or wetlands, transport and placement in deep mines, and incineration. Of these, only land disposal is considered a potentially viable alternative at the present time for the particular material proposed for disposal.

The applicant has evaluated methods of upland disposal of the dredged material as an alternative to ocean disposal stating that there is no vacant land in the vicinity of the project area upon which the dredged material could be disposed of or dewatered. Therefore, it would become necessary to transport this material by truck in a semi-fluid state to some available inland disposal site. If such a site could be found, the applicant has determined that the logistics of dealing with their associated constraints (i.e., drying of material, trucking dumping fees, upland disposal approvals, etc.) would increase the projected cost of the project beyond the point that would make the project economically feasible.



NOTES:

APPROXIMATELY 25,000 CY OF SILT AND MUD TO BE DREDGED BY CLAM SHELL TO ELEVATION -30 FT AND DEPOSITED AT APPROVED MUD DUMP DISPOSAL SITE

PURPOSE: MAINTENANCE OF BERTHING AREA
DATUM: MEAN LOW WATER
ADJACENT PROPERTY OWNERS:

ESSEX CHEMICAL COMPANY
TEXTRON SPENCER KELLOGG COMPANY

STRAUBING & RUBIN
CONSULTING ENGINEERS
SOUTH ORANGE, N.J.

PROPOSED DREDGING AND DISPOSAL

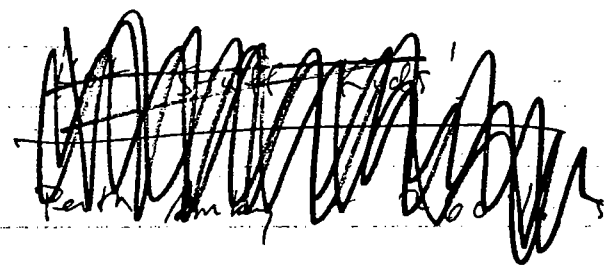
IN: PASSAIC RIVER
AT: NEWARK, NEW JERSEY
COUNTY OF: ESSEX STATE: NEW JERSEY
APPLICATION BY:
CELANESE CHEMICAL COMPANY INC.
NEWARK, NEW JERSEY

SHEET 1 OF 1 DATE 8/15/86

CELANESE

		[2,3,7,8 - TCDD] ppt.		TOC %.
DATE 10-11-87	(1)	270		3.2
	(2)	170	I	3.8
	(3)	160		3.2
	(4)	340		2.8
2-5-88	(1)	150		
	(2)	98		
	(3)	46	II	
	(4)	220		
12-29-88	(1)	135		
	(2)	180		
	(3)	75	III	
	(4)	70		

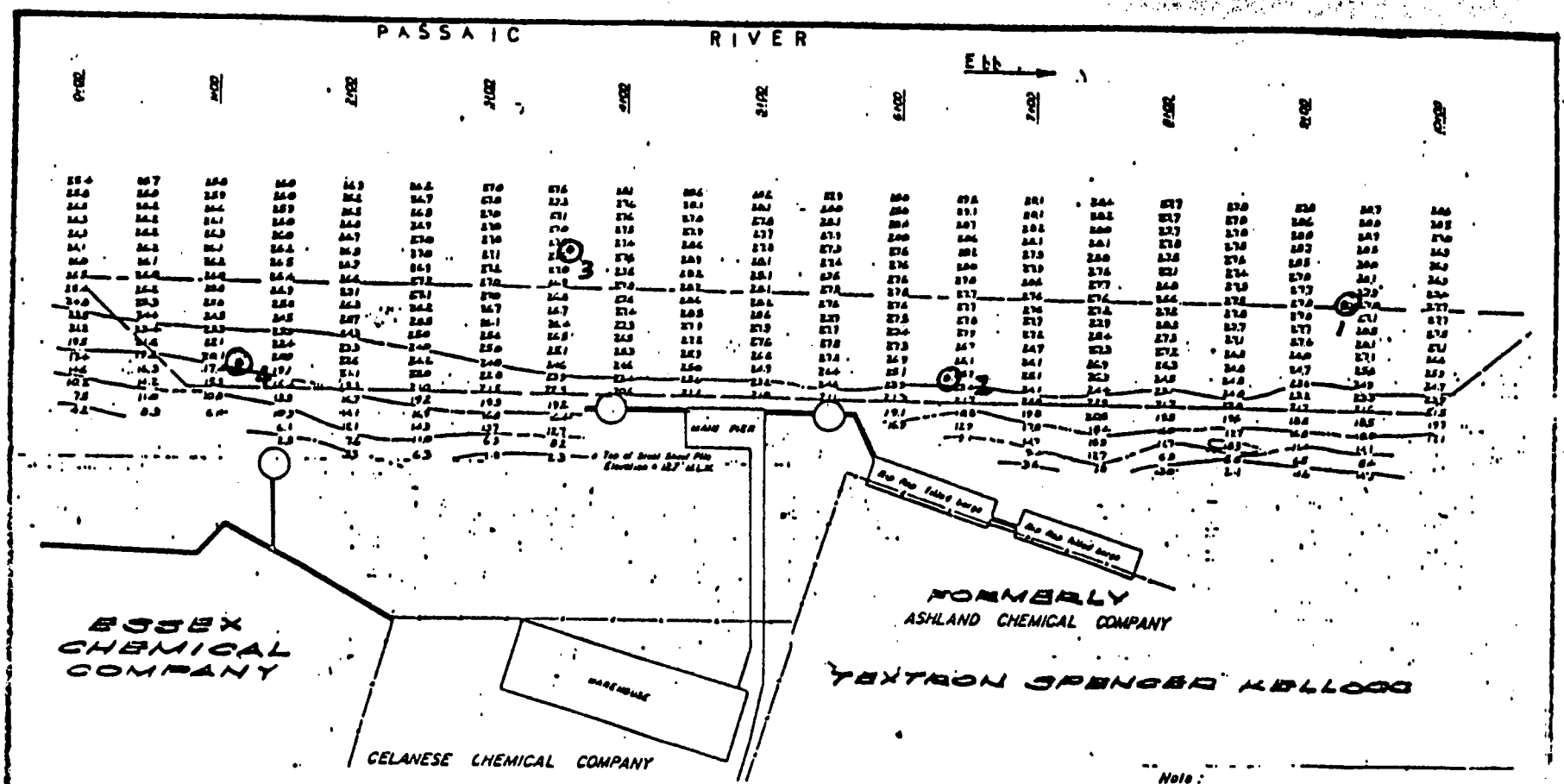
Grain size %
Sand: 8.8
Silt: 65.4
Clay: 25.8



Volume: 25,000 yd³

Chris, celanese went out and sampled 3X.
w/o any authorization from the COE.

-) guess they figured if they would pop enough cores in the Some area - there would be no TCDD left.



Note :
All soundings are in feet and tenths and refer to M.L.W. Datum.

SK-6-86 DS 4/14/86

STRAUBING & RUBIN
CONSULTING ENGINEERS
P. O. BOX 27
SOUTH ORANGE N.J. 07079

MAINTENANCE DREDGING
ALONGSIDE PIER
IN PASSAIC RIVER, NEWARK
ESSEX COUNTY, N.J.

SLUDGE SOUNDINGS
OBTAINED APRIL 28, 1986

CELANESE CHEMICAL CO.

SHEET 2 OF 3

2,3,7,8 - TCDD SAMPLING HISTORY 1986-1990

CELANESE CHEMICAL

PASSAIC RIVER: KEARNY PT REACH

RIVER MI 1. [redacted] - WEST BANK

VOLUME: 25000 cy.

— in pg/g (parts per trillion)

Sample date: Oct. 10, 1986 — Sediment (wet wt.) — 1) ND 2) ND 3) ND 4) ND (DL = .1 ppb)

Samples: 4

Sample Date: ~~Dec. 11~~ Oct. 7, 1987 — Sediment ~~wet~~ (dry wt) — 1) 270 2) 170 3) 160 4) 340 — $\bar{x}$ = 235.00 — σ = 85.83

Samples: 4

Sample Date: Dec. 18, 1987 — Sediment (dry wt) — 1) 130 2) 180 3) 75 4) 70 — $\bar{x}$ = 113.75 — σ = 51.86

Samples: 4

Sample Date: Feb. 5, 1988 — Sediment (dry wt.) — 1) 150 2) 98 3) 46 4) 220 — $\bar{x}$ = 128.50 — σ = 74.32

Samples: 4

Sample Date: Oct 28/Nov 1, 1988

Samples: 10

	Sediment [redacted]		Tissue:	
1)	26.77		1)	8.72
2)	57.21		2)	7.95
3)	113.70	$\bar{x}$ = 38.27	3)	4.67
4)	35.59	σ = 30.90	4)	7.35
5)	20.15		5)	9.57
6)	24.25			$\bar{x}$ = 7.65
7)	7.30			σ = 1.86
8)	9.66			
9)	48.22			

Sample Date: June 12-14, 1990

Samples: 10

	Sediment (dry):		Tissue (wet):
1)	420		1) 17.30
2)	230		2) 13.90
3)	170	$\bar{x}$ = 267.90	3) 17.30
4)	410	σ = 122.05	4) 18.00
5)	360		5) 18.60
6)	230		$\bar{x}$ = 17.02
7)	190		σ = 1.83
8)	240		
9)	350		

Celanese: Sampled: June 12 + 14, 1990

C. Chemical Testing
The results of the bulk sediment analyses are reported in Table 3.A.

Table 3.A

Bulk Sediment Analyses
Concentrations Based on Dry Weight.

Sample	Cu (mg/kg)	Ni (mg/kg)	Zn (mg/kg)	TOC % by wt.	2,3,7,8-TCDD ug/kg = ppb x 1000 = ppt.
core 1	241	46.8	551	5.2	0.42 = 420
core 2	177	35.2	334	3.8	0.23 = 230
core 3	172	38.6	350	3.8	0.17 = 170
core 4	288	48.5	582	4.4	0.41 = 410
core 5	184	37.0	345	3.6	0.36 = 360
core 6	140	30.8	264	3.4	0.23 = 230
core 7	176	38.8	313	4.1	0.19 = 190
core 8	206	42.1	377	3.8	0.24 = 240
core 9	147	34.2	308	4.6	0.35 = 350
core 10	179	36.7	430	4.7	0.25 = 250

* Wastewater Sample — ND

$\bar{x} = 267.90$
$\sigma = 122.05$
range = 170 - 420

Detection limit of metal analyses was 1.0 mg/kg. (dry weight basis)
Detection limit of dioxin analyses was 1.0ng/kg.
* Detection limit for wastewater sample 0.005ng/l

asi 499 Point Breeze Road • Flemington, New Jersey 08822 • Telephone (201) 788-8700 FAX (201) 788-9165

Table 3.B

Nereis virens Tissue Analysis for 2,3,7,8-TCDD
Animals exposed for 28 days

Sample	Replicate	Concentration (ppt)*
pretest	1	<1.0
	2	<1.0
	3	<1.0
reference	1	1.40
	2	1.20
	3	0.99
	4	0.88
	5	0.95
test	1	17.30
	2	13.90
	3	17.30
	4	18.00
	5	18.60

$\bar{x}$ = 17.02
σ = 1.83
range = 13.9 - 18.6

* parts per trillion

asi 499 Point Breeze Road • Flemington, New Jersey 08822 • Telephone (201) 788-8700 FAX (201) 788-9165

12 November 1991

CENAN-OP-W

MEMORANDUM FOR: Chief, CENAN-OP-R

SUBJECT: Review of bioassay/bioaccumulation testing to determine suitability for ocean disposal for Appl. No. 86-0939-OD, Celanese Chemical Corp., Passaic River, Newark NJ

1. Reference is made to your request to review retest data for the subject project. CENAN-OP-W has finished reviewing the data. Our findings are enclosed.

2. Results of bioassay testing indicated that the proposed sediment meets the Limiting Permissible Concentration (LPC) for suspended particulate and solid phases. Ten-day bioaccumulation testing for the usual set of contaminants (mercury, cadmium, petroleum hydrocarbons and PCBs) showed that the sediment had no detectable bioaccumulation potential for these contaminants.

3. Since the project is located in the Passaic River, the sediment was also tested for the presence of 2,3,7,8-TCDD, i.e., dioxin. Dioxin was detected in all ten sediment samples, ranging in concentration from 220 to 530 parts per trillion (pptr). Results of 28-day bioaccumulation testing using the sandworm Nereis virens indicate a statistically significant uptake of 2,3,7,8-TCDD by organisms tested in test sediment when compared to worms tested in reference sediment. An average content of 17.02 pptr was found in test sediment organisms, as opposed to an average 1.08 pptr in reference organisms. Tables summarizing the test results are attached.

4. Calculations of the intentional barge overflow indicate that it will be diluted to an environmentally acceptable level within an acceptable period of time.

5. Based on the testing described above, CENAN-OP-W recommends de facto capping of the proposed sediment upon disposal at the Mud Dump Site. The Federal Interagency Dioxin Steering Committee has not yet reached consensus. However, interim guidelines have been established which require de facto capping of sediments resulting in up to 25 pptr dioxin in test organism tissue.

6. Please forward the Draft Public Notice to CENAN-OP-W for review prior to issuance.

FILE COPY
BIXBY/YAREMKO/OLHA

7. If you have any further questions, please contact me or Joe Olha of my staff at x5621.

MONTE GREGES
Chief, Water Quality
Compliance Branch

Enclosure

OLHA
11/7/91
11/12/91
GREGES
12 Nov

DISPOSITION FORM

For use of this form, see AR 340-15; the proponent agency is TAGO.

Applⁿ # 86-0939-OD

REFERENCE OR OFFICE SYMBOL	SUBJECT
CENANOP-W	Review of Bioassay Data: Celanese Chemical Corp. Passaic River Newark, NJ

TO MEMO FOR THE RECORD FROM C, Water Quality Compliance Branch DATE 4 March 91 CMT 1

P. Bigsby

YAREMKO 4 Nov 1991

1. Enclosed is an interpretive summary of results of three-phased bioassays performed on dredged material composited from 10 sampling sites (shown on inclosed map) located right bank of Passaic River, Newark, NJ. Bioassays were run in accordance with "Ecological Evaluation of Proposed Discharge of Dredged Material into Ocean Waters", which is the Implementation Manual for Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972. At the time that samples were collected, the 21 December 84 edition of the NYD/EPA Region 2 Guidance Manual was in effect.

2. Bioassays were performed by AQUASURVEY, INC (NYTEST - Analytical *). Samples were collected on 12 and 14 June 90 and test results were completed on 24 October 90.

3. All samples consisted of cores to project depth. According to the testing laboratory's report, stratification was not observed in sample cores. Grain size analyses indicate the proposed material to average: 3.2 % sand
65.0% silt
31.8% clay

4. Analysis of the results for the three phases indicates that the LPC for this ıterial is within acceptable limits as defined in the EPA Ocean Dumping Regulations ıd the Corps/EPA Implementation Manual.

5. Results of bioaccumulation analyses performed on organisms surviving the solid phase testing are also inclosed.* An evaluation of these data indicates that the proposed dredged material does not exhibit an environmentally significant bioaccumulation potential.

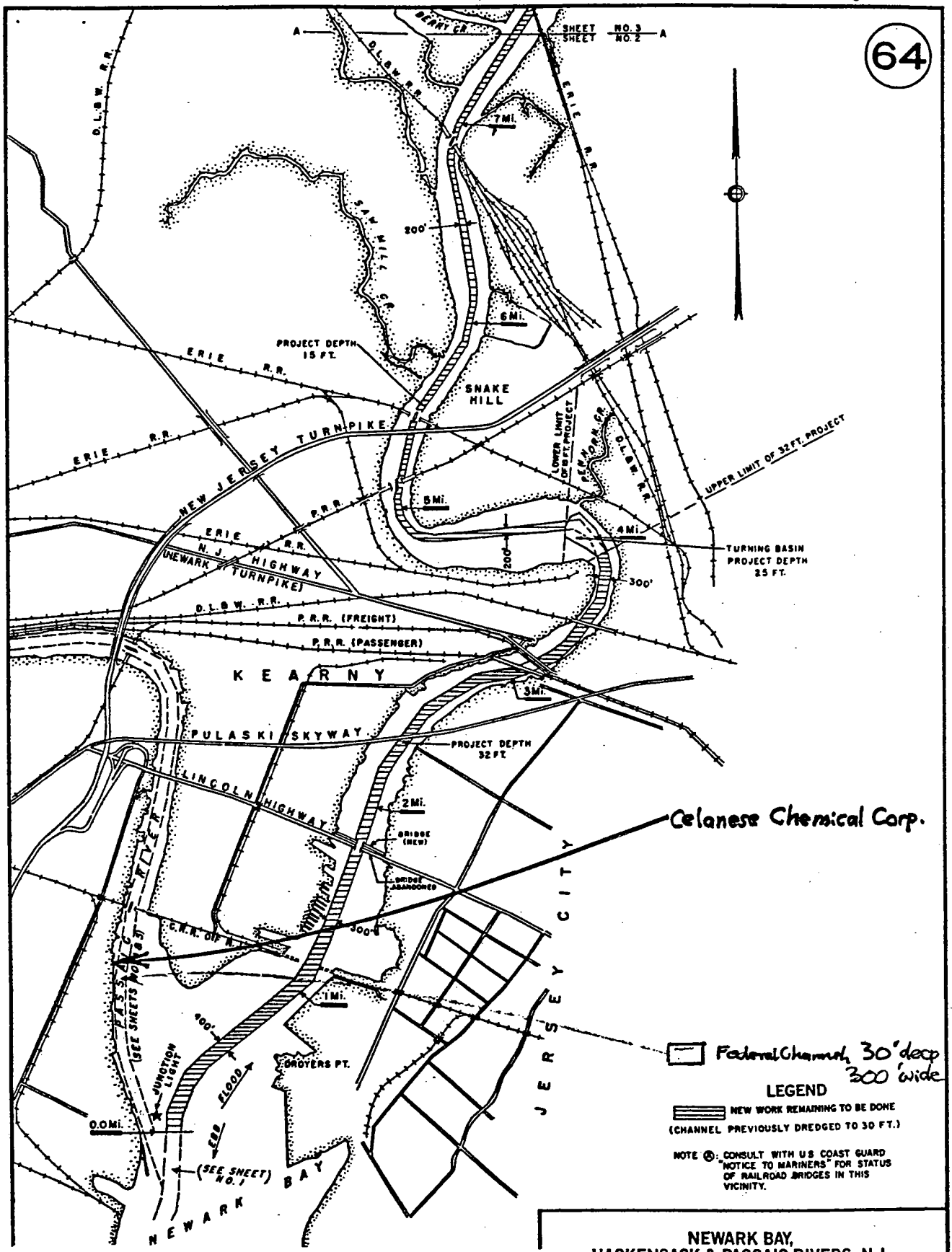
Incl
as

MONTE GREGES
Chief, Water Quality Compliance Branch

* 28-Day bioassay and bioaccumulatory were performed by Aqua Survey. ~~and~~ Bulk sediment analyses for 2,3,7,8-TCDD dioxin were done by Triangle Laboratories, Inc. in accordance with EPA Environmental Research Lab Narrangasett, 12 March 90 Final Report & U.S. Army Corps of Engineers, USOE Procedures approved by the Corps of Engineers.

GOVERNMENT PRINTING OFFICE: 1982-372-711

Appl. # BG-0739.0D, Celanese (Map 1 of 2)



Enclosure 1. Location map of Celanese Chemical Corporation Newark Terminal Wharf, and adjacent Federal channel.

NEWARK BAY,
HACKENSACK & PASSAIC RIVERS, N.J.
(HACKENSACK RIVER)

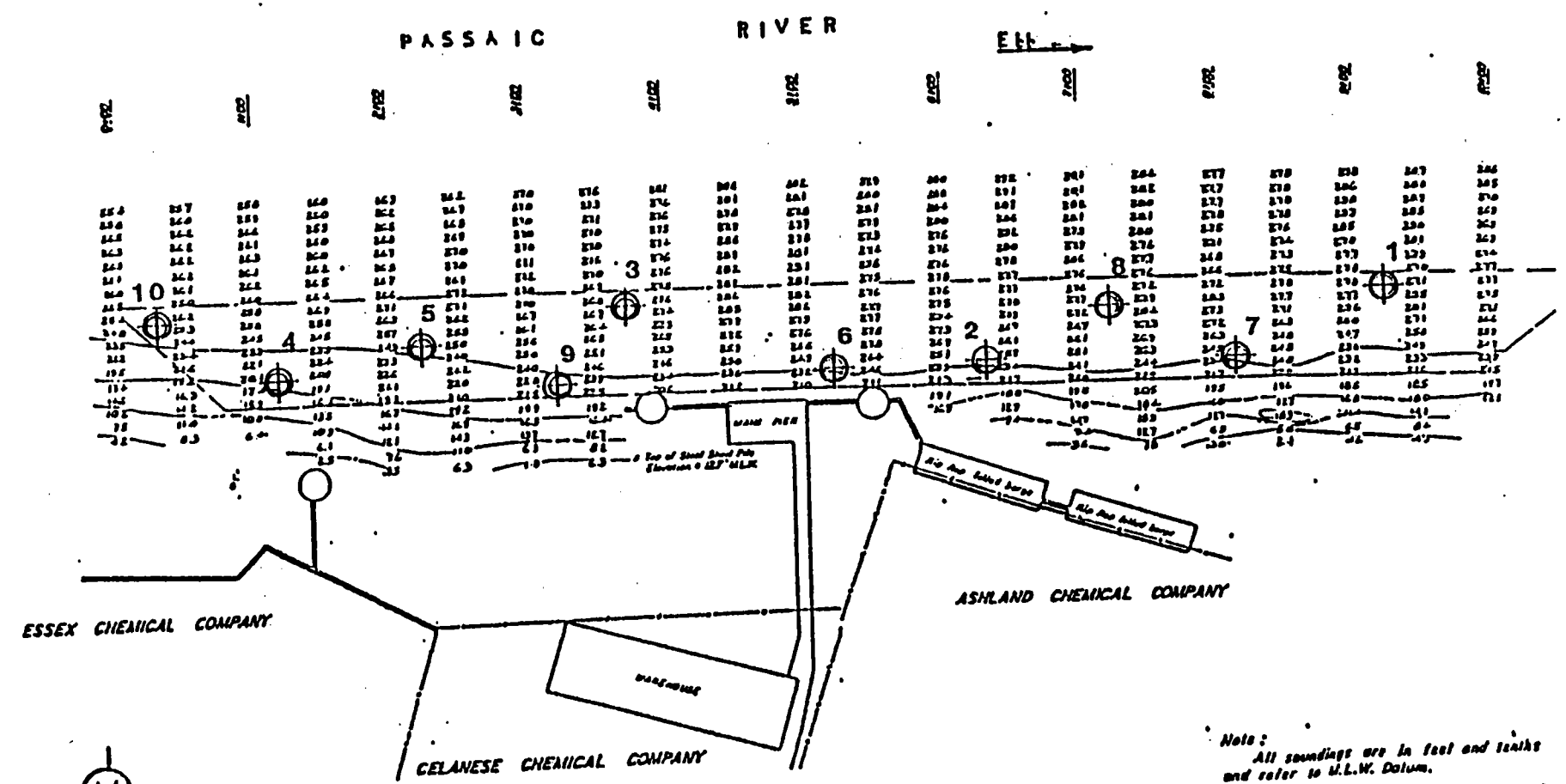
30 SEPTEMBER 1986

SCALE OF FEET
2000 0 2000

DEPARTMENT OF THE ARMY
NEW YORK DISTRICT, CORPS OF ENGINEERS
NEW YORK, NEW YORK

(SHEET NO. 2 OF 5 SHEETS)

Appl. #86-0939-OD, Celanese (Map 2 of 2)



Sample locations map. Samples taken 12 and 14 June, 1990.

Note: All soundings are in feet and tenths and refer to M.L.W. Datum.

SK-6-86 DS 1/14/86

PROJECT DEPTH = -30' MLW
BY

2 = SAMPLING LOCATIONS FOR BIOASSAY/BIOACCUMULATION TESTING.

Susan Yamula
CENAN-OP-WS
4 May 90

SLUDGE SOUNDINGS OBTAINED APRIL 23, 1986

APPLICATION FOR PROPOSED DREDGING AND DISPOSAL
IN: PASSAIC RIVER
AT: NEWARK, NEW JERSEY
COUNTY OF: ESSEX, STATE: N
APPLICATION BY:
CELANESE CHEMICAL COMPANY
T, NEW JERSEY

SH. 2 OF 3 DATE 8/15/86

Applicant: Passaic R.; Newark

Table 1. BIOASSAY RESULTS (1 of 2)

	LC_{50} or EC_{50} (critical)	LPC after 4 hours	DILUTION after 4 hours (TetraTech #12 model)
LIQUID PHASE (96-hour test)	(LIQUID PHASE TESTING NOT REQUIRED)		
Skeletomena costatum			
Mysidopsis bahia			
Menidia menidia			
SUSPENDED PHASE (96-hour test)			
Acartia tonsa	10.8 % ✓	0.11 % ✓	0.0043 %
Mysidopsis bahia	> 100 %	1.0 %	0.0043 %
Menidia menidia	> 100 %	1.0 %	0.0043 %

LC_{50} - Lethal Concentration resulting in 50% mortality
EC_{50} - Effective Concentration resulting in 50% inhibition (applies to phytoplankton)
LPC - Limiting Permissible Concentration (0.01 times critical EC_{50} or LC_{50})

SOLID PHASE (10-day test)	% SURVIVAL			COMPARISON OF REFERENCE & TEST SEDIMENT							
	Control $\bar{X}$ S	Reference $\bar{X}_R$ S_R	Test $\bar{X}_T$ S_T	$\bar{d} = \lvert\bar{X}_R - \bar{X}_T\rvert$	$S_{\bar{d}} = \sqrt{\frac{S_R^2 + S_T^2}{n}}$	calculated $t = \left(\frac{\bar{d}}{S_{\bar{d}}}\right)^2$	n	k	$\nu = k(n-1)$	Table t	Is difference statistically significant*
Paleomonetes pugio	92.3 (4.04)	96.8 (1.30)	89.2 (3.03)	7.6	1.475	26.6	5	2	8	5.318	Yes
Mercenaria mercenaria	100 (0)	100 (0)	100 (0)	0	0	0	5	2	8	5.318	(N/A)
Nereis virens	98.3 (2.89)	98.0 (2.74)	91.0 (6.52)	7.0	3.163	4.90	5	2	8	5.318	No
Total Community	96.9 (4.28)	98.3 (2.12)	93.4 (6.22)	4.90	2.939	2.780	15	2	28	4.194	No

organisms/species/replicates = 20/3/5 except 3 replicates on control and 100 of *P. pugio* organisms
replicates
3 control; 5 otherwise
Total # organisms/test
500 *P. pugio*
100 *M. mercenaria*
100 *N. virens*

* - significant at 95% confidence level[11]
S_C ~~SD_C~~ - standard deviation of control
S_T ~~SD_t~~ - standard deviation of test sediment
$S_{\bar{d}}$ ~~SD_d~~ - standard deviation of difference between means
ν ~~D.F.~~ - degrees of freedom
S_R ~~SD_r~~ - standard deviation of reference sediment

[11] FOR NO INDIVIDUAL SPECIES NOR FOR TOTAL COMMUNITY IS THE MAGNITUDE OF THE DIFFERENCE > 10% i.e. the average test survivals are not more than 10% less than the average reference survivals.

OK JO 3/12

Table 1. BIOASSAY RESULTS (2 of 2)

BIOASSAY FOR DIOXIN TESTING

Celanese Chemical Corp

Passaic River, Newark

Terminal Wharf

SOLID PHASE (28-day test)	% SURVIVAL			COMPARISON OF REFERENCE & TEST SEDIMENT								
	Control $\bar{X}$ (S_C)	Reference $\bar{X}_R$ (S_R)	Test $\bar{X}_T$ (S_T)	$\bar{d} = \lvert\bar{X}_R - \bar{X}_T\rvert$	$S_{\bar{d}} = \sqrt{\frac{S_R^2 + S_T^2}{n}}$	calculated $t = \left(\frac{\bar{d}}{S_{\bar{d}}}\right)^2$	n	k	$\nu = k(n-1)$	Table t	Is diff. Statistic significa*
Nereis virens	98.3 (2.89)	99.0 (2.24)	100 (0)	1.0	1.002	0.996	5	2	8	5.318	No

\# replicates 5

Total # organisms/test 3 control
5 reference & test

* - significant at 95% confidence level
S_C - standard deviation of control
S_T - standard deviation of test sediment
$S_{\bar{d}}$ - standard deviation of difference between means
ν - degrees of freedom
S_R - standard deviation of reference sediment

Table 3. SUSPENDED PARTICULATE PHASE BIOASSAY RESULTS (96 hr test)

Applicant: Celanese Chemical Corp. Passaic River, Newark

Acartia tonsa (copepod)

% Survival

Test Concentrations	Control ✓	10%	50%	100%	LC_{50}
4 hr	100	97	TTTC*	TTTC*	-
8 hr	100	97	43	2	35.6
24 hr	100	80	15	0	18.1
48 hr	98	73	2	-	14.2
72 hr	93	63	0	-	11.4
96 hr	80	57	0	-	10.8

(# organisms/test)

Mysidopsis bahia (mysid shrimp) ✓

% Survival

Test Concentrations	Control	10%	50%	100%	LC_{50}
4 hr	100	100	100	100	> 100
8 hr	100	100	100	100	> 100
24 hr	100	98	100	100	> 100
48 hr	100	98	100	98	> 100
72 hr	100	98	100	95	> 100
96 hr	100	98	98	95	> 100

(# organisms/test)

Menidia menidia (fish) ✓

% Survival

Test Concentrations	Control	10%	50%	100%	LC_{50}
4 hr	100	100	TTTC	TTTC	> 100
8 hr	100	100	100	TTTC	> 100
24 hr	98	100	98	100	> 100
48 hr	97	100	97	97	> 100
72 hr	92	98	97	87	> 100
96 hr	90	98	97	87	> 100

(# organisms/test)

LC_{50} - Lethal Concentration resulting in 50% mortality

* TTTC = Too Turbid to Count

NO. 3128. LOGARITHMIC PROBABILITY. DESIGNED BY HAZEN, WHIPPLE & FULLER. codex GRAPH PAPER ® IN STOCK DIRECT FROM CODEX BOOK CO., NORWOOD, MASS. 02062 PRINTED IN U.S.A.

Organism: A. tonsa Phase: Suspended phase Applicant: Celanese Chemical Corp. Passaic River, Newark

% SURVIVAL

99.99 99.9 99.8 99.5 99 98 95 90 80 70 60 50 40 30 20 10 5 2 1 0.5 0.2 0.1 0.05 0.01

% CONCENTRATION

90 80 70 60 50 40 30 20 10 9 8 7 6 5 4 3 2 1

0.01 0.05 0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.5 99.8 99.9 99.99

Suspended Phase

1	96-hour LC50 =	10.8 %
2	72-hour LC50 =	11.4 %
3	48-hour LC50 =	14.2 %
4	24-hour LC50 =	18.1 %
5	8-hour LC50 =	35.6 %

Table 4. Dilution Evaluation Based on the Tetra Tech Model

Applicant: Celanese Chemical Corp. Passaic R., Newark

The dilution of the proposed dredged material has been evaluated by use of the Tetra Tech computer model. A description of the model has been published as Technical Report D-78-47 of the Corps' Dredged Material Research Program, and is entitled Evaluation and Calibration of the Tetra Tech Dredged Material Disposal Models Based on Field Data. The New York District requested that a study be conducted which would give example dilutions resulting from typical disposal operations and dredged materials found in the New York District. This study has been completed and is entitled Discussion of Dredged Material Disposal Models and Their Application for the New York District.

This evaluation is based on model run number 12, which most closely approximates the project disposal operations and dredged material.

Based on this model run, the dilution of the material at four hours is predicted to be 0.0043 %.

The model run selected most closely approximates the project material for the parameter of percent moisture content, because this parameter is the most sensitive.

Moisture content is 56.6%.

able 5. BIO[illegible]MULATION TEST RESULTS. (10 Day Laboratory Test)

(1 of 2)

Applicant: Celanese Chemical Corp. Passaic River, Newark

	n= 5		$\bar{x}$	S	$\bar{d} = \lvert \bar{x}_{Ref} - \bar{x}_{test} \rvert$	$S_{\bar{d}} = \sqrt{\frac{S_{Ref}^2 + S_{Test}^2}{n}}$	calculated "F" $= \left(\frac{\bar{d}}{S_{\bar{d}}}\right)^2$	C.V. $= \frac{S}{\bar{x}}$ Ref. & Test (5 reps.)	C.V. Sub-samples (3 reps.)	% Recovery
et ydro .10ppm	Palaemonetes pugio	Ref	<0.10	—	—	—	—	—	—	***
		Test	<0.10	—				—	—	—
	Mercenaria mercenaria	Ref	<0.10	—	—	—	—	—	—	***
		Test	<0.10	—				—	—	—
	Nereis virens	Ref	<0.10	—	—	—	—	—	—	***
		Test	<0.10	—				—	—	—
PCB 0.04ppm	Palaemonetes pugio	Ref	<0.04	—	—	—	—	—	—	***
		Test	<0.04	—				—	—	—
	Mercenaria mercenaria	Ref	<0.04	—	—	—	—	—	—	***
		Test	<0.04	—				—	—	—
	Nereis virens	Ref	<0.04	—	—	—	—	—	—	***
		Test	<0.04	—				—	—	—
Hg 0.20ppm	Palaemonetes pugio	Ref	<0.20	—	—	—	—	—	—	***
		Test	<0.20	—				—	—	***
	Mercenaria mercenaria	Ref	<0.20	—	—	—	—	—	—	***
		Test	<0.20	—				—	—	***
	Nereis virens	Ref	<0.20	—	—	—	—	—	—	***
		Test	<0.20	—				—	—	***
Cd .25ppm	Palaemonetes pugio	Ref	<0.25	—	—	—	—	—	—	***
		Test	<0.25	—				—	—	***
	Mercenaria mercenaria	Ref	<0.25	—	—	—	—	—	—	***
		Test	<0.25	—				—	—	***
	Nereis virens	Ref	<0.25	—	—	—	—	—	—	***
		Test	<0.25					—	—	***

*Statistically Significant (95% confidence level)

pre-test done. Estimation of Precision and % Recovery not run – (internal standards used instead).

ble 5. BIOACCUMULATION TEST RESULTS – Dioxin
. of 2)

28 – Day Laboratory Test ✓

Applicant: Celanese Chemical Corp., Passaic River, Newark

n = 5

			$\bar{x}$	S	$\bar{d} = \lvert\bar{x}_{ref} - \bar{x}_{test}\rvert$	$S_{\bar{d}} = \sqrt{\frac{S_{ref}^2 + S_{test}^2}{n}}$	Calculated "F" $= \left(\frac{\bar{d}}{S_{\bar{d}}}\right)^2$	C.V. $= \frac{S}{\bar{x}}$ Ref. & Test (5 reps)	Sub-samples (3 reps)	% Recovery
3,7,8-TCDD dioxin	Nereis virens	Ref	1.08	0.213	15.94	0.8226	375.5 *	0.1972		***
		Test	17.02	1.827				0.1073		
		Ref								***
		Test								
		Ref								***
		Test								
		Ref								***
		Test								
		Ref								***
		Test								
		Ref								***
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		Test								
		Ref								***
		Test								
		Ref								***
		Test								
		Ref								***
		Test								
		Ref								***
		Test								

calculated F = 375.5

Table F is for { treatment } = k-1 = 2-1 = 1
{ and error } = k(n-1) = 2(5-1) = 8

Table F = 5.318

* Statistically Significant (95% confidence level)
Calculated F is >> Table F

k = treatments = 2, reference and test

n = measurements = 5 replicate

Table 6. ELUTRIATE TEST RESULTS (10 Day Laboratory Tests)

Applicant: Celanese Chemical Corp
Passaic River, Newark

CHEMICAL CONSTITUENT	SITE WATER (S.D.) ppb	ELUTRIATE (S.D.) ppb	$\bar{d}$ DIFFERENCE |Site Water S.D. − Elutriate S.D.|	"F" Statistic $\left(\frac{\bar{d}}{SD_{\bar{d}}}\right)^2$	DF
Petroleum Hydrocarb.	< 50 (-)	< 50 (-)	—	—	4
PCB's	< 0.1 (-)	< 0.1 (-)	—	—	4
Hg	< 0.2 (-)	< 0.2 (-)	—	—	4
Cd	< 0.1 (-)	< 0.1 (-)	—	—	4

Values are in µg/l (ppb)

$$SDd = \sqrt{\frac{SDs^2 + SDe^2}{n}}$$

DF= Degrees of freedom
2(n-1)

TABLE 7. BULK SEDIMENT ANALYSIS

Applicant: Celanese Chemical Corp
Passaic River, Newark

n= 10	$\bar{x}$	S.D.	units
Cu	190.9	44.24	ppm
Ni	38.9	5.53	ppm
Zn	385.4	105.22	ppm
% Moisture	56.6	6.176	%
Total organic C (loss on ignition)	4.14	0.568	%
2,3,7,8 -TCDD	285	91.4	pptr

TABLE 8. STANDARD TOXICANT ANALYSIS (96-Hr test)

Applicant: Celanese Chemical Corp. Passaic River, Newark

Toxicant (Brand & grade): SDS ALDRICH 70%

Artificial Seawater Mix: FORTY FATHOMS

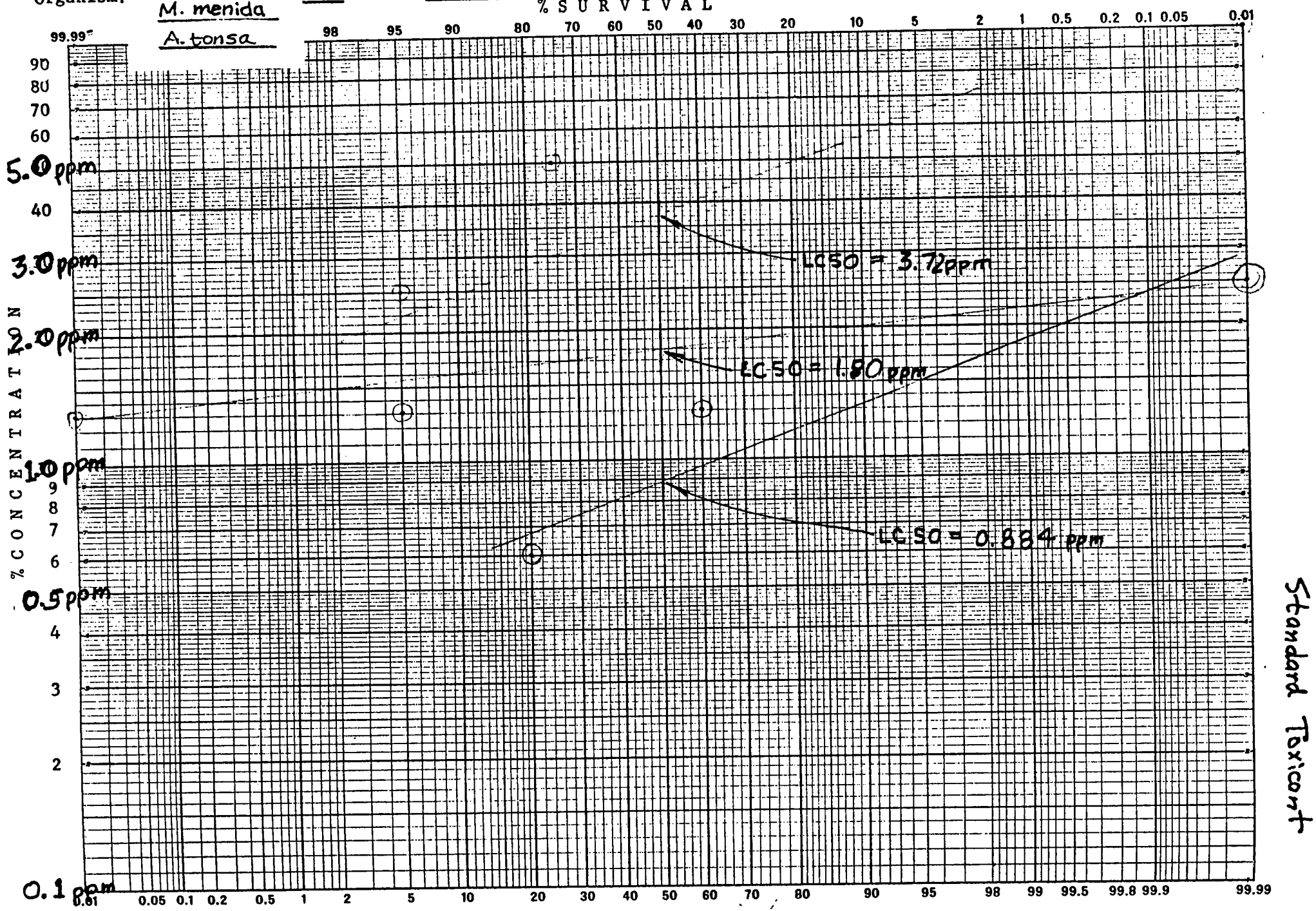
ORGANISM	TEST START DATE	TEST FINISH DATE	TOXICANT CONC (mg/l)	% SURV or % RESP	96-HR ~~EC50~~/LC50 (mg/l)
Acartia tonsa	9 July 1990 1430 hrs	13 July 1990 1430	0.6	80	0.884 with -1 S.D.
			1.3	40	
			2.5	0	
			5.0	0	
Mysidopsis bahia	14 June 1600 hrs	18 June 1990 1600	1.3	95	3.72 within +1 S.D.
			2.5	95	
			5.0	75	
			10.0	0	
Menidia menidia	15 June 1990 1530 hrs	19 June 1990 1530	0.6	100	1.80 within +1 S.D.
			1.3	100	
			2.5	0	
			5.0	0	

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Organism: M. bahia / M. menida / A. tonsa

Phase: Standard Toxicant

Applicant: Celanese Chemical Corp / Passaic River, Newark



Standard Toxicant

SECTION 404b EVALUATION

Passaic R., Newark
APPLICANT Celanese Chemical Corp.
Applic.# 86-0939-OP

A) Elutriate Test Evaluation:

1. Mixing Zone Calculation (based on H.P. D-76-17)

Current Velocity: Weighted average, Passaic River @ Lincoln Bridge + Newark Bay S. Reach (0.588 knots)(1.689 FPS/knot)(½ conservative factor) = 0.496 Ft/sec

Rate of Overflow: 8.10 CFS

If I= front edge of mixing zone.
t= time (in seconds)
R= ½ width of source of overflow (½)(168) = 84 ft.
r= radius of source of overflow (84 ft.)
λ= turbulent dissapation parameter (0.005)
X= horizontal distance from source
Vw= current velocity
d= depth of channel (30 feet)

Then $I=\sqrt{\left(\frac{t(\lambda)+0.149\,R^{.66}}{0.094}\right)^3}$ = 160.8 @ 1 sec.

$A = X\left(\frac{I+2r}{2}\right)$ = (0.496)(164.9) = 81.54

$X = Vw \cdot t$

= 0.496 ft @ 1 sec.

$\frac{I+2r}{2}$ = 164.4 @ 1 sec

Volume of mixing zone (Vm) = (A)(d) = (81.54)(30)

= 2,446 ft³

2. Dillution Calculations

% dilution of elutriate (De) = $\frac{\text{Standard conc.-Ambient conc.}}{\text{Elutriate conc.-Standard conc.}} \times 100$

% dilution of overflow (D) = $\frac{\text{Volume of overflow (Vo)}}{\text{Volume of mixing zone (Vm)}} \times 100$

In order to meet water quality standards, the % ~~dilution~~ Concentration diluted of overflow must not exceed the lowest % dilution of the elutriate necessary to reach ambient concentrations.

Chemical Constituent	De
(No concentrations exceeded detection limits)	

Comments: Since no chemicals (Hg, Cd, PCBs, PHCs) in the elutriate exceeded detection limits, dilution is probably not necessary to reach ambient concentrations

(Celanese Chemical Corp.

B) Bioassay Application:

1. Mixing Zone Calculation (based on M.P. D-76-17)

Current Velocity: _____

Rate of Overflow*: _____

*On a "worst case" basis rate and duration of overflow equals the volume of liquid that one clamshell will hold per minute for no more than one-half hour. (This applies to barge overflow only)

If L= front edge of mixing zone
t= time (in seconds)
R= ½ width of source of overflow (_____)
r= radius of source of overflow (_____)
λ= turbulent dissapation parameter (_____)
X= horizontal distance from source
Vw= current velocity
d= depth of channel (_____)

Then $L = \sqrt{\left(\frac{t(\lambda) + 0.149\ R^{.66}}{0.094}\right)^3}$

$X = Vw \cdot t$

$A = X\left(\frac{L + 2r}{2}\right)$

Volume of mixing zone (Vm)= $A \cdot d$

See Elutriate Evaluation, A) previous page.

2. Dilution Calculation

Lowest L.P.C. from suspended particulate phase of bioassay: _____

$$\% \text{ dilution (D)} = \frac{\text{Volume of overflow (Vo)}}{\text{Volume of mixing zone (Vm)}} \times 100$$

In order to meet water quality standards, the % dilution must not exceed the lowest L.P.C. for the suspended particulate phase of the bioassay.

This is 0.11%, for Acartia tonsa

Celanese Chemical Corp.

Area of channel: According to applicant submitted map of the area to be dredged, the area ~80'x940' = 75,000 sq.ft

t	Concentration after dillution = overflow / Vm % dilution	$\times(\frac{L+2r}{2}) = A$ area affected	$\frac{A}{\text{Area of channel}} =$ % of total area
1 Second	$\frac{8.10}{2,446}$ = 0.331 %		
20 minutes = 1,200 seconds	$\frac{9,720\ ft^3}{9,550,000 ft^3}$ = 0.102%	(595.2)(535) = 318,432 sq ft.	$\frac{318,432}{75,000}$ = 425 % *

$V_m = (A)(d)$

where d = channel depth

and $A = (X)(\frac{L+2r}{2})$

where $X = (V_w)(t)$

where V_w = current velocity

* i.e. Overflow in the relatively small project area (75,000 sq ft.) will require outside the area, at equal and constant depth, the volume of an additional area about 3½ times the project area.

*overflow has ceased

Based on the elutriate/bioassay testing done, this material will dilute to acceptable levels in 20 minutes affecting all of the project area plus an additional area about 3½ times as big, outside the project area.

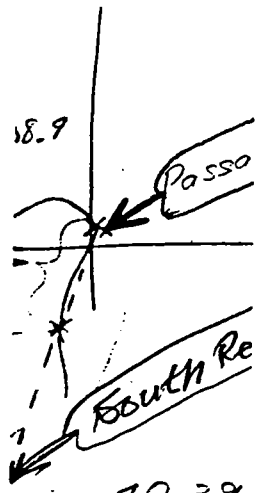
Comments: Lowest LPC in a suspended phase test is 0.11% (for Arcatia tonsa) Within 20 minutes, the overflow has diluted to the extent that it's concentration is 0.10 %, which is less than the LPC

409(b)

Tidal Current Velocity

7407

in. Highway Bridge



Phil feels strongly that .555 knots is a good approximation—

Oksona—

The only question I still have about all this is the 404 evaluation part.

max. vel. 55 knots

To get to below the lowest LDC of liquid phase id. requires @ 1000 seconds.

In 500 seconds, however, the area of the mixing zone ≈ the area of the project.

(3)(.5)

Federal Project adjacent @ 300 feet wide,

PS. MG is also curious. (150')(N) = [illegible]

Joe feet wide

Joe

Can ahead if you want to add some arm-waving statement like "the area required to dilute overflow to below lowest LPC is less than 5 times project area which is available so this isn't significant for instance if the extra dilution area required (less than 4 times project area) were in the (adjacent) Federal channel it would occupy only about 800 feet in the channel -- [illegible]

This would be a problem if the dredging site were a closed, small channel. However, since the mixing zone can actually expand in 3 directions (into the federal channel, up & down the length of the river), our calculations are unrealistically conservative.

DY

TABLE 2. - CURRENT DIFFERENCES AND OTHER CONSTANTS

NO.	PLACE	METER DEPTH	POSITION		TIME DIFFERENCES				SPEED RATIOS		AVERAGE SPEEDS AND DIRECTIONS					
			Lat.	Long.	Min. before Flood	Flood	Min. before Ebb	Ebb	Flood	Ebb	Minimum before Flood		Maximum Flood		Minimum before Ebb		Maximum Ebb	
	...do.....	17	40 39.0	74 05.1					---	---								
	NEWARK BAY																	
3926	South Reach, Newark Bay.....	15	40 39.6	74 08.4	-0 56	-1 45	-0 51	-1 06	0.4	0.4	0.0	- -	0.7	031	0.0	296	0.7	218
	HACKENSACK RIVER																	
3931	Lincoln Highway Bridge, north of.....		40 44	74 06	-0 06	+0 12	+0 47	-0 14	0.5	0.4	0.0	- -	0.9	017	0.0	- -	0.8	181
	PASSAIC RIVER																	
3936	Lincoln Highway Bridge.....		40 44	74 07	-0 31	-0 19	-0 12	-0 20	0.4	0.3	0.0	- -	0.6	009	0.0	- -	0.5	180
	NEW JERSEY COAST				on DELAWARE BAY ENTRANCE, p.58													
3941	Manasquan Inlet.....		40 06	74 02	-0 43	-0 30	-1 12	-0 57	1.2	1.4	0.0	- -	1.7	300	0.0	- -	1.8	120
3946	Manasquan R., hwy. bridge, main chan....		40 06	74 03	-0 41	-0 50	-1 15	+0 10	1.6	1.6	0.0	- -	2.2	230	0.0	- -	2.1	050

Endnotes can be found at the end of Table 2.

Appl. # 86-0939-0D
Celanese Chemical Corp
Report 1 of 2

AQUA SURVEY, INC.

ENVIRON CORPORATION
210 CARNEGIE CENTER, SUITE 201
PRINCETON, NJ 08540

OCTOBER 24, 1990

BR90-1240A

JOB # 9128

499 Point Breeze Road • Flemington, New Jersey 08822 • Telephone (201) 788-8700 FAX (201) 788-9165

I. SCOPE OF WORK

A. Location and Purpose

The field sampling, biological assay and analytical testing described in this report was performed with respect to dredged material from the Passaic River to be disposed of in ocean waters.

B. Services

1. Aqua Survey, Inc. (ASI) was engaged by ENVIRON to perform the following services:

   a. ASI oversaw the collection of ten (10) core samples of sediment which were cored to project depth. The cores were taken from locations identified on a Sampling Plan developed by the Army Corps of Engineers (ACE).

   b. Control and reference sediment samples were collected from locations designated by the ACE.

   c. ASI homogenized each core and provided ten homogeneous samples to NYTEST for Bulk Sediment Analysis. The following analyses were performed:

      Copper
      Nickel
      Zinc
      TOC

   d. Sediment samples from cores 1 - 10, control and reference sediment were examined for particle grain size (ASTM Method D 422, March 1972) and percent moisture.

   e. Site water and sediment samples were sent to NYTEST for chemical analyses. Elutriate was prepared by NYTEST and also analyzed.

asi 499 Point Breeze Road • Flemington, New Jersey 08822 • Telephone (908) 788-8700 FAX (908) 788-9165

f. Solid Phase Bioassays were performed to determine the acute 10-day toxicity to Mercenaria mercenaria, Palaemonetes pugio and Neries virens. Tissue samples of surviving organisms were sent to NYTEST to assess bioaccumulation potential of test sediments using the following method:

Ecological Evaluation of Proposed Discharge of Dredged Material Into Ocean Waters (Implementation Manual for Section 103 of the Public Law 92-532 [Marine Protection, Research and Sanctuaries Act of 1972], EPA/COE (July 1977).

g. A Suspended Particulate Phase Bioassay was performed on the sediment sample to determine the acute 96-hour toxicity to Acartia tonsa, Mysidopsis bahia and Menidia menidia.

h. Standard Reference Toxicant Assays were run for all species used in the Suspended Particulate Phase Bioassay using the following method:

Ecological Evaluation of Proposed Discharge of Dredged Material Into Ocean Waters 2nd printing, April 1978, and Standard Methods, 15th Edition (pp 615-645)

i. Tissues were prepared and sent to NYTEST for chemical analyses in accordance with the following method:

Ecological Evaluation of Proposed Discharge of Dredged Material Into Ocean Waters (Implementation Manual for Section 103 of the Public Law 92-532 [Marine Protection, Research and Sanctuaries Act of 1972], EPA/COE (July 1977)

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2. The following test associated services were provided:

   a. Proper chain-of-custody and QA/QC procedures were followed.

   b. Aqua Survey, Inc. was responsible for the health and safety of its personnel.

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II. METHODOLOGY

A. Sediment Sampling

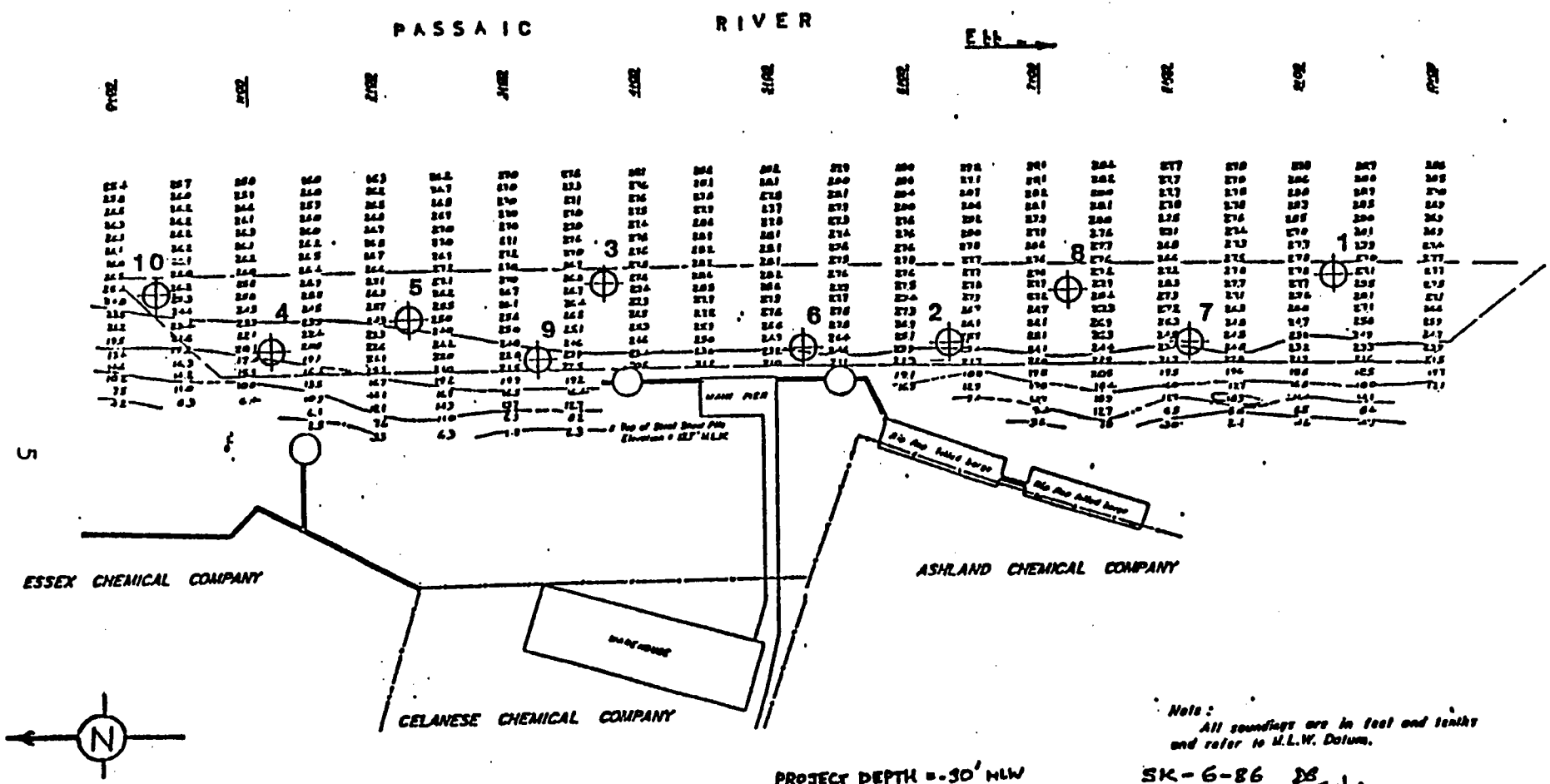
1. Test sediments were cored on June 12 and 14, 1990 from 10 sampling points at the site of the proposed dredging. Sampling points were numbered 1 - 10 (See Figure 1). Sediment samples were cored to project depth.

2. Control sediment was Petersen-dredged from Milton Harbor, New York in ACE designated area (see Figure 2).

3. Reference Sediment was dredged from ACE designated area off the New Jersey coast (Loran C Coordinates on 9960 X and Y are 26910.7, 43629.2).

4. Samples of sediment and site water were maintained at 4° +/- 2° C. Any opened containers of sediment were flushed with nitrogen prior to returning to storage.

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Test Sampling Sites

Figure 1

Note:
All soundings are in feet and tenths and refer to M.L.W. Datum.

PROJECT DEPTH = -30' MLW

SK-6-86

2 = SAMPLING LOCATIONS FOR BIOASSAY/BIOACCUMULATION TESTING.

CENAN-OP-W
4 May 90

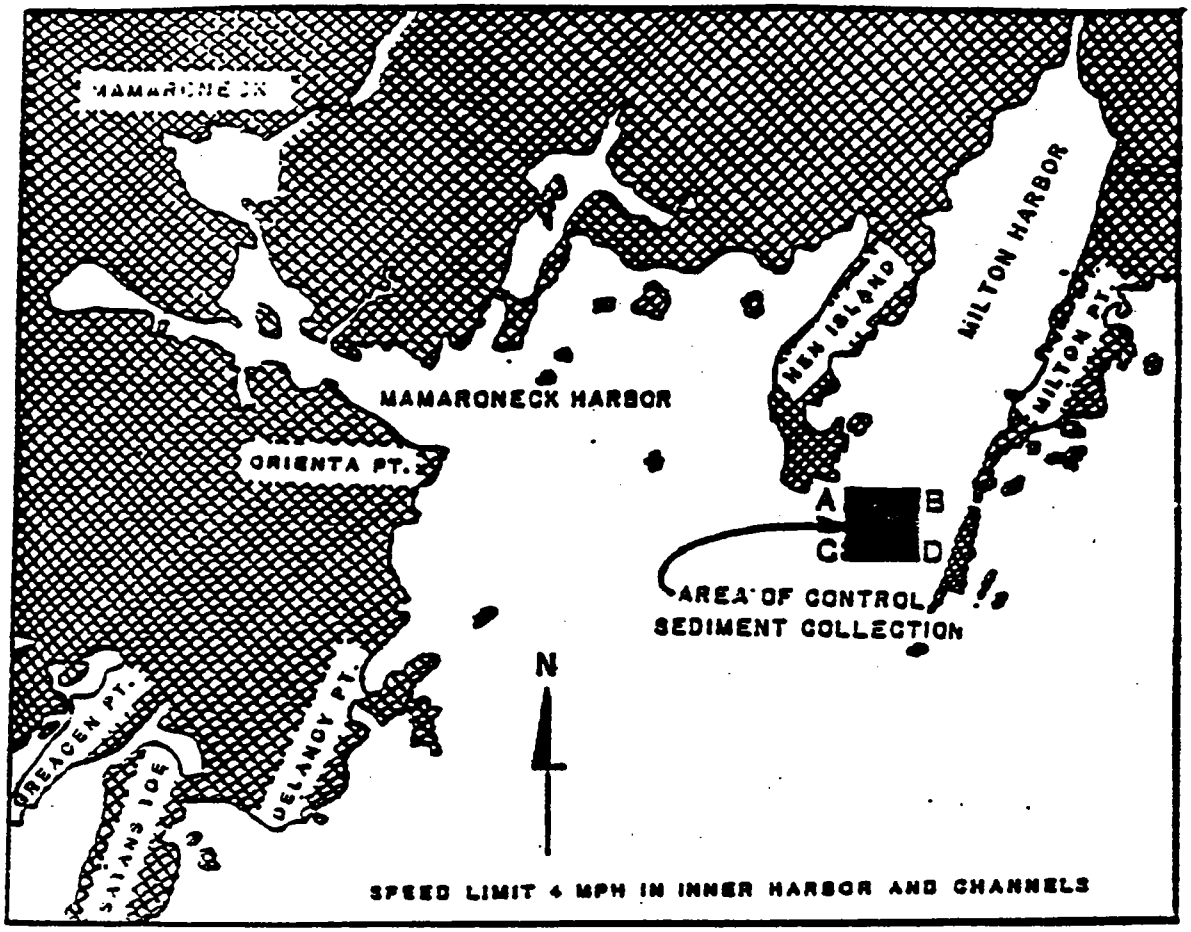
SLUDGE SOUNDINGS
OBTAINED APRIL 23, 1986

APPLICATION FOR PROPOSED
DREDGING AND DISPOSAL
IN: PASSAIC RIVER
AT: NEWARK, NEW JERSEY
COUNTY OF: ESSEX, STATE: NEW JERSEY
APPLICATION BY:
CELANESE CHEMICAL COMPANY, INC.
NEWARK, NEW JERSEY

SHEET 2 OF 3 DATE 8/15/86

Figure 2

Chart showing area for control sediment collection



SCALE 1:20,000 NAUTICAL MILES

1/2 0 1/2 1

YARDS

500 0 500 1000 1500

CORNER	
A	73° 42' 19"
	40° 56' 17"
B	73° 42' 08"
	40° 56' 17"
C	73° 42' 19"
	40° 56' 08"
D	73° 42' 08"
	40° 56' 08"

MILTON HARBOR

RYE, NEW YORK

B. Bioassay Procedures

1. Procedures for conducting the Solid Phase, Suspended Particulate Phase and Standard Reference Toxicant Bioassays:

a. Ecological Evaluation Of Proposed Discharge Of Dredged Material Into Ocean Waters (Implementation Manual for Section 103 of the Public Law 92-532 [Marine Protection, Research and Sanctuaries Act of 1972], EPA/COE (July 1977).

b. Guidance For Performing Tests On Dredged Material To Be Disposed Of In Ocean Waters EPA Region II/COE Regulatory Branch (Water Quality Compliance Section), (21 December 1984).

c. Ecological Evaluation of Proposed Discharge of Dredged Material Into Ocean Waters 2nd printing, April 1978, and Standard Methods, 15th Edition (pp 615-645)

C. Grain Size Procedures

1. Grain size analyses were performed in accordance with:

Standard Method for Particle-Size Analysis of Soils ASTM Designation: D 422 - 63 (Reapproved 1972) American National Standard A37 145-1972 Approved March 2, 1972 by American National Standard Institute.

D. Test Organisms

1. Nereis virens were obtained from Frank Hammond of Wiscasset, Maine. They were shipped in moist seaweed and removed for acclimation immediately upon arrival at the laboratory.

2. Mercenaria mercenaria were obtained from Mariculture Industries, Atlantic City, New Jersey. Acclimation tosediment was begun immediately upon arrival at the laboratory.

3. Palaemonetes pugio were field collected by ASI personnel using hand held seines off Sandy Hook, New Jersey. Enough shrimp for the entire test were obtained at one collection.

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4. Menidia menidia were field collected by ASI personnel using hand held seines off Sandy Hook, New Jersey. Enough fish for the entire test were obtained at one collection.

5. Acartia tonsa were cultured in the bioassay laboratory.

6. Mysidopsis bahia were obtained from Aquatic Biosystems, Inc. of Fort Collins, Colorado.

7. Acclimation of clams and sandworms to reference and control sediment was accomplished over two days before addition of the test material.

8. Acclimation of shrimp and menidia to test water salinity were accomplished through daily renewals over several days.

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III. RESULTS

A. Ten-Day Solid Phase Bioassay

The 10-day Solid Phase Bioassay required that live counts be attempted each day. A definitive count could only be made at the end of the exposure (240-hour). See Tables 1.A-C for test results. Conditions during the 10 - day bioassay are summarized in Tables 1.D and 1.E.

Table 1.A Results of the 10-day Solid Phase Bioassay. Testing was initiated with 20 Nereis virens per replicate.

Sample	Replicate	Final Live Count
control	1	20
	2	19
	3	20
reference	1	20
	2	19
	3	19
	4	20
	5	20
test	1	17
	2	17
	3	18
	4	20
	5	19

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Table 1.B Results of the 10-day Solid Phase Bioassay. Testing was initiated with 20 Mercenaria mercenaria per replicate.

Sample	Replicate	Final Live Count
control	1	20
	2	20
	3	20
reference	1	20
	2	20
	3	20
	4	20
	5	20
test	1	20
	2	20
	3	20
	4	20
	5	20

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Table 1.C Results of the 10-day Solid Phase Bioassay. Testing was initiated with 100 Paleomonetes pugio per replicate.

Sample	Replicate	Final Live Count
control	1	96
	2	93
	3	88
reference	1	99
	2	96
	3	97
	4	96
	5	96
test	1	88
	2	85
	3	93
	4	89
	5	91

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Table 1.D Conditions during the 10-day exposure per replicate

Concentration	pH	Salinity (ppt)
Control 1- 3	7.7 - 8.1	28.0 - 32.0
reference 1-5	7.7 - 8.1	28.5 - 32.0
test 1-5	7.1 - 8.1	28.0 - 32.0

Table 1.E Conditions during the 10-day exposure per replicate.

Concentration	Temp. (C)	Dissolved Oxygen (ppm)
control 1-3	18.0 - 21.0	4.9 - 6.7
reference 1-5	18.0 - 20.5	4.9 - 6.9
test 1-5	18.0 - 21.0	4.0 - 7.0

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B. Suspended Particulate Phase

Suspended Particulate Phase Bioassays were performed with Acartia tonsa, Mysidopsis bahia, and Menidia menidia. See Table 2.A for results, and Tables 2.B through 2.D for conditions during the tests.

Table 2.A Results of 96-hour Suspended Particulate Phase Bioassays. Tests were initiated with 20 organisms per replicate.

		Final Live Counts		
Conc.	Rep.	A. tonsa	M. bahia	M. menidia
Control	A	17	20	18
	B	17	20	16
	C	14	20	20
10%	A	13	20	19
	B	11	19	20
	C	10	20	20
50%	A	0	20	19
	B	0	20	20
	C	0	19	19
100%	A	0	20	19
	B	0	17	15
	C	0	20	18

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Table 2.B

Suspended Particulate Phase — Conditions During 96-hour *A. tonsa* Bioassay

Conc.	Temp(C)	DO (ppm)	Sal (ppt)	pH
0%	18.0-20.0	7.4-7.7	30.0-32.0	7.4-8.0
10%	18.0-20.0	7.3-7.4	29.0-32.0	7.7-8.1
50%	18.0-19.5	6.1-7.4	29.0-32.0	7.4-8.2
100%	19.0	4.8-7.5	28.0-31.0	7.2-8.3

Table 2.C

Suspended Particulate Phase — Conditions During 96-hour *M. bahia* Bioassay

Conc.	Temp(C)	DO (ppm)	Sal (ppt)	pH
0%	19.5-22.0	6.6-7.4	29.0-31.0	8.0-8.4
10%	19.0-22.0	6.6-7.4	29.0-31.0	7.9-8.4
50%	19.0-22.0	6.5-7.4	29.0-31.0	7.9-8.4
100%	19.5-22.0	6.3-7.4	30.0-31.0	7.8-8.4

Table 2.D

Suspended Particulate Phase — Conditions During 96-hour *M. menidia* Bioassay

Conc.	Temp(C)	DO (ppm)	Sal (ppt)	pH
0%	18.0-22.0	5.6-7.2	30.0-31.0	7.7-8.2
10%	18.0-22.0	6.0-7.4	29.0-31.0	7.8-8.2
50%	18.0-22.0	5.2-7.2	28.0-30.0	7.6-8.2
100%	18.0-21.5	5.6-7.2	28.5-30.0	7.7-8.2

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C. Standard Reference Toxicant Bioassays

Standard Reference Toxicant Bioassays were performed with Acartia tonsa, Mysidopsis bahia and Menidia menidia.

See Tables 3.A for results, and Tables 3.B through 3.D for conditions during the bioassay.

Table 3.A Results of 96-Hour Standard Reference Toxicant Bioassays with Sodium Lauryl Sulfate. Bioassay were initiated with 10 organisms per replicate.

		Final Live Counts		
Conc. (ppm)	Rep.	A. tonsa	M. bahia	M. menidia
Control	A	8	10	10
	B	10	10	10
0.6	A	8	NR	10
	B	8		10
1.3	A	4	10	10
	B	4	9	10
2.5	A	0	10	0
	B	0	9	0
5.0	A	0	9	0
	B	0	6	0
10.0	A	NR	0	NR
	B		0	

NR - This concentration was not run

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Table 3.B

Conditions During A. tonsa Standard Reference Toxicant Test

Conc(ppm)	Temp(C)	DO(ppm)	Sal(ppt)	pH
0.0	18.5-20.0	6.1-7.4	30.0-32.0	7.5-8.0
0.6	18.0-20.0	6.6-7.4	30.0-32.0	7.5-8.0
1.3	18.0-20.0	6.6-7.4	30.0-32.0	7.5-7.9
2.5	18.0-19.5	7.2-7.4	31.0-32.0	7.7-7.9
5.0	18.0-19.5	7.0-7.4	31.0-32.0	7.7-7.9

Table 3.C

Conditions During M. bahia Standard Reference Toxicant Test

Conc(ppm)	Temp(C)	DO(ppm)	Sal(ppt)	pH
0.0	19.0-20.5	6.6-7.3	28.0-32.0	8.0-8.2
1.3	19.0-20.5	6.7-7.2	29.0-32.0	8.0-8.2
2.5	19.0-20.5	6.2-7.2	29.0-32.0	8.0-8.2
5.0	19.0-20.5	6.0-7.3	29.0-32.0	8.0-8.2
10.0	19.0-20.5	6.3-7.2	29.0-32.0	8.1-8.2

Table 3.D

Conditions During M. menidia Standard Reference Toxicant Test

Conc(ppm)	Temp(C)	DO(ppm)	Sal(ppt)	pH
0.0	18.0-21.0	4.0-7.9	28.0-32.0	8.0-8.2
0.6	18.0-21.5	4.0-7.8	29.0-32.0	8.0-8.2
1.3	18.0-21.0	4.0-7.7	28.0-32.0	8.0-8.3
2.5	21.0	7.7-8.0	30.5-32.0	8.3
5.0	21.5	8.0-8.1	32.0	8.3

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D. Physical Testing

Test sediment samples were cored from 10 project areas. No discreet strata were observed in any of the 10 cores. All cores were homogenous with no intra-core variation. Grain size and water content determinations were made for each test sediment, reference and control sediment. Grain size distribution is defined by the following criteria:

Sand	< 0.0625 mm
Silt	< 0.0625 but > 0.0039 mm
Clay	< 0.0039 mm

Table 4. Results of Grain Size and Moisture Content Analysis.

	% Sand	% Silt	% Clay	% Moisture
Core 1	12.0	73.0	15.0	60.7
Core 2	3.0	59.0	38.0	57.3
Core 3	3.0	62.0	35.0	57.4
Core 4	4.0	60.0	36.0	58.1
Core 5	0.0	65.0	35.0	57.4
Core 6	2.0	63.0	33.0	56.1
Core 7	3.0	66.0	31.0	57.3
Core 8	2.0	64.0	34.0	59.7
Core 9	0.0	71.0	29.0	60.9
Core 10	3.0	66.0	31.0	60.8
	$\bar{x}$ 3.2, s=3.36	$\bar{x}$=64.9, s=4.43	$\bar{x}$=31.7, s=6.45	$\bar{x}$=58.27, s=2.39
Control	19.0	42.0	39.0	56.1
Reference	93.0	7.0	0.0	18.6

($\bar{x}$=mean, s=st.dev.) JD, 3/5/91

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E. Chemical Testing

Site Water (Table 5.A), Elutriate (Table 5.B), Bulk Sediment (Table 5.C) and Bioaccumulation (Table 5.D) analyses were performed.

Table 5.A

Site Water Analyses (Results in ug/l)

Lab. Rep.	1 Hg	2 Cd	3 PCB's	4 PHC's
1	<0.2	<0.1	<0.1	<50
2	<0.2	<0.1	<0.1	<50
3	<0.2	<0.1	<0.1	<50

1 Detection limit = 0.2 ug/l
2 Detection limit = 0.1 ug/l
3 Detection limit = 0.1 ug/l
4 Detection limit = 50.0 ug/l

Table 5.B

Elutriate Analyses (Results in ug/l)

Lab. Rep.	1 Hg	2 Cd	3 PCB's	4 PHC's
1	<0.2	<0.1	<0.1	<50
2	<0.2	<0.1	<0.1	<50
3	<0.2	<0.1	<0.1	<50

1 Detection limit = 0.2 ug/l
2 Detection limit = 0.1 ug/l
3 Detection limit = 0.1 ug/l
4 Detection limit = 50.0 ug/l

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Table 5.C

Bulk Sediment Analyses
Concentrations Based on Dry Weight.

Sample	Cu (mg/kg)	Ni (mg/kg)	Zn (mg/kg)	TOC % by wt.
core 1	241	46.8	551	5.2
core 2	177	35.2	334	3.8
core 3	172	38.6	350	3.8
core 4	288	48.5	582	4.4
core 5	184	37.0	345	3.6
core 6	140	30.8	264	3.4
core 7	176	38.8	313	4.1
core 8	206	42.1	377	3.8
core 9	147	34.2	308	4.6
core 10	179	36.7	430	4.7

Detection limit of metal analyses was 1.0 mg/kg.
(dry weight basis)

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Table 5.D continued

Sample Replicate		1 Hg	2 Cd	3 PCB's	4 PHC's
			Mercenaria mercenaria		
pretest	1	<0.20	<0.25	<0.04	<0.10
	2	<0.20	<0.25	<0.04	<0.10
	3	<0.20	<0.25	<0.04	<0.10
ref.	1	<0.20	<0.25	<0.04	<0.10
	2	<0.20	<0.25	<0.04	<0.10
	3A	<0.20	<0.25	<0.04	<0.10
	3B	<0.20	<0.25	<0.04	<0.10
	3C	<0.20	<0.25	<0.04	<0.10
	4	<0.20	<0.25	<0.04	<0.10
	5	<0.20	<0.25	<0.04	<0.10
test	1	<0.20	<0.25	<0.04	<0.10
	2	<0.20	<0.25	<0.04	<0.10
	3A	<0.20	<0.25	<0.04	<0.10
	3B	<0.20	<0.25	<0.04	<0.10
	3C	<0.20	<0.25	<0.04	<0.10
	4	<0.20	<0.25	<0.04	<0.10
	5	<0.20	<0.25	<0.04	<0.10
test	3A*	**	**	<0.04	<0.10
test	3B*	**	**	<0.04	<0.10
test	3C*	**	**	<0.04	<0.10

* Re-extracted samples
** Metals could not be re-extracted
1 Detection limit = 0.20 mg/l
2 Detection limit = 0.25 mg/l
3 Detection limit = 0.04 mg/l
4 Detection limit = 0.10 mg/l

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Table 5.D

Bioaccumulation analyses for pre-test, reference and test Solid Phase Exposures with Nereis virens, Mercenaria mercenaria, and Palaemonetes pugio. Results in mg/kg.

		1 Hg	2 Cd	3 PCB's	4 PHC's
Sample Replicate			Nereis virens		
pretest	1	<0.20	<0.25	<0.04	<0.10
	2	<0.20	<0.25	<0.04	<0.10
	3	<0.20	<0.25	<0.04	<0.10
ref.	1	<0.20	<0.25	<0.04	<0.10
	2	<0.20	<0.25	<0.04	<0.10
	3A	<0.20	<0.25	<0.04	<0.10
	3B	<0.20	<0.25	<0.04	<0.10
	3C	<0.20	<0.25	<0.04	<0.10
	4	<0.20	<0.25	<0.04	<0.10
	5	<0.20	<0.25	<0.04	<0.10
test	1	<0.20	<0.25	<0.04	<0.10
	2	<0.20	<0.25	<0.04	<0.10
	3A	<0.20	<0.25	<0.04	<0.10
	3B	<0.20	<0.25	<0.04	<0.10
	3C	<0.20	<0.25	<0.04	<0.10
	4	<0.20	<0.25	<0.04	<0.10
	5	<0.20	<0.25	<0.04	<0.10
test	3A*	**	**	<0.04	<0.10
test	3B*	**	**	<0.04	<0.10
test	3C*	**	**	<0.04	<0.10

* Re-extracted samples
** Metals could not be re-extracted
1 Detection limit = 0.20 mg/l
2 Detection limit = 0.25 mg/l
3 Detection limit = 0.04 mg/l
4 Detection limit = 0.10 mg/l

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Table 5.D continued

Sample Replicate		1 Hg	2 Cd	3 PCB's	4 PHC's
			Palaemonetes pugio		
pretest	1	<0.20	<0.25	<0.04	<0.10
	2	<0.20	<0.25	<0.04	<0.10
	3	<0.20	<0.25	<0.04	<0.10
ref.	1	<0.20	<0.25	<0.04	<0.10
	2	<0.20	<0.25	<0.04	<0.10
	3A	<0.20	<0.25	<0.04	<0.10
	3B	<0.20	<0.25	<0.04	<0.10
	3C	<0.20	<0.25	<0.04	<0.10
	4	<0.20	<0.25	<0.04	<0.10
	5	<0.20	<0.25	<0.04	<0.10
test	1	<0.20	<0.25	<0.04	<0.10
	2	<0.20	<0.25	<0.04	<0.10
	3A	<0.20	<0.25	<0.04	<0.10
	3B	<0.20	<0.25	<0.04	<0.10
	3C	<0.20	<0.25	<0.04	<0.10
	4	<0.20	<0.25	<0.04	<0.10
	5	<0.20	<0.25	<0.04	<0.10
test	3A*	**	**	<0.04	<0.10
test	3B*	**	**	<0.04	<0.10
test	3C*	**	**	<0.04	<0.10

* Re-extracted samples
** Metals could not be re-extracted
1 Detection limit = 0.20 mg/l
2 Detection limit = 0.25 mg/l
3 Detection limit = 0.04 mg/l
4 Detection limit = 0.10 mg/l

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IV. SUMMARY

Solid Phase Bioassays

As detailed in Tables 1.A through 1.C, average control and reference mortality was less than 10%. The following mortalities were observed among organisms exposed to test sediment.

Neries virens:	9.0%
Palaemonetes pugio:	10.8%
Mercenaria mercenaria:	0%

The limit for significance of results is ten percent mortality as set by the ACOE.

Suspended Particulate Phase Bioassays

The results of the Suspended Particulate Phase are as follows:

Acartia tonsa	96-hr LC50 = 11.4% 95% C.L. 0-50.0 (Binomial Method)
Mysidopsis bahia	96-hr LC50 = >100%
Menidia menidia	96-hr LC50 = >100%

Bioaccumulation Analyses

The results of the bioaccumulation analyses are as follows:

Site Water analyses Hg, Cd, PCB's and PHC's were all below detection limits.

Elutriate analyses Hg, Cd, PCB's and PHC's were all below detection limits.

The average metal concentrations of the ten cores were as follows:

Cu	191	mg/Kg
Ni	38.9	mg/Kg
Zn	385.4	mg/Kg
TOC	4.1	% by Weight

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Standard Reference Toxicant Bioassays

Standard reference toxicant (Sodium Decdecyl Sulfate) was purchased from Aldrich Chemical Company. F Fathoms synthetic seawater mix was utilized as dilu e following LC50 values were calculated:

Acartia tonsa	96-hr LC50 = 1.0 p 95% C.L. 0.7 - 1.2 pit Test)
Mysidopsis bahia	96-hr LC50 = 5.5 95% C./L. 4.7 - oving rage)
Menidia menidia	96-hr LC50 = 1.8 ppm 95% C.L. 1.3 - 2.5 (Binomial Method)

All values are within accepted ranges as set by the ACOE for all organisms.

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APPENDICES

LIST OF APPENDICES

A.	Solid Phase Raw Data	A 1 - 6
B.	Suspended Particulate Phase Data	B 1 - 13
C.	Standard Reference Toxicant Data	C 1 - 14
D.	Grain Size Analyses	D 1 - 14
E.	Chemical Anayses	E 1 - 6

Client: Environ Project: H. Celanese Project Number: 4128
Test Type: Solid Phase Lab: Trailer #3 Manager:
Acclimatization Starting Date: 6/15/90 Exposure Starting Date: 6/13/90 Depuration Starting Date: / /

		N. virens						P. pugio						M. mercenaria					
Live Count	Repl	a1	a2	a3	0	10	d31	a1	a2	a3	0	10	d31	a1	a2	a3	0	10	d31
Control	1	20			20	20	20				100	96	96	20			20	20	20
	2	20			20	19	19				100	93	93	20			20	20	20
	3	20			20	20	20				100	88	77	20			20	20	20
Reference	1	20			20	20	20				100	99	⊙89	20			20	20	20
	2	20			20	19	19				100	96	96	20			20	20	20
	3	20			20	19	19				100	97	97	20			20	20	20
	4	20			20	20	20				100	96	96	20			20	20	20
	5	20			20	20	20				100	96	96	20			20	20	20
Test Sed.	1	20			20	17	17				100	88	88	20			20	20	20
	2	20			20	17	17				100	85	85	20			20	20	20
	3	20			20	18	18				100	93	93	20	*		20	20	20
	4	20			20	20	20				100	89	89	20			20	20	20
	5	20			20	19	19				100	91	91	20	*		20	20	20
Initials		KH			KH		KH				KH		KH	KH			KH		KH

NOTES: * A2 - one clam replaced in each

DAY 2: P. pugio OBSERVED EATING A ½ cm Piece OF Nereis IN Cont. #

DAY 1: - N.U.O. 4pm 11:15

DAY 3: N.U.O. 4pm - All Pumps were calibrated - all are pumping 200 mL/m except control #3 - 190 mL/min. 4pm (Pumps are "on" for 19.5 min./HR.) T331 #5 - 215 mL/min.

DAY 4: N.U.O. 4pm 12:30

DAY 5: N.U.O. 4pm 15.00

DAY 6: N.U.O. 4pm 14:15

DAY 7: N.U.O. 4pm. 09.55

DAY 8: N.U.O. All metering Pumps CALIBRATED TODAY - All Pumps = 200 mL/min. EXCEPT: Ref 1 - 210 mL/min, R5 - 825 mL/min, T2 - 220 mL/min, T3 - 220 mL/min & T5 - 230 mL/min

DAY 9: N.U.O. 4pm. 10:00 - 11:20 NOTED 1 Nereis IN R2 Swimming FREELY, NOT Re BURRO

DAY 10: 1 Dead Nereis in R2 4pm

⊙ low DO - airstone clogged

Last column appears to be a 11-day observation by the person K.H.

SOLID PHASE

Client: Environ Site #: H. Celanese Project Number: 9128

Project: H. Celanese Manager: Coles

Organism: Nereis virens, M. mer., P. pug. 0

DISSOLVED OXYGEN ppm

	Repl.	a1	a2	a3	0	1	2	3	4	5	6	7	8	9	10	d1	d2	d3
Control	1				5.1	6.1	6.4	6.1	6.2	6.3	6.0	6.1	5.9	5.9	6.7			
	2				5.1	6.1	6.4	6.0	5.3	5.5	6.1	6.2	5.7	5.7	6.3			
	3				4.9	6.2	6.5	6.0	6.2	6.1	5.8	5.9	5.7	6.0	6.7			
Reference	1				4.9	5.8	6.5	5.8	6.0	6.1	6.0	5.8	5.8	5.4	6.5			
	2				5.2	5.6	6.6	5.9	6.0	5.9	6.0	5.8	5.6	5.8	6.6			
	3				5.5	4.9	5.7	6.1	6.3	6.4	6.1	6.2	5.9	6.2	6.9			
	4				5.4	6.6	6.4	6.4	6.0	5.9	5.7	5.6	5.2	5.6	6.4			
	5				5.4	6.0	6.0	5.7	5.7	5.8	5.8	5.8	5.6	5.5	6.1			
Test Sediment	1				4.1	6.5	6.6	6.3	6.3	6.0	6.1	6.1	6.0	6.1	6.5			
	2				4.2	6.7	6.8	6.4	6.3	6.1	6.1	6.2	5.9	6.2	6.8			
	3				4.7	6.8	6.7	6.4	6.2	6.0	6.0	6.1	5.7	5.9	6.5			
	4				5.0	7.0	6.9	6.5	6.2	6.0	6.1	6.2	5.9	6.3	6.8			
	5				4.0	6.4	7.0	6.6	6.4	6.2	6.1	6.2	5.9	6.4	6.9			
Initials					JC	KH	KH	KH	KH	KH	KH	KH	KH	KH	KH			

SALINITY ppt

	Repl.	a1	a2	a3	0	1	2	3	4	5	6	7	8	9	10	d1	d2	d3
Control	1				30.0	28.0	31.0	31.0	30.5	29.5	32.0	32.0	32.0	29.5	28.5			
	2				30.0	29.5	30.5	30.5	30.5	29.5	32.0	32.0	32.0	29.5	28.5			
	3				30.0	28.5	31.0	30.5	30.0	29.5	32.0	32.0	31.5	29.5	28.0			
Reference	1				30.0	29.0	30.5	30.5	30.5	29.5	32.0	32.0	31.5	29.5	28.5			
	2				30.0	29.0	30.5	30.5	30.5	29.0	32.0	32.0	32.0	29.5	28.5			
	3				30.0	29.0	31.0	30.5	30.5	29.5	31.5	32.0	32.0	29.5	28.5			
	4				30.0	29.0	31.0	30.5	30.5	29.0	31.5	32.0	32.0	29.5	28.5			
	5				30.0	29.0	31.0	31.0	30.5	29.5	32.0	32.0	32.0	29.5	28.5			
Test Sediment	1				29.0	29.0	31.0	31.0	30.5	29.5	32.0	32.0	32.0	29.5	28.5			
	2				29.0	29.0	31.0	31.0	30.0	29.5	32.0	32.0	32.0	29.0	28.5			
	3				29.0	28.5	30.5	30.5	30.0	29.5	31.5	32.0	32.0	29.0	28.0			
	4				29.0	28.5	30.0	30.5	30.0	29.0	31.5	32.0	31.5	29.0	28.0			
	5				29.0	28.0	30.0	30.5	30.0	29.0	31.5	32.0	31.5	29.0	28.0			
Initials					JC	KH	KH	KH	KH	KH	KH	KH	KH	KH	KH			

NOTES:

Client: Environ Project: Ft. Eustis Project Number: 9128
Test Type: Solid Phase Lab: Trailer #3 Manager: Coles

Temperature	Repl.	a1	a2	a3	0	1	2	3	4	5	6	7	8	9	10	d1	d2
Control	1				20.0	18.0	18.0	19.0	19.0	18.5	19.5	19.0	21.0	19.0	19.5		
	2				20.0	18.0	18.0	19.0	19.0	18.5	19.5	19.0	21.0	19.0	19.5		
	3				20.0	18.0	18.0	19.0	18.5	18.5	19.0	18.5	20.5	19.0	19.0		
Reference	1				20.0	18.0	18.0	19.0	18.5	18.5	19.0	18.5	20.5	18.5	19.0		
	2				20.0	18.0	18.0	19.0	18.5	18.0	18.5	18.5	20.5	18.5	19.0		
	3				20.0	18.0	18.0	19.0	18.5	18.0	18.5	18.5	20.5	18.5	19.0		
	4				20.0	18.0	18.0	19.0	18.5	18.0	19.0	18.5	20.5	18.5	19.0		
	5				20.0	18.0	18.0	19.0	18.5	18.0	19.0	18.5	20.5	18.5	19.0		
Test Sediment	1				21.5	18.0	18.0	19.0	18.5	18.0	18.0	18.5	20.5	18.5	19.5		
	2				21.0	18.0	18.5	17.0	18.5	18.0	18.0	18.5	20.5	18.5	19.5		
	3				21.0	18.5	18.5	19.0	18.5	18.0	18.0	18.5	20.5	18.5	19.5		
	4				21.0	18.5	18.5 (19.5 Sam)	19.0	18.5	18.0	18.0	18.5	20.5	18.5	19.5		
	5				21.0	18.5	18.5	19.0	18.5	18.0	18.0	18.5	20.5	18.5	19.5		
Initials					Sam	Sam	Sam	Sam	Sam	Sam	Sam	Sam	Sam	Sam	KH/E		
					KH	KH	KH	KH	KH	KH	KH	KH	KH	KH	KH		

pH	Repl.	a1	a2	a3	0	1	2	3	4	5	6	7	8	9	10	d1	d2
Control	1				7.7	7.7	7.8	7.8	7.8	7.9	7.8	8.0	8.0	8.0	8.1		
	2				7.7	7.8	7.8	7.8	7.8	7.9	7.8	8.0	8.0	8.0	8.1		
	3				7.7	7.9	7.9	7.8	7.8	7.9	7.8	7.9	8.0	8.0	8.1		
Reference	1				7.7	7.9	7.9	7.8	7.9	7.9	7.8	7.8	8.0	8.0	8.1		
	2				7.7	7.9	7.9	7.8	7.9	8.0	7.8	7.9	8.1	8.0	8.1		
	3				7.7	7.9	7.8	7.9	7.9	8.0	7.9	7.9	8.1	8.1	8.1		
	4				7.7	7.9	7.8	7.9	7.8	7.9	7.9	7.9	8.0	8.0	8.1		
	5				7.7	7.9	7.9	7.9	7.9	7.9	7.9	7.9	8.0	8.0	8.1		
Test Sediment	1				7.1	7.9	7.8	7.9	8.0	7.9	7.8	7.9	8.0	8.0	8.1		
	2				7.1	8.0	7.8	7.9	8.0	8.0	7.9	7.9	8.0	8.0	8.1		
	3				7.1	8.0	7.8	7.9	8.0	8.0	7.9	7.9	8.0	8.0	8.1		
	4				7.1	8.0	7.8	7.9	8.0	7.9	8.0	7.9	8.0	8.0	8.1		
	5				7.1	8.0	7.8	7.8	7.9	7.9	7.9	7.9	8.1	8.0	8.1		
Initials					Sam	Sam	Sam	Sam	Sam	Sam	Sam	Sam	Sam	Sam	JC/KH		
					KH	KH	KH	KH	KH	KH	KH	KH	KH	KH	KH		

KH

TEST ORGANISM TRANSPORTATION AQUA SURVEY, INC.

JOB # 9128 QA/QC K Hagen

Date: 6/15/90 ASI Investigator: J. Myers

Client: Coleneco In-lab, (mobile), or satellite (circle 1)

Test Species: N. virens

Total number of organisms acclimated: 350

A. Organisms

1. ASI culture (Tank & Log #): _____
2. Procured from: 90-48
3. Age: —

B. Holding Water

1. Temperature: ~~21.5°C~~ Dry
2. Salinity: —
* Notes: SP.

C. Destination

1. Laboratory arrival date/time: 6/15/90 12:30 pm
2. Arrival holding water temperature: ~~23.5°C~~ 21.5°C
3. Acclimation water temperature: NA
4. Acclimation water salinity: NA
* Notes: _____

D. Acclimation

1. Holding water volume (1 gal=3.8L): NA
2. Acclimation chamber volume: NA
3. Acclimation began (date & time): NA
4. Changeover rate (ml/minute)(2 drops=1ml): NA
5. Acclimation ended (date & time): NA

TEST ORGANISM TRANSPORTATION AQUA SURVEY, INC.

JOB # 9128 QA/QC K Hayes

Date: 6/15/90 ASI Investigator: J. Ruiz

Client: Environ In-lab, mobile, or satellite (circle 1)

Test Species: M. menidia

Total number of organisms acclimated: 300

A. Organisms

1. ASI culture (Tank & Log #): —
2. Procured from: 90-42
3. Age: —

B. Holding Water

1. Temperature: Dry
2. Salinity: 30.0 ppt
* Notes: SP

C. Destination

1. Laboratory arrival date/time: 6/15/90
2. Arrival holding water temperature: Dry
3. Acclimation water temperature: NA
4. Acclimation water salinity: NA
* Notes:

D. Acclimation

1. Holding water volume (1 gal=3.8L): NA
2. Acclimation chamber volume: NA
3. Acclimation began (date & time): NA
4. Changeover rate (ml/minute)(2 drops=1ml): NA
5. Acclimation ended (date & time): NA

TEST ORGANISM TRANSPORTATION AQUA SURVEY, INC.

JOB # 9128 QA/QC K. Hoyer

Date: 6/15/90 ASI Investigator: J. Ryan

Client: H Cotoneu In-lab, mobile, or satellite (circle 1)

Test Species: L. plumis

Total number of organisms acclimated: 1400+

A. Organisms

1. ASI culture (Tank & Log #): Q53 - 90-149
2. Procured from: 90-46
3. Age: —

B. Holding Water

1. Temperature: 20.5 °C
2. Salinity: 27.5
* Notes: 5°.

C. Destination

1. Laboratory arrival date/time: 6/15/90
2. Arrival holding water temperature: 22.5 °C
3. Acclimation water temperature: NA
4. Acclimation water salinity: NA
* Notes:

D. Acclimation

1. Holding water volume (1 gal=3.8L): N/A
2. Acclimation chamber volume: NA
3. Acclimation began (date & time): NA
4. Changeover rate (ml/minute)(2 drops=1ml): NA
5. Acclimation ended (date & time): NA

SUSPENDED PARTICULATE PHASE

Job # 9124 Site #: : Organism: A. tonsa RETEST

Client: H. CELANESE Manager: DOUGLAS/COLES

Starting Date: 7-9-90 Starting Time: 11:30 AM

Time of Observation - Number of Survivors

Exposure Condition	Replicate	0 hr	4 hr	8 hr	24 hr	48 hr	72 hr	96 hr
Culture Water Control	A.	20	20	20	20	20	20	17^3
	B.	20	20	20	20	20	$19'$	17^2
	C.	20	20	20	20	$19'$	17^2	14^3
10% test medium	A.	20	20	20	17^2	15^2	13	13
	B.	20	$19'$	19	17^2	15^2	15	11
	C.	20	$19'$	19	14^5	14	10	10
50% test medium	A.	20	TTTC	9 *	2^{13}	0^2	—	—
	B.	20	"	10 *	4^4	0^2	—	—
	C.	20	"	7 *	3^8	1	0	—
100% test medium	A.	20	"	1 *	0	—	—	—
	B.	20	"	0 *	0	—	—	—
	C.	20	"	0 *	0	—	—	—
‡		✓	✓	✓	✓	✓	✓	✓
Initials		SLO	SLO	SLO	SLO	SLO	SLO	SLO

‡ Check here to indicate "nothing unusual observed" except for any replicates described below

NOTES: TTTC = Too Turbid To Count

* estimates only, very turbid

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SUSPENDED PARTICULATE PHASE

Job #: 9128 Site #: _____ Organism: A. tonsa
RETEST

Client: M. CELANESE Manager: DOUGLAS/COLES

Starting Date: 7-9-90 Starting Time: 11:30 AM

Exposure Condition	Replicate	Dissolved Oxygen ppm					Temperature Degrees C				
		0 hr	24 hr	48 hr	72 hr	96 hr	0 hr	24 hr	48 hr	72 hr	96 hr
Culture Water Control	A.	7.7	7.4	7.4	7.4	7.4	20.0	19.0	18.0	18.5	18.0
	B.										
	C.										
10% test medium	A.	7.4	7.4	7.4	7.3	7.4	20.0	19.0	18.0	18.5	18.0
	B.										
	C.										
50% test medium	A.	6.1	7.4	7.4	—	—	19.5	19.0	18.0	—	—
	B.			7.4	—	—			18.0	—	—
	C.			7.4	7.3				18.0	18.5	
100% test medium	A.	4.8	7.4	—	—	—	19.0	19.0	—	—	—
	B.		7.5	—	—	—		19.0	—	—	—
	C.		7.5	—	—	—		19.0	—	—	—
	Initials	SD	SD	SD	SD/SO	SD/SO	SD	SD	SD	SD/SO	SD/SO

NOTES: Aeration begun at 0 hrs

SUSPENDED PARTICULATE PHASE

Job #: _____ Site #: _____ Organism: A. Tonsa
RETEST

Client: H. ARANESE Manager: DOUGLAS/COLES

Starting Date: 7-9-90 Starting Time: 11:30 AM

Exposure Condition	Replicate	Salinity ppt					pH				
		0 hr	24 hr	48 hr	72 hr	96 hr	0 hr	24 hr	48 hr	72 hr	96 hr
Culture Water Control	A.	32.0	30*	31	32.0	32.0	7.7	7.4	7.6	8.0	8.0
	B.										
	C.										
10% test medium	A.	32.0	29	30	32.0	32.0	7.7	7.7	7.7	8.0	8.1
	B.										
	C.										
50% test medium	A.	31.0	29	30	—	—	7.4	8.1	7.8	—	—
	B.			30	—	—			7.8	—	—
	C.			30	32.0				7.7	8.2	
100% test medium	A.	31.0	28.0	—	—	—	7.2	8.2	—	—	—
	B.		28.0	—	—	—		8.3	—	—	—
	C.		28.0	—	—	—		8.3	—	—	—
	Initials	SLD	SLD	SLD	~~SLD~~ SC	~~SLD~~ SC	SLD	SLD	SLD	~~SLD~~ SC	~~SLD~~ SC

NOTES:

* 24 hrs - added D.I. to adjust salinity down to 28-32 (evaporation compensation)

H. clarese spp. Test

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(%)
100	60	60	100	8.673618E-17
50	60	60	100	8.673618E-17
10	60	26	43.33333	3.190308

THE BINOMIAL TEST SHOWS THAT 0 AND 50 CAN BE USED AS STATISCALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS SINCE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS 100 PERCENT.
AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 11.43975

WHEN THERE ARE LESS THAN TWO CONCENTRATIONS AT WHICH THE PERCENT DEAD IS BETWEEN 0 AND 100, NEITHER THE MOVING AVERAGE NOR THE PROBIT METHOD CAN GIVE ANY STATISTICALLY SOUND RESULTS.

SUSPENDED PARTICULATE PHASE

Job # 9128 Site #: : Organism: M. bahia

Client: HOECHST CELANESE Manager: DOUGLAS/COLES

Starting Date: 7-2-90 Starting Time: 3:00PM

Time of Observation - Number of Survivors

Exposure Condition	Replicate	0 hr	4 hr	8 hr	24 hr	48 hr	72 hr	96 hr
Culture Water Control	A.	20	20	20	20	20	20	20
	B.	20	20	20	20	20	20	20
	C.	20	20	20	20	20	20	20
10% test medium	A.	20	20	20	20	20	20	20
	B.	20	20	20	19	19	19	19
	C.	20	20	20	20	20	20	20
50% test medium	A.	20	20	20	20	20	20	20
	B.	20	20	20	20	20	20	20
	C.	20	20	20	20	20	20	19
100% test medium	A.	20	20	20	20	20	20	20
	B.	20	20	20	20	19	17	17
	C.	20	20	20	20	20	20	20
	‡	✓	✓	✓	✓	✓	✓	✓
	Initials	SD	SD	SD	SD	SD	SD	SD

‡ Check here to indicate "nothing unusual observed" except for any replicates described below

NOTES:

SUSPENDED PARTICULATE PHASE

Job #: 9128 Site #: _____ Organism: M. bahia

Client: HOECHST CELANESE Manager: _____

Starting Date: 7-2-90 Starting Time: 3:00 PM

Exposure Condition	Replicate	Dissolved Oxygen ppm					Temperature Degrees C				
		0 hr	24 hr	48 hr	72 hr	96 hr	0 hr	24 hr	48 hr	72 hr	96 hr
Culture Water Control	A.	6.6	7.4	7.0	7.1/7.6	7.0	21.0	21.5	22.0	20.0	19.5
	B.	6.6					21.0				
	C.	6.6					21.0				
10% test medium	A.	6.6	7.4	7.0	7.1/7.7	7.1	21.5	22.0	21.5	20.0	19.0
	B.	6.6					21.5				
	C.	6.6					21.5				
50% test medium	A.	6.5	7.4	7.0	7.1/7.7	7.1	21.0	22.0	21.5	20.0	19.0
	B.	6.5					21.0				
	C.	6.5					21.0				
100% test medium	A.	6.3	7.4	7.0	7.0	7.2	20.0	22.0	22.0	20.0	19.5
	B.	6.3					20.0				
	C.	6.3					20.0				
	Initials	AS	SD	JO/SD	SD	JO/SD	AS	SD	JO/SD	SD	JO/SD

NOTES: Aeration started at 0 hrs SD

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SUSPENDED PARTICULATE PHASE

Job #: 9128 Site #: _____ Organism: M. bahia

Client: HOECHST CELANESE Manager: _____

Starting Date: 7-2-90 Starting Time: 3:00 PM

Exposure Condition	Replicate	Salinity ppt					pH				
		0 hr	24 hr	48 hr	72 hr	96 hr	0 hr	24 hr	48 hr	72 hr	96 hr
Culture Water Control	A.	31.0	30.0	30.0	29.0	29.0	8.0	8.4	8.3	8.2	8.3
	B.	31.0					8.0				
	C.	31.0					8.0				
10% test medium	A.	30.0	30.0	31.0	29.0	29.0	7.9	8.4	8.3	8.2	8.3
	B.	30.0					7.9				
	C.	30.0					7.9				
50% test medium	A.	31.0	30.0	31.0	30.0	29.0	7.9	8.4	8.3	8.3	8.3
	B.	31.0					7.9				
	C.	31.0					7.9				
100% test medium	A.	30.0	30.0	31.0	30.0	30.0	7.8	8.4	8.4	8.3	8.4
	B.	30.0					7.8				
	C.	30.0					7.8				
	Initials		SH	SH/SO	SH	SH/SO		SH		GS	SH/SO

NOTES:

Adjusted salinity down to 30 ± 2 ppt in all chambers on 7/5; DI water additions SH 7/5

SUSPENDED PARTICULATE PHASE

Job # 9128 Site #: _____ Organism: ~~Artemia~~ M. menidia

Client: HOECHST CELANESE Manager: DOUGLAS/COLES

Starting Date: 7-2-90 Starting Time: 2:00 PM

Time of Observation - Number of Survivors

Exposure Condition	Replicate	0 hr	4 hr	8 hr	24 hr	48 hr	72 hr	96 hr
Culture Water Control	A.	20	20	20	20	20	18[2]	18
	B.	20	20	20	19[1]	18[1]	17[1]	16[1]
	C.	20	20	20	20	20	20	20
10% test medium	A.	20	20	20	20	20	19[1]	19
	B.	20	20	20	20	20	20	20
	C.	20	20	20	20	20	20	20
50% test medium	A.	20	TTTC	20	19[1]	~~8~~19	19[1]	19
	B.	20	TTTC	20	20	20	20	20
	C.	20	TTTC	20	20	19[1]	19	19
100% test medium	A.	20	TTTC	TTTC	20	20	19[1]	19
	B.	20	TTTC	TTTC	20	19[1]	15[4] ~~16~~ 16	15
	C.	20	TTTC	TTTC	20	19[1]	18[1]	18
	‡	✓	✓	✓	✓	✓	✓	✓
	Initials	SLO	SLO	SLO	SLO	SLO	SLO	JGD

‡ Check here to indicate "nothing unusual observed" except for any replicates described below

NOTES: Aeration started at 0 hrs SLO 7/2

TTTC - Too Turbid to Count

SUSPENDED PARTICULATE PHASE

Job #: 9128 Site #: _____ Organism: M. menidia

Client: Hoechst Celanese Manager: Douglas

Starting Date: 7-2-90 Starting Time: 2:00 pm

Exposure Condition	Replicate	Dissolved Oxygen ppm					Temperature Degrees C				
		0 hr	24 hr	48 hr	72 hr	96 hr	0 hr	24 hr	48 hr	72 hr	96 hr
Culture Water Control	A.	5.6	7.2	6.8	6.5	6.6	21.5	21.5	20.0	19.5	19.0
	B.	5.6	6.8	6.7	6.5	6.6	21.5	22.0	19.5	19.0	18.0
	C.	6.0	6.0	6.0	5.4	6.8	22.0	21.5	19.0	19.0	18.0
10% test medium	A.	6.4	7.2	7.2	7.0	7.0	22.0	21.0	19.0	19.0	18.0
	B.	6.4	7.4	7.2	6.9	7.0	22.0	21.0	19.0	19.0	18.0
	C.	6.0	7.1	7.0	6.8	6.6	22.0	21.0	19.0	19.0	18.0
50% test medium	A.	5.2	6.4	6.3	6.0	6.2	21.5	22.0	21.5	20.0	19.5
	B.	5.4	7.2	6.6	6.5	6.7	21.5	21.0	19.5	19.0	18.5
	C.	5.6	6.0	7.0	7.0	6.8	21.0	21.5	19.5	19.0	18.0
100% test medium	A.	6.2	7.2	7.0	7.0	7.0	21.0	21.5	19.0	19.0	18.0
	B.	5.8	7.2	7.0	6.8	7.0	20.5	21.0	19.0	19.0	18.0
	C.	5.6	7.2	7.0	6.4	6.6	21.0	21.0	19.0	19.0	18.0
	Initials	[illegible]	SD	[illegible]	SD/KB	SD/SD	[illegible]	SD	SD/SD	SD	SD

NOTES:

SUSPENDED PARTICULATE PHASE

Job #: 9128 Site #: _____ Organism: M. menidia

Client: HOECHST CEL. Manager: DOUGLAS

Starting Date: 7-2-90 Starting Time: 2:00 PM

Exposure Condition	Replicate	Salinity ppt					pH				
		0 hr	24 hr	48 hr	72 hr	96 hr	0 hr	24 hr	48 hr	72 hr	96 hr
Culture Water Control	A.	31.0	~~29.0~~ 30.0*	30.0	30.0	30.0	7.7	8.2	8.0	7.9	8.1
	B.	31.0	~~29.0~~ 30.0*	30.0	30.0	30.0	7.7	8.1	8.0	7.9	8.1
	C.	31.0	~~29.0~~ 30.0*	30.0	31.0	30.0	7.8	7.9	7.9	7.7	8.1
10% test medium	A.	30.0	29.0	30.0	31.0	30.0	7.9	8.2	8.1	8.0	8.2
	B.	30.0	29.0	30.0	31.0	30.0	7.9	8.1	8.1	8.1	8.2
	C.	30.0	30.0	30.0	31.0	30.0	7.8	8.1	8.1	8.1	8.1
50% test medium	A.	30.0	29.0	30.0	30.0	30.0	7.6	8.0	8.0	8.1	8.0
	B.	30.0	29.0	30.0	30.0	30.0	7.7	8.1	8.1	8.1	8.1
	C.	30.0	28.0	30.0	30.0	30.0	7.6	7.9	8.2	8.2	8.2
100% test medium	A.	29.5	29.0	30.0	30.0	30.0	7.7	8.1	8.2	8.2	8.2
	B.	29.0	29.0	30.0	30.0	30.0	7.7	8.2	8.1	8.2	8.2
	C.	28.5	29.0	30.0	30.0	30.0	7.7	8.1	8.1	8.1	8.1
	Initials	[illegible]	SD	SD 7/3	SD/CB	SD 7/5	[illegible]	SD	[illegible]	CB	SD

*SD 7/3

NOTES:

TEST ORGANISM TRANSPORTATION AQUA SURVEY, INC.

JOB #_____ QA/QC _____

Date: 7-2-90 ASI Investigator: J Fisher

Client: H. Cleaver (In-lab), mobile, or satallite (circle 1)

Test Species: A. tonsa

Total number of organisms acclimatad: 240

A. Organisms

1. ASI culture (Tank & Log #): Jar #2
2. Procured from: 90-27-A
3. Age: Mixed Adult.

B. Holding Water

1. Temperature: 20.0°C
2. Salinity: 30.0 ppt
* Notes: S.P.

C. Destination

1. Laboratory arrival date/time: 7-2-90 2:00 pm
2. Arrival holding water temperature: 20.0°C
3. Acclimation water temperature: _____
4. Acclimation water salinity: _____
* Notes: _____

D. Acclimation

1. Holding water volume (1 gal=3.8L): _____
2. Acclimation chamber volume: _____
3. Acclimation began (date & time): _____
4. Changeover rate (ml/minute)(2 drops=1ml): _____
5. Acclimation ended (date & time): _____

TEST ORGANISM TRANSPORTATION AQUA SURVEY, INC.

JOB # _____ QA/QC _____

Date: 7-2-90 ASI Investigator: J Myers

Client: H/Cedars (In-lab), mobile, or satellite (circle 1)

Test Species: M. bahia

Total number of organisms acclimated: ~~300~~ 240

A. Organisms

1. ASI culture (Tank & Log #): QS2 90-166
2. Procured from: 90-55
3. Age: < 3 days

B. Holding Water

1. Temperature: 19.0°C
2. Salinity: 31.0
* Notes: SAP.

C. Destination

1. Laboratory arrival date/time: 7-2-90 - 1:00 PM
2. Arrival holding water temperature: ~~31.0°C~~ 19.0°C
3. Acclimation water temperature: _____
4. Acclimation water salinity: _____
* Notes: _____

D. Acclimation

1. Holding water volume (1 gal=3.8L): _____
2. Acclimation chamber volume: _____
3. Acclimation began (date & time): _____
4. Changeover rate (ml/minute)(2 drops=1ml): _____
5. Acclimation ended (date & time): _____

TEST ORGANISM TRANSPORTATION AQUA SURVEY, INC.

JOB #_____ QA/QC _____

Data: 7-2-90 ASI Investigator: J. Myers

Client: H. Colonese (In-Lab) mobile, or satellite (circle 1)

Test Species: M. meridia

Total number of organisms acclimated: 240

A. Organisms

1. ASI culture (Tank & Log #): Q55 90-165
2. Procured from: 90-51
3. Age: _____

B. Holding Water

1. Temperature: 22.5°C
2. Salinity: 28.5
* Notes: SW

C. Destination

1. Laboratory arrival date/time: 7-2-90 1:00 PM
2. Arrival holding water temperature: 22.5°C
3. Acclimation water temperature: _____
4. Acclimation water salinity: _____
* Notes: _____

D. Acclimation

1. Holding water volume (1 gal=3.8L): _____
2. Acclimation chamber volume: _____
3. Acclimation began (date & time): _____
4. Changeover rate (ml/minute)(2 drops=1ml): _____
5. Acclimation ended (date & time): _____

STANDARD REFERENCE TOXICANT

Job #: _____ Toxicant: ALDRICH SDS Organism: A. tonsa

Supplier, Lot # SDS 70%

Client: H. Celanese/ACOE Manager: DOUGLAS/COLES

Starting Date: 7-9-90 Starting Time: 2:30 PM

Time of Observation - Number of Survivors

Exposure Condition	Replicate	0 hr	4 hr	8 hr	24 hr	48 hr	72 hr	96 hr
Culture Water Control	A.	10	10	10	10	10	10	8^2
	B.	10	10	10	10	10	10	10
	C.							
0.6 ppm	A.	10	10	10	10	10	8^2	8
	B.	10	10	10	10	10	9^1	8^1
	C.							
1.3 ppm	A.	10	10	10	5^5	5	4^1	4
	B.	10	10	10	8^2	5^3	4^1	4
	C.							
2.5 ppm	A.	10	10	9^1	0^9	—	—	—
	B.	10	10	9^1	0^9	—	—	—
	C.							
5.0 ppm	A.	10	7^3	0^7	—	—	—	—
	B.	10	9^1	0^9	—	—	—	—
-	C.							
____ ppm	A.							
	B.							
	C.							
	Initials	SAD	SAD	SAD	SAD	SAD	SAD	SAD/SD

STANDARD REFERENCE TOXICANT

Job # _____ Toxicant: ALDRICH SDS Organism: A. tonsa

Client: H. CELEBESE/ACOE Manager: DOUGLAS/COLES

Starting Date: 7-9-90 Starting Time: 2:30 pm

Exposure Condition	Repl.	Salinity ppt					pH				
		0 hr	24 hr	48 hr *	72 hr	96 hr	0 hr	24 hr	48 hr	72 hr	96 hr
Culture Water Control	A.	32 ~~30~~	30	32	30	30	8.0	7.7	7.5	7.6	7.7
	B.	~~30~~ 7/9									
	C.										
0.6 ppm	A.	32	30	32	30	32	8.0	7.7	7.5	7.7	7.8
	B.										
	C.										
1.3 ppm	A.	32	30	32	31	31	7.9	7.7	7.5	7.8	7.8
	B.										
	C.										
2.5 ppm	A.	32	31	—	—	—	7.9	7.7	—	—	—
	B.		31	—	—	—		7.7	—	—	—
	C.										
5.0 ppm	A.	32	31	—	—	—	7.9	7.7	—	—	—
	B.		31	—	—	—		7.7	—	—	—
	C.										
____ ppm	A.										
	B.										
	C.										
	Initials	SLO	SLO	SLO	SR 50	FR 50	SLO	SLO	SLO	SLO	SR JO

* Added DI to replace evaporative loss

STANDARD REFERENCE TOXICANT

Job #: _____ Toxicant: SDS Organism: A. tonsa

Client: NCELANESE/ACOE Manager: DOUGLAS/COLES

Starting Date: 7-9-90 Starting Time: 2:30 pm

Exposure Condition	Repl.	Dissolved Oxygen ppm					Temperature Degrees C				
		0 hr	24 hr	48 hr	72 hr	96 hr	0 hr	24 hr	48 hr	72 hr	96 hr
Culture Water Control	A.	7.4	7.2	7.0	6.6	6.1	20	18.5	19.5	18.5	20.0
	B.										
	C.										
0.6 ppm	A.	7.4	7.2	7.0	6.6	6.8	20	18.0	18.0	18.5	20.0
	B.										
	C.										
1.3 ppm	A.	7.4	7.2	7.0	6.6	6.8	19.5	18.0	18.0	18.5	20.0
	B.										
	C.										
2.5 ppm	A.	7.4	7.2	—	—	—	19.5	18.0	—	—	—
	B.		7.2	—	—	—		18.0	—	—	—
	C.										
5.0 ppm	A.	7.4	7.2	—	—	—	19.5	18.0	—	—	—
	B.		7.0	—	—	—		18.0	—	—	—
	C.										
_____ ppm	A.										
	B.										
	C.										
	Initials	SAD	SAD	SAD	SAD/JO	SAD/JO	SAD	SAD	SAD	SAD	SAD/JO

Aqua-Survey Stock and Treatments Preparation Sheet

**** ALL UNITS ARE IN PPM UNLESS OTHERWISE SPECIFIED ****

Job No. : QA/QC Species: A. tonsa

Date : 7/9/90 Location: ASI Flemington,NJ

TOXICANT: SDS SOURCE/LOT No.: Aldrich 70%

Enter ratio of stock solution to highest test concentration in 14A
5.0000 Enter Stock Solution Volume: 1000.0000

Enter concentrations in PPM, highest to lowest, in column A below:
5.0000
2.5000
1.3000
0.6000
0.0000
0.0000

Enter total volume of each container in Milliliters in A-25:
400.0000
Enter number of replicates per treatment in A-27:
3.0000
Enter excess solution for each treatment in A-29:
0.0000 . Total ml= 1200.0000

First, prepare STOCK SOLUTION by adding
0.0250 mg./ml.= 0.0250
grams of stock chemical to a 1 1000.0000 ml. volumetric flask.
Mix, then pour to mixing chambers as follows:

Conc., PPM	ml. Stock Sol'n.	ml. Dilution Water
0.0000	0.0000	1200.0000
0.0000	0.0000	1200.0000
0.0000	0.0000	1200.0000
0.6000	28.8000	1171.2000
1.3000	62.4000	1137.6000
2.5000	120.0000	1080.0000
5.0000	240.0000	960.0000
Totals:	451.2000	7948.8000

By: [signature]

A. tonsa. SRT Aldrich SLS. 7/9/90.

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(%)
5 ppm	20	20	100	9.536743E-05
2.5	20	20	100	9.536743E-05
1.3	20	12	60.00001	25.17223
.6	20	4	20	.5908966

THE BINOMIAL TEST SHOWS THAT .6 AND 2.5 CAN BE USED AS STATISCALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS SINCE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS 99.40901 PERCENT.
AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 1.080278

>>>>>>>>RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
2	9.753784E-02		1.028152	.8109624
1.247065				

>>>>>>>RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
6	.1559421	1	.3851469

SLOPE = 4.509742
95 PERCENT CONFIDENCE LIMITS = 2.728867 AND 6.290616

LC50 = .9994058
95 PERCENT CONFIDENCE LIMITS = .7842579 AND 1.231675
LC1 = .3046452
95 PERCENT CONFIDENCE LIMITS = .1271034 AND .4552574

STANDARD REFERENCE TOXICANT

Job #: 9120 Toxicant: SDS Organism: M. bahia

Supplier, Lot # ALDRICH

Client: RETEST Manager: DOUGLAS

Starting Date: 6/14/90 Starting Time: 4:00 PM

Time of Observation - Number of Survivors

Exposure Condition	Replicate	0 hr	4 hr	8 hr	24 hr	48 hr	72 hr	96 hr
Culture Water Control	A.	~~10~~ 10	10	~~10~~ 10	10	10	10	10
	B.	~~10~~ 10	10	~~10~~ 10	10	10	10	10
	C.							
1.3 ppm	A.	10	10	10	10	10	10	10
	B.	10	10	10	10	9[1]	9	9
	C.							
2.5 ppm	A.	10	10	10	10	10	10	10
	B.	10	10	10	10	10	9[1]	9
	C.							
5.0 ppm	A.	10	10	10	10	10	10	9[1]
	B.	10	10	9[1]	8[1]	8	6[2]	6
	C.							
10.0 ppm	A.	10	10	10	3[7]	2[1]	0[2]	—
	B.	10	10	5[5]	2[3]	1[1]	0[1]	—
-	C.							
——— ppm	A.							
	B.							
	C.							
	Initials	[illegible]	[illegible]	[illegible]	SD	[illegible]	[illegible]	SD

STANDARD REFERENCE TOXICANT

Job # 9120 Toxicant: SDS Organism: M. bahia

Client: RetesT Manager: Douglas

Starting Date: 6/14/90 Starting Time: 9:00pm

Exposure Condition	Repl.	Salinity ppt					pH				
		0 hr	24 hr	48 hr	72 hr	96 hr	0 hr	24 hr	48 hr	72 hr	96 hr
Culture Water Control	A.	31.0	32.0	32.0	31.0	28.0	8.0	8.1	8.2	8.1	8.2
	B.										
	C.										
1.3 ppm	A.	31.0	32.0	31.0	32.0	29.0	8.0	8.1	8.2	8.1	8.2
	B.										
	C.										
2.5 ppm	A.	31.0	32.0	32.0	32.0	29.0	8.0	8.1	8.2	8.1	8.2
	B.										
	C.										
5.0 ppm	A.	30.0	32.0	31.5	32.0	29.0	8.0	8.1	8.2	8.1	8.2
	B.										
	C.										
10.0 ppm	A.	30.0	31.0	31.0	32.0	29.0	8.05	8.1	8.2	8.1	8.2
	B.										
	C.										
____ ppm	A.										
	B.										
	C.										
	Initials										

STANDARD REFERENCE TOXICANT

Job # 9120 Toxicant: SDS Organism: M. bahia

Client: ReTox Manager: Douglas

Starting Date: 6/19/90 Starting Time: 4:00 pm

Exposure Condition	Repl.	Dissolved Oxygen ppm					Temperature Degrees C				
		0 hr	24 hr	48 hr	72 hr	96 hr	0 hr	24 hr	48 hr	72 hr	96 hr
Culture Water Control	A.	7.3	6.8	7.0	7.0	6.6	20.5	20.5	20.0	19.0	19.0
	B.										
	C.										
1.3 ppm	A.	7.2	6.7	7.0	7.2	7.0	20.5	20.5	20.0	19.0	19.0
	B.										
	C.										
2.5 ppm	A.	7.2	6.2	6.9	7.2	7.0	20.5	20.5	20.0	19.0	19.0
	B.										
	C.										
5.0 ppm	A.	7.2	6.0	6.9	7.3	7.0	20.5	20.5	20.0	19.0	19.0
	B.										
	C.										
10.0 ppm	A.	7.2	6.3	6.6	7.0	7.0	20.5	20.5	20.0	19.0	19.0
	B.										
	C.										
____ ppm	A.										
	B.										
	C.										
	Initials			JSO							

6/14/90. SRT M. Bahia Aldrich SDS.

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(%)
10	20	20	100	9.536743E-05
5	20	5	25	2.069473
2.5	20	1	5	2.002716E-03
1.3	20	1	5	2.002716E-03

THE BINOMIAL TEST SHOWS THAT 5 AND 10 CAN BE
USED AS STATISCALLY SOUND CONSERVATIVE 95 PERCENT
CONFIDENCE LIMITS SINCE THE ACTUAL CONFIDENCE LEVEL
ASSOCIATED WITH THESE LIMITS IS 97.93044 PERCENT.
AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 6.02491

>>>>>>>>RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
2	6.572943E-02		5.519039	4.728657
6.531674				

>>>>>>>RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
7	6.235482	9.131312	0

A PROBABILITY OF 0 MEANS THAT IT IS LESS THAN 0.001

SINCE THE PROBABILITY IS LESS THAN 0.05, RESULTS CALCULATED
USING THE PROBIT METHOD PROBABLY SHOULD NOT BE USED.

SLOPE = 4.378799
95 PERCENT CONFIDENCE LIMITS =-6.555477 AND 15.31307

LC50 = 5.360156
95 PERCENT CONFIDENCE LIMITS = 0 AND + INFINITY
LC1 = 1.576889
95 PERCENT CONFIDENCE LIMITS = 0 AND + INFINITY

LC50 = 5.52 ppm

C.L = 4.7 - 6.5 ppm.

STANDARD REFERENCE TOXICANT

Job #: 9120 Toxicant: SDS Organism: M. menidia

Supplier, Lot # ALDRICH

Client: _____ Manager: DOUGLAS

Starting Date: 6/15/90 Starting Time: 3:30 pm

Time of Observation - Number of Survivors

Exposure Condition	Replicate	0 hr	4 hr	8 hr	24 hr	48 hr	72 hr	96 hr
Culture Water Control	A.	10	10	10	10	10	10	10
	B.	10	10	10	10	10	10	10
	~~C.~~							
.6 ppm	A.	10	10	10	10	10	10	10
	B.	10	10	10	10	10	10	10
	~~C.~~							
1.3 ppm	A.	10	10	10	10	10	10	10
	B.	10	10	10	10	10	10	10
	~~C.~~							
2.5 ppm	A.	10	0 10	0	—	—	—	—
	B.	10	0 10	0	—	—	—	—
	~~C.~~							
5.0 ppm	A.	10	0 10	0	—	—	—	—
	B.	10	0 10	0	—	—	—	—
—	~~C.~~							
_____ ppm	A.							
	B.							
	C.							
	Initials	SJL	SJL	[illegible]	[illegible]	[illegible]	SJL	

STANDARD REFERENCE TOXICANT

Job # 9120 Toxicant: SDS Organism: M. memidia

Client: _____ Manager: DOUGLAS

Starting Date: 6/15/90 Starting Time: 3:30 PM

Exposure Condition	Repl.	Dissolved Oxygen ppm					Temperature Degrees C				
		0 hr	24 hr	48 hr	72 hr	96 hr	0 hr	24 hr	48 hr	72 hr	96 hr
Culture Water Control	A.	7.9	4.2	7.7	7.2	7.2	21.0	19.5	18.5	18.5	18.5
	B.	7.9	4.0	7.7	7.4	7.2	21.0	19.5	18.5	18.5	18.0
	~~C.~~										
1.6 ppm	A.	7.6	4.0	7.6	7.3	7.2	21.5	19.5	18.0	18.0	18.0
	B.	7.8	4.0	7.7	7.4	7.2	21.5	19.5	18.0	18.0	18.0
	~~C.~~										
1.3 ppm	A.	7.5	4.0	7.7	7.4	7.0	21.0	19.0	18.0	18.0	18.0
	B.	7.6	4.0	7.7	7.4	7.2	21.0	19.0	18.0	18.0	18.0
	~~C.~~										
2.5 ppm	A.	8.0	\	—	—	—	21.0	—	—	—	—
	B.	7.7	—	—	—	—	21.0	—	—	—	—
	~~C.~~										
5.0 ppm	A.	8.1	—	—	—	—	21.5	—	—	—	—
	B.	8.0	—	—	—	—	21.5	—	—	—	—
	~~C.~~										
_____ ppm	A.										
	B.										
	C.										
	Initials	CR	JE	KM	AW	AW	CR	AW	KM	AW	AW

STANDARD REFERENCE TOXICANT

Job # 9130 Toxicant: SDS Organism: M. arenaria

Client: _____ Manager: DOUGLAS

Starting Date: 6/15/90 Starting Time: 3:30 ~~3:00~~ PM

Exposure Condition	Repl.	Salinity ppt					pH				
		0 hr	24 hr	48 hr	72 hr	96 hr	0 hr	24 hr	48 hr	72 hr	96 hr
Culture Water Control	A.	30.0	~~30.0~~*	30.0	28.5	29.0	8.1	8.1	8.0	8.1	8.1
	B.	30.0	~~30.0~~*	30.0	28.0	29.0	8.2	8.1	8.1	8.1	8.1
	C.										
.6 ppm	A.	31.5	~~31.5~~*	31.0	29.0	29.5	8.2	8.1	8.0	8.1	8.1
	B.	32.0	~~32.0~~*	32.0	30.0	31.0	8.2	8.1	8.1	8.2	8.2
	C.										
1.3 ppm	A.	30.5	~~30.5~~*	30.0	28.0	28.0	8.2	8.0	8.2	8.2	8.3
	B.	31.5	~~31.0~~*	30.0	28.0	28.0	8.2	8.0	8.2	8.2	8.3
	C.										
2.5 ppm	A.	32.0	~~32.0~~*	—	—	—	8.3	—	—	—	—
	B.	30.5	~~30.5~~*	—	—	—	8.3	—	—	—	—
	C.										
5.0 ppm	A.	32.0	~~32.0~~*	—	—	—	8.3	—	—	—	—
	B.	32.0	~~34.0~~*	—	—	—	8.3	—	—	—	—
	C.										
____ ppm	A.										
	B.										
	C.										
	Initials	SD	CR	JM	JM	JM	CR	JM	JM	JM	JM

*SD 6/15 wrong entry

24 hr: CON A 32.0 ~~32.0~~ B 31.5 ~~31.5~~

SALINITY .6 ~~.6~~ A 32.0 B 32.0

2.5 A — B —

5.0 A — B —

C-12

Aqua-Survey Stock and Treatments Preparation Sheet

**** ALL UNITS ARE IN PPM UNLESS OTHERWISE SPECIFIED ****

Job No. : QA/QC Species: M. menidia

Date : 6/15/90 Location: ASI Flemington,NJ

TOXICANT: SDS SOURCE/LOT No.: Aldrich

Enter ratio of stock solution to highest test concentration in 14A
75.0000 Enter Stock Solution Volume: 1000.0000

Enter concentrations in PPM, highest to lowest, in column A below:
5.0000
2.5000
1.3000
0.6000
0.0000
0.0000

Enter total volume of each container in Milliliters in A-25:
19000.0000
Enter number of replicates per treatment in A-27:
2.0000
Enter excess solution for each treatment in A-29:
0.0000 . Total ml= 38000.0000

First, prepare STOCK SOLUTION by adding
0.3750 mg./ml.= 0.3750
grams of stock chemical to a 1 1000.0000 ml. volumetric flask.
Mix, then pour to mixing chambers as follows:

Conc., PPM	ml. Stock Sol'n.	ml. Dilution Water
0.0000	0.0000	38000.0000
0.0000	0.0000	38000.0000
0.0000	0.0000	38000.0000
0.6000	60.8000	37939.2000
1.3000	131.7333	37868.2667
2.5000	253.3333	37746.6667
5.0000	506.6667	37493.3333
Totals:	952.5333	265047.4667

By:_____

6/15/90 SRT M. menidia Aldrich SOS

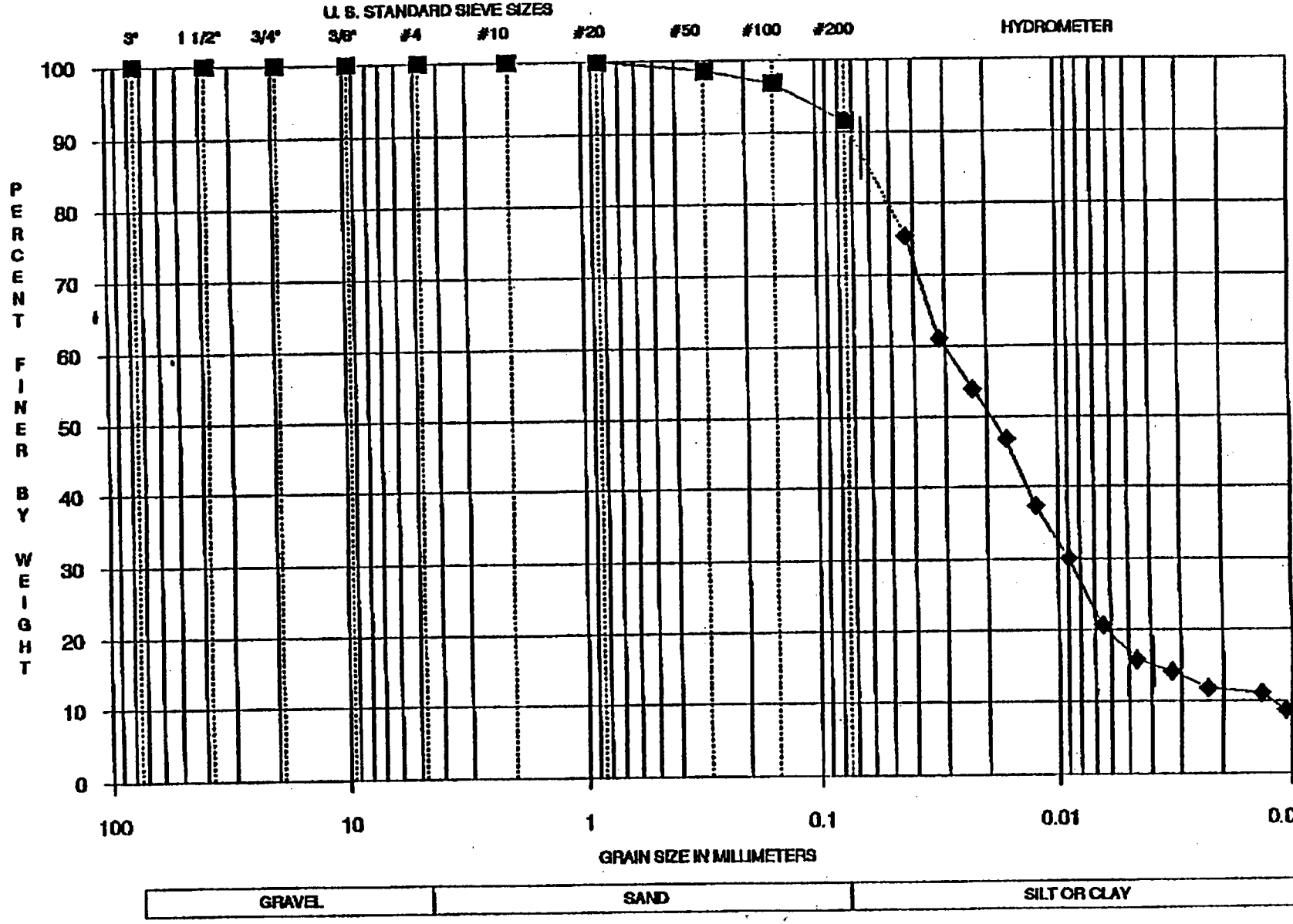
CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (%)
5	20	20	100	9.536743E-05
2.5	20	20	100	9.536743E-05
1.3	20	0	0	9.536743E-05
.6	20	0	0	9.536743E-05

THE BINOMIAL TEST SHOWS THAT 1.3 AND 2.5 CAN BE USED AS STATISCALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS SINCE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS 99.99982 PERCENT.
AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 1.802775

WHEN THERE ARE LESS THAN TWO CONCENTRATIONS AT WHICH THE PERCENT DEAD IS BETWEEN 0 AND 100, NEITHER THE MOVING AVERAGE NOR THE PROBIT METHOD CAN GIVE ANY STATISTICALLY SOUND RESULTS.

WESTON ENVIRONMENTAL TECHNOLOGY LABORATORY

GRAIN SIZE DISTRIBUTION CURVE FOR
AQUASURVEY PROJECT SAMPLE CORE #1, ETL SAMPLE # 9009X002-001

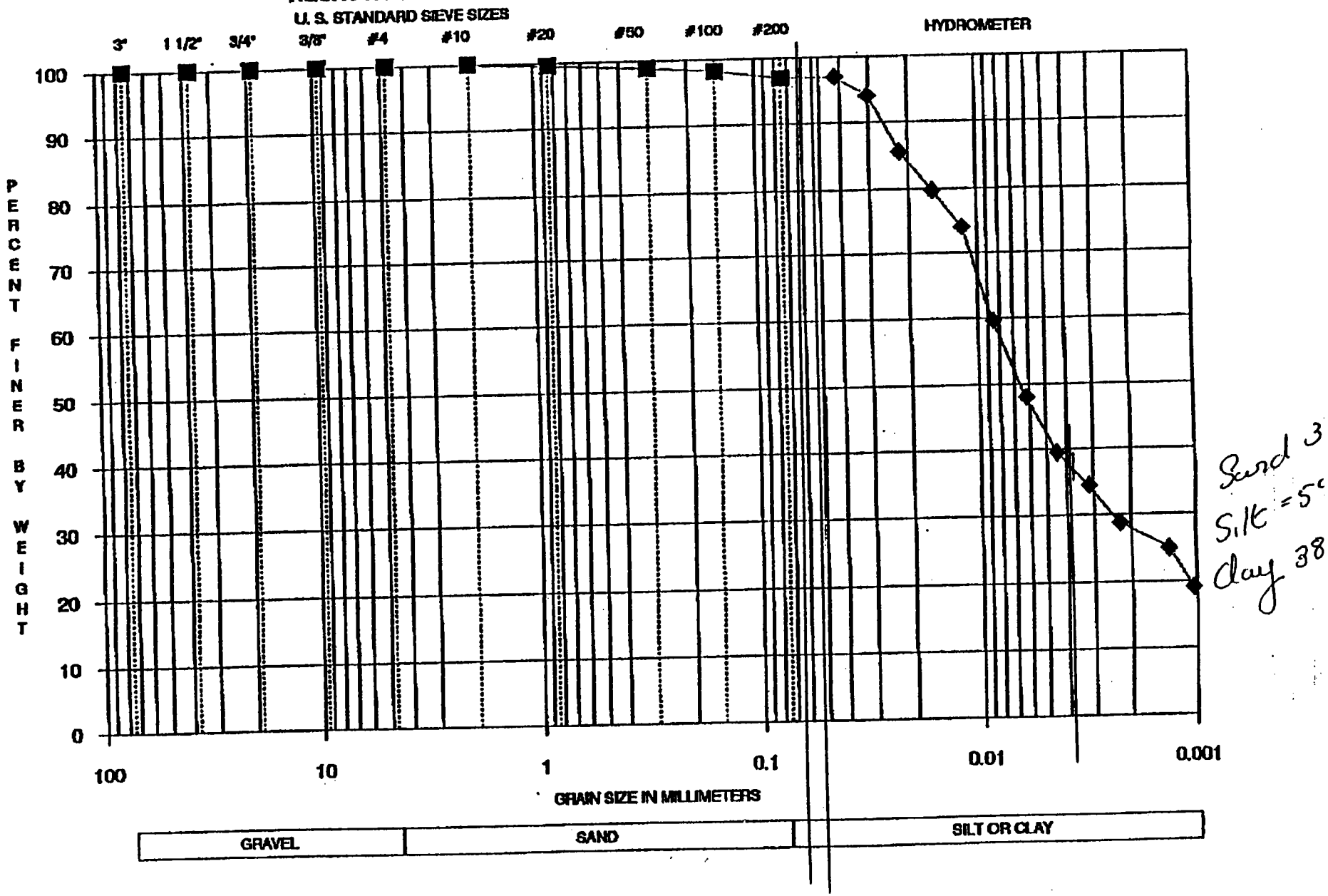


Sand. 12%
Silt = 73
Clay 15%

D-1

WESTON ENVIRONMENTAL TECHNOLOGY LABORATORY

GRAIN SIZE DISTRIBUTION CURVE FOR
AQUASURVEY PROJECT SAMPLE CORE #2, ETL SAMPLE # 9009X002-002



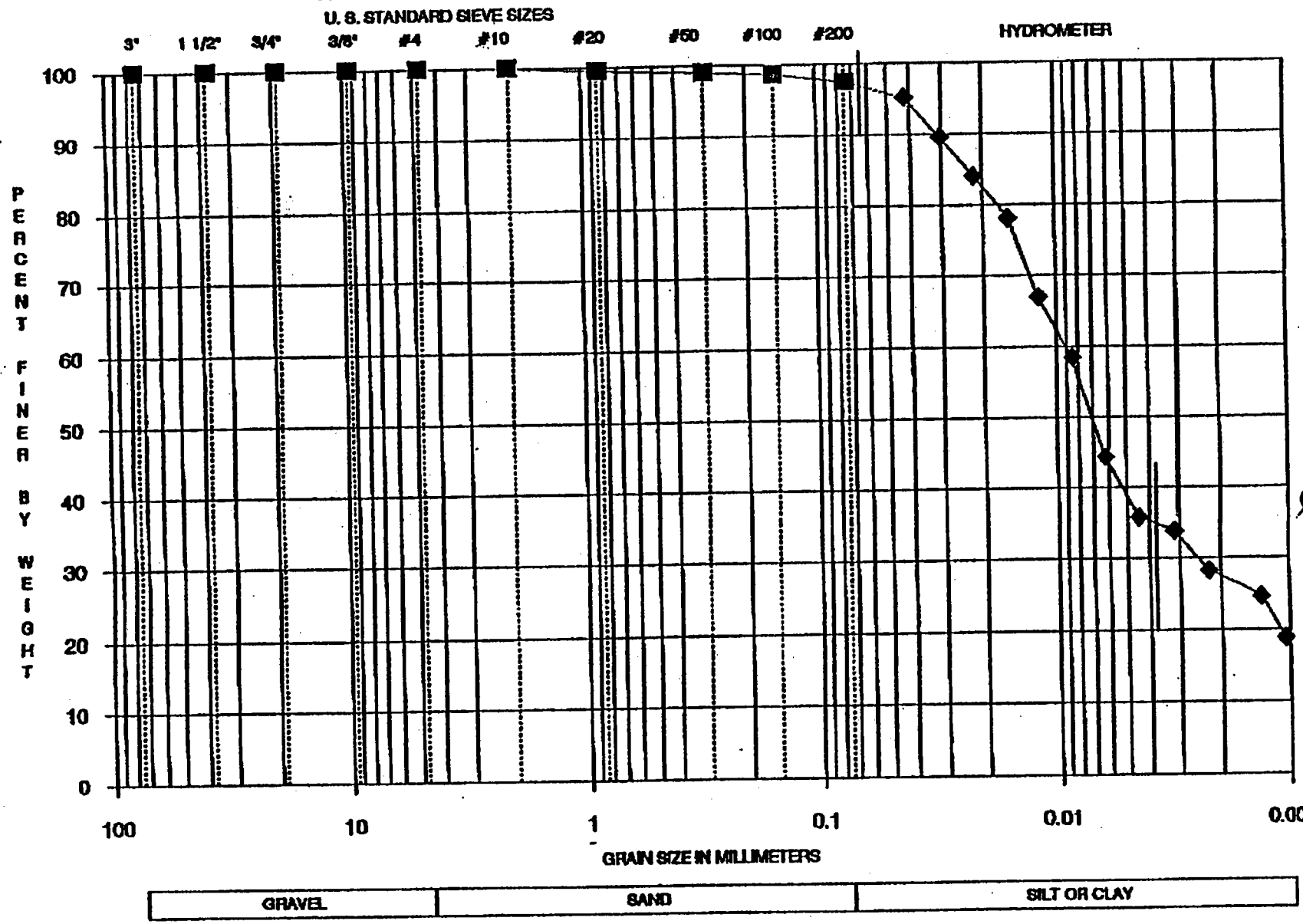
Sand 3
Silt = 5
Clay 38

D-2

SENT BY:ROY F. WESTON, INC. ;10- 1-90 ; 2:03PM ; 254 LAB WESTON;

WESTON ENVIRONMENTAL TECHNOLOGY LABORATORY

GRAIN SIZE DISTRIBUTION CURVE FOR
AQUASURVEY PROJECT SAMPLE CORE #3, ETL SAMPLE # 9009X002-003

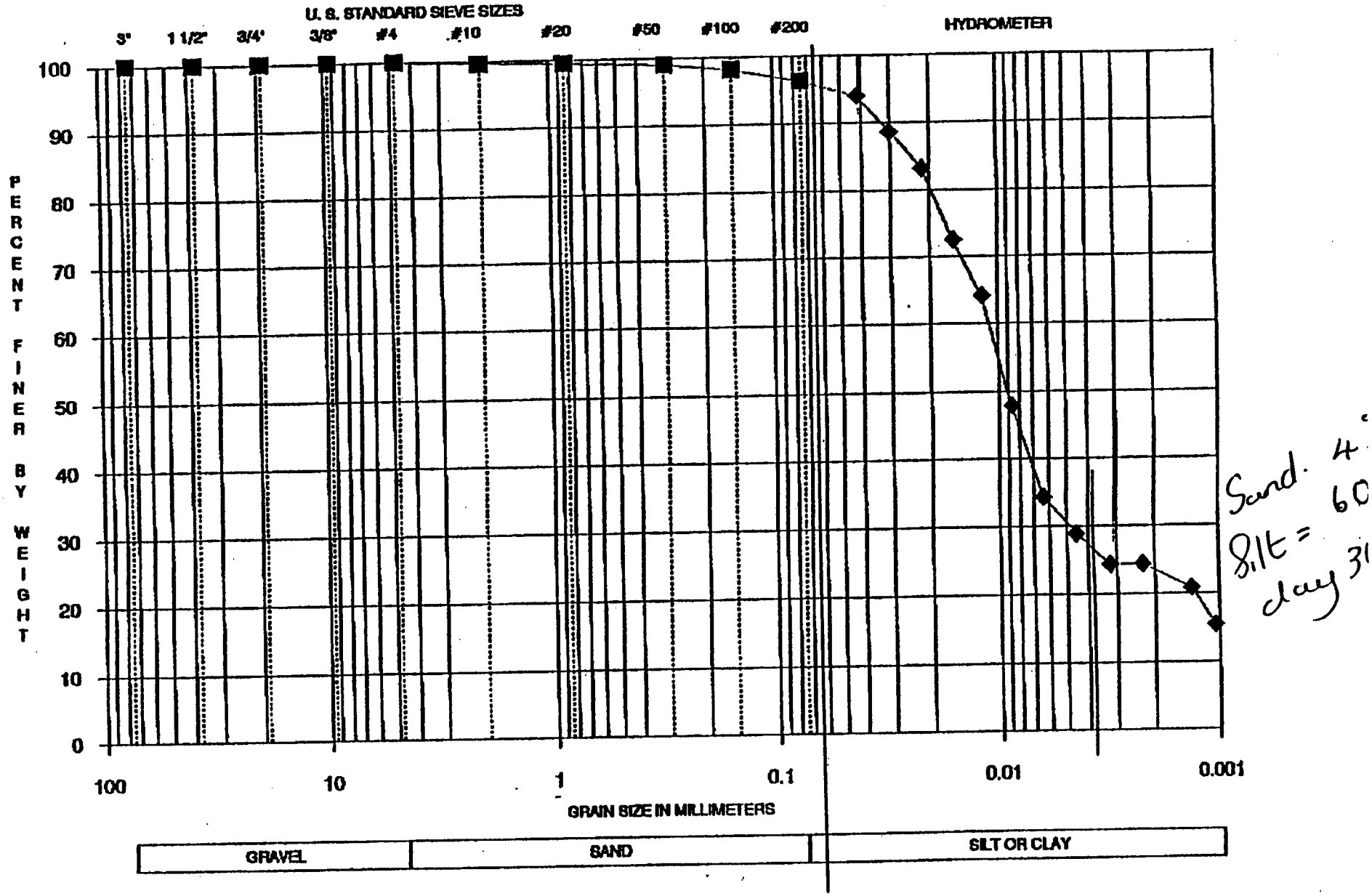


Sand 3%
Silt 62%
Clay 35

D-3

WESTON ENVIRONMENTAL TECHNOLOGY LABORATORY

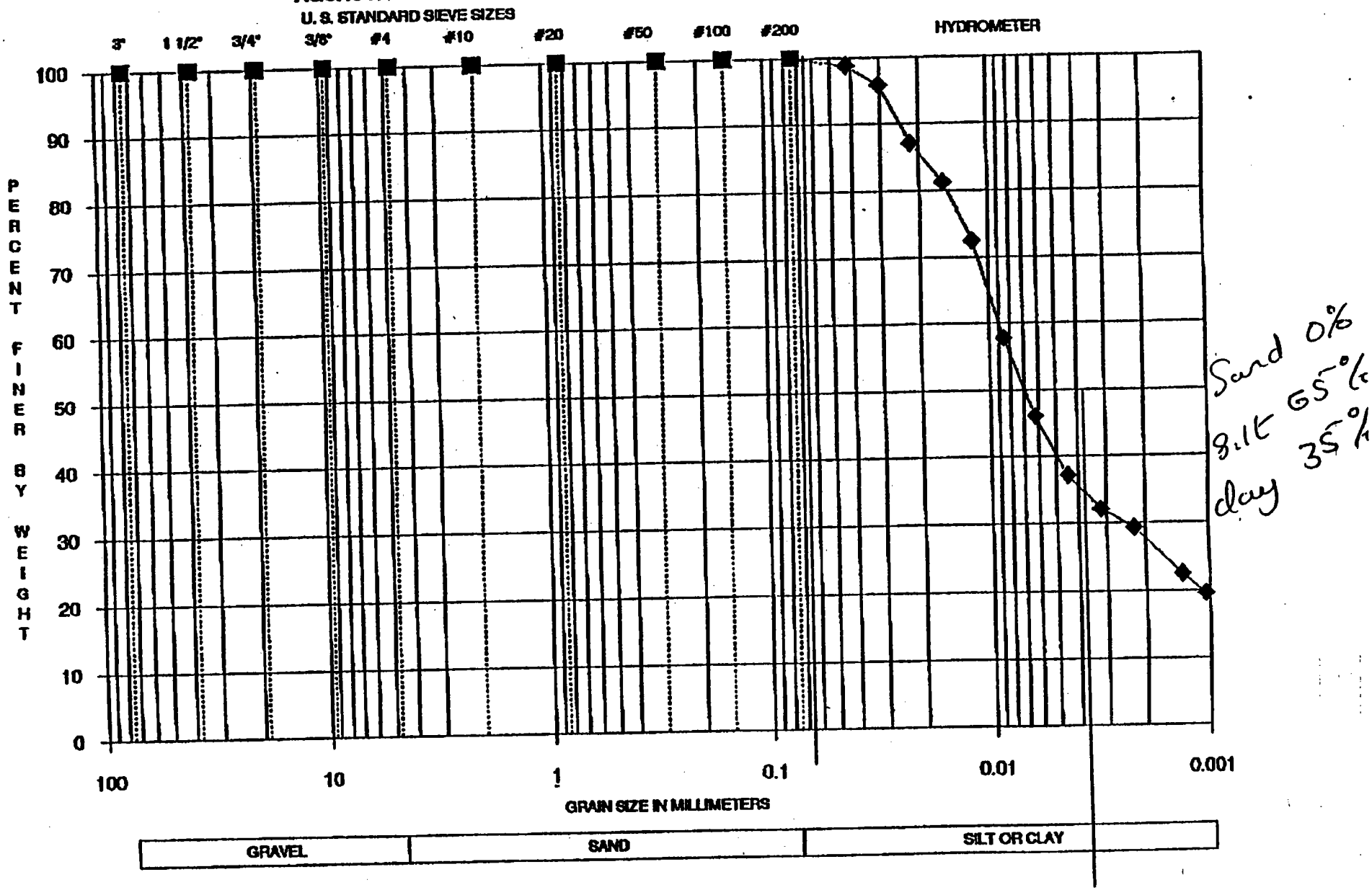
GRAIN SIZE DISTRIBUTION CURVE FOR
AQUASURVEY PROJECT SAMPLE CORE #4, ETL SAMPLE # 9009X002-004



Sand. 4
Silt = 60
day 31

WESTON ENVIRONMENTAL TECHNOLOGY LABORATORY

GRAIN SIZE DISTRIBUTION CURVE FOR
AQUASURVEY PROJECT SAMPLE CORE #5, ETL SAMPLE # 9009X002-005

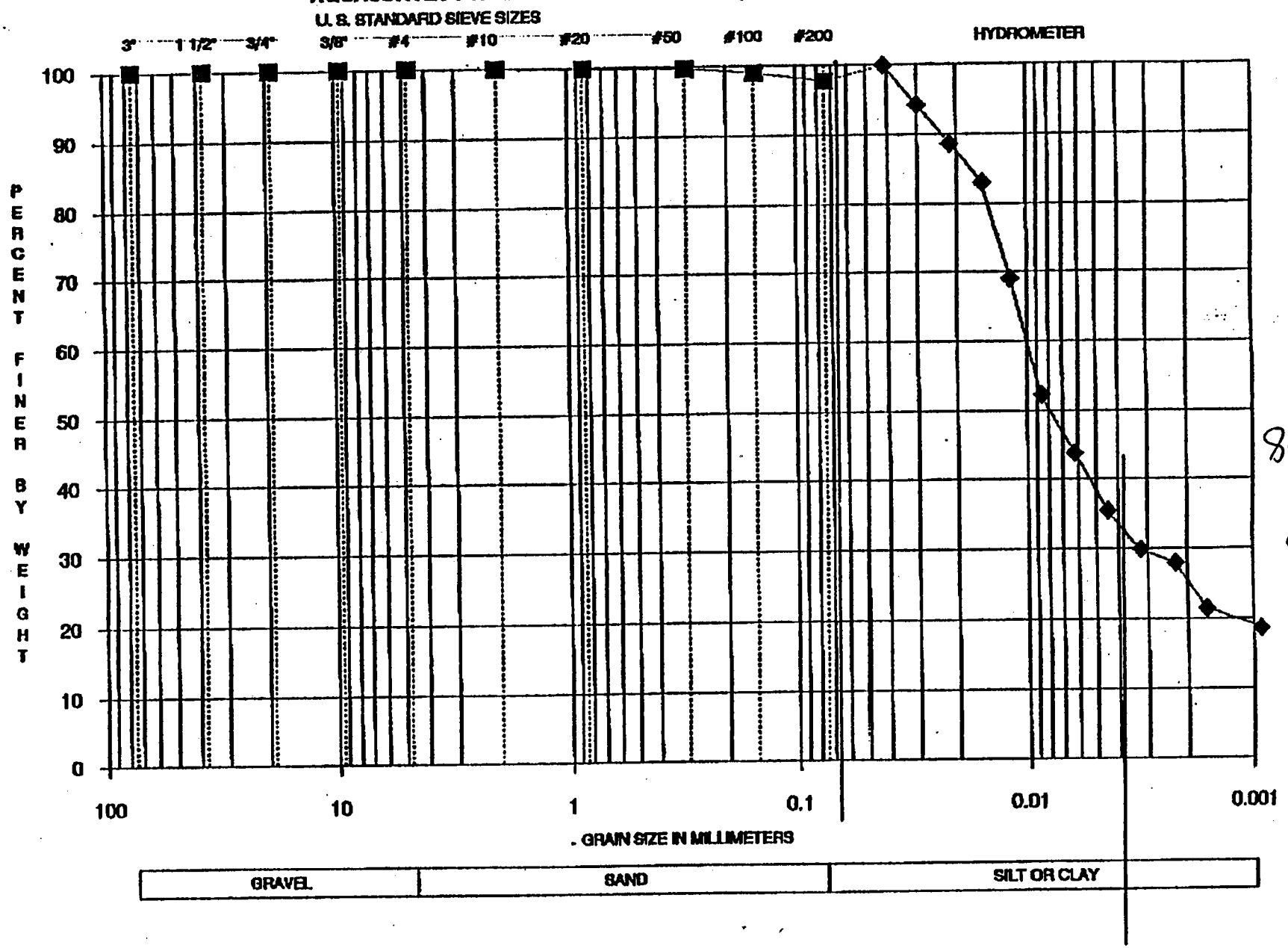


Sand 0%
Silt 65%
day 35%

D-5

WESTON ENVIRONMENTAL TECHNOLOGY LABORATORY

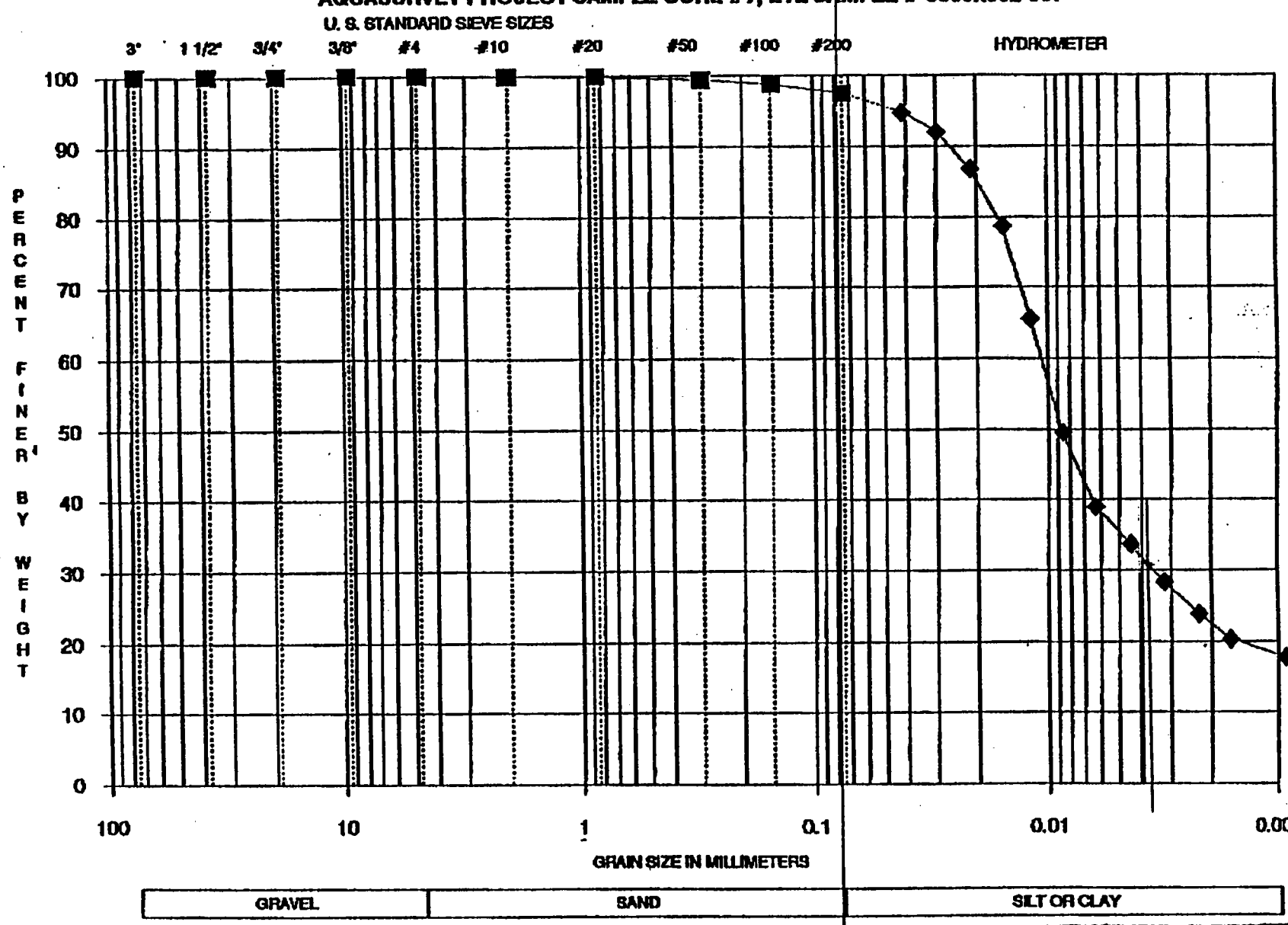
GRAIN SIZE DISTRIBUTION CURVE FOR
AQUASURVEY PROJECT SAMPLE CORE #6, ETL SAMPLE # 9009X002-006



Sand 2%
Silt 63%
day 33%

WESTON ENVIRONMENTAL TECHNOLOGY LABORATORY

GRAIN SIZE DISTRIBUTION CURVE FOR
AQUASURVEY PROJECT SAMPLE CORE #7, ETL SAMPLE # 9009X002-007

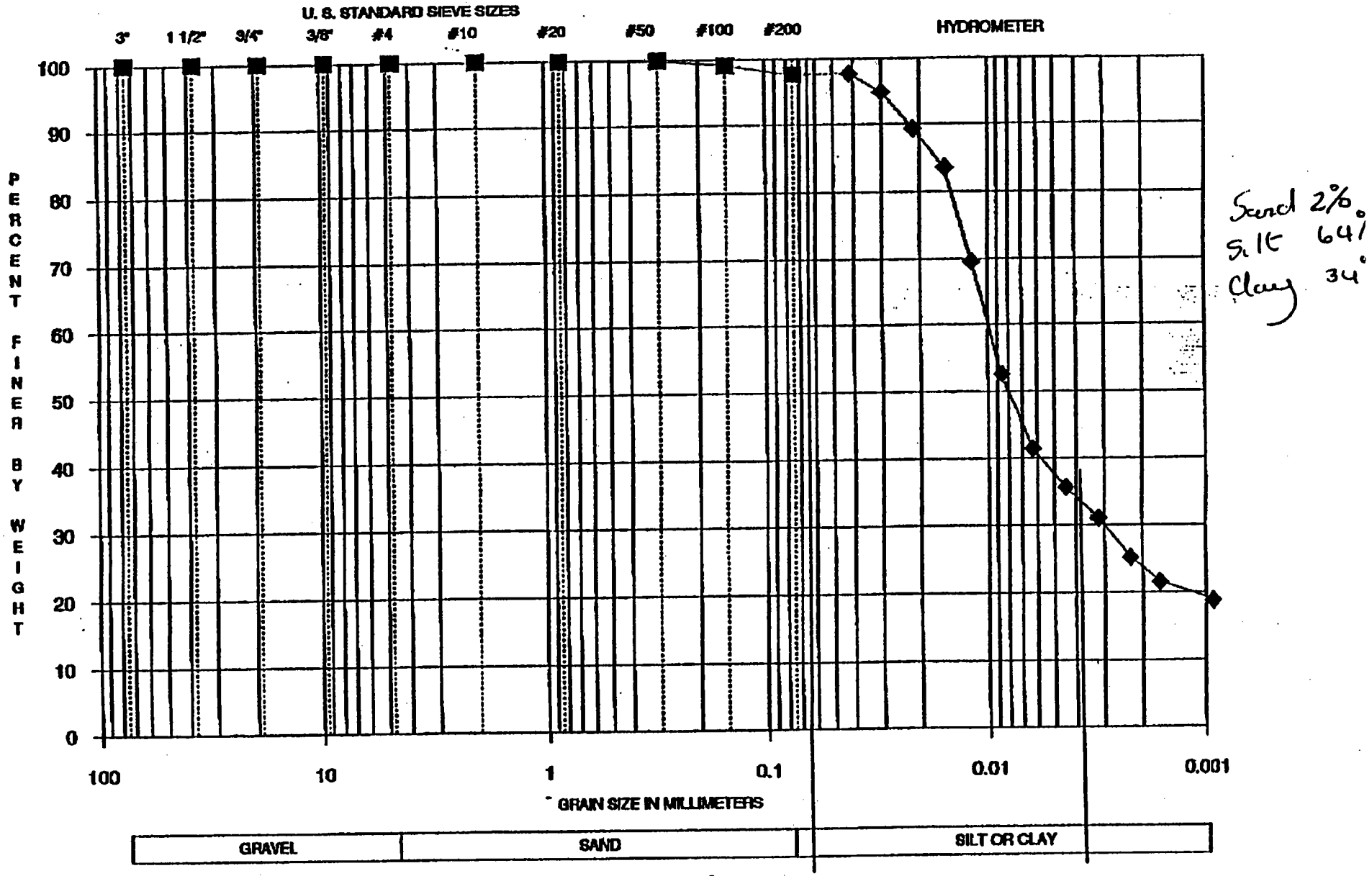


sand 3%
silt - 6%
clay - 31

D-7

WESTON ENVIRONMENTAL TECHNOLOGY LABORATORY

GRAIN SIZE DISTRIBUTION CURVE FOR
AQUASURVEY PROJECT SAMPLE CORE #8, ETL SAMPLE # 9009X002-008

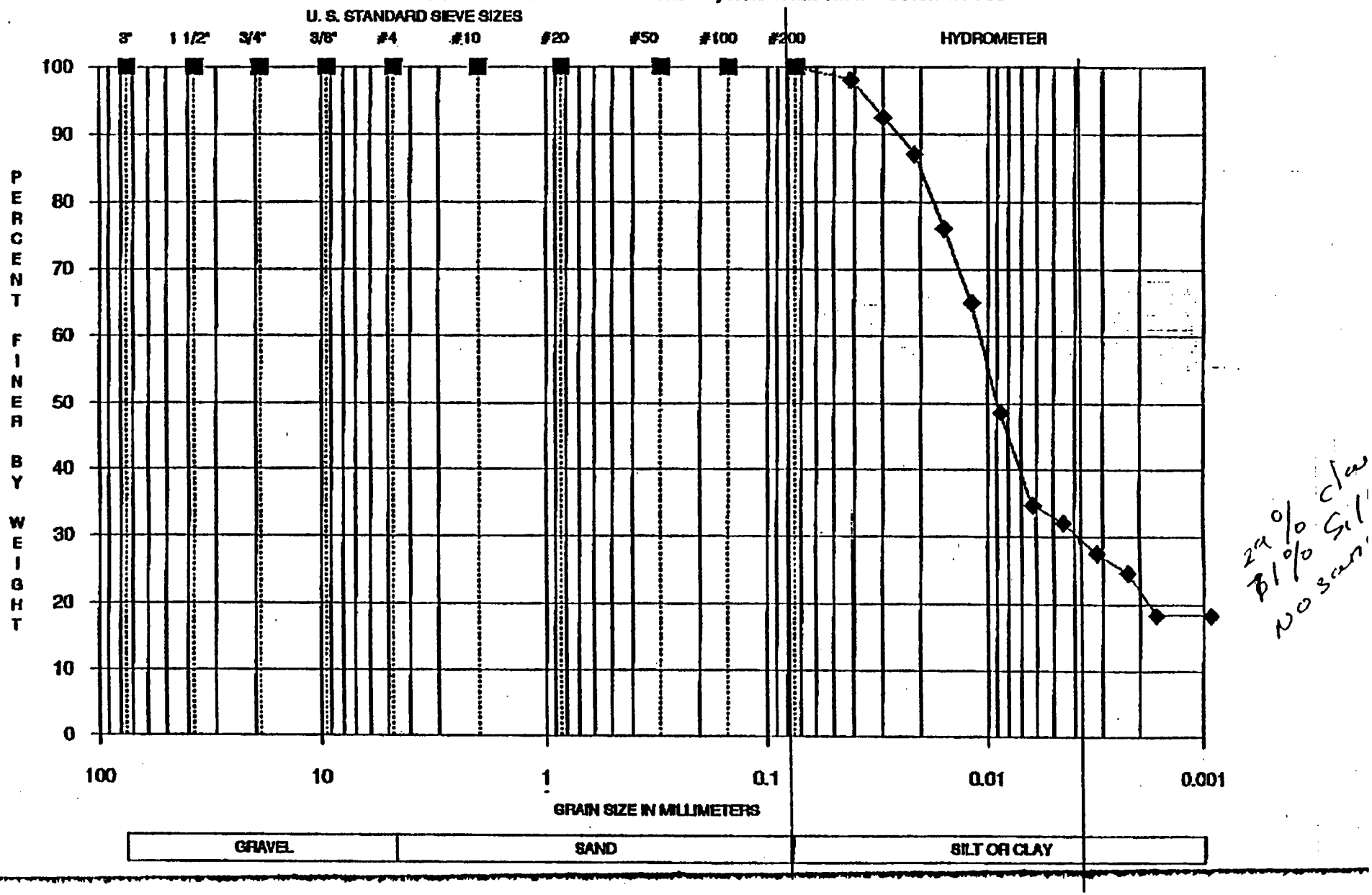


Sand 2%
Silt 64%
Clay 34%

D-8

WESTON ENVIRONMENTAL TECHNOLOGY LABORATORY

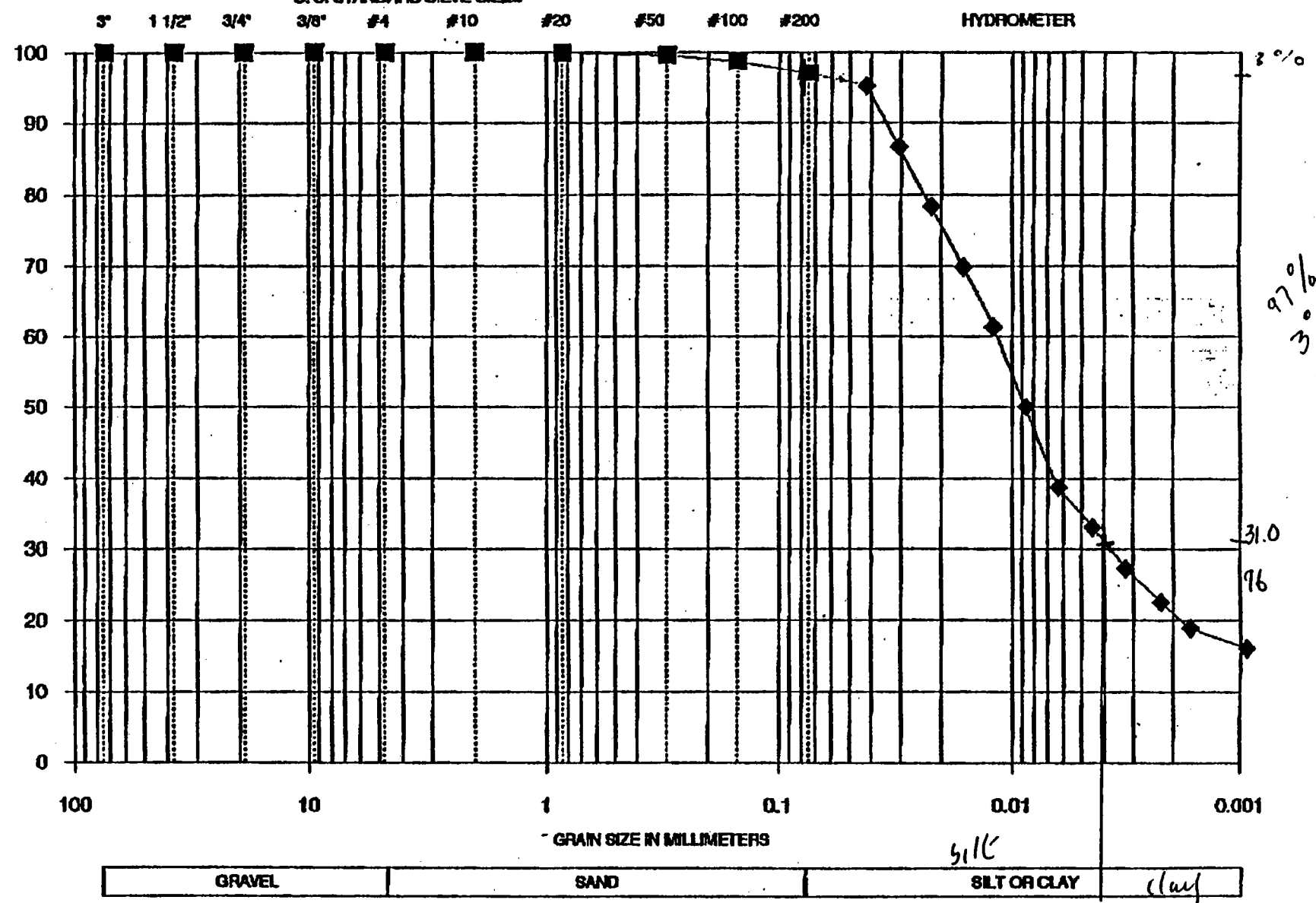
GRAIN SIZE DISTRIBUTION CURVE FOR
AQUASURVEY PROJECT SAMPLE CORE #9, ETL SAMPLE # 9009X002-009



2% Clay
81% Silt
No sand

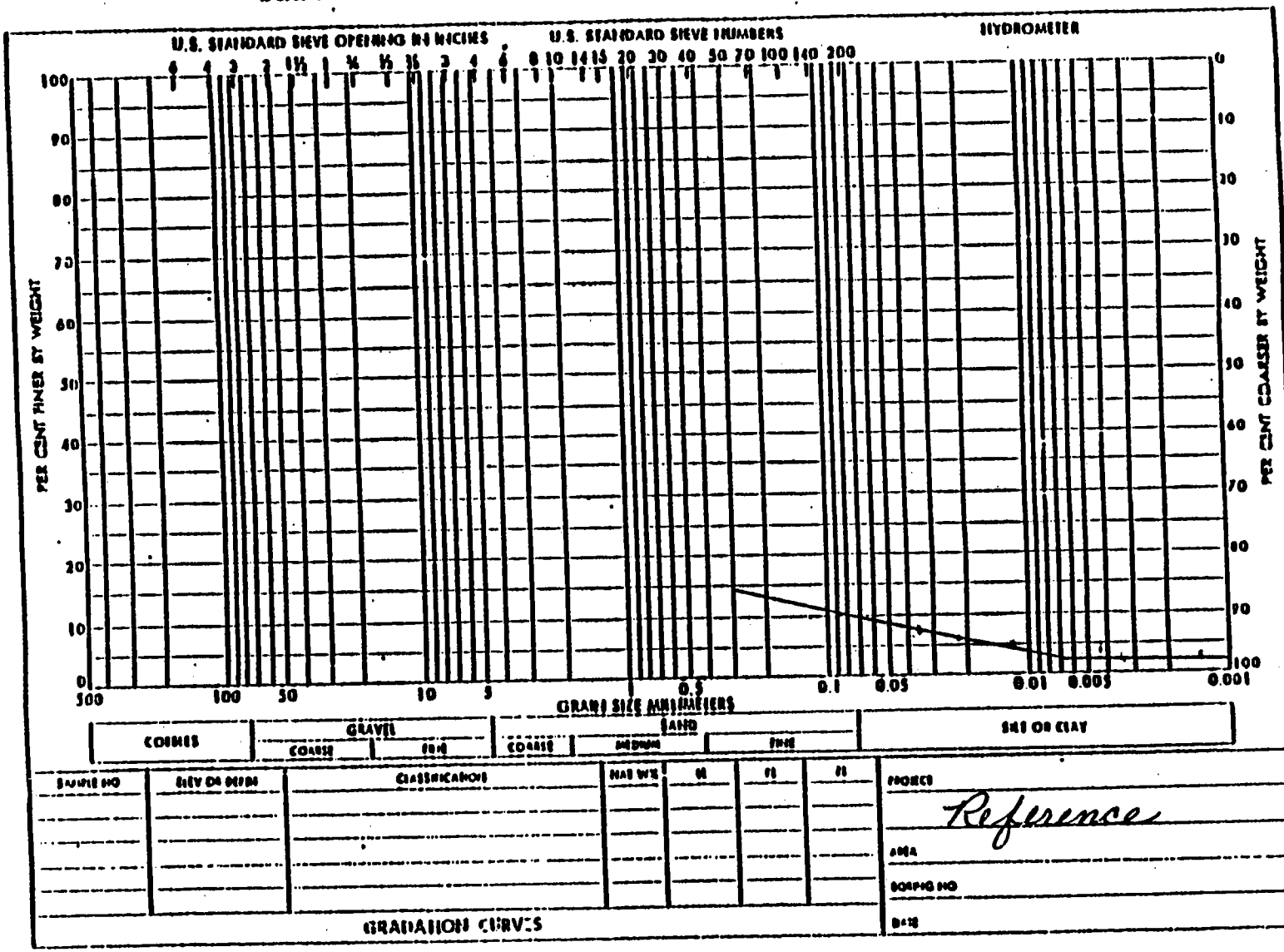
WESTON ENVIRONMENTAL TECHNOLOGY LABORATORY

GRAIN SIZE DISTRIBUTION CURVE FOR
AQUASURVEY PROJECT SAMPLE CORE #10, ETL SAMPLE # 9009X002-010



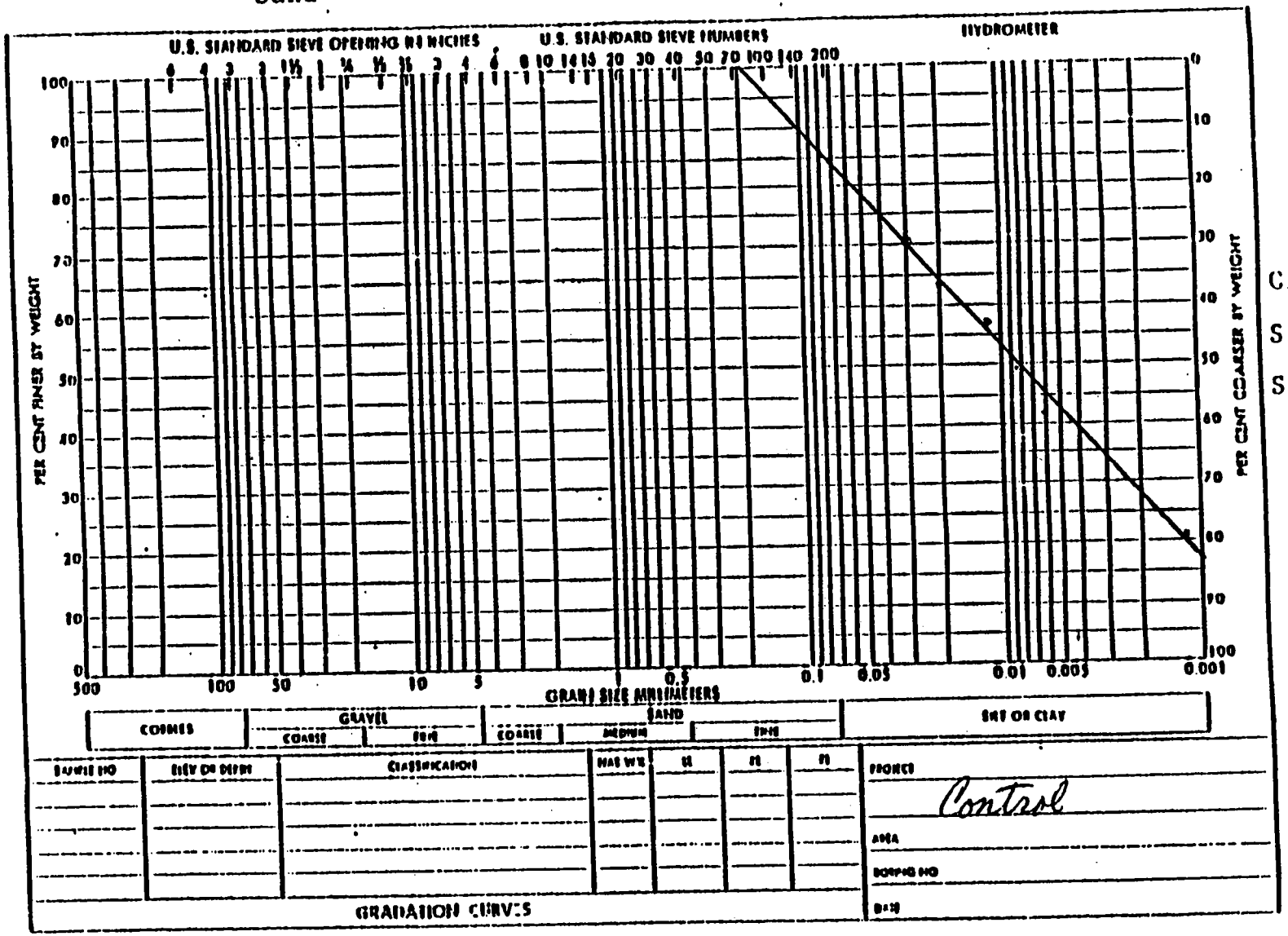
D-10

Sand ≥ 0.0625 0.0039 < Silt < 0.0625 Clay ≥ 0.0039



Clay- 0%
Silt- 7%
Sand- 93%

Sand ≥ 0.0625 0.0039 < Silt < 0.0625 Clay ≥ 0.0039



Clay- 39%
Silt- 42%
Sand- 19%

nytest environmental inc.

Project No. 90-17077

Login No. 5117

ELUTRIATE ANALYSIS

RESULTS IN UG/L (IN TRIPLICATE)

	CADMIUM	MERCURY	PETROLEUM HYDROCARBONS	PCB'S
1	< 0.1	< 0.2	< 50	< 0.1
2	< 0.1	< 0.2	< 50	< 0.1
3	< 0.1	< 0.2	< 50	< 0.1

SITE WATER

RESULTS IN UG/L - (IN TRIPLICATE)

	CADMIUM	MERCURY	PETROLEUM HYDROCARBONS	PCB'S
1	< 0.1	< 0.2	< 50	< 0.1
2	< 0.1	< 0.2	< 50	< 0.1
3	< 0.1	< 0.2	< 50	< 0.1

nytest environmental inc.

Project No. 9017077
Login No. :5117

BULK SEDIMENT ANALYSIS

RESULTS IN MG/KG DRY WT. BASIS EXCEPT WHERE NOTED.

SAMPLE IDENTIFICATION	COPPER	NICKEL	ZINC	TOC % BY WEIGHT
Sample #: 1	241	46.8	551	5.2
2	177	35.2	334	3.8
3	172	38.6	350	3.8
4	288	48.5	582	4.4
5	184	37.0	345	3.6
6	140	30.8	264	3.4
7	176	38.8	313	4.1
8	206	42.1	377	3.8
9	147	34.2	308	4.6
10	179	36.7	430	4.7
	$\bar{x}$ = 190.9	$\bar{x}$ = 38.87	$\bar{x}$ = 385.4	$\bar{x}$ = 4.14
	S = 44.32	S = 5.53	S = 105.22	S = 0.57

$\bar{x}$ = mean
S = std deviat

3/15/91

E-2

00 01

nytest environmental inc

PROJECT NO.: 90-17077
LOGIN NO.: 5117

BIOACCUMULATION ANALYSIS: ( )
Palaemonetes pugio

REFERENCE	CADMIUM	MERCURY	TOTAL PETROLEUM HYDROCARBONS AS C-10	PCB'S
1	< 0.25	< 0.20	< 0.1	< 0.04
2	< 0.25	< 0.20	< 0.1	< 0.04
3A	< 0.25	< 0.20	< 0.1	< 0.04
3B	< 0.25	< 0.20	< 0.1	< 0.04
3C	< 0.25	< 0.20	< 0.1	< 0.04
4	< 0.25	< 0.20	< 0.1	< 0.04
5	< 0.25	< 0.20	< 0.1	< 0.04
TEST				
1	< 0.25	< 0.20	< 0.1	< 0.04
2	< 0.25	< 0.20	< 0.1	< 0.04
3A	< 0.25	< 0.20	< 0.1	< 0.04
3B	< 0.25	< 0.20	< 0.1	< 0.04
3C	< 0.25	< 0.20	< 0.1	< 0.04
4	< 0.25	< 0.20	< 0.1	< 0.04
5	< 0.25	< 0.20	< 0.1	< 0.04
3A*	**	**	< 0.1	< 0.04
3B*	**	**	< 0.1	< 0.04
3C*	**	**	< 0.1	< 0.04

*RE-EXTRACTED SAMPLES

**METALS COULD NOT BE RE-EXTRACTED
< = LESS THAN

00 05

PROJECT NO.: 90-17077
LOGIN NO.: 5117

PRETEST ORGANISMS - (IN TRIPLICATE)

RESULTS IN: MG/KG

IDENTIFICATION	CADMIUM	MERCURY	TOTAL PETROLEUM HYDROCARBONS AS C-10	PCB'S
Nereis virens				
A	< 0.25	< 0.20	< 0.10	< 0.04
B	< 0.25	< 0.20	< 0.10	< 0.04
C	< 0.25	< 0.20	< 0.10	< 0.04
Mercenaria mercenaria				
A	< 0.25	< 0.20	< 0.10	< 0.04
B	< 0.25	< 0.20	< 0.10	< 0.04
C	< 0.25	< 0.20	< 0.10	< 0.04
Paleamonetes pugio				
A	< 0.25	< 0.20	< 0.10	< 0.04
B	< 0.25	< 0.20	< 0.10	< 0.04
C	< 0.25	< 0.20	< 0.10	< 0.04

< = less than

00 03

nytest environmental inc.

PROJECT NO.: 90-17077
LOGIN NO.: 5117

BIOACCUMULATION ANALYSIS: (Nereis virens)

REFERENCE	CADMIUM	MERCURY	TOTAL PETROLEUM HYDROCARBONS AS C-10	PCB'S
1	< 0.25	< 0.20	< 0.1	< 0.04
2	< 0.25	< 0.20	< 0.1	< 0.04
3A	< 0.25	< 0.20	< 0.1	< 0.04
3B	< 0.25	< 0.20	< 0.1	< 0.04
3C	< 0.25	< 0.20	< 0.1	< 0.04
4	< 0.25	< 0.20	< 0.1	< 0.04
5	< 0.25	< 0.20	< 0.1	< 0.04
TEST				
1	< 0.25	< 0.20	< 0.1	< 0.04
2	< 0.25	< 0.20	< 0.1	< 0.04
3A	< 0.25	< 0.20	< 0.1	< 0.04
3B	< 0.25	< 0.20	< 0.1	< 0.04
3C	< 0.25	< 0.20	< 0.1	< 0.04
4	< 0.25	< 0.20	< 0.1	< 0.04
5	< 0.25	< 0.20	< 0.1	< 0.04
3A*	**	**	< 0.1	< 0.04
3B*	**	**	< 0.1	< 0.04
3C*	**	**	< 0.1	< 0.04

*RE-EXTRACTED SAMPLES

**METALS COULD NOT BE RE-EXTRACTED
< = LESS THAN

00 07

nytest environmental inc.

PROJECT NO.: 90-17077
LOGIN NO.: 5117

BIOACCUMULATION ANALYSIS: ( )
Mercenaria mercenaria

REFERENCE	CADMIUM	MERCURY	TOTAL PETROLEUM HYDROCARBONS AS C-10	PCB'S
1	< 0.25	< 0.20	< 0.1	< 0.04
2	< 0.25	< 0.20	< 0.1	< 0.04
3A	< 0.25	< 0.20	< 0.1	< 0.04
3B	< 0.25	< 0.20	< 0.1	< 0.04
3C	< 0.25	< 0.20	< 0.1	< 0.04
4	< 0.25	< 0.20	< 0.1	< 0.04
5	< 0.25	< 0.20	< 0.1	< 0.04
TEST				
1	< 0.25	< 0.20	< 0.1	< 0.04
2	< 0.25	< 0.20	< 0.1	< 0.04
3A	< 0.25	< 0.20	< 0.1	< 0.04
3B	< 0.25	< 0.20	< 0.1	< 0.04
3C	< 0.25	< 0.20	< 0.1	< 0.04
4	< 0.25	< 0.20	< 0.1	< 0.04
5	< 0.25	< 0.20	< 0.1	< 0.04
3A*	**	**	< 0.1	< 0.04
3B*	**	**	< 0.1	< 0.04
3C*	**	**	< 0.1	< 0.04

*RE-EXTRACTED SAMPLES

**METALS COULD NOT BE RE-EXTRACTED
< = LESS THAN

Appl. #86-0939-OD
Celanese Chemical Corp.
Report 2 of 2

Contains
2,3,7,8-TCDD data

AQUA SURVEY, INC.

ENVIRON CORPORATION
210 CARNEGIE CENTER, SUITE 201
PRINCETON, NJ 08540

OCTOBER 24, 1990

BR90-1240B JOB # 9128

499 Point Breeze Road • Flemington, New Jersey 08822 • Telephone (201) 788-8700 FAX (201) 788-9165

I. SCOPE OF WORK

A. Location and Purpose

The field sampling, biological assay and analytical testing described in this report was performed with respect to dredged material from the Passaic River to be disposed of in ocean waters.

B. Services

1. Aqua Survey, Inc. (ASI) was engaged by ENVIRON to perform the following services:

   a. ASI oversaw the collection of ten (10) core samples of sediment which were cored to project depth. The cores were taken from locations identified on a Sampling Plan developed by the Army Corps of Engineers (ACE).

   b. Control and reference sediment samples were collected from locations designated by the ACE.

   c. Sediment samples from cores 1 - 10, control and reference sediment were examined for particle grain size (ASTM Method D 422, March 1972) and percent moisture.

   d. ASI provided Triangle Laboratories, Inc. with ten homogenous sediment samples for 2,3,7,8-TCDD analysis.

   e. A 28-day Solid Phase Bioassay was performed to determine the potential for 2,3,7,8-TCCD bioaccumulation in Neries virens. Pre-test and test tissues were prepared and sent to Triangle Laboratory, Inc. for 2,3,7,8,-TCDD analysis in accordance with the following method:

   Ecological Evaluation of Proposed Discharge of Dredged Material Into Ocean Waters (Implementation Manual for Section 103 of the Public Law 92-532 [Marine Protection, Research and Sanctuaries Act of 1972], EPA/COE (July 1977).

   f. A water sample from the wastewater holding tank was provided to Triangle Laboratory, Inc. for 2,3,7,8-TCDD analysis.

asi 499 Point Breeze Road • Flemington, New Jersey 08822 • Telephone (908) 788-8700 FAX (908) 788-9165

2. The following test associated services were provided:

   a. Proper chain-of-custody and QA/QC procedures were followed.

   b. Aqua Survey, Inc. was responsible for the health and safety of its personnel.

II. METHODOLOGY

A. Sediment Sampling

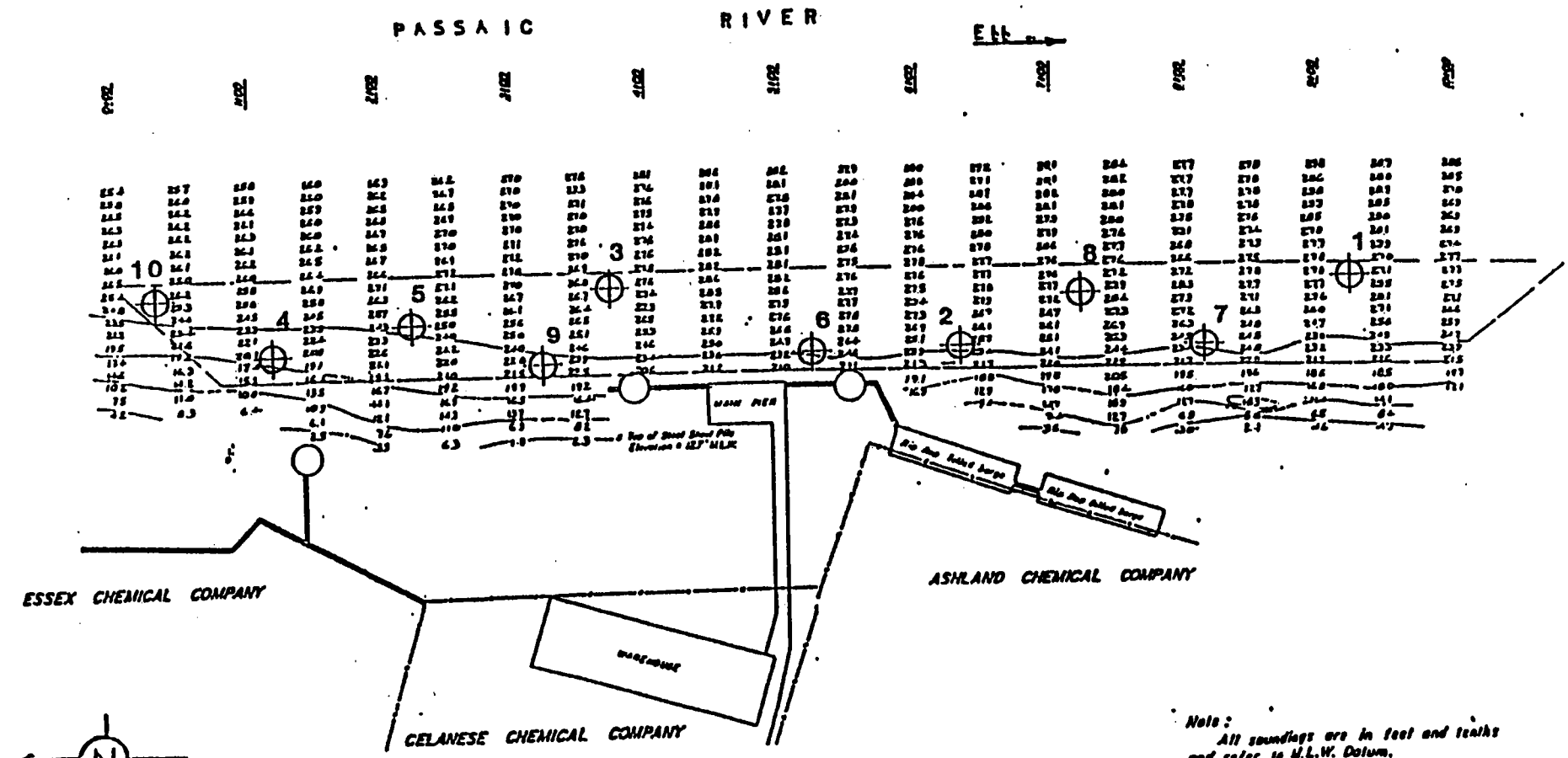
1. Test sediments were cored on June 12 and 14, 1990 from 10 sampling points at the site of the proposed dredging. Sampling points were numbered 1 - 10 (See Figure 1). Sediment samples were cored to project depth.

2. Control sediment was Petersen-dredged from Milton Harbor, New York in ACE designated area (See Figure 2).

3. Reference Sediment was dredged from ACE designated area off the New Jersey coast (Loran C Coordinates on 9960 X and Y are 26910.7, 43629.2).

4. Samples of sediment and site water were maintained at 4° +/- 2° C. Any opened containers of sediment were flushed with nitrogen prior to returning to storage.

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Test Sampling Sites

Figure 1

Note:
All soundings are in feet and tenths and refer to M.L.W. Datum.

SK-6-86 DS 7/9/86

PROJECT DEPTH = -30' MLW
DY

2 = SAMPLING LOCATIONS FOR BIOASSAY/BIOACCUMULATION TESTING.

Oksana Yarmula
CENAN-OP-W
4 May 90

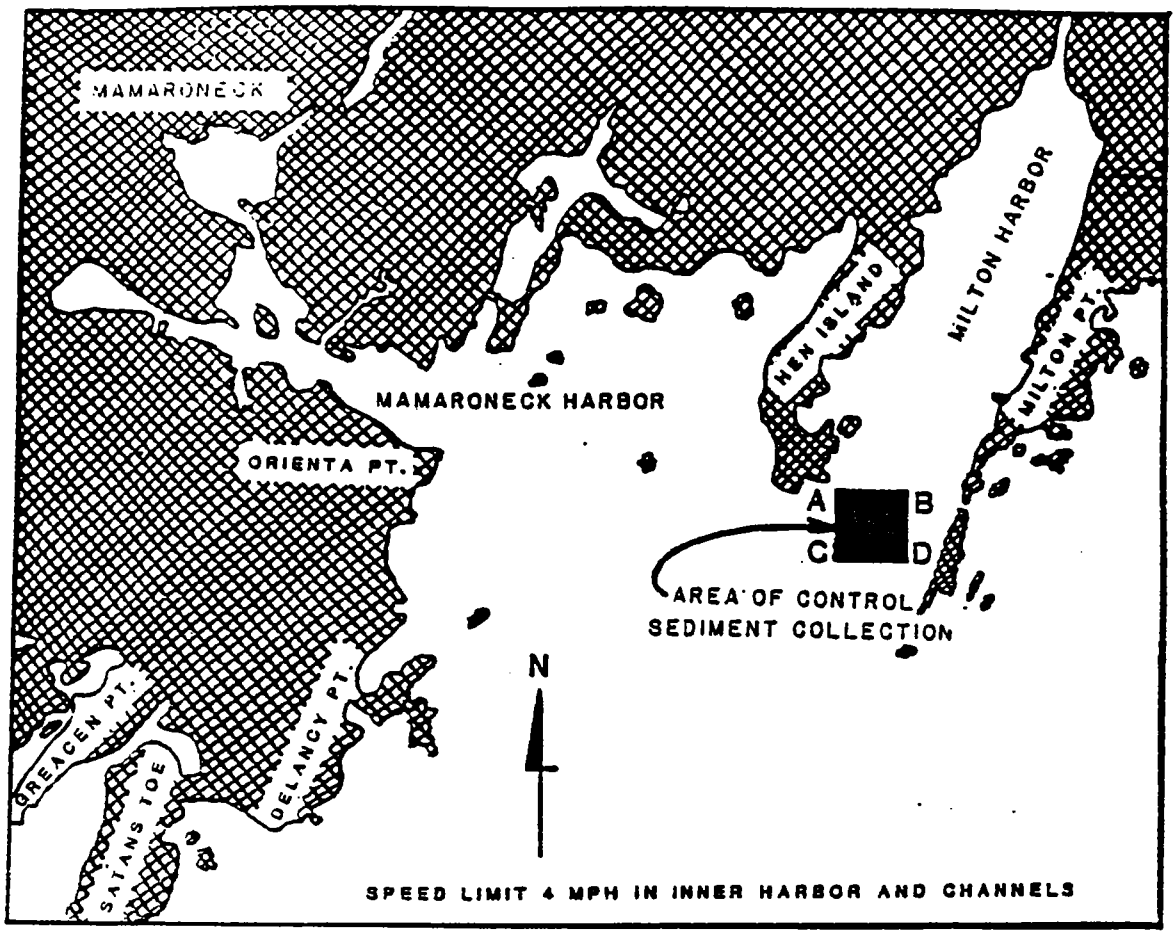
SLUDGE SOUNDINGS
OBTAINED APRIL 23, 1986

APPLICATION FOR PROPOSED
DREDGING AND DISPOSAL
IN: PASSAIC RIVER
AT: NEWARK, NEW JERSEY
COUNTY OF: ESSEX, STATE: NEW JER
APPLICATION BY:
CELANESE CHEMICAL COMPANY, INC.
NEWARK, NEW JERSEY

SHEET 2 OF 3 DATE 8/15/86

Figure 2

Chart showing area for control sediment collection



SCALE 1:20,000 NAUTICAL MILES

1/2 0 1/2 1

YARDS

500 0 500 1000 1500

CORNER	
A	73° 42' 19"
	40° 56' 17"
B	73° 42' 08"
	40° 56' 17"
C	73° 42' 19"
	40° 56' 08"
D	73° 42' 08"
	40° 56' 08"

MILTON HARBOR

RYE, NEW YORK

B. Bioassay Procedures

1. Procedures for conducting the 28-Day Solid Phase Bioassay were developed at ASI in accordance with:

   a. Ecological Evaluation Of Proposed Discharge Of Dredged Material Into Ocean Waters (Implementation Manual for Section 103 of the Public Law 92-532 [Marine Protection, Research and Sanctuaries Act of 1972], EPA/COE (July 1977).

   b. Guidance For Performing Tests On Dredged Material To Be Disposed Of In Ocean Waters EPA Region II/COE Regulatory Branch (Water Quality Compliance Section), (21 December 1984).

   c. 2,3,7,8-TCDD, 2,3,7,8-TCDF and PCBs in Marine Sediments and Biota: Laboratory and Field Studies, U.S. Environmental Protection Agency, Environmental Research Laboratory, Narrangansett, RI 02882. Final Report to U.S. Army Corps of Engineers, New York District, March 12, 1990.

   Procedures were approved by the USACOE.

C. Grain Size Procedures

1. Grain size analyses were performed in accordance with:

   Standard Method for Particle-Size Analysis of Soils ASTM Designation: D 422 - 63 (Reapproved 1972) American National Standard A37 145-1972 Approved March 2, 1972 by American National Standard Institute.

D. Test Organism

1. Nereis virens were obtained from Frank Hammond of Wiscasset, Maine. They were shipped in moist seaweed and removed for acclimation immediately upon arrival at the laboratory.

2. Acclimation of the sandworms to reference or control sediment was accomplished over two days before addition of the test material.

asi 499 Point Breeze Road • Flemington, New Jersey 08822 • Telephone (201) 788-8700 FAX (201) 788-9165

III. RESULTS

A. Twenty-eight-Day Solid Phase Bioassay

The 28-day Solid Phase Bioassay required that live counts be attempted each day. A definitive count could only be made at the end of the exposure (672-hour). See Table 1.A for the final live count at the conclusion of the bioassay. Experimental conditions during the bioassay are summarized in Tables 1.B and 1.C.

Table 1.A Results of the 28-day Solid Phase Bioassay. Testing was initiated with 20 *Nereis virens* per replicate.

Sample	Replicate	Final Live Count
control	1	20
	2	20
	3	19
reference	1	20
	2	20
	3	20
	4	20
	5	19
test	1	20
	2	20
	3	20
	4	20
	5	20

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Table 1.B Conditions during the 28-day exposure per replicate

Concentration	pH	Salinity (ppt)
Control 1- 3	7.9 - 8.3	28.0 - 33.5
reference 1-5	7.9 - 8.3	28.0 - 33.5
test 1-5	7.9 - 8.3	28.0 - 33.5

Table 1.C Conditions during the 28-day exposure per replicate.

Concentration	Temp. (C)	Dissolved Oxygen (ppm)
control 1-3	20.0 - 21.5	4.3 - 6.7
reference 1-5	20.0 - 21.0	4.7 - 6.8
test 1-5	19.5 - 21.0	4.8 - 6.8

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B. Physical Testing

Test sediment samples were cored from 10 project areas. No discreet strata were observed in any of the 10 cores. All cores were homogenous with no intra-core variation. Grain size and water content determinations were made for each test sediment, reference and control sediment. Grain size distribution is defined by the following criteria:

Sand	< 0.0625 mm
Silt	< 0.0625 but > 0.0039 mm
Clay	< 0.0039 mm

The results of the physical testing of each of the cores are reported in Table 2.

Table 2. Results of Grain Size and Moisture Content Analyses.

	% Sand	% Silt	% Clay	% Moisture
Core 1	12.0	73.0	15.0	60.7
Core 2	3.0	59.0	38.0	57.3
Core 3	3.0	62.0	35.0	57.4
Core 4	4.0	60.0	36.0	58.1
Core 5	0.0	65.0	35.0	57.4
Core 6	2.0	63.0	33.0	56.1
Core 7	3.0	66.0	31.0	57.3
Core 8	2.0	64.0	34.0	59.7
Core 9	0.0	71.0	29.0	60.9
Core 10	3.0	66.0	31.0	60.8
Control	19.0	42.0	39.0	56.1
Reference	93.0	7.0	0.0	18.6

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C. Chemical Testing
The results of the bulk sediment analyses are reported in Table 3.A.

Table 3.A

Bulk Sediment Analyses
Concentrations Based on Dry Weight.

Sample	Cu (mg/kg)	Ni (mg/kg)	Zn (mg/kg)	TOC % by wt.	2,3,7,8-TCDD ug/kg
core 1	241	46.8	551	5.2	0.42
core 2	177	35.2	334	3.8	0.23
core 3	172	38.6	350	3.8	0.17
core 4	288	48.5	582	4.4	0.41
core 5	184	37.0	345	3.6	0.36
core 6	140	30.8	264	3.4	0.23
core 7	176	38.8	313	4.1	0.19
core 8	206	42.1	377	3.8	0.24
core 9	147	34.2	308	4.6	0.35
core 10	179	36.7	430	4.7	0.25
* Wastewater Sample					ND

Detection limit of metal analyses was 1.0 mg/kg. (dry weight basis)
Detection limit of dioxin analyses was 1.0ng/kg.
* Detection limit for wastewater sample 0.005ng/l

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Table 3.B

Nereis virens Tissue Analysis for 2,3,7,8-TCDD
Animals exposed for 28 days

Sample	Replicate	Concentration (ppt)*
pretest	1	<1.0
	2	<1.0
	3	<1.0
reference	1	1.40
	2	1.20
	3	0.99
	4	0.88
	5	0.95
test	1	17.30
	2	13.90
	3	17.30
	4	18.00
	5	18.60

* parts per trillion

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IV. SUMMARY

Solid Phase Bioassays

As detailed in Table 1.A, there was less than 10% control or reference organism mortality, and no mortality was observed in the organisms exposed to the test sediment.

The limit for significance of results is ten percent mortality as set by the ACOE.

Bioaccumulation Analysis

As detailed in Table 3.B there was no detectable 2,3,7,8-TCDD in the pretest organisms, less than 1.5 ppt 2,3,7,8-TCDD in the reference organisms and less than 20 ppt 2,3,7,8-TCDD in the test organisms after 28 days of exposure to test sediment.

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APPENDICES

LIST OF APPENDICES

A.	Solid Phase Raw Data	A 1 - 7
B.	Grain Size Analyses	B 1 - 10
C.	Chemical Analyses	C 1 - 22

Client: Environ Site #: H. Celanese Project Number: 9128

Project: H Celanese Manager: J Coles

Exposure Starting Date: 7/10/90 Depuration Starting Date: 8/7/90

NUMBER OF SURVIVORS

		N. virens											
	Repl	a0	0	10	20	28	d1	a0	0	10	20	28	d1
Control	1	20	20	20	20	20	20						
	2	20	20	20	20	20	20						
	3	20	20	20	20	19	19						
Reference	1	20	20	20	20	20	20						
	2	20	20	20	20	20	20						
	3	20	20	20	20	20	20						
	4	20	20	20	20	20	20						
	5	20	20	19	19	19	19						
Test	1	20	20	20	20	20	20						
	2	20	20	20	20	20	20						
	3	20	20	20	20	20	20						
	4	20	20	20	20	20	20						
	5	20	20	20	20	20	20						
*		✓*	✓*	✓	✓	✓	✓						
Initials		JC	JC	SD	QM	QM/SD	QM						

* Check here to indicate "nothing unusual observed" with the exceptions noted below

NOTES: * all worms down within ½ hr.

DAY 1 - 1 dead Nor.25 sp. Removed from Test = 5 QM

DAY 1 - All Pumps CALIBRATED AT TANKS: All Delivering at least 200 ml/min @ QM. | R5 205 | T2 240 | T3 220 | T5 210 |

DAY 2: 1 Nor.25 sp. in R5 in poor condition, 1 Nor.25 in T5 nearly dead. All @ 15°C (6

DAY 3: Removed 1 dead Nor.25 sp. from R5, QM

11: All Pumps Calib. at tanks: All Deliver 200 ml/min. minimum. | T2 210 | T3 220 | T5 210 | QM

DAY 4: N.U.O. SD

DAY 5: N.U.O. SD

11: All pumps calibrated at tanks; all 200 ml/min. minimum

~~R1~~ R1 R3 R4 T1 = 205 R5 = 250 T1 = 205 T2 = 220 T3 = 230 S

DAY 6: N.U.O. QM

DAY 7 N.U.O. All Pumps CALIBRATED. All Delivering Minimum 200 ML/MIN.

| R1 205 | R5 240 | T1 210 | T2 220 | T3 240 | QM |

DAY 8: N.U.O. QM

DAY 9: N.U.O. All Pumps CALIBRATED. All min. 200 ml/min. QM | R1 210 | R5 220 | T1 220 | T2 200 |

DAY 10: N.U.O. SD

DAY 11 N.U.O JC - All Calibrated to > 200mls/minute - Count tank 1 of Controls @ 190

Day 12 = NUO - JM

DAY 13 = N.U.O. All TANKS CALIBRATED, All > 200 mL/min. GSM 7/23/90

DAY 14 - N.U.O. GSM

DAY 15 - N.U.O. All TANKS CALIBRATED, None < 200 mL/min. GSM

DAY 16 - N.U.O. GSM

DAY 17 - N.U.O. All TANKS CALIBRATED, All AT 200 mL/min. OR SLIGHTLY >. GSM

Day 18 - N.U.O. GSM.

Day 19 - | R5 290 | T2 240 | T3 280 | All tanks calibrated; All 200mL/m GSM

DAY 20: N.U.O. GSM (Live COUNT DONE: NO WORMS ON MUD SURFACE, NONE REMOVED/DEAD SINCE 4:00 COUNT, ALL APPEARS OK.)

DAY 21: N.U.O. All TANKS CALIBRATED, NONE < 200 mL/min. GSM

DAY 22: N.U.O. GSM

DAY 23: N.U.O. All TANKS CALIBRATED, NONE < 200 mL/min. FLOW. GSM

DAY 24: N.U.O. GSM

DAY 25: N.U.O. All TANKS CALIBRATED, NONE < 200 mL/min. GSM

Day 26 NUO

DAY 27: N.U.O. TANKS CALIBRATED - All AT 200 mL/min OR >. GSM

DAY 28: N.U.O. TEST TERMINATION TODAY. All ORGANISMS ACCOUNTED FOR EXCEPT CONTROL #3 (19 WORMS RECOVERED) GSM & J.O.

DAY D: All ORGANISMS DEPURATED WELL; All ACCOUNTED FOR. GSM

Client: Environ Site #: 1 Project Number: 9128

Project: H. Celanese Manager: J. Coles

Organism: N. virens

TEMPERATURE C	Repl.	a0	0	1	2	3	4	5	6	7	8	9	10	11	12	13
Control	1	18.0	18.0	20.0	20.5	20.5	20.0	20.0	19.5	20.5	20.5	20.5	20.5	20.5	20.0	20.0
	2	18.0	18.0	20.0	20.5	20.5	20.0	20.0	19.5	20.5	20.5	20.5	20.5	20.5	20.5	20.0
	3	18.0	18.0	20.0	20.5	20.5	20.0	20.0	20.0	20.5	20.5	20.5	20.5	20.0	20.0	20.0
Reference	1	18.0	18.0	20.0	20.5	20.5	20.0	20.0	20.0	20.5	20.5	20.5	20.5	20.0	20.0	19.5
	2	18.0	18.0	20.0	20.5	20.5	20.0	20.0	20.0	20.5	20.5	20.5	20.5	20.0	20.0	19.5
	3	18.0	18.0	20.0	20.5	20.5	20.0	20.0	20.0	20.5	20.5	20.5	20.5	20.0	20.0	19.5
	4	18.0	18.0	20.0	20.5	20.5	20.0	20.0	20.0	20.5	20.5	20.5	20.0	20.0	20.0	19.5
	5	18.0	18.0	20.0	20.5	20.5	19.5	20.0	20.0	20.5	20.5	20.5	20.0	20.0	20.0	20.0
Test Sediment	1	18.0	18.0	20.0	20.5	20.5	20.0	20.5	20.0	20.5	20.5	20.5	20.0	20.0	20.0	20.0
	2	18.0	18.0	20.0	20.5	20.5	19.5	20.5	20.0	20.5	20.5	20.5	20.5	20.0	20.0	20.0
	3	18.5	18.5	20.0	20.5	20.0	19.5	20.0	20.0	20.5	20.0	20.5	20.5	20.0	20.0	20.0
	4	18.5	18.5	20.0	20.5	20.0	19.5	19.5	19.5	20.5	20.0	20.5	20.0	19.5	20.0	19.5
	5	18.5	18.5	20.0	20.5	20.0	19.5	19.5	19.5	20.5	20.0	20.5	20.0	18.5	19.5	19.5
Initials		JL	JL	JSm	JSm	JSm	SLO	SLO	JSm	JSm	JSm	JSm	SLO	DM	DM	JSm

pH	Repl.	a0	0	1	2	3	4	5	6	7	8	9	10	11	12	13
Control	1	7.9	7.9	7.9	7.9	8.0	8.1	8.0	8.0	8.1	8.0	8.2	8.2	8.2	8.1	8.1
	2	8.0	8.0	8.0	7.9	7.9	8.1	8.1	8.0	8.1	8.0	8.2	8.2	8.2	8.1	8.1
	3	8.0	8.0	7.9	8.0	7.9	8.1	8.0	8.0	8.1	8.1	8.2	8.2	8.2	8.1	8.1
Reference	1	8.2	8.2	8.0	8.0	8.0	8.1	8.1	8.0	8.1	8.0	8.2	8.2	8.2	8.1	8.2
	2	8.2	8.2	8.0	8.0	8.0	8.1	8.0	8.1	8.1	8.0	8.2	8.2	8.2	8.1	8.2
	3	8.2	8.2	8.0	8.0	7.9	8.1	8.1	8.1	8.1	8.0	8.2	8.2	8.2	8.1	8.2
	4	8.2	8.2	7.9	8.0	7.9	8.1	8.0	8.1	8.1	8.1	8.2	8.2	8.2	8.1	8.1
	5	8.2	8.2	7.9	8.0	7.9	8.1	8.0	8.1	8.1	8.1	8.2	8.2	8.2	8.1	8.2
Test Sediment	1	8.0	8.0	7.9	8.0	7.8	8.0	8.0	8.1	8.0	8.1	8.1	8.1	8.2	8.1	8.1
	2	8.1	8.1	7.9	7.9	7.9	8.1	8.0	8.0	8.0	8.1	8.1	8.2	8.2	8.1	8.1
	3	8.1	8.1	7.9	8.0	7.9	8.0	7.9	8.0	8.1	8.1	8.1	8.1	8.2	8.1	8.2
	4	8.1	8.1	7.9	7.9	7.9	8.0	8.0	7.9	8.0	7.9	8.1	8.1	8.2	8.1	8.1
	5	8.1	8.1	7.9	7.9	7.9	8.1	7.8	7.9	8.0	7.9	8.1	8.1	8.2	8.1	8.1
Initials		JL	JL	JSm	JSm	JSm	SLO	SLO	JSm	JSm	JSm	JSm	SLO	DM	DM	JSm

NOTES:

Client: Environ Site #: Project Number: 9128

Project: H. Celanese Manager: J. Coles

Organism: M. virens

D.O. ppm	Repl.	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Control	1	6.6	6.7	6.4	5.9	6.2	5.8	5.9	6.1	6.0	6.2	6.3	6.1	6.4	6.3	6.6
	2	6.4	6.5	6.3	5.7	6.8	6.3	6.1	6.3	6.1	6.2	6.3	6.1	6.3	6.3	6.3
	3	6.5	6.5	6.3	5.8	6.1	5.8	6.0	6.2	6.0	6.1	6.2	6.0	6.2	6.4	6.3
Reference	1	6.3	6.4	5.8	5.4	6.3	5.9	6.2	6.4	5.9	6.1	6.1	6.1	6.2	6.3	6.0
	2	6.4	6.2	5.7	5.2	6.4	6.0	6.1	6.3	6.0	6.1	6.3	6.2	6.2	6.2	6.4
	3	6.1	6.4	5.7	5.4	6.4	6.0	6.2	6.1	6.2	6.3	6.2	6.1	6.2	6.3	6.3
	4	6.4	6.6	5.9	5.8	6.0	6.2	6.1	6.2	6.3	6.2	6.1	6.0	6.2	6.4	6.4
	5	6.5	6.9	5.7	5.9	6.6	6.0	5.9	6.0	6.1	6.3	6.2	6.0	6.3	6.4	6.4
Test Sediment	1	6.2	6.6	5.5	5.0	6.6	5.8	6.1	6.0	6.0	6.1	6.0	5.9	6.2	6.3	6.4
	2	6.5	6.4	5.4	5.3	6.5	5.3	5.8	5.9	6.2	6.3	6.0	5.8	6.2	6.2	6.4
	3	6.3	6.2	5.6	5.2	6.2	5.8	6.0	6.2	6.2	6.3	6.3	6.2	6.1	6.3	6.8
	4	6.8	6.7	5.8	5.7	6.4	5.8	6.1	6.0	6.1	6.2	6.3	6.2	6.2	6.3	6.4
	5	6.5	6.1	6.0	5.9	6.6	6.0	6.2	6.1	6.1	6.1	6.3	6.1	6.2	6.1	6.6
	Initials	JM	JM	JM	JM	GM	GM	JM	JM	JM	JM	JM	JM	JM	JM	JM

SALINITY ppt	Repl.	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Control	1	31.5	32.0	32.0	30.0	28.0	32.5	30.0	29.0	31.0	31.0	30.5	31.0	30.5	29.0	30.0
	2	31.5	32.0	32.0	31.0	28.0	32.5	30.0	29.0	31.0	31.0	30.5	31.0	30.5	28.5	30.0
	3	31.0	32.0	32.0	29.0	28.0	32.5	30.0	29.0	31.0	30.5	30.5	31.0	30.5	28.5	30.0
Reference	1	31.0	32.0	32.0	31.5	28.0	32.5	30.0	29.0	31.0	30.5	30.0	31.0	30.5	28.5	30.0
	2	31.0	32.0	32.0	30.0	28.0	32.5	30.0	29.5	30.5	30.5	30.0	31.0	30.5	28.5	30.0
	3	31.0	31.5	32.0	31.0	28.0	32.5	30.0	29.5	30.5	31.0	30.5	31.0	30.0	28.5	30.0
	4	31.5	31.5	32.0	31.0	28.0	32.5	30.0	29.5	31.0	30.5	30.5	31.0	30.0	28.5	30.5
	5	31.0	31.5	31.5	31.5	28.0	32.5	30.0	29.5	31.0	30.5	30.5	31.0	30.0	29.0	30.5
Test Sediment	1	31.5	31.5	31.5	32.0	28.0	32.5	30.0	30.0	31.0	30.5	30.5	31.0	30.0	29.0	30.5
	2	31.5	31.5	32.0	31.0	28.0	32.5	30.0	29.5	31.0	30.0	30.5	31.0	30.0	29.0	30.5
	3	31.0	31.5	32.0	29.5	28.0	32.5	30.0	29.0	30.5	30.0	30.5	30.5	30.0	28.5	30.5
	4	31.0	31.5	31.5	29.5	28.0	32.5	29.5	29.0	30.5	30.0	30.5	30.5	30.0	28.5	30.5
	5	31.0	31.5	31.5	30.5	28.0	32.5	29.5	29.0	30.5	30.0	30.5	31.0	30.0	28.5	30.5
	Initials	GM	GM	GM	GM	GM	GM	GM	GM	GM	GM	GM	GM	JM	GM	GM

NOTES:

Client: Environ Site #: Project Number: 9128

Project: H. Celeveras Manager: D. Coles

Organism: N. virens

D.O. ppm	Repl.	a0	0	1	2	3	4	5	6	7	8	9	10	11	12	13
Control	1	4.8	4.8	4.3	4.5	6.0	5.1	6.0	5.8	5.7	6.0	6.2	6.2	6.2	6.6	6.4
	2	5.2	5.2	5.2	5.4	5.9	5.8	6.6	5.9	5.6	5.8	6.1	6.0	5.8	6.4	6.3
	3	5.0	5.0	5.1	5.2	5.8	5.4	6.2	5.9	5.8	5.9	6.0	6.2	6.2	6.6	6.3
Reference	1	5.8	5.8	5.8	5.6	5.9	5.9	6.3	6.1	6.0	6.1	6.0	5.9	6.2	6.2	6.0
	2	5.4	5.4	4.9	4.9	5.2	5.4	6.2	5.7	6.0	6.0	5.9	6.1	6.3	6.4	6.3
	3	5.6	5.6	5.0	5.1	5.5	5.6	6.6	6.1	5.7	5.8	5.9	6.0	6.0	6.2	6.0
	4	5.6	5.6	5.1	5.2	5.4	5.6	5.8	6.3	5.5	5.5	5.8	6.0	6.2	6.4	6.4
	5	5.4	5.4	4.7	4.8	5.0	5.2	5.6	5.8	5.4	5.5	5.3	5.3	6.2	6.6	6.5
Test Sediment	1	4.8	4.8	5.1	5.0	5.7	5.5	5.9	6.0	5.7	5.9	5.9	5.6	5.7	6.0	6.1
	2	5.1	5.1	5.2	5.2	5.8	5.8	6.2	6.1	5.6	5.5	5.5	5.8	6.0	6.2	6.3
	3	5.1	5.1	5.4	5.3	6.3	6.2	6.7	6.0	5.7	5.9	5.6	5.7	5.8	6.2	6.0
	4	5.1	5.1	4.9	4.8	6.0	5.5	6.0	5.4	5.5	5.6	5.3	5.0	6.2	6.8	6.7
	5	5.1	5.1	4.9	5.0	5.7	5.8	6.2	5.8	5.4	5.6	5.4	5.5	6.4	6.6	6.6
Initials		JL	JL	JM	JM	JM	SD	SD	JM	JM	JM	JM	JM SD	JM	JM	JM

SALINITY ppt	Repl.	a0	0	1	2	3	4	5	6	7	8	9	10	11	12	13
Control	1	33.0	32.0	29.5	30.0	29.0	31.5	31.5	29.0	30.5	30.5	28.0	29.0	29.0	30.0	28.0
	2	33.0	31.0	29.5	30.0	29.0	31.5	32.0	29.0	30.5	30.0	28.0	29.0	29.0	30.0	28.0
	3	33.5	32.0	29.5	30.0	29.0	31.5	31.0	28.5	30.5	30.0	28.0	29.0	29.0	30.0	28.0
Reference	1	33.0	31.5	29.5	30.0	29.0	32.0	31.0	28.5	30.5	30.0	28.0	29.0	29.0	30.0	28.0
	2	33.5	32.0	29.5	30.0	29.0	31.5	31.0	28.5	30.5	30.0	28.0	29.0	29.0	30.0	28.0
	3	33.5	32.0	29.0	30.0	29.0	31.0	31.0	28.5	30.5	30.0	28.0	29.0	29.0	30.0	28.0
	4	33.0	31.5	29.0	30.0	29.0	31.0	31.0	28.5	30.5	30.0	28.5	29.0	29.0	30.0	28.0
	5	32.5	31.0	29.0	30.0	28.5	32.0	30.0	28.5	31.0	30.0	28.5	29.0	29.0	30.0	28.0
Test Sediment	1	33.0	32.0	29.0	30.0	28.5	32.0	31.5	28.5	31.0	30.0	28.5	29.0	29.0	30.0	28.0
	2	33.0	32.0	29.5	30.0	29.0	32.0	31.5	29.0	30.5	30.0	28.0	29.0	29.0	30.0	28.5
	3	33.5	31.5	29.0	29.5	29.0	31.5	31.0	28.5	30.5	30.0	29.0	29.0	29.0	30.0	28.5
	4	33.5	31.5	29.5	29.5	29.0	31.5	31.0	28.5	30.5	30.0	29.0	29.0	29.0	30.0	29.0
	5	33.5	32.0	29.5	29.5	29.5	31.5	31.0	29.0	31.0	30.0	28.0	29.0	29.0	30.0	28.0
Initials		JL	JL	JM	JM	JM	SD	SD	JM	JM	JM	JM	JM SD	JM	JM	JM

NOTES: a0 salinity reduced before introduction of organisms

Client: Environ Site #: Project Number: 9128

Project: H. Celanese Manager: J. Coles

Organism: N. Virens

TEMPERATURE C	Repl.	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Control	1	20.5	20.5	20.5	20.5	21.5	21.0	21.0	21.0	20.5	20.5	20.5	21.0	21.0	20.5	21.5
	2	20.5	20.5	20.5	20.5	21.0	21.0	21.0	21.0	20.5	20.5	20.5	21.0	20.5	20.0	21.5
	3	20.0	20.5	20.0	20.5	21.0	21.0	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.0	21.5
Reference	1	20.0	20.0	20.0	20.5	21.0	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.0	21.0
	2	20.0	20.0	20.0	20.5	21.0	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.0	21.0
	3	20.0	20.0	20.0	20.5	21.0	20.5	20.5	20.0	20.5	20.5	20.5	20.5	20.5	20.0	21.0
	4	20.0	20.0	20.0	20.5	21.0	20.5	20.5	20.0	20.5	20.5	20.5	20.5	20.5	20.0	21.0
	5	20.5	20.0	20.0	20.5	21.0	20.5	20.5	20.0	20.5	20.5	20.5	20.5	20.5	20.0	21.0
Test Sediment	1	20.5	20.0	20.0	20.5	21.0	21.0	20.5	20.0	20.5	20.5	20.5	20.5	20.5	20.0	21.0
	2	20.5	19.5	20.0	20.0	21.0	21.0	20.5	20.0	20.5	20.5	20.5	20.5	20.5	20.0	21.0
	3	20.0	19.5	20.0	20.0	21.0	21.0	21.0	20.5	20.5	20.5	20.5	21.0	21.0	20.0	21.0
	4	20.0	19.5	20.0	20.0	21.0	20.5	21.0	20.5	20.5	20.5	20.5	21.0	20.5	20.0	21.0
	5	20.0	19.5	20.0	20.0	21.0	20.5	20.5	21.0	20.5	20.5	20.5	20.5	20.5	20.0	21.0
	Initials	GM	GM	GM	GM	GM	GM	GM	GM	GM	GM	GM	GM	GM	GM	GM

pH	Repl.	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Control	1	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.2	8.2	8.2	8.2	8.3	8.2	8.2
	2	~~8.4~~ 8.3	8.3	8.2	8.3	8.3	8.3	8.2	8.3	8.2	8.2	8.2	8.2	8.3	8.2	8.2
	3	~~8.4~~ 8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.2	8.2	8.2	8.2	8.2	8.3	8.2	8.2
Reference	1	~~8.4~~ 8.3	8.3	8.2	8.3	8.3	8.3	8.3	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2
	2	~~8.4~~ 8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.2	8.2	8.2	8.2	8.2	8.2	8.2
	3	~~8.4~~ 8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.2	8.1	8.2	8.2	8.2	8.3	8.2
	4	8.2	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.2	8.2	8.1	8.2	8.2	8.2	8.2
	5	8.2	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.2	8.2	8.2	8.1	8.2	8.2	8.2
Test Sediment	1	8.2	8.2	8.2	8.3	8.3	8.3	8.2	8.3	8.2	8.1	8.1	8.1	8.2	8.1	8.2
	2	8.2	8.2	8.3	8.3	8.3	8.3	8.2	8.2	8.1	8.1	8.1	8.1	8.2	8.1	8.2
	3	8.2	8.2	8.2	8.3	8.3	8.3	8.2	8.2	8.2	8.1	8.2	8.2	8.2	8.1	8.2
	4	8.2	8.2	8.2	8.3	8.3	8.3	8.2	8.2	8.2	8.2	8.1	8.2	8.3	8.2	8.2
	5	8.2	8.2	8.3	8.3	8.3	8.3	8.2	8.2	8.2	8.1	8.1	8.2	8.3	8.2	8.2
	Initials	GM	GM	GM	GM	GM	GM	GM	GM	GM	GM	GM	GM	GM	GM	GM

NOTES:

TEST ORGANISM TRANSPORTATION AQUA SURVEY, INC.

JOB # 9128 QA/QC _____

Date: 7-5-90 ASI Investigator: J. Banks / J. Coles

Client: Environ In-lab, mobile, or satellite (circle 1)

Test Species: N. virens

Total number of organisms acclimated: 260

A. Organisms

1. ASI culture (Tank & Log #): ~~~~

2. Procured from: 90-57

3. ~~Age:~~ 4-6"

B. Holding Water

1. Temperature: 20.0°C

2. Salinity: 32.0 ppt

* Notes: _____

C. Destination

1. Laboratory arrival date/time: 7/5/90 2:40PM

2. Arrival holding water temperature: 17.0°C ~~NA~~

3. Acclimation water temperature: NA

4. Acclimation water salinity: NA

* Notes: _____

D. Acclimation

1. Holding water volume (1 gal=3.8L): NA

2. Acclimation chamber volume: NA

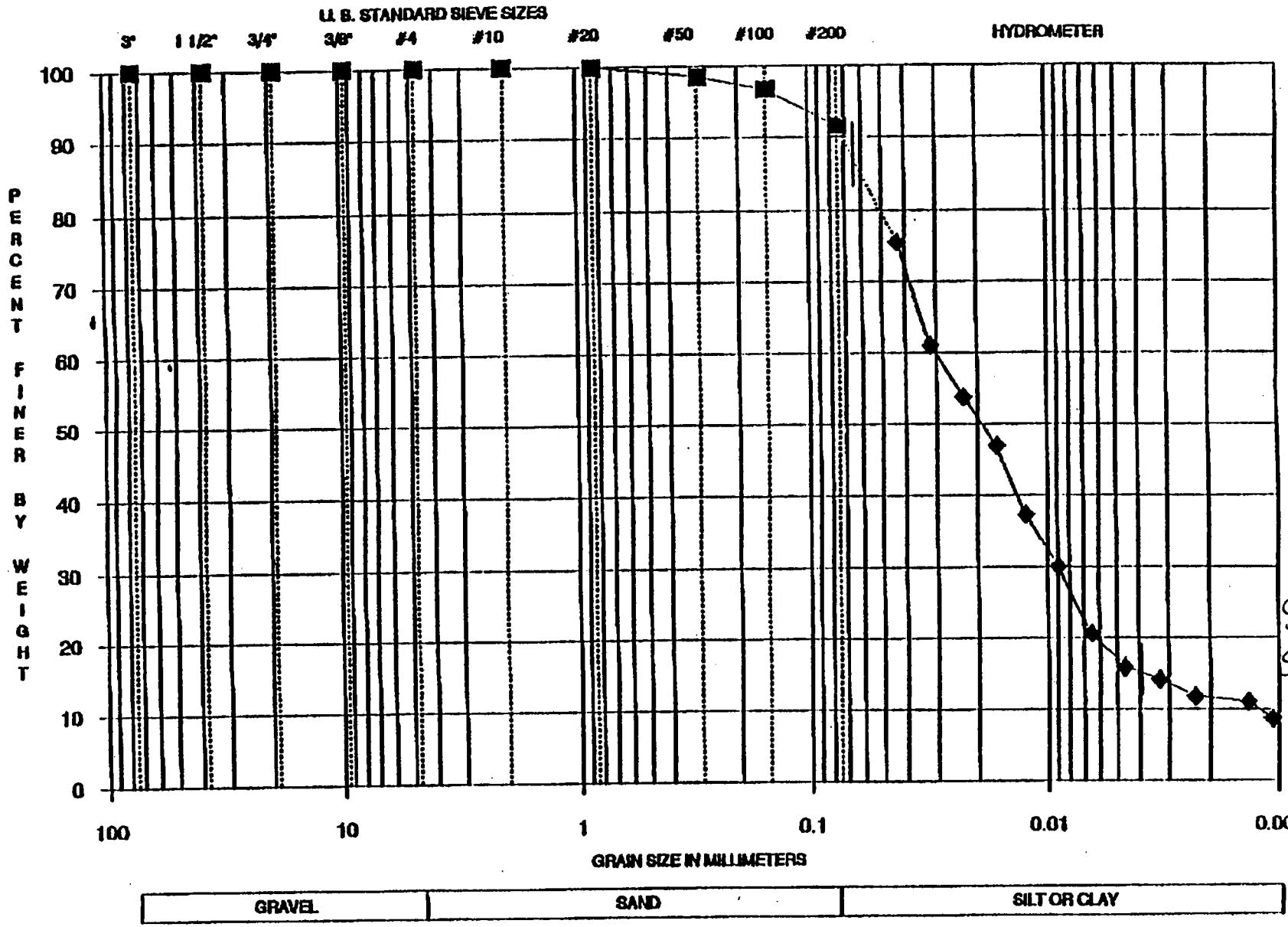
3. Acclimation began (date & time): NA

4. Changeover rate (ml/minute)(2 drops=1ml): NA

5. Acclimation ended (date & time): NA

WESTON ENVIRONMENTAL TECHNOLOGY LABORATORY

GRAIN SIZE DISTRIBUTION CURVE FOR
AQUASURVEY PROJECT SAMPLE CORE #1, ETL SAMPLE # 9009X002-001

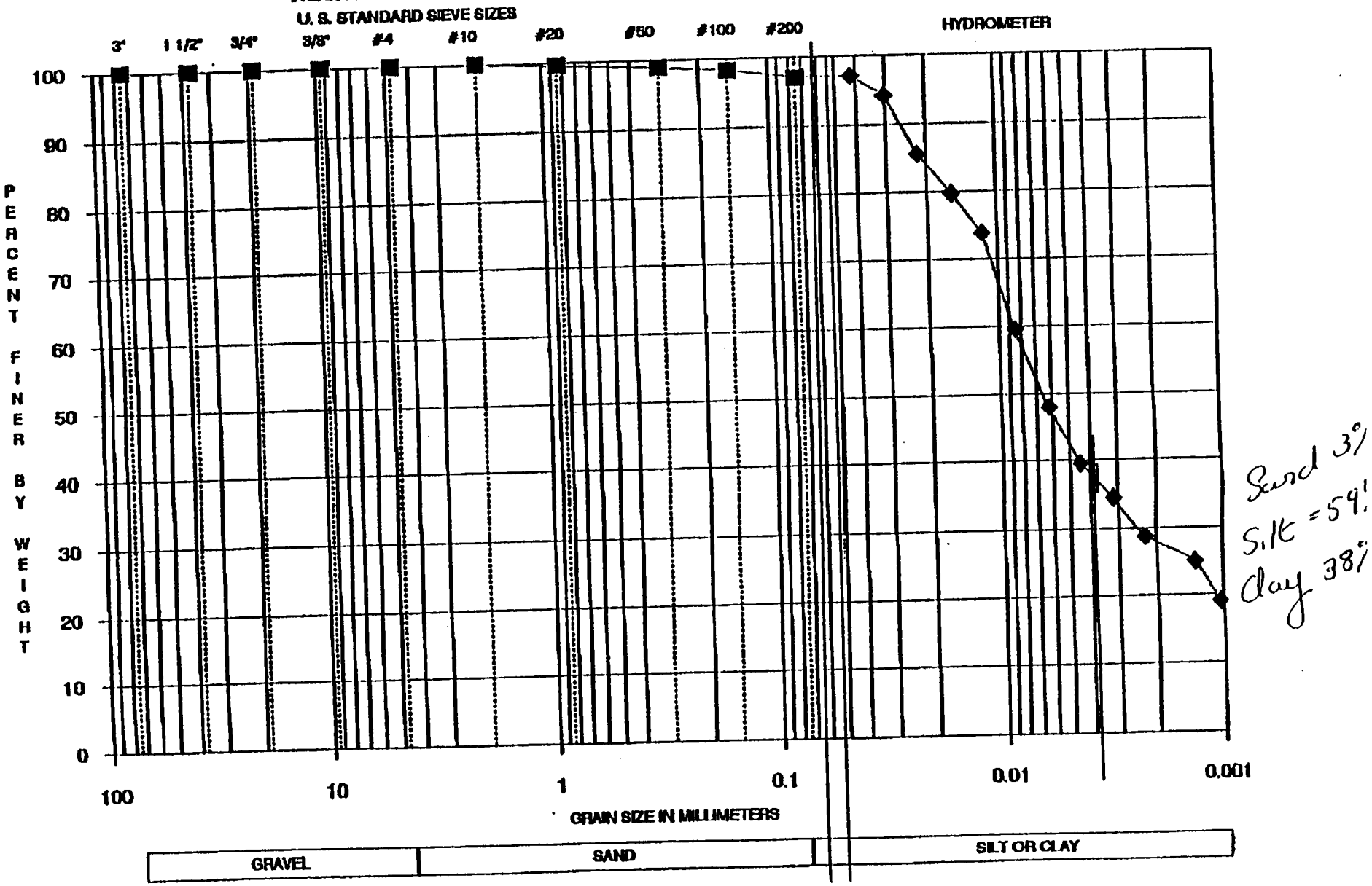


Sand. 12%
Silt = 73
Clay 15%

B-1

WESTON ENVIRONMENTAL TECHNOLOGY LABORATORY

GRAIN SIZE DISTRIBUTION CURVE FOR
AQUASURVEY PROJECT SAMPLE CORE #2, ETL SAMPLE # 9009X002-002

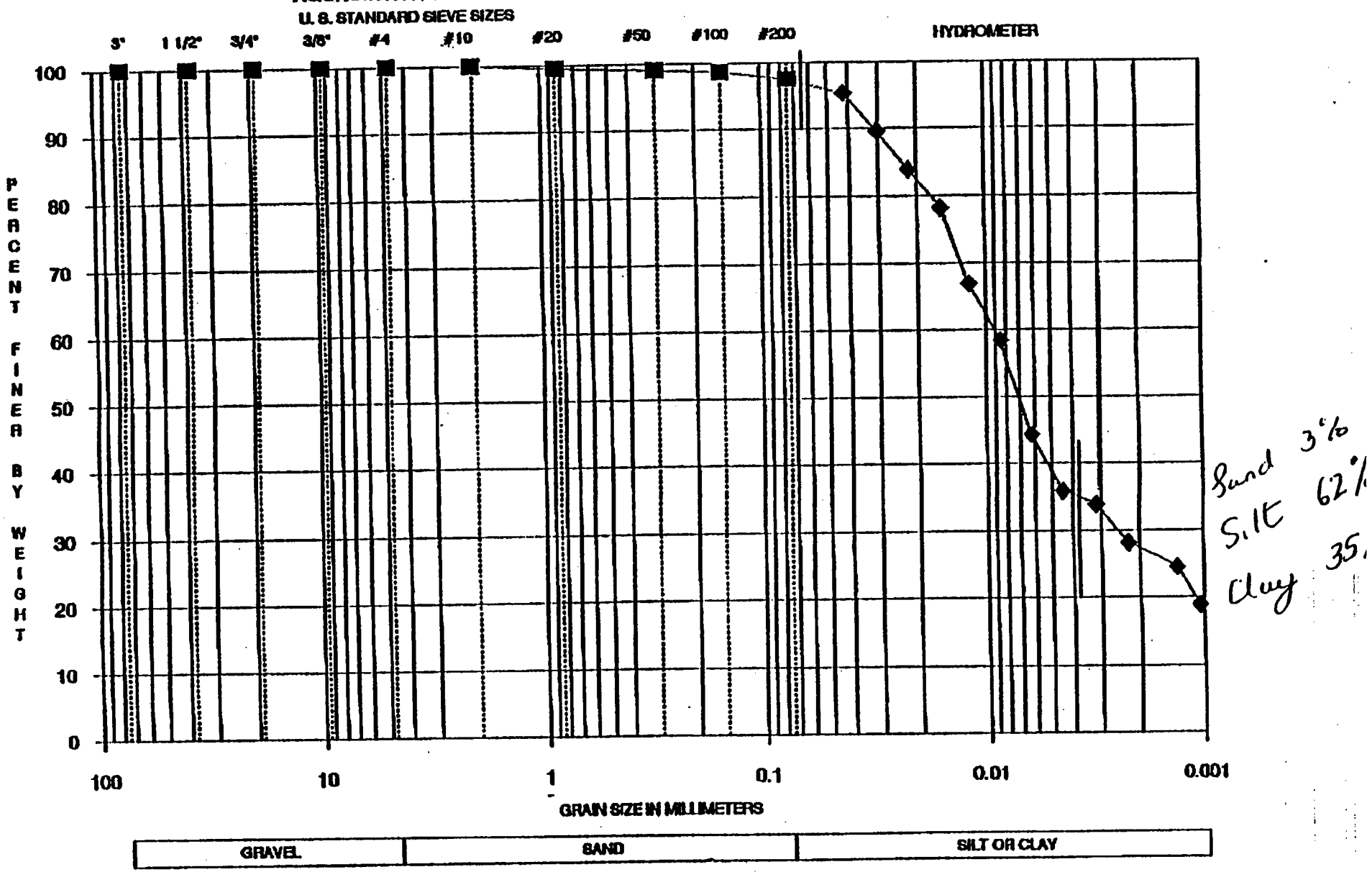


Sand 3%
Silt = 59%
Clay 38%

B-2

WESTON ENVIRONMENTAL TECHNOLOGY LABORATORY

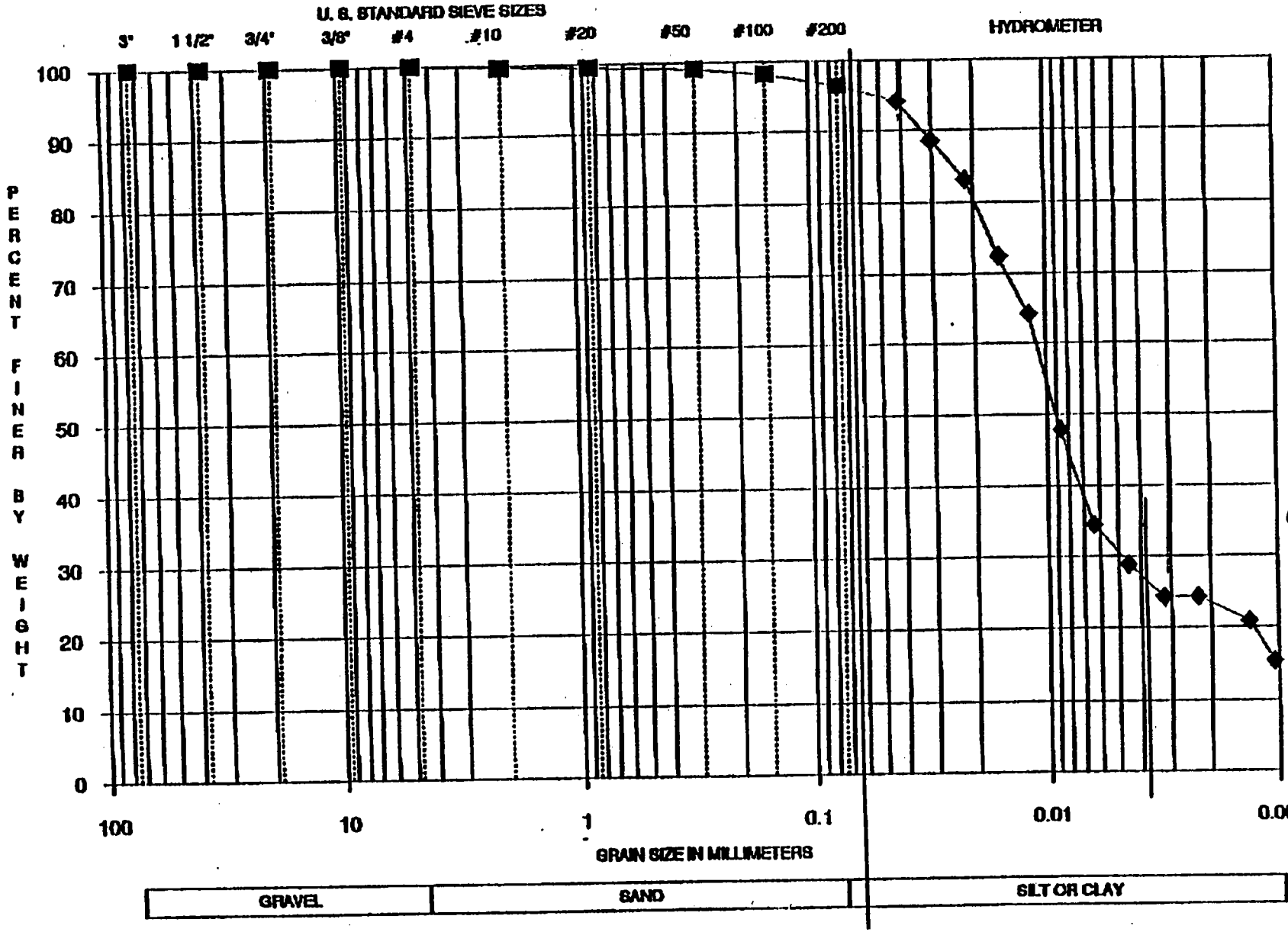
GRAIN SIZE DISTRIBUTION CURVE FOR
AQUASURVEY PROJECT SAMPLE CORE #3, ETL SAMPLE # 9009X002-003



Sand 3%
Silt 62%
Clay 35%

WESTON ENVIRONMENTAL TECHNOLOGY LABORATORY

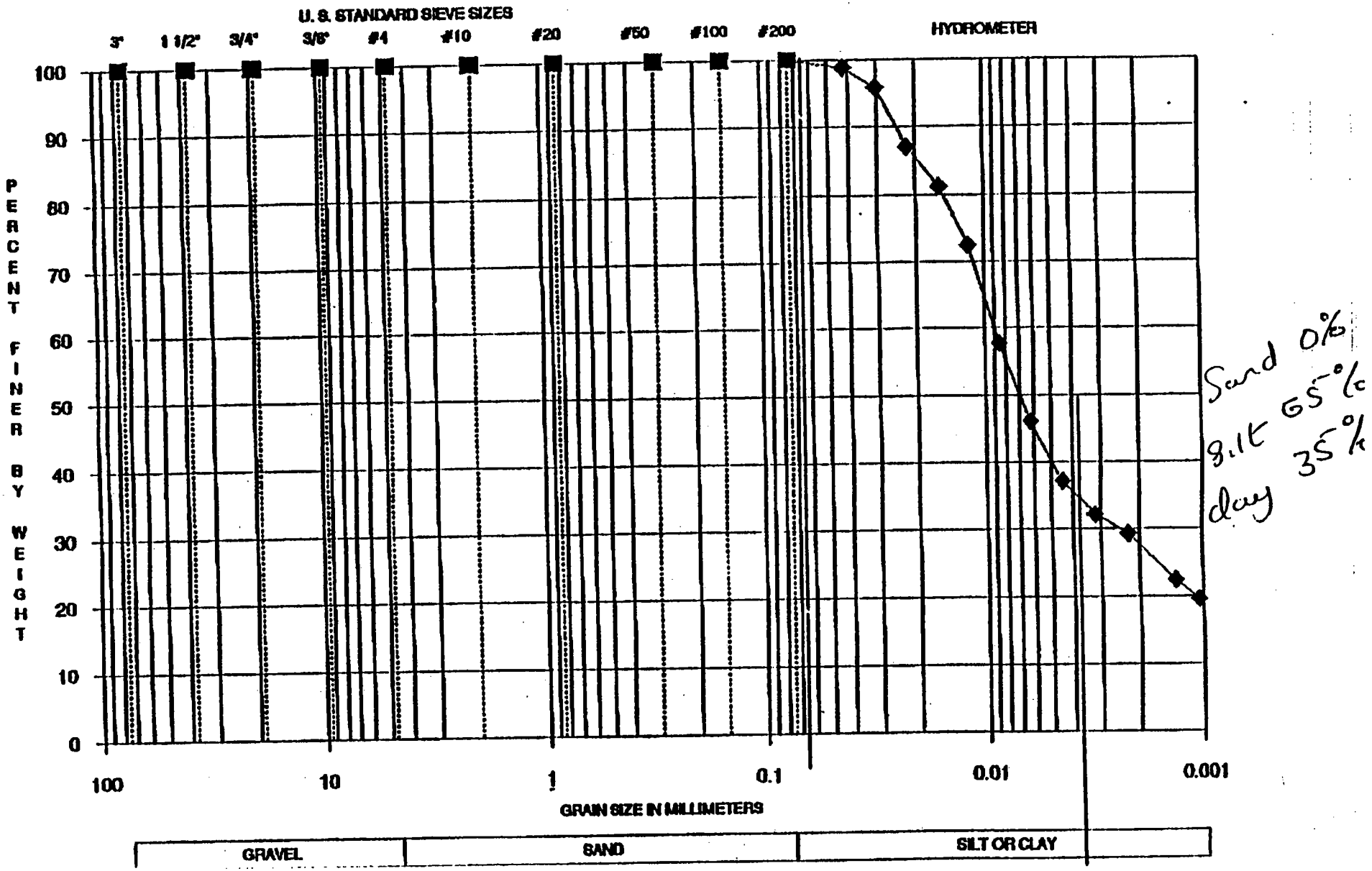
GRAIN SIZE DISTRIBUTION CURVE FOR
AQUASURVEY PROJECT SAMPLE CORE #4, ETL SAMPLE # 9009X002-004



Sand 4%
Silt = 60%
day 36

WESTON ENVIRONMENTAL TECHNOLOGY LABORATORY

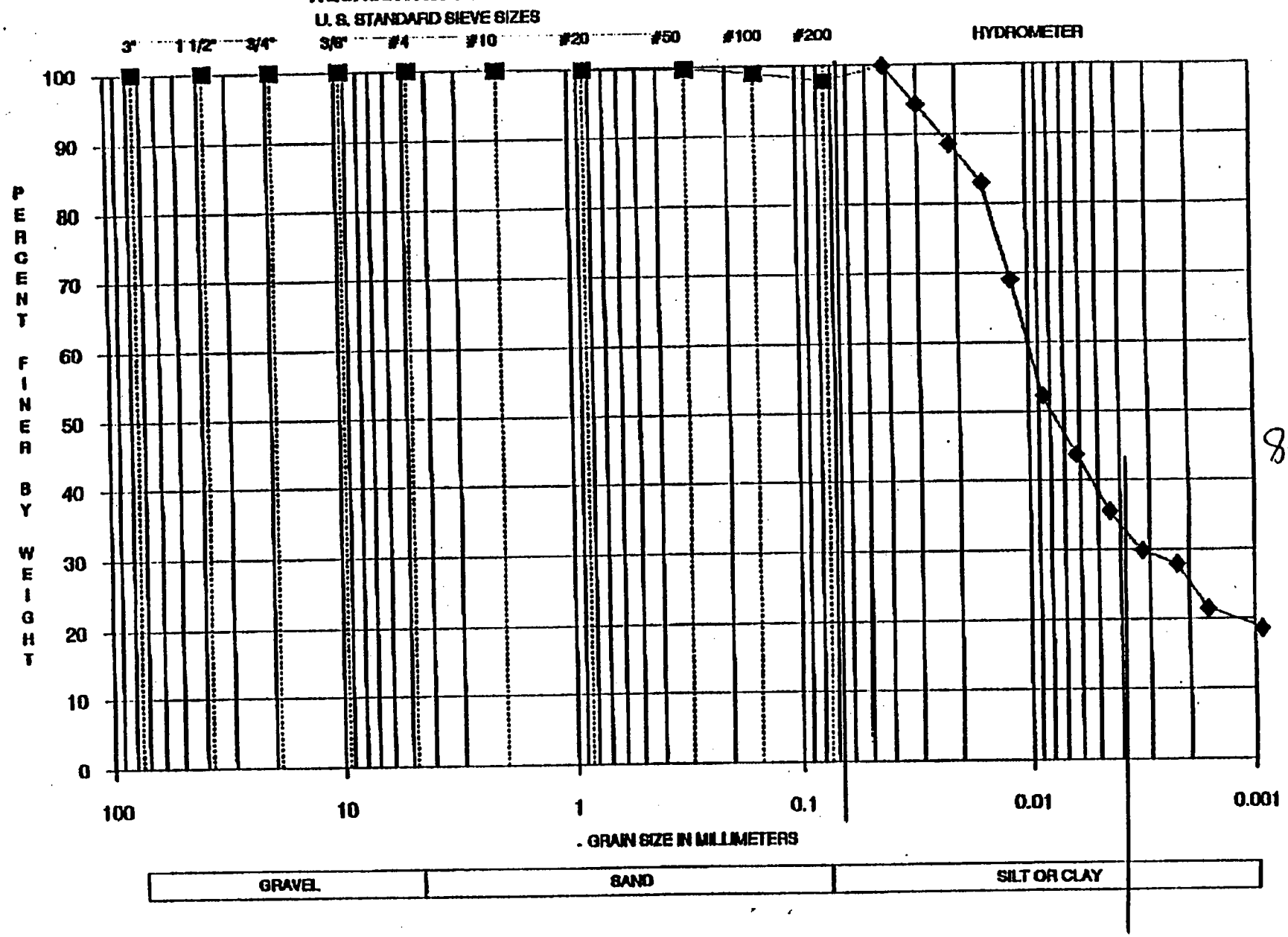
GRAIN SIZE DISTRIBUTION CURVE FOR
AQUASURVEY PROJECT SAMPLE CORE #5, ETL SAMPLE # 9009X002-005



Sand 0%
Silt 65%
clay 35%

WESTON ENVIRONMENTAL TECHNOLOGY LABORATORY

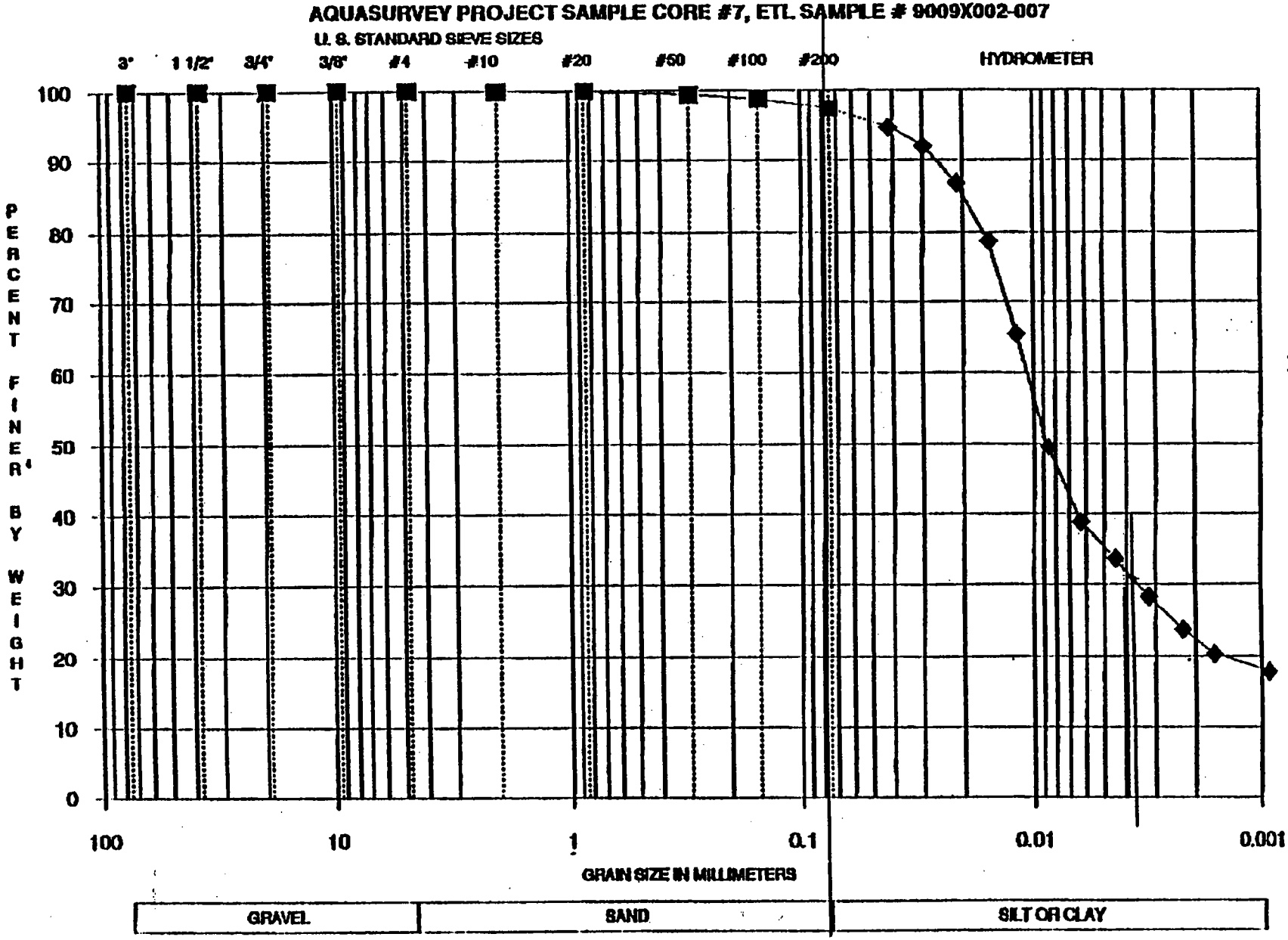
GRAIN SIZE DISTRIBUTION CURVE FOR
AQUASURVEY PROJECT SAMPLE CORE #6, ETL SAMPLE # 9009X002-006



Sand 2%
Silt 63%
clay 33%

WESTON ENVIRONMENTAL TECHNOLOGY LABORATORY

GRAIN SIZE DISTRIBUTION CURVE FOR
AQUASURVEY PROJECT SAMPLE CORE #7, ETL SAMPLE # 9009X002-007

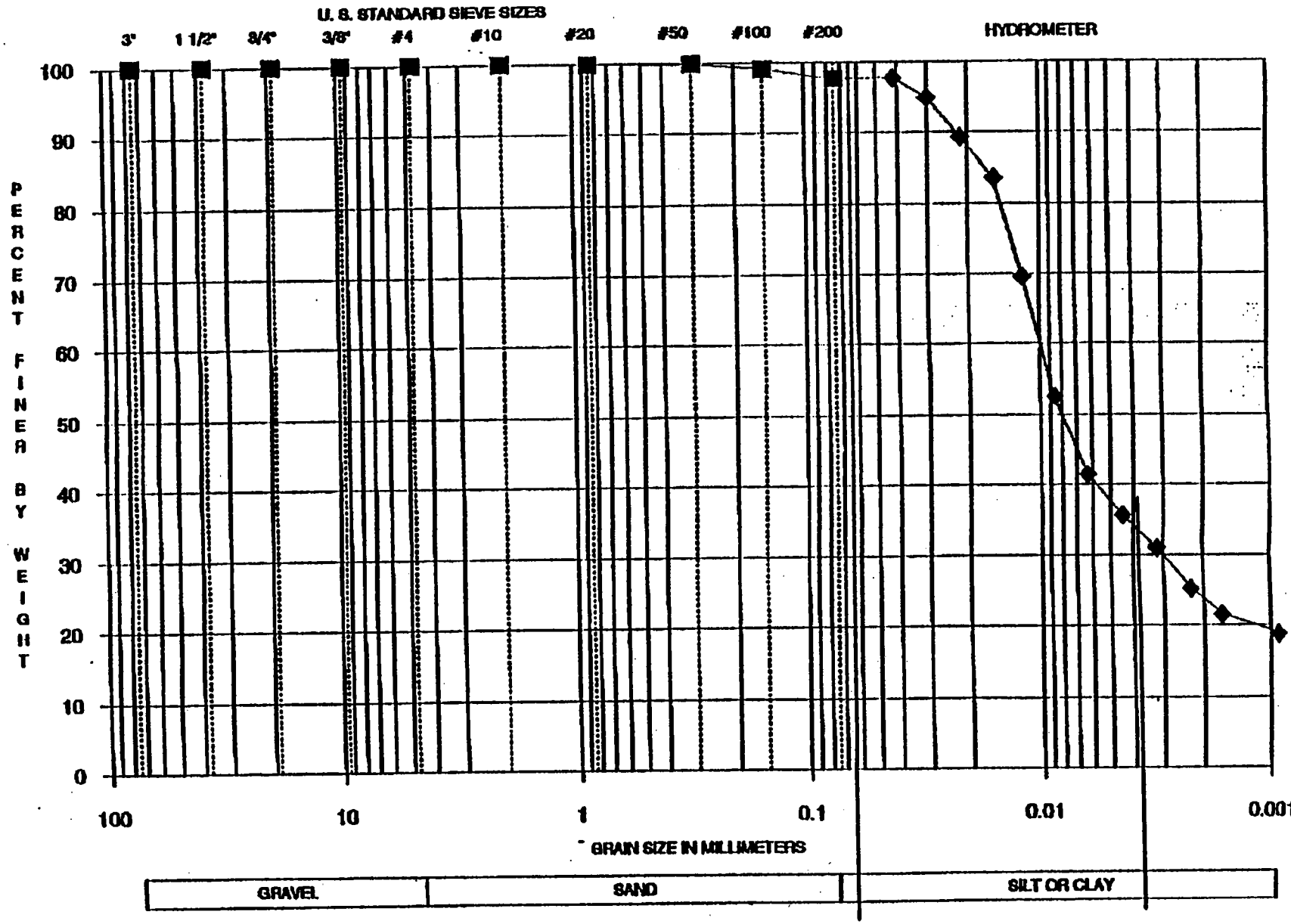


sand 3%
silt - 66%
clay - 31%

B-7

WESTON ENVIRONMENTAL TECHNOLOGY LABORATORY

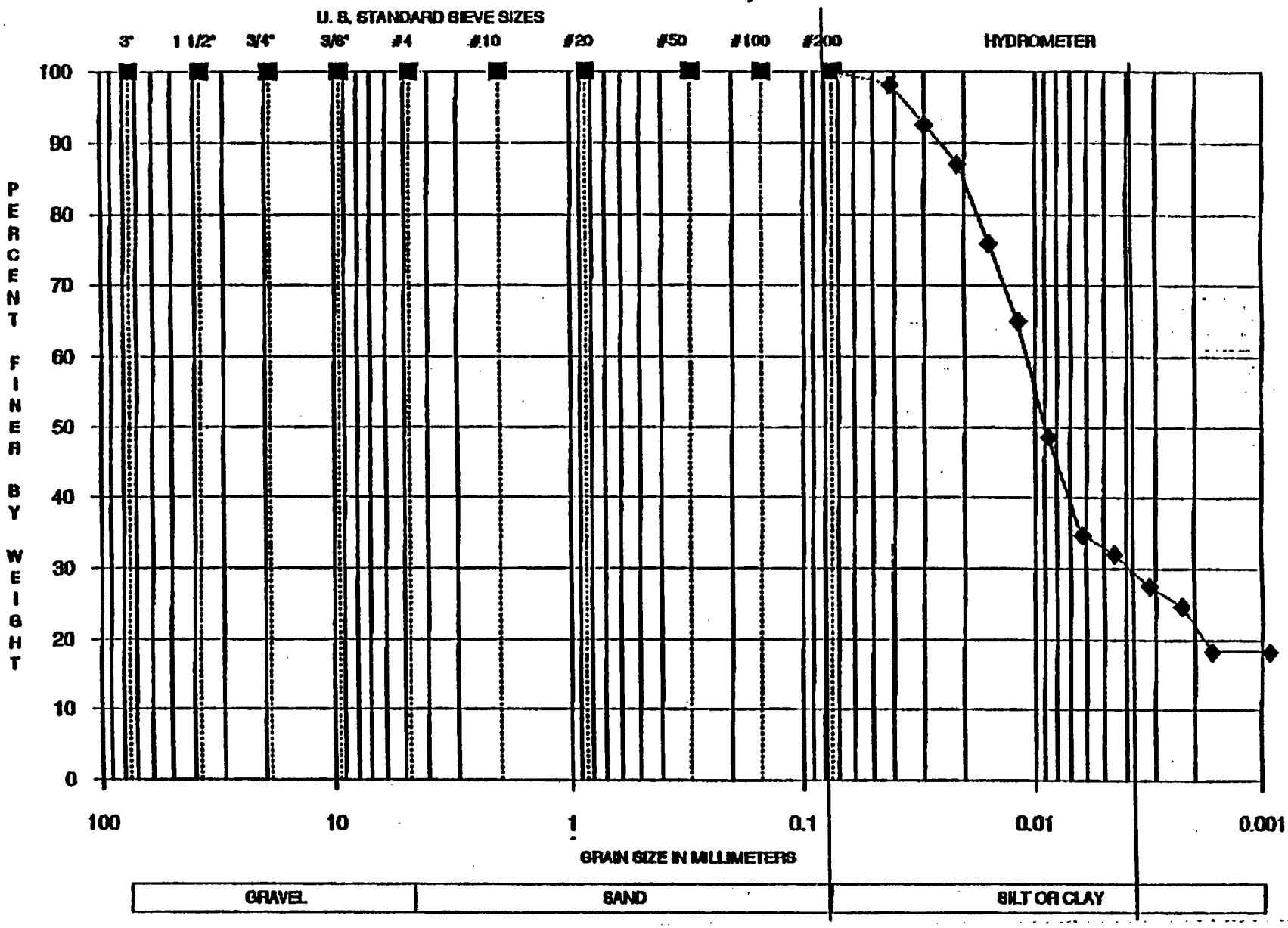
GRAIN SIZE DISTRIBUTION CURVE FOR
AQUASURVEY PROJECT SAMPLE CORE #8, ETL SAMPLE # 9009X002-008



Sand 2%
Silt 64%
Clay 34%

WESTON ENVIRONMENTAL TECHNOLOGY LABORATORY

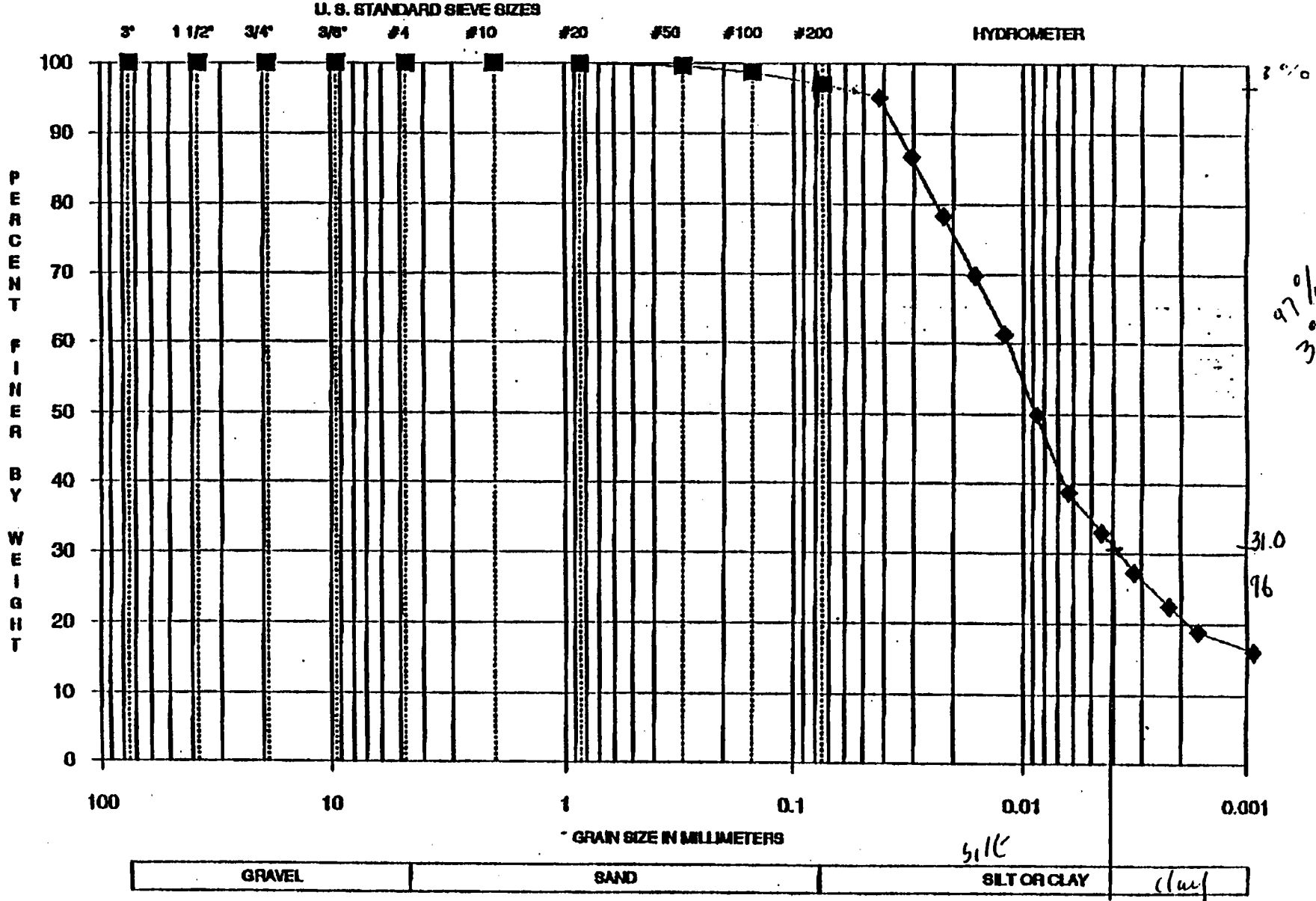
GRAIN SIZE DISTRIBUTION CURVE FOR
AQUASURVEY PROJECT SAMPLE CORE #9, ETL SAMPLE # 9009X002-009



20% clay
81% Silt
No sand

WESTON ENVIRONMENTAL TECHNOLOGY LABORATORY

GRAIN SIZE DISTRIBUTION CURVE FOR
AQUASURVEY PROJECT SAMPLE CORE #10, ETL SAMPLE # 9009X002-010



B-10

pretest worms.

Triangle Laboratories, Inc.
Summary Table of Results for TLI# 16140
Aqua Survey, Inc. Job No. 9128

Filename	TLI Number	TCDD (ppt)	Total TCDD (ppt)
U901221	TLI Blank	< 1.0	< 1.0
U901221	34-55-1A	< 1.0	< 1.0
U901228	34-55-1C	< 1.0	< 1.0
U901310	34-55-1B	< 1.0	< 1.0

Reference Worms

TRIANGLE LABORATORIES. INC.
CONFIRMATION ANALYSIS (DB-5)

08/30/90

FILE NAME....: U901384
CONCAL (VER).: U901372
PROJECT NUMBER: 16288
ANALYST.....: VC
SAMPLE SIZE..: 20.320 g
DATE RECEIVED.: 08/11/90
SPIKE FILE...: SPC2NF2K

CLIENT ID....: AQUA SURVE
SAMPLE ID....: 1 REFWORMS
ICAL DATE....: 06/12/90
ANALYSIS DATE: 08/26/90
SAMPLE MATRIX: WORMS
DATE COLLECTED: / /

TLI NUMBER....: 35-54-1
SAMPLE ORIGIN: n/a
SHIPMENT NO...: n/a

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	1.4				0.80	27:42	___

SURROGATE STD. RECOVERY SUMMARY (TYPE 8)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37C1-TCDD	44.7	45.4		27:42	___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDD	40.1	40.8	0.79	27:41	___

MRS 8/30/90

C2NF_RPT rev:3.01

Bio-Accum Reference

Reference Worms

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-5)

08/30/90

FILE NAME....: U901365
CONCAL (VER).: U901372
PROJECT NUMBER: 16288
ANALYST.....: VC
SAMPLE SIZE..: 20.540 g
DATE RECEIVED.: 08/11/90
SPIKE FILE...: SPC2NF2K

CLIENT ID....: AQUA SURVE
SAMPLE ID....: 2 REFWORMS
ICAL DATE....: 06/12/90
ANALYSIS DATE: 08/26/90
SAMPLE MATRIX: WORMS
DATE COLLECTED: / /

TLI NUMBER....: 35-54-2
SAMPLE ORIGIN: n/a
SHIPMENT NO...: n/a

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	1.2				0.74	27:42	___

SURROGATE STD. RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	86.0	88.3		27:42	___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDD	72.5	74.5	0.78	27:41	___

MSS 8/30/90

C2NF_RPT rev:3.01

Reference Worms

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-5)

08/30/90

FILE NAME....: U901386
CONCAL (VER).: U901372
PROJECT NUMBER: 16288
ANALYST.....: VC
SAMPLE SIZE..: 20.500 g
DATE RECEIVED.: 08/11/90
SPIKE FILE...: SPC2NF2K

CLIENT ID....: AQUA SURVE
SAMPLE ID....: 3 REFWORMS
ICAL DATE....: 06/12/90
ANALYSIS DATE: 08/26/90
SAMPLE MATRIX: WORMS
DATE COLLECTED: / /

TLI NUMBER....: 35-54-3
SAMPLE ORIGIN: n/a
SHIPMENT NO...: n/a

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	0.99				0.79	27:41	___

SURROGATE STD. RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37C1-TCDD	72.9	74.7		27:42	___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDD	58.0	59.4	0.81	27:40	___

MJS 8/30/90

C2NF_RPT rev:3.01

Reference Worms

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-5)

FILE NAME....: U901389
CONCAL (VER).: U901388
PROJECT NUMBER: 16288
ANALYST.....: VC
SAMPLE SIZE..: 20.000 g
DATE RECEIVED.: 08/11/90
SPIKE FILE...: SPC2NF2K

CLIENT ID....: AQUA SURVE
SAMPLE ID....: 4 REFWORMS
ICAL DATE....: 06/12/90
ANALYSIS DATE: 08/27/90
SAMPLE MATRIX: WORMS
DATE COLLECTED: / /

TLI NUMBER....: 35-54-4
SAMPLE ORIGIN: n/a
SHIPMENT NO...: n/a

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	0.88				0.75	27:41	___

SURROGATE STD. RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37C1-TCDD	51.6	51.6		27:41	___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDD	44.1	44.1	0.78	27:40	___

MSS 8/30/90

C2NF_RPT rev:3.01

Reference Worms

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-5)

08/30/90

FILE NAME....: U901390
CONCAL (VER).: U901388
PROJECT NUMBER: 16288
ANALYST.....: VC
SAMPLE SIZE..: 20.020 g
DATE RECEIVED.: 08/11/90
SPIKE FILE...: SPC2NF2K

CLIENT ID.....: AQUA SURVE
SAMPLE ID.....: 5 REFWORMS
ICAL DATE.....: 06/12/90
ANALYSIS DATE: 08/27/90
SAMPLE MATRIX: WORMS
DATE COLLECTED: / /

TLI NUMBER....: 35-54-5
SAMPLE ORIGIN: n/a
SHIPMENT NO...: n/a

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	0.95				0.73	27:41	___

SURROGATE STD. RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37C1-TCDD	85.0	85.1		27:42	___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDD	74.0	74.1	0.78	27:40	___

MLS 8/30/90

C2NF_RPT rev:3.01

Test Worms

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-5)

09/21/90

FILE NAME....: U901745
CONCAL (VER).: U901742
PROJECT NUMBER: 16288R
ANALYST.....: KF
SAMPLE SIZE..: 20.170 g
DATE RECEIVED.: 08/11/90
SPIKE FILE...: SPC2NF2K

CLIENT ID....: AQUA
SAMPLE ID....: 1 TEST WORMS
ICAL DATE....: 06/12/90
ANALYSIS DATE: 09/18/90
SAMPLE MATRIX: WORMS
DATE COLLECTED: / /

TLI NUMBER....: 35-54-6
SAMPLE ORIGIN: n/a
SHIPMENT NO...: n/a

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	17.3				0.75	28:26	—
TOTAL TCDD	18.7	2		19.8	0.75		—

$\bar{x} = 18.0$
JO 3/12/91

B2-Accum Test

SURROGATE STD. RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	79.4	80.1		28:26	—

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDD	84.8	85.5	0.80	28:25	—

9/21/91

C2NF_RPT rev:3.01

Test Worms

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-5)

09/21/90

FILE NAME....: U901746
CONCAL (VER).: U901742
PROJECT NUMBER: 16288R
ANALYST.....: KF
SAMPLE SIZE..: 20.660 g
DATE RECEIVED.: 08/11/90
SPIKE FILE...: SPC2NF2K

CLIENT ID....: AQUA
SAMPLE ID....: 2 TEST WORMS
ICAL DATE....: 06/12/90
ANALYSIS DATE: 09/18/90
SAMPLE MATRIX: WORMS
DATE COLLECTED: / /

TLI NUMBER....: 35-54-7
SAMPLE ORIGIN: n/a
SHIPMENT NO...: n/a

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	13.9				0.71	28:25	—
TOTAL TCDD	14.9	2		15.4	0.73		—

$\bar{x} = 14.4$
JO 3/12/91

SURROGATE STD. RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37C1-TCDD	72.8	75.2		28:25	—

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDD	75.5	77.9	0.82	28:24	—

JP 9/21/90

C2NF_RPT rev:3.01

Test Worms

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-5)

08/30/90

FILE NAME....: U901393
CONCAL (VER).: U901388
PROJECT NUMBER: 16288
ANALYST.....: VC
SAMPLE SIZE..: 20.050 g
DATE RECEIVED.: 08/11/90
SPIKE FILE...: SPC2NF2K

CLIENT ID....: AQUA SURVE
SAMPLE ID....: 3 TEST WORM
ICAL DATE....: 06/12/90
ANALYSIS DATE: 08/27/90
SAMPLE MATRIX: WORMS
DATE COLLECTED: / /

TLI NUMBER....: 35-54-8
SAMPLE ORIGIN: n/a
SHIPMENT NO...: n/a

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	17.3				0.77	27:41	___

SURROGATE STD. RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	102	103		27:41	___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDD	88.4	88.7	0.80	27:40	___

MJS 8/30/90

C2NF_RPT rev:3.01

Test Worms

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-5)

08/30/90

FILE NAME....: U901394
CONCAL (VER).: U901388
PROJECT NUMBER: 16288
ANALYST.....: DM
SAMPLE SIZE..: 20.620 g
DATE RECEIVED.: 08/11/90
SPIKE FILE...: SPC2NF2K

CLIENT ID....: AQUA SURVE
SAMPLE ID....: 4 TEST WORM
ICAL DATE....: 06/12/90
ANALYSIS DATE: 08/27/90
SAMPLE MATRIX: WORMS
DATE COLLECTED: / /

TLI NUMBER....: 35-54-9
SAMPLE ORIGIN: n/a
SHIPMENT NO...: n/a

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	18.0				0.73	27:42	___

SURROGATE STD. RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37C1-TCDD	129	133		27:42	___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDD	104	107	0.79	27:40	___

MBS 8/30/90

C2NF_RPT rev:3.01

Test Worms

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-5)

08/30/90

FILE NAME....: U901395
CONCAL (VER).: U901388
PROJECT NUMBER: 16288
ANALYST.....: DM
SAMPLE SIZE..: 20.360 g
DATE RECEIVED.: 08/11/90
SPIKE FILE...: SPC2NF2K

CLIENT ID....: AQUA SURVE
SAMPLE ID....: 5 TEST WORM
ICAL DATE....: 06/12/90
ANALYSIS DATE: 08/27/90
SAMPLE MATRIX: WORMS
DATE COLLECTED: / /

TLI NUMBER....: 35-54-10
SAMPLE ORIGIN: n/a
SHIPMENT NO...: n/a

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	18.6				0.81	27:41	—

SURROGATE STD. RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37C1-TCDD	103	105		27:41	—

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDD	94.6	96.3	0.80	27:40	—

MBC 8/30/90

C2NF_RPT rev:3.01

Test Sediment

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-5)

07/31/90

FILE NAME....: S902306
CONCAL.....: S902299
ANALYST.....: HSK
SAMPLE SIZE..: 6.70 g
ICAL DATE....: 07/26/90
SPIKE FILE...: SPC2NF10

CLIENT ID....: AQUA
SAMPLE ID....: #1
ANALYSIS DATE: 07/27/90
SAMPLE MATRIX: SEDIMENT
SAMPLE ORIGIN: ENVIRON

TLI NUMBER....: 33-83-1
PROJECT NUMBER: 16025
DATE RECEIVED.: 06/25/90
DATE COLLECTED: 06/20/90
SHIPMENT NO...: n/a

NAME	CONC(ppb)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	0.42				0.78	32:13	___
TOTAL TCDD	0.53	8		0.53	0.78		___

SURROGATE STD. RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppb)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	0.90	60.1		32:13	___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppb)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDD	0.97	64.9	0.81	32:12	___

C2NF_RPT rev:3.01

CJP 7/31/90

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anal

Test Sediment

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-5)

07/31/90

FILE NAME....:	S902307	CLIENT ID....:	AQUA	TLI NUMBER....:	33-83-2
CONCAL.....:	S902299	SAMPLE ID....:	#2		
ANALYST.....:	HSK	ANALYSIS DATE:	07/27/90	PROJECT NUMBER:	16025
SAMPLE SIZE..:	6.44 g	SAMPLE MATRIX:	SEDIMENT	DATE RECEIVED.:	06/25/90
ICAL DATE....:	07/26/90	SAMPLE ORIGIN:	ENVIRON	DATE COLLECTED:	06/20/90
SPIKE FILE...:	SPC2NF10			SHIPMENT NO...:	n/a

NAME	CONC(ppb)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	0.23				0.76	32:10	___
TOTAL TCDD	0.29	6		0.32	0.76		___

SURROGATE STD. RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppb)	% REC.	RATIO	RT	FLAGS
37C1-TCDD	1.2	78.9		32:10	___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppb)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDD	1.3	82.4	0.81	32:09	___

cjp 7/31/90

C2NF_RPT rev:3.01

Test Sediment

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-5)

07/31/90

FILE NAME....:	S902308	CLIENT ID....:	AQUA	TLI NUMBER....:	33-83-3
CONCAL.....:	S902299	SAMPLE ID....:	#3		
ANALYST.....:	JA	ANALYSIS DATE:	07/27/90	PROJECT NUMBER:	16025
SAMPLE SIZE..:	6.90 g	SAMPLE MATRIX:	SEDIMENT	DATE RECEIVED.:	06/25/90
ICAL DATE....:	07/26/90	SAMPLE ORIGIN:	ENVIRON	DATE COLLECTED:	06/20/90
SPIKE FILE...:	SPC2NF10			SHIPMENT NO...:	n/a

NAME	CONC(ppb)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	0.17				0.81	32:09	___
TOTAL TCDD	0.22	4		0.24	0.77		___

SURROGATE STD. RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppb)	% REC.	RATIO	RT	FLAGS
37C1-TCDD	0.32	56.7		32:08	___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppb)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDD	0.90	61.8	0.83	32:07	___

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C2NF_RPT rev:3.01

Test Sediment

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-5)

07/31/90

FILE NAME....:	S902309	CLIENT ID....:	AQUA	TLI NUMBER....:	33-83-4
CONCAL.....:	S902299	SAMPLE ID....:	#4		
ANALYST.....:	JA	ANALYSIS DATE:	07/27/90	PROJECT NUMBER:	16025
SAMPLE SIZE..:	6.43 g	SAMPLE MATRIX:	SEDIMENT	DATE RECEIVED.:	06/25/90
ICAL DATE....:	07/26/90	SAMPLE ORIGIN:	ENVIRON	DATE COLLECTED:	06/20/90
SPIKE FILE...:	SPC2NF10			SHIPMENT NO...:	n/a

NAME	CONC(ppb)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	0.41				0.79	32:13	___
TOTAL TCDD	0.48	6		0.49	0.76		___

SURROGATE STD. RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppb)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	1.0	65.4		32:13	___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppb)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDD	1.1	70.9	0.80	32:11	___

C2NF_RPT rev:3.01

CJP 7/31/90

Test Sediment

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-5)

07/31/90

FILE NAME....: S902310
CONCAL.....: S902299
ANALYST.....: JA
SAMPLE SIZE..: 7.43 g
ICAL DATE....: 07/26/90
SPIKE FILE...: SPC2NF10

CLIENT ID....: AQUA
SAMPLE ID....: #5
ANALYSIS DATE: 07/27/90
SAMPLE MATRIX: SEDIMENT
SAMPLE ORIGIN: ENVIRON

TLI NUMBER....: 33-83-5
PROJECT NUMBER: 16025
DATE RECEIVED.: 06/25/90
DATE COLLECTED: 06/20/90
SHIPMENT NO...: n/a

NAME	CONC(ppb)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	0.36				0.81	32:09	—
TOTAL TCDD	0.43	5		0.45	0.75		—

SURROGATE STD. RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppb)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	1.0	74.6		32:09	—

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppb)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDD	1.1	81.1	0.82	32:07	—

cjp 7/31/90

C2NF_RPT rev:3.01

Test Sediment

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-5)

07/31/90

FILE NAME....: S902311
CONCAL.....: S902299
ANALYST.....: JA
SAMPLE SIZE..: 6.95 g
ICAL DATE....: 07/26/90
SPIKE FILE...: SPC2NF10

CLIENT ID....: AQUA
SAMPLE ID....: #6
ANALYSIS DATE: 07/27/90
SAMPLE MATRIX: SEDIMENT
SAMPLE ORIGIN: ENVIRON

TLI NUMBER....: 33-83-6
PROJECT NUMBER: 16025
DATE RECEIVED.: 06/25/90
DATE COLLECTED: 06/20/90
SHIPMENT NO...: n/a

NAME	CONC(ppb)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	0.23				0.79	32:11	—
TOTAL TCDD	0.30	7		0.30	0.76		—

SURROGATE STD. RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppb)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	1.1	79.0		32:11	—

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppb)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDD	1.2	84.0	0.80	32:09	—

C2NF_RPT rev:3.01

7/31/90

Test Sediment

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-5)

07/31/90

FILE NAME....: S902312
CONCAL.....: S902299
ANALYST.....: JA
SAMPLE SIZE..: 7.24 g
ICAL DATE....: 07/26/90
SPIKE FILE...: SPC2NF10

CLIENT ID....: AQUA
SAMPLE ID....: #7
ANALYSIS DATE: 07/28/90
SAMPLE MATRIX: SEDIMENT
SAMPLE ORIGIN: ENVIRON

TLI NUMBER....: 33-83-7
PROJECT NUMBER: 16025
DATE RECEIVED.: 06/25/90
DATE COLLECTED: 06/20/90
SHIPMENT NO...: n/a

NAME	CONC(ppb)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	0.19				0.78	32:11	---
TOTAL TCDD	0.29	7		0.30	0.79		---

SURROGATE STD. RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppb)	% REC.	RATIO	RT	FLAGS
37C1-TCDD	1.1	82.0		32:11	---

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppb)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDD	1.2	84.7	0.80	32:10	---

cjn 7/31/90

C2NF_RPT rev:3.01

Test Sediment

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-5)

FILE NAME....:	S902315	CLIENT ID....:	AQUA	TLI NUMBER....:	33-83-8
CONCAL.....:	S902314	SAMPLE ID....:	#8		
ANALYST.....:	JA	ANALYSIS DATE:	07/28/90	PROJECT NUMBER:	16025
SAMPLE SIZE..:	7.05 g	SAMPLE MATRIX:	SEDIMENT	DATE RECEIVED.:	06/25/90
ICAL DATE....:	07/26/90	SAMPLE ORIGIN:	ENVIRON	DATE COLLECTED:	06/20/90
SPIKE FILE...:	SPC2NF10			SHIPMENT NO...:	n/a

NAME	CONC(ppb)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	0.24				0.79	32:13	___
TOTAL TCDD	0.31	9		0.31	0.78		___

SURROGATE STD. RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppb)	% REC.	RATIO	RT	FLAGS
37C1-TCDD	1.1	78.0		32:13	___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppb)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDD	1.2	81.7	0.81	32:11	___

cjp 7/31/90

C2NF_RPT rev:3.01

Test Sediment

TRIANGLE LABORATORIES. INC.
CONFIRMATION ANALYSIS (DB-5)

FILE NAME....: S902316
CONCAL.....: S902314
ANALYST.....: JA
SAMPLE SIZE..: 6.43 g
ICAL DATE....: 07/26/90
SPIKE FILE...: SPC2NF10

CLIENT ID....: AQUA
SAMPLE ID....: #9
ANALYSIS DATE: 07/28/90
SAMPLE MATRIX: SEDIMENT
SAMPLE ORIGIN: ENVIRON

TLI NUMBER....: 33-83-9
PROJECT NUMBER: 16025
DATE RECEIVED.: 06/25/90
DATE COLLECTED: 06/20/90
SHIPMENT NO...: n/a

NAME	CONC(ppb)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	0.35				0.77	32:12	—
TOTAL TCDD	0.44	9		0.45	0.80		—

SURROGATE STD. RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppb)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	1.0	66.6		32:12	—

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppb)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDD	1.1	71.4	0.81	32:11	—

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Test Sediment

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-5)

07/31/90

FILE NAME....: S902317
CONCAL.....: S902314
ANALYST.....: JA
SAMPLE SIZE..: 7.51 g
ICAL DATE....: 07/26/90
SPIKE FILE...: SPC2NF10

CLIENT ID....: AQUA
SAMPLE ID....: #10
ANALYSIS DATE: 07/28/90
SAMPLE MATRIX: SEDIMENT
SAMPLE ORIGIN: ENVIRON

TLI NUMBER....: 33-83-10
PROJECT NUMBER: 16025
DATE RECEIVED.: 06/25/90
DATE COLLECTED: 06/20/90
SHIPMENT NO...: n/a

NAME	CONC(ppb)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	0.25				0.79	32:11	—
TOTAL TCDD	0.31	6		0.32	0.77		—

SURROGATE STD. RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppb)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	0.91	68.1		32:11	—

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppb)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDD	0.96	71.7	0.81	32:11	—

cjp 7/31/90

C2NF_RPT rev:3.01

Wastewater Sample

TRIANGLE LABORATORIES, INC.
CONFIRMATION ANALYSIS (DB-5)

08/30/90

FILE NAME....: U901382 CLIENT ID....: AQUA TLI NUMBER....: 35-89-1
CONCAL (VER).: U901372 SAMPLE ID....: SUBSURFACE SAMPLE
PROJECT NUMBER: 16329 ICAL DATE....: 06/12/90
ANALYST.....: JA ANALYSIS DATE: 08/26/90
SAMPLE SIZE..: 984.000 ml SAMPLE MATRIX: WATER SAMPLE ORIGIN: HOECHST
DATE RECEIVED.: 08/18/90 DATE COLLECTED: 08/16/90
SPIKE FILE...: SPC2NF2K SHIPMENT NO...: ENVIRON

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.005				—
TOTAL TCDD	ND		0.005				—

SURROGATE STD. RECOVERY SUMMARY (TYPE B)

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	0.77	38.0		27:42	✓

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDD	0.76	37.2	0.77	27:41	✓

DH 8/30/90 C2NF_RPT rev:3.01

waste water

C'Ksana Yavenko
F/I

SAMPLE LOCATIONS
W/ 2,3,7,8-TCDD DATA

ENVIRON

January 10, 1989

VIA FEDERAL EXPRESS

SAMPLE DATES: 11/1/88 by Aqua Survey.
10/28/88
MH 8/5/92

Mr. George Nieves
U.S. Army Corps of Engineers
Regulatory Branch, Western Permits Section
CENANOP-RW
26 Federal Plaza
New York, NY 10278-0090

Subject : Application No. 86-939-OD

Dear Sir:

The Hoechst Celanese Corporation (HCC) is currently attempting to obtain a permit for the dredging and ocean disposal of sediments from the Passaic River near the HCC Newark Terminal facility. As a condition to granting the permit, the New York District of the Army Corps of Engineers has required that HCC perform extensive sampling and analysis of the sediment. The sediment testing program (as set forth in the attached letter from T. M. Creamer, Chief, Operations Division, to Mr. D. Flynn of HCC) includes the following tests:

- Bulk testing of homogenates from ten (10) sediment cores for 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) and total organic carbon (TOC).
- A 10-day solid phase and tissue bioaccumulation analysis for 2,3,7,8-TCDD using five (5) replicate testing of one aquatic organism (Nereis virens).

This sediment testing program was recently completed for HCC by Aqua Survey, Inc.; their report is enclosed. As shown in the report, 2,3,7,8-TCDD concentrations in bulk sediment were found to range from 7.3 ppt to 113.7 ppt, with an average of 38 ppt. TOC levels ranged from 0.59% to 0.98%, with an average of 0.70%. Levels of 2,3,7,8-TCDD in exposed test organisms were found to range from 4.7 ppt to 9.6 ppt, with an average of 7.7 ppt. Since the 2,3,7,8-TCDD concentrations in the test organisms were below 25 ppt, current policy of the New York District of the Army Corps of Engineers would permit ocean disposal of the sediment as long as it was expeditiously capped.

Dredging at the HCC Terminal in Newark is essential; the extensive buildup of sediments has already made it impossible for large ships to reach the facility. It is critical that HCC obtain a dredging and disposal permit as soon as possible since the use of the terminal is becoming increasingly restricted, and the long-term viability of the facility is threatened. I therefore look forward to hearing from you regarding the HCC permit application at your earliest convenience.

Sincerely,

Stephen T. Washburn
Senior Associate

cc: T. Creamer, Army Corps of Engineers
E. Stern, Army Corps of Engineers
D. Flynn, HCC
D. Ganguly, HCC
D. Walker, HCC

CELANESE

Table 4. 2,3,7,8-TCDD Bulk sediment results per core

core #1	26.769 ppt
core #2	57.213 ppt
core #3	113.699 ppt
core #4	35.587 ppt
core #5	20.152 ppt
core #6	24.254 ppt
core #7	7.301 ppt
core #8	9.659 ppt
core #9	48.215 ppt
core #10	39.855 ppt

Table 5. 2,3,7,8-TCDD Neries virens tissue analysis for worms pooled from each replicate test tank

test replicate tank 1	8.723 ppt
test replicate tank 2	7.951 ppt
test replicate tank 3	4.669 ppt
test replicate tank 4	7.345 ppt
test replicate tank 5	9.565 ppt

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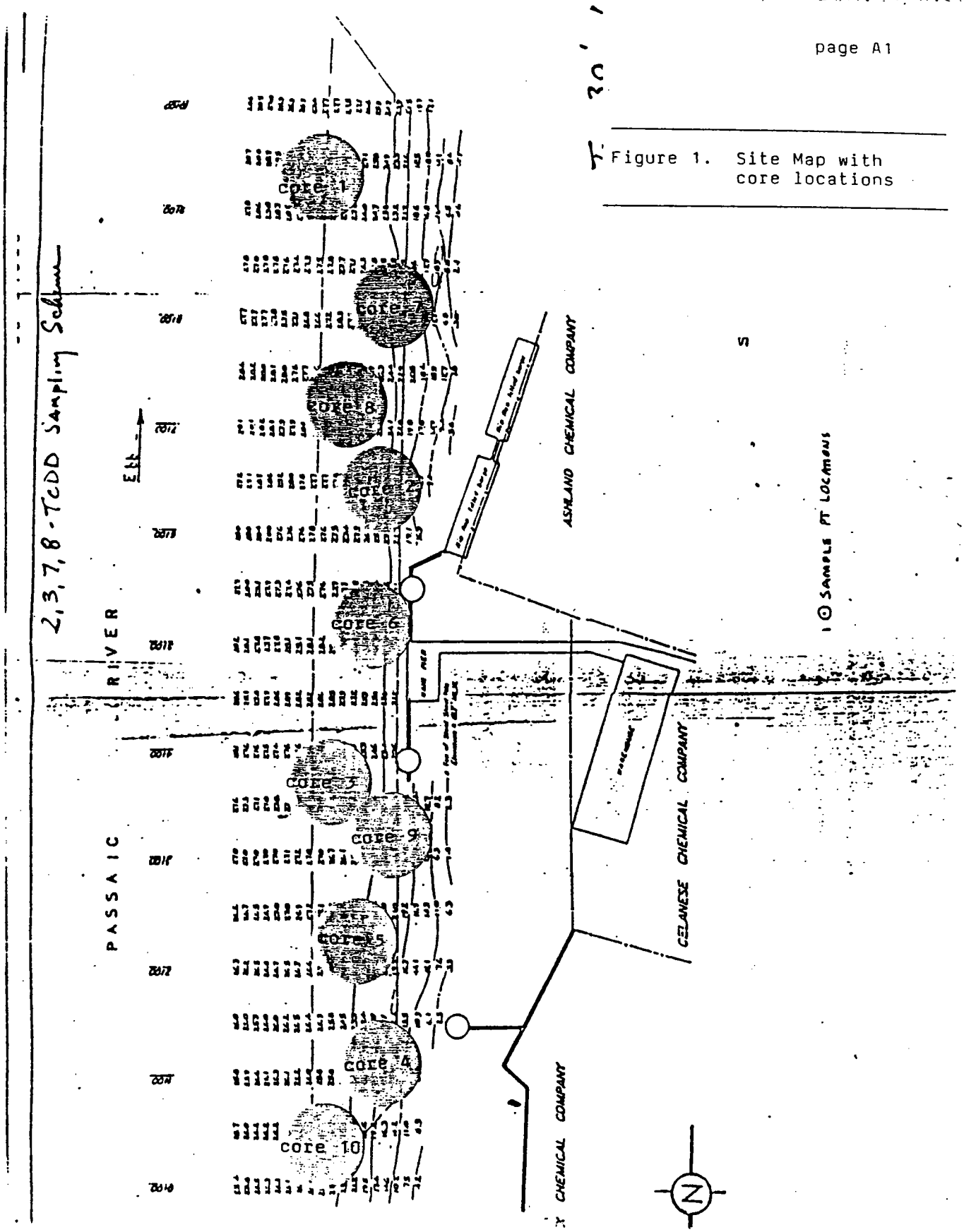


Figure 1. Site Map with core locations

ANTOS

Celanese Chem : 10/28/88 and

Sampled: [redacted] 11/1/88

Table 4. 2,3,7,8-TCDD Bulk sediment results per core

core #1	26.769 ppt
core #2	57.213 ppt
core #3	113.699 ppt
core #4	35.587 ppt
core #5	20.152 ppt
core #6	24.254 ppt
core #7	7.301 ppt
core #8	9.659 ppt
core #9	48.215 ppt
core #10	39.855 ppt

$\bar{x}$ = 38.27

σ = 30.90

Table 5. 2,3,7,8-TCDD Neries virens tissue analysis for worms pooled from each replicate test tank

10 day bioaccum

test replicate tank 1	8.723 ppt
test replicate tank 2	7.951 ppt
test replicate tank 3	4.669 ppt
test replicate tank 4	7.345 ppt
test replicate tank 5	9.565 ppt

$\bar{x}$ = 7.65

σ = 1.86

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