36757

36757

NUS CORPORATION
A Halliburton Company

FINAL DRAFT
SITE INSPECTION REPORT
LI TUNGSTEN
GLEN COVE, NEW YORK
VOLUME 3 OF 5

FIELD INVESTIGATION TEAM ACTIVITIES AT UNCONTROLLED HAZARDOUS SUBSTANCES FACILITIES — ZONE I

NUS CORPORATION
SUPERFUND DIVISION

100920

02-9003-01-SI
REV. NO. 0

FINAL DRAFT
SITE INSPECTION REPORT
LI TUNGSTEN
GLEN COVE, NEW YORK
VOLUME 3 OF 5

PREPARED UNDER

TECHNICAL DIRECTIVE DOCUMENT NO. 02-9003-01
CONTRACT NO. 68-01-7346

FOR THE

ENVIRONMENTAL SERVICES DIVISION
U.S. ENVIRONMENTAL PROTECTION AGENCY

SEPTEMBER 28, 1990

NUS CORPORATION
SUPERFUND DIVISION

100921

REFERENCE NO. 36

100922

No reference to OSHA

WESTON
MANAGERS DESIGNERS CONSULTANTS
Suite 201, 1090 King Georges Post Road,
Edison, NJ 08837, • (201) 225-6116 • FAX (201) 225-7037

TECHNICAL ASSISTANCE TEAM FOR EMERGENCY RESPONSE REMOVAL AND PREVENTION
EPA CONTRACT 68-01-7367

TAT-02-F-05531

MEMORANDUM

TO: Charlie Fitzsimmons, USEPA

FROM: Laura J. Amend, TAT II PM LA
William J. Kowalski, TAT II QC WJK

SUBJECT: Li Tungsten
Air Sampling Analytical Results Evaluation
TDD #02-8906-14,A,B

DATE: October 20, 1989

Attached to this report, please find Tables 1,2,3, and 4; entitled Volatile Organic Analysis Summary, Metals Analysis Summary, Acid Gas Analysis Summary, and Asbestos Air Sample Analysis Summary, respectively. Each table compares sample concentrations of each compound analyzed with several regulatory limits. As can be easily observed, the reported results for all analytes are well below their respective statutory limits. All values are reported in ug/m^3, except where otherwise specified. A brief description of the statutes is as follows:

ACGIH TLV - (American Conference of Governmental Industrial Hygienists Threshold Limit Value). Airborne concentrations of substances which the ACGIH believes that nearly all workers may be repeatedly exposed without adverse effect. These values are recommendations and not backed by any regulatory guidance.

OSHA TWA - (Occupational Safety and Health Act Time Weighted Average). Maximum average airborne concentration/exposure in any given 8-hour work shift of a 40-hour work week. Promulgated in 29 CFR Part 1910.1000, Subpart Z.

OSHA STEL - (OSHA Short Term Exposure Limit). Maximum airborne 15-minute time weighted average concentration/ exposure at any time during workday (unless another time limit is specified). Promulgated in 29 CFR Part 1910.1001, Subpart Z.

NIOSH TWA - (National Institute for Occupational Safety and Health Time Weighted Average). Recommended exposure limits based on a 10-hour workday. Not a regulatory guidance.

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NIOSH ceiling - Recommended concentration above which workers should never be exposed. These values are not backed by regulation.

OSHA/NIOSH IDLH (OSHA/NIOSH Immediately Dangerous to Life and Health). Designed in a joint effort between the Occupational Safety and Health Administration and NIOSH for the purpose of respirator selection. The maximum concentration from which, in the event of respirator failure, a worker could escape within 30 minutes without experiencing any escape-impairing or irreversible health effects. These values are not backed by regulation.

OSHA Action Level (for asbestos) - The regulatory lower limit at which employers must provide training and medical surveillance for personnel.

NY State Clearance Level: Established by the State of New York as acceptable post-abatement air quality standards.

The asbestos air samples indicate levels of approximately one-half the New York State clearance level. Therefore, according to New York State guidelines and based on these sample analysis no (further) asbestos remediation need be performed at this time. However, visual inspection of the facility indicates that asbestos containing materials are located throughout the site and appear friable. The presence of bulk asbestos has been documented in the bulk asbestos analytical results. Therefore, TAT can only surmise that the asbestos air samples were collected during static conditions, at a time when wind and passing workers could not raise asbestos fibers from the surface into the atmosphere. TAT recommends that a more comprehensive asbestos sampling program be established and conducted and that an asbestos removal/mitigation program be addressed as part of the overall scope of work for this clean up.

The inorganic acid analytical results are rather confusing. For nitrate and sulfate, the blank (I0A-14) shows similar results to the samples. However, the chloride concentration for the blank is significantly higher than any of the samples, and the blank indicates elevated fluoride concentrations as well. These results could be due to any of a number of scenarios. Since TAT does not have access to a sampling QA/QC plan used during the sampling, TAT has no way of knowing what sample handling protocol was followed, or even if the blank was a) opened in the hot zone and no air volume pulled through it, b) opened in the clean zone and shipped with the samples, or c) shipped to the lab unopened. There may have been an error in sample labeling in the field, mishandling of sample tubes in the field or the lab, or even contamination of the blank in the lab when the analysis was run. NIOSH method 7903, which was utilized to analyze the samples, calls for samples to be

collected on silica-gel tubes at .2 to .5 liters/min. for a minimum of 3 liters to a maximum of 100 liters. However, the throughput when sampling for HF should not exceed 0.3 l/min. The lack of a sampling plan makes it impossible to determine the throughput used when collecting the samples or the actual volume collected. The method publishes the working range for this analysis to be 0.01 to 5 mg/m^3 (10 - 5000 ug/m^3), which is at least one order of magnitude higher than the results obtained for these samples. Taking all these possibilities into account, it is impossible to determine the validity of the acid gas sample analysis. While the analytes indicate levels far below their respective statutory guidelines, TAT recommends the results be disregarded as inconclusive.

Attachments

Codes used in Tables 1-4

LFL	- lowest feasible limit
LDL	- lowest detection limit
SIXB	- undergoing 6(b) rulemaking
B	- also found in lab blank
J	- estimated value
-	- no limit set by applicable agency/regulation

Volatile Organics Analysis Summary
(Table 1)

	VOC-2 ug/m^3	VOC-3 ug/m^3	VOC-4 ug/m^3	ACGIH TLV ug/m^3 (1987-88)	OSHA TWA-ug/m^3 (3/89)	OSHA STEL-ug/m^3 (3/89)	NIOSH TWA-ug/m^3 (1986)	NIOSH Ceiling-ug/m3 (1986)	Carcinogen
Chloromethane	<1	<1	<1	105,000	105,000	205,000	LFL	-	Yes
Bromomethane	<1	<1	<1	20,000	20,000	-	-	-	-
Vinyl Chloride	<1	<1	<1	10,000	1,000(ppb)	5,000(ppb)	LDL	-	Yes
Chloroethane	<1	<1	<1	2,600,000	2,600,000	-	-	-	-
Methylene Chloride	0.6B(5.7B)	0.6(5.9)	2.6	350,000	500,000	-	LFL	-	Yes
Acetone	<1	<1	<1	1,780,000	1,800,000	2,400,000	590,000	-	-
Carbon Disulfide	<0.5	<0.5	<0.5	30,000	12,000	36,000	1,000	10,000	-
1,1-Dichloroethene	<0.5	<0.5	<0.5	20,000	4,000	-	-	-	-
1,1-Dichloroethane	<0.5	<0.5	<0.5	810,000	400,000	-	-	-	-
total-1,2-Dichloroethene	<0.5	<0.5	<0.5	790,000	790,000	-	-	-	-
Chloroform	<0.5	0.2J(2.0J)	0.3J	50,000	9,780	-	-	9,600(60min)	Yes
1,2-Dichloroethane	<0.5	<0.5	<0.5	40,000	4,000	8,000	1,000	2,000	Yes
2-Butanone	<1.0	<1.0	<1.0	590,000	590,000	885,000	590,000	-	-
1,1,1-Trichloroethane	<0.5	0.3J(2.9J)	0.3J	1,900,000	1,900,000	2,450,000	-	1,900,000	-
Carbon Tetrachloride	<0.5	0.1J(1.0J)	0.2J	30,000	12,600	-	-	2,000(60 min)	Yes
Vinyl Acetate	<0.1	<0.1	<0.1	30,000	30,000	60,000	-	-	-
Bromodichloromethane	<0.5	<0.5	<0.5	-	-	-	-	-	Yes
1,1,2,2-Tetrachloroethane	<0.5	<0.5	<0.5	7,000	7,000	-	LDL	-	Yes
1,2-Dichloropropane	<0.5	<0.5	<0.5	350,000	350,000	510,000	-	-	-
trans-1,3-Dichloropropene	<0.5	<0.5	<0.5	5,000	5,000	-	-	-	-
Trichloroethene	<0.5	<0.5	<0.5	270,000	270,000	1,080,000	25,000	-	Yes
Benzene	<0.5	<0.5	<0.5	30,000	1,000	5,000	100	1,000	Yes
cis-1,3-Dichloropropene	<0.5	<0.5	<0.5	5,000	5,000	-	-	-	-
2-Chloroethylvinylether	<1.0	<1.0	<1.0	-	-	-	-	-	-
Bromoform	<0.5	<0.5	<0.5	5,000	5,000	-	-	-	-
2-Hexanone	<1.0	<1.0	<1.0	20,000	20,000	-	4,000	-	-
4-Methyl-2-Pentanone	<1.0	<1.0	<1.0	-	205,000	300,000	-	-	-
Tetrachloroethene	<0.5	<0.5	<0.5	335,000	170,000	-	LFL	-	Yes
Toluene	<0.5	<0.5	<0.5	375,000	375,000	560,000	1,080,000	2,160,000(10 min)	-
Chlorobenzene	<0.5	<0.5	<0.5	350,000	350,000	-	-	-	-
Ethylbenzene	<0.5	<0.5	<0.5	435,000	435,000	545,000	-	-	-
Styrene	<0.5	<0.5	<0.5	215,000	215,000	425,000	215,000	425,000	-
total Xylenes	<0.5	<0.5	<0.5	435,000	435,000	655,000	435,000	870,000	-
total Dichlorobenzene	<3.0	<3.0	<3.0	300,000	450,000	675,000	-	300,000	-

Metals Analysis Summary
(Table 2)

	ICP-1 ug/m^3	ICP-2 ug/m^3	ICP-3 ug/m^3	ICP-4 ug/m^3	ICP-5 ug/m^3	ICP-B ug/m^3	ACGIH TLV ug/m^3	OSHA TWA ug/m^3	OSHA STEL ug/m^3	NIOSH TWA ug/m^3	NIOSH/OSHA IDLH ug/m^3	Carcinogen
Cadmium	<0.01	<0.01	<0.01	<0.01	0.06	<0.01	50	SIXB	SIXB	LFL	-	Yes
Copper	0.05	0.09	0.12	0.06	0.07	0.02	1,000	1,000	-	-	-	-
Chromium	<0.01	<0.01	<0.01	<0.01	<0.01	0.03	500	1,000	-	25(Cr VI)	500,000	Yes
Iron	0.18	22.17	0.45	1.56	4.06	0.36	1,000	10,000	-	-	-	-
Nickel	<0.01	0.06	0.05	<0.01	0.11	<0.01	1,000	1,000	-	15	-	Yes
Zinc	0.15	0.14	<0.01	0.12	0.35	0.10	10,000	10,000	-	5,000	-	-
Lead	<0.15	<0.15	<0.15	<0.15	<0.15	<0.005	150	50	-	100	-	-
Silver	<0.01	0.76	<0.01	<0.01	<0.01	<0.01	100	10	-	-	-	-
Sodium	<0.01	1.97	<0.01	<0.01	<0.01	1.26	-	-	-	-	-	-
Aluminum	0.50	0.15	0.28	0.64	1.79	0.25	10,000	15,000	-	-	-	-
Manganese	<0.01	<0.01	<0.01	<0.01	2.83	0.09	5,000	5,000	-	-	10,000,000	-
Arsenic	<0.01	<0.01	<0.01	<0.01	<0.01	<0.50	200	500	-	2	-	Yes
Beryllium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	2.0	2.0	5.0	5	-	Yes
Molybdenum	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	5,000	10,000	-	-	-	-
Phosphorous	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	100	100	-	-	-	-
Platinum	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1,000	1,000	-	-	-	-
Selenium	0.13	<0.01	<0.01	0.12	<0.01	<0.50	200	200	-	-	100,000	-
Tellurium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	100	100	-	-	-	-
Thallium	0.56	0.02	<0.01	<0.01	<0.01	0.03	100	100	-	-	20,000	-
Tin	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	2,000	2,000	-	100	200,000	-
Titanium	0.22	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-
Vanadium	<0.01	0.04	0.01	0.07	0.19	0.18	50	50	-	-	-	-
Yttrium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1,000	1,000	-	-	-	-
Zirconium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	5,000	5,000	10,000	-	500,000	-

Acid Gas Analysis Summary
(Table 3)

	IOA-11 ug/m^3	IOA-12 ug/m^3	IOA-13 ug/m^3	IOA-14 ug/m^3	ACGIH TLV ug/m^3	OSHA TWA ug/m^3	OSHA STEL ug/m^3	NIOSH TWA ug/m^3	NIOSH Ceiling ug/m^3	IDLH ug/m^3
Chloride (from HCL)	1.86	0.41	0.55	2.82	7,000	-	-	-	7,000	140,000
Fluoride (from HF)	3.28	2.78	1.49	1.37	2,500	2,500	5,000	2,500	5,000	25,000
Nitrate (from HNO_3)	0.09	<0.09	<0.09	0.10	5,000	5,000	10,000	5,000	-	250,000
Sulfate (from H_2SO_4)	1.01	<0.9	<0.9	1.0	1,000	1,000	-	1,000	-	80,000

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Asbestos Air Sample Analysis Summary
(Table 4)

Sample #	Volume (l)	Air Concentration fibers/cc	OSHA TWA (fibers/cc)	OSHA Action level (fibers/cc)	NIOSH TWA (fibers/cc)	NY State Clearance level (fibers/cc)
01(T-00304)	1170	<0.0047	0.2	0.1	0.1	0.01
02(T-00305)	936	<0.0049	0.2	0.1	0.1	0.01
03(T-00306)	1058	0.0047	0.2	0.1	0.1	0.01
04(T-00307)	933	<0.0049	0.2	0.1	0.1	0.01
05(T-00308)	904	<0.0051	0.2	0.1	0.1	0.01

TOTAL ANALYTICAL SERVICES FOR A SAFE ENVIRONMENT

nytest environmental inc.

Composite Compatibility tests results, See Status report # 6617.

Project No.: 89-16154

Log in No: 2644

P.O. No.: Pending

Date: October 26, 1989

ANALYTICAL DATA REPORT PACKAGE
FOR

Direct Environmental Inc.

290 Sanford Street

East Orange, NJ 07018

Att: Brent Thompson
Ref: Li Tungsten

SAMPLE IDENTIFICATION	LABORATORY NUMBER	TYPE OF SAMPLE	DATE AND TIME OF SAMPLE COLLECTION

SEE NEXT PAGE

REPORT PREPARED BY:
PARAG K. SHAH, Ph. D.
ORGANIC LAB. MANAGER

MARLIN MC CRICKARD
INORGANIC LAB. MANAGER

DOUGLAS SHEELEY
LABORATORY DIRECTOR

N.J. Cert # 73469

jc

WE CERTIFY THAT THIS REPORT IS A TRUE REPORT OF RESULTS OBTAINED FROM OUR TESTS OF THIS MATERIAL.

RESPECTFULLY SUBMITTED,
NYTEST ENVIRONMENTAL INC.

Remo Gigante

REMO GIGANTE
EXECUTIVE V.P.

100930

Report on sample(s) furnished by client applies to sample(s). Report on sample(s) obtained by us applies only to lot sampled. Information contained herein is not to be used for reproduction except by special permission. Sample(s) will be retained for thirty days maximum after date of report unless specifically requested otherwise by client. In the event that there are portions or parts of sample(s) remaining after Nytest has completed the required tests, Nytest shall have the option of returning such sample(s) to the client at the client's expense.

box 1518 □ 60 seaview blvd., port washington, ny 11050 □ (516) 625-5500

nytest environmental inc.

Project No.: 89-16154

SAMPLE IDENTIFICATION	LABORATORY NUMBER	TYPE OF SAMPLE	DATE AND TIME OF SAMPLE COLLECTION
B-1	2644001	Waste	10/03/89
B-2	2644002	Waste	10/03/89
B-3	2644003	Waste	10/03/89
B-4	2644004	Waste	10/03/89
O-1	2644005	Waste	10/03/89
O-2	2644006	Oil	10/03/89
O-3	2644007	Oil	10/03/89
O-4	2644008	Oil	10/03/89
O-5	2644009	Oil	10/03/89
A-1	2644010	Waste	10/03/89
W-1	2644011	Water	10/03/89
W-2	2644012	Water	10/03/89
OW-1-O	2644013	Oil	10/03/89
OW-1-W	2644014	Water	10/03/89

nytest environmental inc.

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Project No.:89-16154

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NEI

CHAIN OF CUSTODY / FIELD DATA SHEET

Direct Environmental, Inc.
290 Sanford St., East Orange, N.J. 07018
201/677-1800 ■ FAX: 201/675-5919

CLIENT: DIRECT ENVIRONMENTAL

CLIENT/PROJECT SITE: L-1 TENNESSEE

PAGE: 1 OF: 1

CLIENT CONTACT: ROBERT THOMPSON

PROJECT JOB NO.:

SAMPLE DESCRIPTION/LOCATION	TYPE GRB	TYPE COMP	MATRIX TYPE	DATE SAMPLED	TIME	PRESERVATIVE	NUMBER OF CONTAINERS	COLLECTED BY:	ANALYSIS REQUESTED
B-1		X	liq	10-3		ice	1	RBT	total: Na, K, CN⁻, OH⁻,
B-2 BASES		X	liq	"		"	1	RBT	As, Ba, Ca, Cr, Pb,
B-3		X	liq	"		"	1	RBT	Hg, Se, Ag, W, Cu,
B-4		X	liq	"		"	1	RBT	and pH, sulfide, reactivity
O-1		X	liq	"		"	2	RBT	VOC, flash, PCB, sulfide,
O-2		X	"	"		"	2	RBT	BTU, Cl, EP tox metals,
O-3 OILS		X	"	"		"	2	RBT	
O-4		X	"	"		"	2	RBT	
O-5		X	"	"		"	2	RBT	
A-1 ▷ ACID		X	"	"		"	1	RBT	total: same as B, no CN⁻, no OH
									pH, specific gravity, total sulfide,
									chloride, fluoride, reactivity
W-1 WATER		X	"	"		"	1	RBT	pH, tox metals, sulfide, chloride
W-2		X	"	"		"	1	RBT	fluoride, NH_3, reactivity
OW-1 ▷ MIXTURE		X	"	"		"	1	RBT	top layer analyze like Oil &
									bottom layer analyze like Water, and

REMARKS: 2 week turnaround

SHIPPED BY:
UPS: CLIENT VEHICLE
FEDX: LAB VEHICLE:
OTHER: DEI VEHICLE: X

RELINQUISHED BY:	RECEIVED BY:	DATE:	TIME:	REASON:	RELINQUISHED TO LABORATORY BY:	ACCEPTED FOR LAB BY:	DATE:	TIME:
RB THOMPSON						[illegible]	10/4	PM

LABORATORY COMMENTS:

100933

nytest environmental inc.

Laboratory Deliverable
Check List

		Check if Complete
I.	Cover Page, Format, and Laboratory Certification (Include Cross Reference Table of Field I.D. # and Laboratory I.D. #)	✓
II.	Chain of Custody	✓
III.	Summary Sheets Listing Analytical Results Including QA Data Information	✓
IV.	Laboratory Chronicle and Methodology Summary including Sampling Holding Time Check	✓
V.	Initial Calibration and Continuing Calibration (Time & Date Summary)	✓
VI.	Tune Summary (MS)	✓
VII.	Blanks (Method, Field, Trip)	✓
VIII.	Surrogate Recovery Summary	✓
IX.	Non-Conformance Summary	✓

Laboratory Manager

10/30/89
Date

100934

nytest environmental inc

Laboratory Chronicle

Project No:89-16154

Client Name:Direct Environmental

Date Received:10/04/89
Sample ID:As per chain of custody

Organics Extraction:

1. Acids _____

2. Base/Neutrals _____
10/10/89
3. Pesticides/PCBs _____

4. Dioxin _____

Analysis:

10/11/89
1. Volatiles _____

2. Acids _____

3. Base/Neutrals _____
10/14/89, 10/18/89
4. Pesticides/PCBs _____

5. Dioxin _____

Section Supervisor
Review & Approval _____

Inorganics:

10/16/89, 10/17/89
1. Metals _____

2. Cyanides _____

3. Phenols _____

Other Analysis:

_____

_____

_____

Section Supervisor
Review & Approval _____

Quality Control Supervisor
Review & Approval _____

100935

If fractions are re-extracted and re-analyzed include dates for both.

nytest environmental inc.

NON-CONFORMANCE SUMMARY

Project No: 89-16154

All samples were analyzed as per required protocols. All organic analysis was performed at medium level and results reported in ug/kg as received.

METHODOLOGY SUMMARY
NYTEST ENVIRONMENTAL INC.

AQUEOUS SAMPLE PREPARATION [See reference 1 and 2]	METHOD
BNA, Pesticides / PCB's Extraction (2)	3510
AA/ICP Sample Preparation (1)	200.7
Furnace Sample Preparation (1)	200.0
Mercury Sample Preparation (1)	245.1
Hexavalent Chromium Sample Preparation (1)	218.5

NON-AQUEOUS EXTRACTIONS [See reference 2]

SOIL AND SEDIMENT SAMPLES:

BNA, Pesticides / PCB's Extraction	3550
AA/ICP Sample Preparation	3050
Furnace Sample Preparation	3050
Mercury Sample Preparation	7471

SLUDGE / PETROLEUM BASED SAMPLES: [See reference 2]

AA/ICP Sample Preparation	3050
Furnace Sample Preparation	3020 / 3030 / 3050
Mercury Sample Preparation	7471

ICP (INDUCTIVELY COUPLED PLASMA):

	REFERENCE 1a/REFERENCE 2a
ALUMINUM	200.7/6010
ANTIMONY	200.7/6010
BARIUM	200.7/6010
BERYLLIUM	200.7/6010
CADMIUM	200.7/6010
CALCIUM	200.7/6010
CHROMIUM	200.7/6010
COBALT	200.7/6010
COPPER	200.7/6010
IRON	200.7/6010
LEAD	200.7/6010
MAGNESIUM	200.7/6010
MANGANESE	200.7/6010
MOLYBDENUM	200.7/6010
NICKEL	200.7/6010
POTASSIUM	200.7/6010
SILVER	200.7/6010
SODIUM	200.7/6010
TIN	200.7/6010
TITANIUM	200.7/6010
VANADIUM	200.7/6010
ZINC	200.7/6010

METHODOLOGY SUMMARY
NYTEST ENVIRONMENTAL INC.

FURNACE AA:	REFERENCE 1 / REFERENCE 2
ANTIMONY	204.1 / 7041
ARSENIC	206.2 / 7060
LEAD	239.2 / 7421
SELENIUM	270.2 / 7740
THALLIUM	279.2 / 7841
TIN	282.2
VANADIUM	286.2 / 7911
MERCURY	245.1 / 7470

AQUEOUS METHODOLOGIES: [See reference 3]

Organochlorine Pesticides and PCB's by Gas Chromatography	608
Herbicides by Gas Chromatography	362
Purgeable Organics by GC/MS	624
Base/Neutral, Acids by GC/MS	625
2,3,7,8 - TCDD by GC/MS	613 / 625

NON - AQUEOUS METHODOLOGIES: [See reference 2]

Gas Chromatography / Mass Spectrometry for:

Purgeable Organics	8240
Base / Neutral and Acid Extractables	8270

Organochlorine Pesticides and PCB's by Gas Chromatography	8080

MISCELLANEOUS ANALYSIS: [See reference 2]

Extraction Procedure Toxicity	1310
Ignitability	1010
Corrosivity	1110
Reactivity	CHAPTER 8.3

Toxicity Characteristic Leaching Procedure (TCLP) [Reference 5]

METHODOLOGY SUMMARY
NYTEST ENVIRONMENTAL INC.

ADDITIONAL INORGANIC PARAMETERS

PARAMETER	REFERENCE 1	REFERENCE 2
BROMIDE	320.1	
COLOR	110.2	
CONDUCTANCE	120.1	
CONDUCTANCE		9050
ODOR	140.1	
pH	150.1	
pH		9040
TDS	160.2	
TSS	160.2	
TS	160.3	
HARDNESS	130.1	
TEMPERATURE	170.1	
TURBIDITY	180.1	
ACIDITY	305.1	
ALKALINITY	310.1	
AMMONIA	350.2,.3	
CHLORIDE	325.3	
CHLORIDE		9252
RESIDUAL CHLORINE	330.2	
COD	410.3,405.1	
CYANIDE	335.3	
OIL AND GREASE	413.1,.2	
OIL AND GREASE		9070
FLUORIDE	340.2	
TKN	351.2	
NO2/NO3	353.2	
D.O.	360.2	
PETROLEUM-HYDROCARBONS (see reference 4)	418.1	
PHENOL	420.2	
PHOSPHORUS	365.1	
SILICA	370.1	
SULFATE	375.4,.2	
SULFIDE	376.1	
SURFACTANTS	425.1	
TOC	415.1	

REFERENCES:

(1) - 600 / 4-79-002 Methods for Chemical Analysis of Water and Waste
(1a) - 600 / 4-79-002 Methods for Chemical Analysis of Water and Waste As modified by the EPA CLP Statement of Work 787
(2) - SW 846 Test Methods for Evaluating Solid Waste
(2a) - SW 846 Test Methods for Evaluating Solid Waste As modified by the EPA CLP Statement of Work 787
(3) - 40 CFR Part 136, VOL. 49, No. 209 Test Parameters for the Analysis of Pollutants
(4) - as modified by NJDEP - BISE (for non aqueous samples)
(5) Federal Register Vol 51 No. 216 Friday 11/7/86 p.40643 - 40652

nytest environmental inc

ORGANIC DATA REPORTING QUALIFIERS

U Indicates compound was analyzed for but not detected. Report the minimum detection limit for the sample with the U (e.g. 10U) based on necessary concentration dilution actions. (This is not necessarily the instrument detection limit.) The footnote should read U-Compound was analyzed for but not detected. The number is the minimum attainable detected limit for the sample.

J Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed or when the mass spectral data indicates the presence of a compound that meets the identification criteria but the result is less than the specified detection limit but greater than zero (e.g.: If limit of detection is 10 ug/l and a concentration of 3 ug/l is calculated, report as 3J.)

B This flag is used when the analyte is found in the blank as well as a sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

D This flag indentifies all compounds indentified in an analysis at a secondary dilution factor.

Note: Data on soil samples expressed on a dry weight basis.

nytest environmental inc.

REPORT OF ANALYSIS

Project No.: 89-16154
Log In No: 2644

We find as follows:

Sample Identification		Parameter(s)	
		Chlorine % by wt.	Heating Value Btu/gal.
O-1	2644005	0.018	145,122
O-2	2644006	0.025	143,732
O-3	2644007	7.80	137,980
O-4	2644008	0.015	143,657
O-5	2644009	0.12	141,031

nytest environmental inc

Project No:89-16154

Sample Identification and Results

Sample No:O-1
Lab Sample ID No.:2644005

Results	Max. Allowable Levels	Found
Ignitability, F PM	140	202
Sulfide, PPM	-	14

E P Toxicity (PPM)

Arsenic	5.0	< .5
Barium	100.0	<10.0
Cadmium	1.0	< .1
Chromium	5.0	< .5
Lead	5.0	< .5
Mercury	0.2	< .02
Selenium	1.0	< .1
Silver	5.0	< .5

ND = None Detected
< = Less than

nytest environmental inc.

Project No:89-16154

Sample Identification and Results

Sample No:0-2
Lab Sample ID No.:2644006

Results	Max. Allowable Levels	Found
Ignitability, F PM	140	>212
Sulfide, PPM	-	32

E.P Toxicity (PPM)

Arsenic	5.0	< .5
Barium	100.0	<10.0
Cadmium	1.0	< .1
Chromium	5.0	< .5
Lead	5.0	< .5
Mercury	0.2	< .02
Selenium	1.0	< .1
Silver	5.0	< .5

ND = None Detected
< = Less than

nytest environmental inc

Project No:89-16154

Sample Identification and Results

Sample No:O-3
Lab Sample ID No.:2644007

Results	Max. Allowable Levels	Found
Ignitability, F PM	140	>212
Sulfide, PPM	-	46

E P Toxicity (PPM)

Arsenic	5.0	< .5
Barium	100.0	<10.0
Cadmium	1.0	< .1
Chromium	5.0	< .5
Lead	5.0	< .5
Mercury	0.2	< .02
Selenium	1.0	< .1
Silver	5.0	< .5

ND = None Detected
< = Less than

nytest environmental inc

Project No:89-16154

Sample Identification and Results

Sample No:O-4
Lab Sample ID No.:2644008

Results	Max. Allowable Levels	Found
Ignitability, F PM	140	>212
Sulfide, PPM	-	40

E P Toxicity (PPM)

Arsenic	5.0	< .5
Barium	100.0	<10.0
Cadmium	1.0	< .1
Chromium	5.0	< .5
Lead	5.0	< .5
Mercury	0.2	< .02
Selenium	1.0	< .1
Silver	5.0	< .5

ND = None Detected
< = Less than

nytest environmental inc

Project No:89-16154

Sample Identification and Results

Sample No:0-5
Lab Sample ID No.:2644009

Results	Max. Allowable Levels	Found
Ignitability, F PM	140	155
Sulfide, PPM	-	16

E P Toxicity (PPM)

Arsenic	5.0	< .5
Barium	100.0	<10.0
Cadmium	1.0	< .1
Chromium	5.0	< .5
Lead	5.0	< .5
Mercury	0.2	< .02
Selenium	1.0	< .1
Silver	5.0	< .5

ND = None Detected
< = Less than

nytest environmental inc

Project No:89-16154

Sample Identification and Results

Sample No:OW-1-0
Lab Sample ID No.:2644013

Results	Max. Allowable Levels	Found
Ignitability, F PM	140	>212
Sulfide, PPM	-	<0.1

E P Toxicity (PPM)

Arsenic	5.0	< .5
Barium	100.0	<10.0
Cadmium	1.0	< .1
Chromium	5.0	< .5
Lead	5.0	< .5
Mercury	0.2	< .02
Selenium	1.0	< .1
Silver	5.0	< .5

ND = None Detected
< = Less than

nytest environmental inc.

REPORT OF ANALYSIS

Project No.:89-16154

We find as follows:

Parameter(s)	Sample Identification			
	A-1 (2644010)	W-1 (2644011)	W-2 (2644012)	OW-1-W (2644014)
pH	<0.20	7.9	5.9	9.0
Reactivity to Cyanide, ppm	<1	<1	<1	<1
Reactivity to Sulfide, ppm	<10	<10	<10	<10
Sulfide, ppm	4	56	32	<0.1
Chloride, ppm	31600	20	37	<1
Fluoride, ppm	0.04	1.9	1.7	3.7
Specific Gravity	1.162	-	-	-
Ammonia, ppm	-	5.60	2.10	5.80

nytest environmental inc

REPORT OF ANALYSIS

Project No.:89-16154

We find as follows:

Parameter(s)	Sample Identification			
	B-1 (2644001)	B-2 (2644002)	B-3 (2644003)	B-4 (2644004)
pH	13.28	12.48	13.37	13.53
Reactivity to Cyanide, ppm	<1	<1	<1	<1
Reactivity to Sulfide, ppm	<10	<10	<10	<10
Sulfide, ppm	26	162	4	16
Cyanide, ppm	<0.01	0.03	<0.01	<0.01
Phenol, ppm	0.014	0.006	0.005	0.006

nytest environmental inc.

REPORT OF ANALYSIS

Project No.:89-16154

We find as follows:

Parameter(s)	Sample Identification			
Results in ppm:	B-1 (2644001)	B-2 (2644002)	B-3 (2644003)	B-4 (2644004)
Arsenic	1.6	1.6	1.4	<1.0
Barium	<10.0	<10.0	<10.0	<10.0
Chromiun	<5.0	<5.0	<5.0	<5.0
Copper	12.4	14.8	10.8	11.2
Lead	<5.0	<5.0	<5.0	<5.0
Mercury	<0.1	<0.1	<0.1	<0.1
Potassium	15300	66400	15800	44800
Selenium	<1.0	<1.0	<1.0	<1.0
Silver	<5.0	<5.0	5.4	<5.0
Sodium	144	7300	1630	13600
Calcium	354	448	418	224

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REPORT OF ANALYSIS

Project No.:89-16154

We find as follows:

Parameter(s)	Sample Identification		
Results in ppm:	A-1 (2644010)	W-1 (2644011)	W-2 (2644012)
Arsenic	2.2	1.4	<1.0
Barium	<10	<10	<10
Chromiun	11.8	<5.0	<5.0
Copper	21.0	-	-
Lead	<5.0	<5.0	83.6
Mercury	<0.1	<0.1	<0.1
Potassium	<80.0	-	-
Selenium	<1.0	1.4	<1.0
Silver	<5.0	<5.0	<5.0
Sodium	89.2	-	-
Calcium	266	-	-

ORGANICS ANALYSIS DATA SHEET

SAMPLE NUMBER:O-1

Contractor: NYTEST ENVIRONMENTAL INC.
Lab Sample ID No:2644005
Sample Matrix:Oil
Data Release Authorized By:

Project No:89-16154
Date Sample Received:10/4/89

VOLATILE COMPOUNDS

Concentration: Low Medium (Circle One)
Date Extracted/Prepared: NA
Date Analyzed:10/11/89 11:30
Conc/Dil Factor: 625
Percent Moisture Not Decanted:

CAS Number		ug/kg
74-87-3	Chloromethane	6250.0 U
74-83-9	Bromomethane	6250.0 U
75-01-4	Vinyl Chloride	6250.0 U
75-00-3	Chloroethane	6250.0 U
75-09-2	Methylene Chloride	3600.0 B
67-64-1	Acetone	5600.0 B
75-15-0	Carbon Disulfide	3125.0 U
75-35-4	1,1-Dichloroethene	3125.0 U
75-34-3	1,1-Dichloroethane	3125.0 U
540-59-0	Total-1,2-Dichloroethene	3125.0 U
67-66-3	Chloroform	3125.0 U
107-06-2	1,2-Dichloroethane	3125.0 U
78-93-3	2-Butanone	6250.0 U
71-55-6	1,1,1-Trichloroethane	3125.0 U
56-23-5	Carbon Tetrachloride	3125.0 U
108-05-4	Vinyl Acetate	6250.0 U
75-27-4	Bromodichloromethane	3125.0 U

CAS Number		ug/kg
79-34-5	1,1,2,2-Tetrachloroethane	3125.0 U
78-87-5	1,2-Dichloropropane	3125.0 U
10061-02-6	Trans-1,3-Dichloropropene	3125.0 U
79-01-6	Trichloroethene	3125.0 U
124-48-1	Dibromochloromethane	3125.0 U
79-00-5	1,1,2-Trichloroethane	3125.0 U
71-43-2	Benzene	180000.0
10061-01-5	cis-1,3-Dichloropropene	3125.0 U
110-75-8	2-Chloroethylvinylether	6250.0 U
75-25-2	Bromoform	3125.0 U
591-78-6	2-Hexanone	6250.0 U
108-10-1	4-Methyl-2-Pentanone	6250.0 U
127-18-4	Tetrachloroethene	3125.0 U
108-88-3	Toluene	130000.0
108-90-7	Chlorobenzene	3125.0 U
100-41-4	Ethylbenzene	25000.0
100-42-5	Styrene	53000.0
	Total Xylenes	18000.0
	Total Dichlorobenzene	18750.0 U

Data Reporting Qualifiers

For reporting results to EPA, the following results qualifiers are used. Additional flags or footnotes explaining results are encouraged. However, the definition of each flag must be explicit.

VALUE If the result is a value greater than or equal to the detection limit, report the value.

U Indicates compound was analyzed for but not detected. Report the minimum detection limit for the sample with the U (e.g. 10U), based on necessary concentration dilution actions. (This is not necessarily the instrument detection limit.) The footnote should read U-Compound was analyzed for but not detected. The number is the minimum attainable detection limit for the sample.

J Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed or when the mass spectral data indicates the presence of a compound that meets the identification criteria but the result is less than the specified detection limit but greater than zero (e.g. 10J).

C This flag applies to pesticide parameters where the identification ha been confirmed by GC/MS Single component pesticides greater than or equal to 10 ug/l in the final extract should be confirmed by GC/MS.

B This flag is used when the analyte is found in the blank as well as a sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

Other specific flags and footnotes may be required to properly define the results. If used, they must be fully described and such description attached to the data summary report.

nytest environmental inc.

ORGANICS ANALYSIS DATA SHEET

Contractor: NYTEST ENVIRONMENTAL INC.
Project No: 89-16154

SAMPLE NUMBER: O-1
Lab Sample ID No.:2664005

Tentatively Identified Compounds

	CAS Number	Compound Name	Fraction	RT or Scan Number	Estimated Concentration (ug/l or ug/Kg)
1		Unknown Alkene	VOA	7:08	26000 J
2		Unknown Alkene	VOA	8:48	14000 J
3		Unknown Alkene	VOA	10:20	30000 J
4		Unknown Aromatic	VOA	14:20	7500 J
5		Unknown Alkene	VOA	16:12	20000 J
6		Unknown aromatic	VOA	17:10	5100 J
7		Unknown Alkene	VOA	17:58	29000 J
8		Unknown Alkene	VOA	19:00	8300 J
9		Unknown Aromatic	VOA	19:56	18000 J
10		Unknown Aromatic	VOA	21:20	4700 J
11		Unknown Alkene	VOA	22:08	9600 J
12		Unknown Alkene	VOA	25:28	6300 J
13		Unknown Alkene	VOA	30:10	5300 J
14		Unknown Aromatic	VOA	39:34	9500 J
15		Unknown Aromatic	VOA	40:38	6800 J
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					

ORGANICS ANALYSIS DATA SHEET

SAMPLE NUMBER:O-1
(2644005)

Contractor: NYTEST ENVIRONMENTAL INC.
Project No:89-16154

PESTICIDE/PCBs

Concentration: Low Medium (Circle One)
Date Extracted/Prepared:10/10/89
Date Analyzed:10/14/89
Conc/Dil Factor: 1
Percent Moisture not decanted: 0 NA

GPC Cleanup __Yes _X_ No
Separatory Funnel Extraction __ Yes
Continuous Liquid-liquid Extraction __Yes

1

CAS Number		ug/l or ug/Kg (Circle One)
12674-11-2	Aroclor-1016	1200.00 U
11104-28-2	Aroclor-1221	1200.00 U
11141-16-5	Aroclor-1232	1200.00 U
53469-21-9	Aroclor-1242	1200.00 U
12672-29-6	Aroclor-1248	1200.00 U
11097-69-1	Aroclor-1254	2400.00 U
11096-82-5	Aroclor-1260	2400.00 U

nytest environmental inc

Table of Contents

Project No : 89-16154

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TOTAL ANALYTICAL SERVICES FOR A SAFE ENVIRONMENT

nytest environmental inc.

Composites for second group of drum samples See Report # 19

Project No.: 89-16154

Log in No: 2785

P.O. No.: Pending

Date: October 29, 1989

ANALYTICAL DATA REPORT PACKAGE
FOR

Direct Environmental Inc.

66-B Otis Street

West Babylon, NY 11704

Attn: B Thompson
Ref: LI Tungsten Hart Environmental

SAMPLE IDENTIFICATION	LABORATORY NUMBER	TYPE OF SAMPLE	DATE AND TIME OF SAMPLE COLLECTION
A-2	2785001	Waste Drum	10/18/89
B-4	2785002	Waste Drum	10/18/89
O-1A	2785003	Waste Drum	10/18/89
206	2785004	Waste Drum	10/18/89
T-28	2785005	Waste Drum	10/18/89
T-29	2785006	Waste Drum	10/18/89
T-19	2785007	Waste Drum	10/18/89
O-10	2785008	Waste Drum	10/18/89
C-23	2785009	Waste Drum	10/18/89
C-24	2785010	Waste Drum	10/18/89

REPORT PREPARED BY:
PARAG K. SHAH, Ph. D.
ORGANIC LAB. MANAGER

WE CERTIFY THAT THIS REPORT IS A TRUE REPORT OF RESULTS OBTAINED FROM OUR TESTS OF THIS MATERIAL.

RESPECTFULLY SUBMITTED,
NYTEST ENVIRONMENTAL INC.

DOUGLAS SHEELEY
LABORATORY DIRECTOR

Remo Gigante
REMO GIGANTE
EXECUTIVE V.P.

mo

Report on sample(s) furnished by client applies to sample(s). Report on sample(s) obtained by us applies only to lot sampled. Information contained herein is not to be used for reproduction except by special permission. Sample(s) will be retained for thirty days maximum after date of report unless specifically requested otherwise by client. In the event that there are portions or parts of sample(s) remaining after Nytest has completed the required tests, Nytest shall have the option of returning such sample(s) to the client at the client's expense.

box 1518 □ 60 seaview blvd., port washington, ny 11050 □ (516) 625-5500

→ NEI

CHAIN OF CUSTODY / FIELD DATA SHEET

Direct Environmental, Inc.
290 Sanford St., East Orange, N.J. 07018
201/677-1800 ■ FAX: 201/675-5919

CLIENT: DIRECT ENVIRONMENTAL

CLIENT/PROJECT SITE: LI TUNGSTEN HART ENVIRONMENTAL

PAGE: 1 OF: 1

CLIENT CONTACT: J. THOMPSON

PROJECT JOB NO.:

SAMPLE DESCRIPTION/LOCATION	TYPE GRB	TYPE COMP	MATRIX TYPE	DATE SAMPLED	TIME	PRESERVATIVE	NUMBER OF CONTAINERS	COLLECTED BY:	ANALYSIS REQUESTED
A-7		x	liq	10.18		ice	1	RBT	TOTAL: As, Ba, Cd, Cr, Pb, Hg, Se, Ag, W, Cu, cyanide, sulfide, fluoride ✓, sp. gr. pH.
B-4		x	liq	10.18		"	1	RBT	Total: Na, K, CN, OH, As, Ba, Ca, Cr, Pb, Hg, Se, W, Cu, ✓ pH, sulfide.
O-1A		x	liq	10.18		"	2	RBT	VO, GP, PCB, tox, flash, metals, DTW, CIT,
T-~~26~~ 28 BT	x		liq	10.18		"	1	RBT	PCB
T-~~27~~ 29 BT.	x		liq	10.18		"	1	RBT	PCB
T-19	x		liq	10.18		"	1	RBT	PCB
O-10	x		liq	10.18		"	1	RBT	PCB
C-23	x		liq	10.18		"	1	RBT	PCB
C-24	x		liq	10.18		"	1	RBT	PCB
206		x	solid	10.18		"	1	RBT	GP, tox, metals, VW, reactivity

REMARKS:

SHIPPED BY:
UPS:
FEDX:
OTHER:
CLIENT VEHICLE
LAB VEHICLE:
DEI VEHICLE: X

RELINQUISHED BY:	RECEIVED BY:	DATE:	TIME:	REASON:	RELINQUISHED TO LABORATORY BY:	ACCEPTED FOR LAB BY:	DATE:	TIME:
RESTRICTED	[illegible]	10/18	11:45	Transfer	[illegible]	[illegible]	10/18	1:45 pm

LABORATORY COMMENTS:

100957

00001

nytest environmental inc

Laboratory Chronicle

Project No: 89-16154

Client Name: Direct Environmental Inc.

Date Received: 10/18/89
Sample ID: As per Chain of Custody

Organics Extraction:

1. Acids _____
2. Base/Neutrals _____
3. Pesticides/PCBs 10/23/89
4. Dioxin _____

Analysis:

1. Volatiles 10/26/89
2. Acids _____
3. Base/Neutrals _____
4. Pesticides/PCBs 10/24/89
5. Dioxin _____

Section Supervisor
Review & Approval _____

Inorganics:

1. Metals 11/1/89
2. Cyanides 10/20/89
3. Phenols _____

Other Analysis:

_____

_____

_____

Section Supervisor
Review & Approval _____

Quality Control Supervisor
Review & Approval _____

100958

If fractions are re-extracted and re-analyzed include dates for both.

nytest environmental inc

NON-CONFORMANCE SUMMARY
(Case Narrative)

Project Number: 89-16154

GENERAL COMMENTS

All results reported are on a wet weight basis, no results have been corrected for moisture content due to the nature of the samples.

VOLATILE FRACTION

Sample O -1A was analyzed at medium level with an additional 500 dilution due to high concentrations of both targeted and non-targeted compounds.

PESTICIDE/PCB FRACTION

Surrogate Dibutylchloroendate fell outside QC limits for sample O-1A due to interference of compound containing similar chemical properties. Please note limits are advisory only.

METHODOLOGY SUMMARY
NYTEST ENVIRONMENTAL INC.

AQUEOUS SAMPLE PREPARATION [See reference 1 and 2]	METHOD
BNA, Pesticides / PCB's Extraction (2)	3510
AA/ICP Sample Preparation (1)	200.7
Furnace Sample Preparation (1)	200.0
Mercury Sample Preparation (1)	245.1
Hexavalent Chromium Sample Preparation (1)	218.5

NON-AQUEOUS EXTRACTIONS [See reference 2]

SOIL AND SEDIMENT SAMPLES:

BNA, Pesticides / PCB's Extraction	3550
AA/ICP Sample Preparation	3050
Furnace Sample Preparation	3050
Mercury Sample Preparation	7471

SLUDGE / PETROLEUM BASED SAMPLES: [See reference 2]

AA/ICP Sample Preparation	3050
Furnace Sample Preparation	3020 / 3030 / 3050
Mercury Sample Preparation	7471

ICP (INDUCTIVELY COUPLED PLASMA):

	REFERENCE 1a/REFERENCE 2a
ALUMINUM	200.7/6010
ANTIMONY	200.7/6010
BARIUM	200.7/6010
BERYLLIUM	200.7/6010
CADMIUM	200.7/6010
CALCIUM	200.7/6010
CHROMIUM	200.7/6010
COBALT	200.7/6010
COPPER	200.7/6010
IRON	200.7/6010
LEAD	200.7/6010
MAGNESIUM	200.7/6010
MANGANESE	200.7/6010
MOLYBDENUM	200.7/6010
NICKEL	200.7/6010
POTASSIUM	200.7/6010
SILVER	200.7/6010
SODIUM	200.7/6010
TIN	200.7/6010
TITANIUM	200.7/6010
VANADIUM	200.7/6010
ZINC	200.7/6010

METHODOLOGY SUMMARY
NYTEST ENVIRONMENTAL INC.

FURNACE AA:	REFERENCE 1 / REFERENCE 2
ANTIMONY	204.1 / 7041
ARSENIC	206.2 / 7060
LEAD	239.2 / 7421
SELENIUM	270.2 / 7740
THALLIUM	279.2 / 7841
TIN	282.2
VANADIUM	286.2 / 7911
MERCURY	245.1 / 7470

AQUEOUS METHODOLOGIES: [See reference 3]

Organochlorine Pesticides and PCB's by Gas Chromatography	608
Herbicides by Gas Chromatography	362
Purgeable Organics by GC/MS	624
Base/Neutral, Acids by GC/MS	625
2,3,7,8 - TCDD by GC/MS	613 / 625

NON - AQUEOUS METHODOLOGIES: [See reference 2]

Gas Chromatography / Mass Spectrometry for:

Purgeable Organics	8240
Base / Neutral and Acid Extractables	8270

Organochlorine Pesticides and PCB's by Gas Chromatography	8080

MISCELLANEOUS ANALYSIS: [See reference 2]

Extraction Procedure Toxicity	1310
Ignitability	1010
Corrosivity	1110
Reactivity	CHAPTER 8.3

Toxicity Characteristic Leaching Procedure (TCLP) [Reference 5]

METHODOLOGY SUMMARY
NYTEST ENVIRONMENTAL INC.

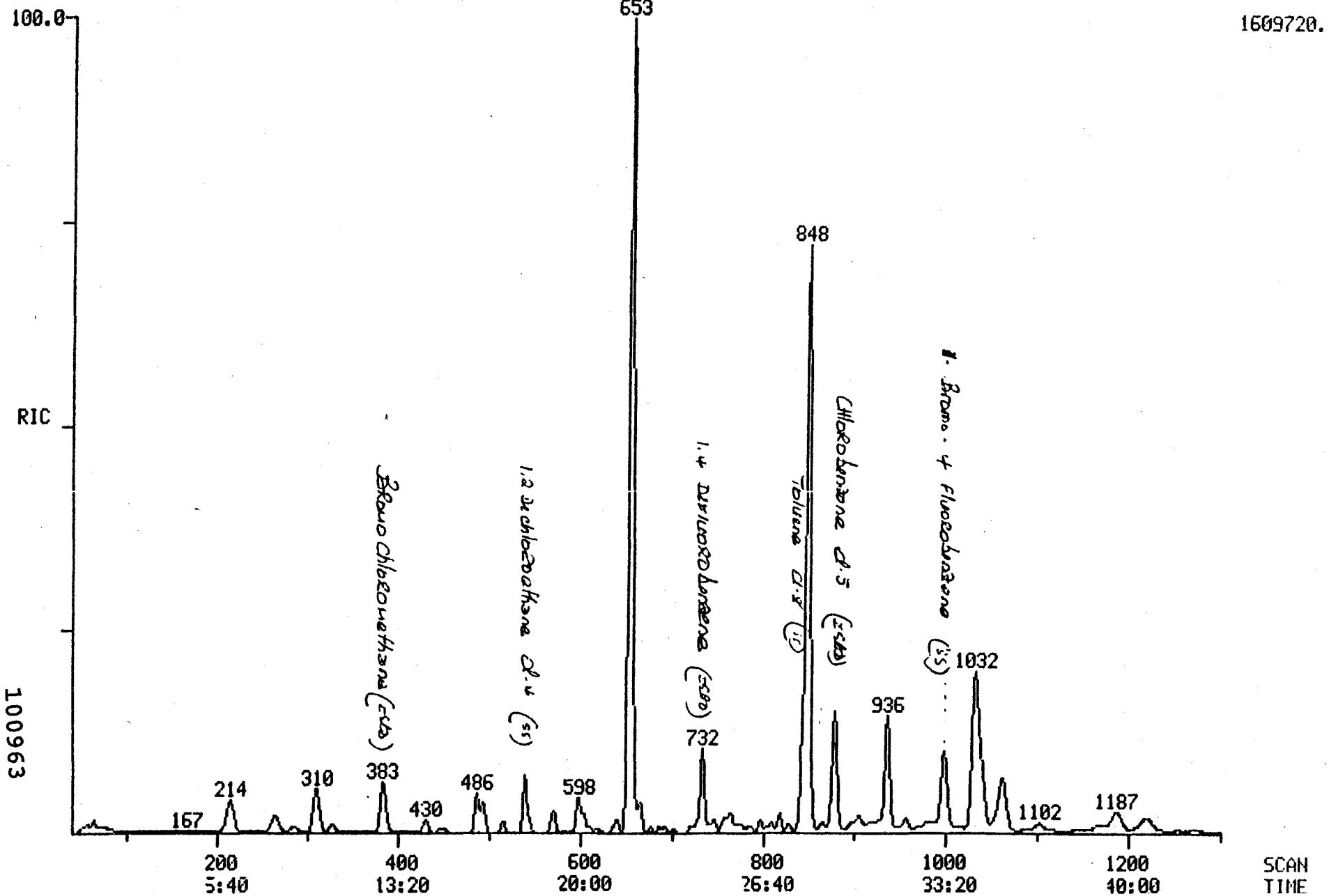
ADDITIONAL INORGANIC PARAMETERS

PARAMETER	REFERENCE 1	REFERENCE 2
BROMIDE	320.1	
COLOR	110.2	
CONDUCTANCE	120.1	
CONDUCTANCE		9050
ODOR	140.1	
pH	150.1	
pH		9040
TDS	160.2	
TSS	160.2	
TS	160.3	
HARDNESS	130.1	
TEMPERATURE	170.1	
TURBIDITY	180.1	
ACIDITY	305.1	
ALKALINITY	310.1	
AMMONIA	350.2,.3	
CHLORIDE	325.3	
CHLORIDE		9252
RESIDUAL CHLORINE	330.2	
COD	410.3,405.1	
CYANIDE	335.3	
OIL AND GREASE	413.1,.2	
OIL AND GREASE		9070
FLUORIDE	340.2	
TKN	351.2	
NO2/NO3	353.2	
D.O.	360.2	
PETROLEUM-HYDROCARBONS (see reference 4)	418.1	
PHENOL	420.2	
PHOSPHORUS	365.1	
SILICA	370.1	
SULFATE	375.4,.2	
SULFIDE	376.1	
SURFACTANTS	425.1	
TOC	415.1	

REFERENCES:

(1) - 600 / 4-79-002 Methods for Chemical Analysis of Water and Waste
(1a) - 600 / 4-79-002 Methods for Chemical Analysis of Water and Waste As modified by the EPA CLP Statement of Work 787
(2) - SW 846 Test Methods for Evaluating Solid Waste
(2a) - SW 846 Test Methods for Evaluating Solid Waste As modified by the EPA CLP Statement of Work 787
(3) - 40 CFR Part 136, VOL. 49, No. 209 Test Parameters for the Analysis of Pollutants
(4) - as modified by NJDEP - BISE (for non aqueous samples)
(5) Federal Register Vol 51 No. 216 Friday 11/7/86 p.40643 - 40652

RIC DATA: C7610 #1 SCANS 40 TO 1300
10/11/89 11:30:00 CALI: C7610 #2
SAMPLE: DIRECT ENVIRONMENTAL, 0-1,REC'D 10/04/89,N2644-005,LOGIN 2644
CONDS.: 20UL(4G/10MLS)INST:C
RANGE: G 1,1300 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3



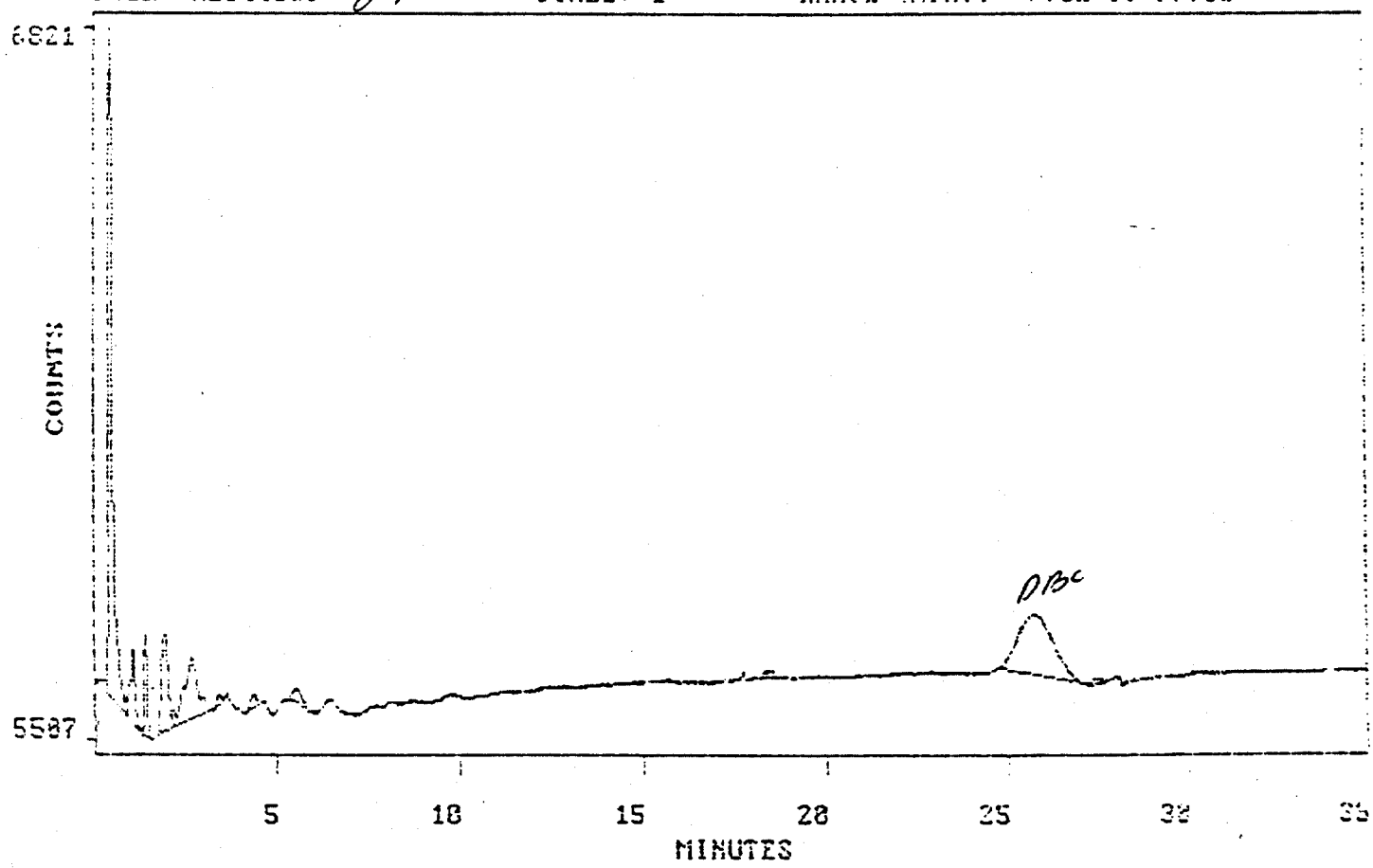
100963

RECONSTRUCT SCREEN DUMP
Data Acquisition

Time.12.04.41 Date:SAT 14 OCT 87

Time:11.27:37 Date:SAT 14 OCT 87
Method:A2

FILE: M2641835 0-1 SCALE: 1 RANGE (MIN.): 8.82 TO 35.00



100964

Channel #.....2 Time:12.33:20 Date.SAT 14 OCT 89
Run #2 of 6

Sample name.....DIRECT ENV 10/4-10/10/89
Data file.....D6:N2644005
Method name.....A2

Author.....METHOD 608 /// 80801 JCR
Instrument.....TRACOR 222 w.ECD
Column.... ....1.5%SP2250/1.95%SP2401 on 100/120 sup.
Notes.....
2UL 10M/50ML N2644004 IS BLANK

Run time.....35.00 min. Delay time...0.00 min.
Acq. time.....11:27:37 Acq. date....SAT 14 OCT 89
Start FW.....10.00 sec. End FW.....40.00 sec.
Slope sens.....1.75 uv/sec.

Area reject....100
peaks found..12

AREA PERCENT REPORT

Peak	R.T.(min)	R/S	Peak name	Area %	Area	Peak Ht.	SL
1	0.462			36.780	9459	1240	BV
2	1.039			5.070	1304	137	VB
3	1.414			4.188	1077	187	BB
4	1.925			8.768	2255	186	BB
5	2.172			0.727	187	27	BV
6	2.675			10.716	2756	112	VB
7	3.425			0.774	199	20	BB
8	4.333			0.995	256	23	BB
9	5.492			1.672	430	24	BB
10	18.567			0.918	236	14	BB
11	25.738			28.750	7394	109	BB
12	27.438			0.642	165	10	BB
TOTALS				100.000	25718		

100965

ORGANICS ANALYSIS DATA SHEET

SAMPLE NUMBER:0-2

Contractor: NYTEST ENVIRONMENTAL INC.
Lab Sample ID No:2644006
Sample Matrix:Oil
Data Release Authorized By:

Project No:89-16154
Date Sample Received:10/4/89

VOLATILE COMPOUNDS

Concentration: Low Medium (Circle One)
Date Extracted/Prepared: NA
Date Analyzed:10/11/89
Conc/Dil Factor: 625
Percent Moisture Not Decanted:

CAS Number		ug/kg
74-87-3	Chloromethane	6250.0 U
74-83-9	Bromomethane	6250.0 U
75-01-4	Vinyl Chloride	6250.0 U
75-00-3	Chloroethane	6250.0 U
75-09-2	Methylene Chloride	3125.0 U
67-64-1	Acetone	3900.0 B
75-15-0	Carbon Disulfide	3125.0 U
75-35-4	1,1-Dichloroethene	3125.0 U
75-34-3	1,1-Dichloroethane	3125.0 U
540-59-0	Total-1,2-Dichloroethene	3125.0 U
67-66-3	Chloroform	3125.0 U
107-06-2	1,2-Dichloroethane	3125.0 U
78-93-3	2-Butanone	6250.0 U
71-55-6	1,1,1-Trichloroethane	3125.0 U
56-23-5	Carbon Tetrachloride	3125.0 U
108-05-4	Vinyl Acetate	6250.0 U
75-27-4	Bromodichloromethane	3125.0 U

CAS Number		ug/kg
79-34-5	1,1,2,2-Tetrachloroethane	3125.0 U
78-87-5	1,2-Dichloropropane	3125.0 U
10061-02-6	Trans-1,3-Dichloropropene	3125.0 U
79-01-6	Trichloroethene	3125.0 U
124-48-1	Dibromochloromethane	3125.0 U
79-00-5	1,1,2-Trichloroethane	3125.0 U
71-43-2	Benzene	3125.0 U
10061-01-5	cis-1,3-Dichloropropene	3125.0 U
110-75-8	2-Chloroethylvinylether	6250.0 U
75-25-2	Bromoform	3125.0 U
591-78-6	2-Hexanone	6250.0 U
108-10-1	4-Methyl-2-Pentanone	6250.0 U
127-18-4	Tetrachloroethene	3125.0 U
108-88-3	Toluene	2500.0
108-90-7	Chlorobenzene	3125.0 U
100-41-4	Ethylbenzene	5500.0
100-42-5	Styrene	3125.0 U
	Total Xylenes	30000.0
	Total Dichlorobenzene	18750.0 U

Data Reporting Qualifiers

For reporting results to EPA, the following results qualifiers are used. Additional flags or footnotes explaining results are encouraged. However, the definition of each flag must be explicit.

VALUE If the result is a value greater than or equal to the detection limit, report the value.

U Indicates compound was analyzed for but not detected. Report the minimum detection limit for the sample with the U (e.g. 10U), based on necessary concentration dilution actions. (This is not necessarily the instrument detection limit.) The footnote should read U-Compound was analyzed for but not detected. The number is the minimum attainable detection limit for the sample.

J Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed or when the mass spectral data indicates the presence of a compound that meets the identification criteria but the result is less than the specified detection limit

C This flag applies to pesticide parameters where the identification h been confirmed by GC/MS Single component pesticides greater than or equal to 10 ug/l in the final extract should be confirmed by GC/MS.

B This flag is used when the analyte is found in the blank as well as sample. It indicates possible/probable blank contamination and warn the data user to take appropriate action.

Other specific flags and footnotes may be required to properly defi the results. If used, they must be fully described and such descri tion attached to the data summary report.

100966

nytest environmental inc.

ORGANICS ANALYSIS DATA SHEET

SAMPLE NUMBER: O-2
Lab Sample ID No.:2664006

Contractor: NYTEST ENVIRONMENTAL INC.
Project No: 89-16154

Tentatively Identified Compounds

CAS Number	Compound Name	Fraction	RT or Scan Number	Estimated Concentration (ug/l or ug/Kg)
1	Unknown Alcohol	VOA	31:12	12000 J
2	Unknown Alkene	VOA	33:50	6600 J
3	Unknown Alkene	VOA	36:18	19000 J
4	Unknown Aromatic	VOA	36:46	16000 J
5	Unknown Aromatic	VOA	37:56	5600 J
6	Unknown Aromatic	VOA	39:32	19000 J
7	Unknown Aromatic	VOA	40:06	38000 J
8	Unknown Aromatic	VOA	42:28	4100 J
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				

ORGANICS ANALYSIS DATA SHEET

SAMPLE NUMBER:O-2
(2644006)

Contractor: NYTEST ENVIRONMENTAL INC.
Project No:89-16154

PESTICIDE/PCBs

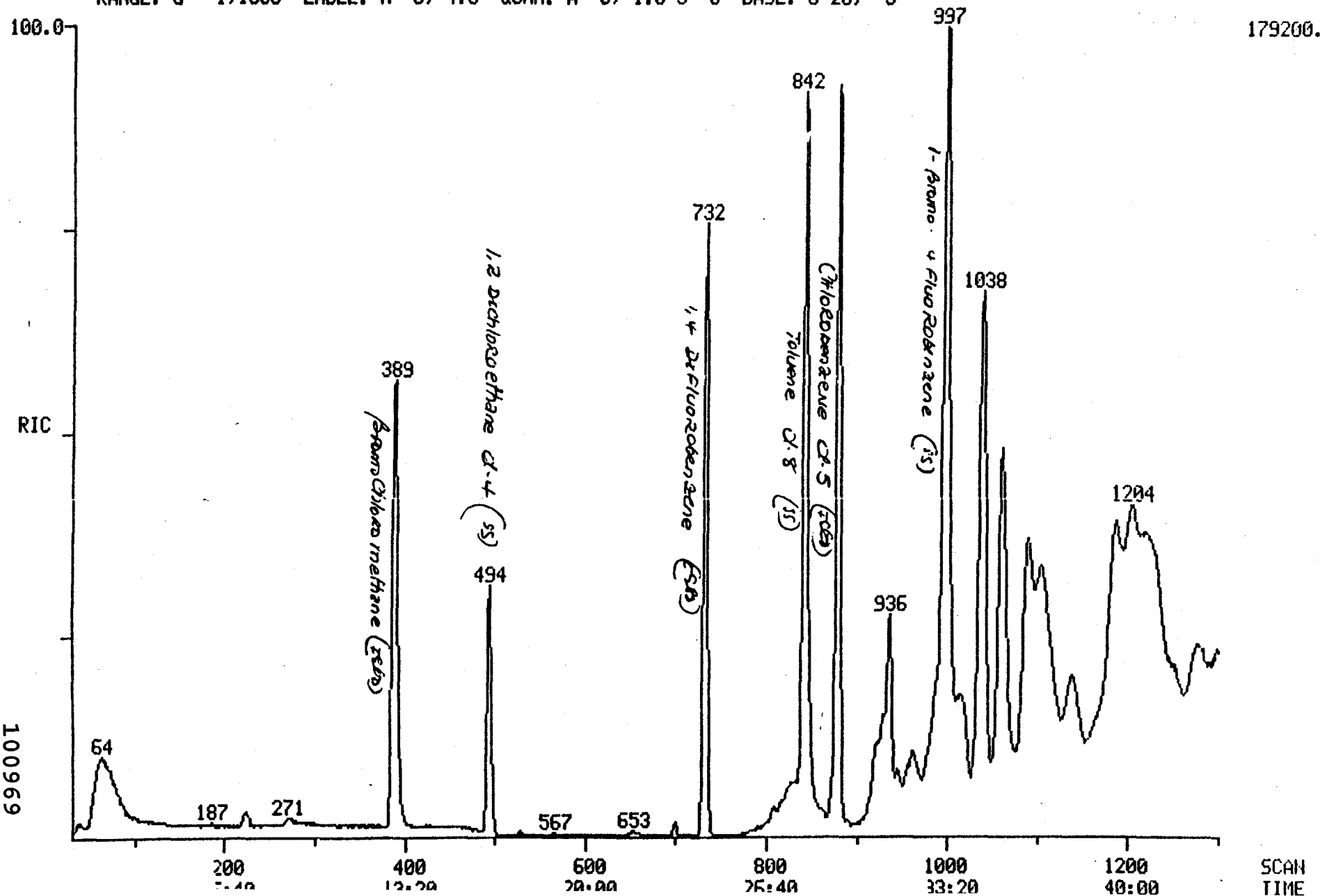
Concentration: Low Medium (Circle One)
Date Extracted/Prepared:10/10/89
Date Analyzed:10/14/89
Conc/Dil Factor: 1
Percent Moisture not decanted: 0

GPC Cleanup__Yes _X_ No
Separatory Funnel Extraction __ Yes
Continuous Liquid-liquid Extraction __Yes

1

CAS Number		ug/l or ug/Kg (Circle One)
12674-11-2	Aroclor-1016	1200.00 U
11104-28-2	Aroclor-1221	1200.00 U
11141-16-5	Aroclor-1232	1200.00 U
53469-21-9	Aroclor-1242	1200.00 U
12672-29-6	Aroclor-1248	1200.00 U
11097-69-1	Aroclor-1254	2400.00 U
11096-82-5	Aroclor-1260	2400.00 U

RIC DATA: C7611 #1 SCANS 30 TO 1300
10/11/89 12:55:00 CALI: C7611 #2
SAMPLE: DIRECT ENVIRONMENTAL,0-2/N2644-006, REC'D 10/4/89,LOGIN 2644
CONDS.: 4G/10ML MEOH,20UL/5ML,INST:C
RANGE: G 1,1300 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3

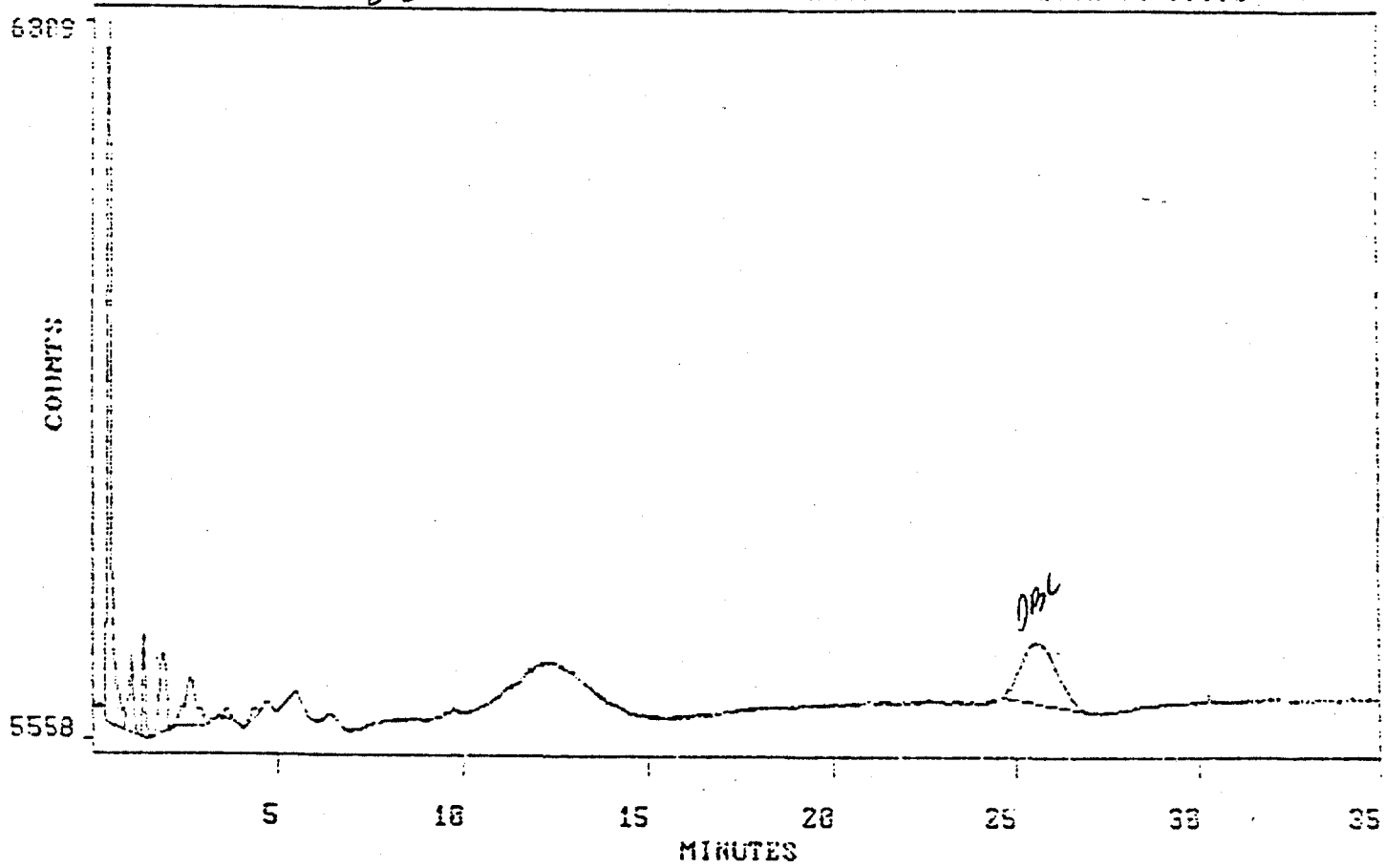


RECONSTRUCT SCREEN DUMP
Data Acquisition

Time:12:49:02 Date:SAT 14 OCT 89

Time:12:04.03 Date:SAT 14 OCT 89
Method:A2

FILE: N2644888 0-2 SCALE: 1 RANGE (MIN.): 0.82 TO 35.00



100970

Channel #.....2 Time.12.40:59 Date.SAT 14 OCT 89
Run #3 of 6

Sample name.....DIRECT ENV 10/4-10/10/89
Data file.....D6:N2644006
Method name.....A2

Author.....METHOD 608 /// 80801 JCR
Instrument.....TRACOR 222 w.ECD
Column.....1.5%SP2250/1.95%SP2401 on 100/120 sup.
Notes.....
2UL 1GM/50ML N2644004 IS BLANK

Run time.....35.00 min. Delay time...0.00 min.
Acq. time.....12:04:03 Acq. date....SAT 14 OCT 89
Start PW.....10.00 sec. End PW.....40.00 sec.
Slope sens.....1.75 uv/sec.

Area reject....100
peaks found..8

AREA PERCENT REPORT

Peak	R.T.(min)	R/S	Peak name	Area %	Area	Peak Ht.	BL
1	0.458			40.082	9190	1235	BV
2	1.026			5.282	1211	131	VB
3	1.402			4.645	1065	187	BB
4	1.903			7.092	1626	139	BB
5	2.655			8.618	1976	88	BB
6	3.633			0.824	189	18	BB
7	4.369			1.008	231	17	BB
8	25.592			32.449	7440	107	BB
TOTALS				100.000	22928		

100971

ORGANICS ANALYSIS DATA SHEET

SAMPLE NUMBER:O-3

Contractor: NYTEST ENVIRONMENTAL INC.
Lab Sample ID No:2644007
Sample Matrix:Oil
Data Release Authorized By:

Project No:89-16154
Date Sample Received:10/4/89

VOLATILE COMPOUNDS

Concentration: Low Medium (Circle One)
Date Extracted/Prepared: NA
Date Analyzed:10/11/89
Conc/Dil Factor: 1250
Percent Moisture Not Decanted:

CAS Number		ug/kg
74-87-3	Chloromethane	12500.0 U
74-83-9	Bromomethane	12500.0 U
75-01-4	Vinyl Chloride	12500.0 U
75-00-3	Chloroethane	12500.0 U
75-09-2	Methylene Chloride	6250.0 U
67-64-1	Acetone	12500.0 U
75-15-0	Carbon Disulfide	6250.0 U
75-35-4	1,1-Dichloroethene	6250.0 U
75-34-3	1,1-Dichloroethane	6250.0 U
540-59-0	Total-1,2-Dichloroethene	6250.0 U
67-66-3	Chloroform	6250.0 U
107-06-2	1,2-Dichloroethane	6250.0 U
78-93-3	2-Butanone	12500.0 U
71-55-6	1,1,1-Trichloroethane	6250.0 U
56-23-5	Carbon Tetrachloride	6250.0 U
108-05-4	Vinyl Acetate	12500.0 U
75-27-4	Bromodichloromethane	6250.0 U

CAS Number		ug/kg
79-34-5	1,1,2,2-Tetrachloroethane	6250.0 U
78-87-5	1,2-Dichloropropane	6250.0 U
10061-02-6	Trans-1,3-Dichloropropene	6250.0 U
79-01-6	Trichloroethene	21000.0
124-48-1	Dibromochloromethane	6250.0 U
79-00-5	1,1,2-Trichloroethane	6250.0 U
71-43-2	Benzene	7800.0
10061-01-5	cis-1,3-Dichloropropene	6250.0 U
110-75-8	2-Chloroethylvinylether	12500.0 U
75-25-2	Bromoform	6250.0 U
591-78-6	2-Hexanone	12500.0 U
108-10-1	4-Methyl-2-Pentanone	12500.0 U
127-18-4	Tetrachloroethene	6250.0 U
108-88-3	Toluene	41000.0
108-90-7	Chlorobenzene	6250.0 U
100-41-4	Ethylbenzene	120000.0
100-42-5	Styrene	3125.0 U
	Total Xylenes	1100000.0
	Total Dichlorobenzene	37500.0 U

Data Reporting Qualifiers

For reporting results to EPA, the following results qualifiers are used. Additional flags or footnotes explaining results are encouraged. However, the definition of each flag must be explicit.

VALUE If the result is a value greater than or equal to the detection limit, report the value.

U Indicates compound was analyzed for but not detected. Report the minimum detection limit for the sample with the U (e.g. 10U), based on necessary concentration dilution actions. (This is not necessarily the instrument detection limit.) The footnote should read U-Compound was analyzed for but not detected. The number is the minimum attainable detection limit for the sample.

J Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed or when the mass spectral data indicates the presence of a compound that meets the identification criteria but the result is less than the specified detection limit but greater than zero (e.g. 10J).

C This flag applies to pesticide parameters where the identification has been confirmed by GC/MS Single component pesticides greater than or equal to 10 ug/l in the final extract should be confirmed by GC/MS.

B This flag is used when the analyte is found in the blank as well as a sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

Other specific flags and footnotes may be required to properly define the results. If used, they must be fully described and such description attached to the data summary report.

nytest environmental inc.

ORGANICS ANALYSIS DATA SHEET

SAMPLE NUMBER: O-3
Lab Sample ID No.:2664007

Contractor: NYTEST ENVIRONMENTAL INC.
Project No: 89-16154

Tentatively Identified Compounds

	CAS Number	Compound Name	Fraction	RT or Scan Number	Estimated Concentration (ug/l or ug/Kg)
1		Unknown Hydrocarbon	VOA	26:06	15000 J
2		Unknown Alcohol	VOA	26:18	22000 J
3		Unknown	VOA	30.42	320000 J
4		Unknown Alkene	VOA	30.58	54000 J
5		Unknown	VOA	31:28	69000 J
6		Unknown Hydrocarbon	VOA	32:02	120000 J
7		Unknown Hydrocarbon	VOA	32:54	52000 J
8		Unknown Hydrocarbon	VOA	33:48	160000 J
9		Unknown Hydrocarbon	VOA	35:44	70000 J
10		Unknown Hydrocarbon	VOA	36:20	1100000 J
11		Unknown Hydrocarbon	VOA	37:08	350000 J
12		Unknown Hydrocarbon	VOA	38:02	630000 J
13		Unknown Hydrocarbon	VOA	39:30	870000 J
14		Unknown Hydrocarbon	VOA	40:54	2500000 J
15		Unknown Hydrocarbon	VOA	42:34	400000 J
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					

ORGANICS ANALYSIS DATA SHEET

SAMPLE NUMBER:0-3
(2644007)

Contractor: NYTEST ENVIRONMENTAL INC.
Project No:89-16154

PESTICIDE/PCBs

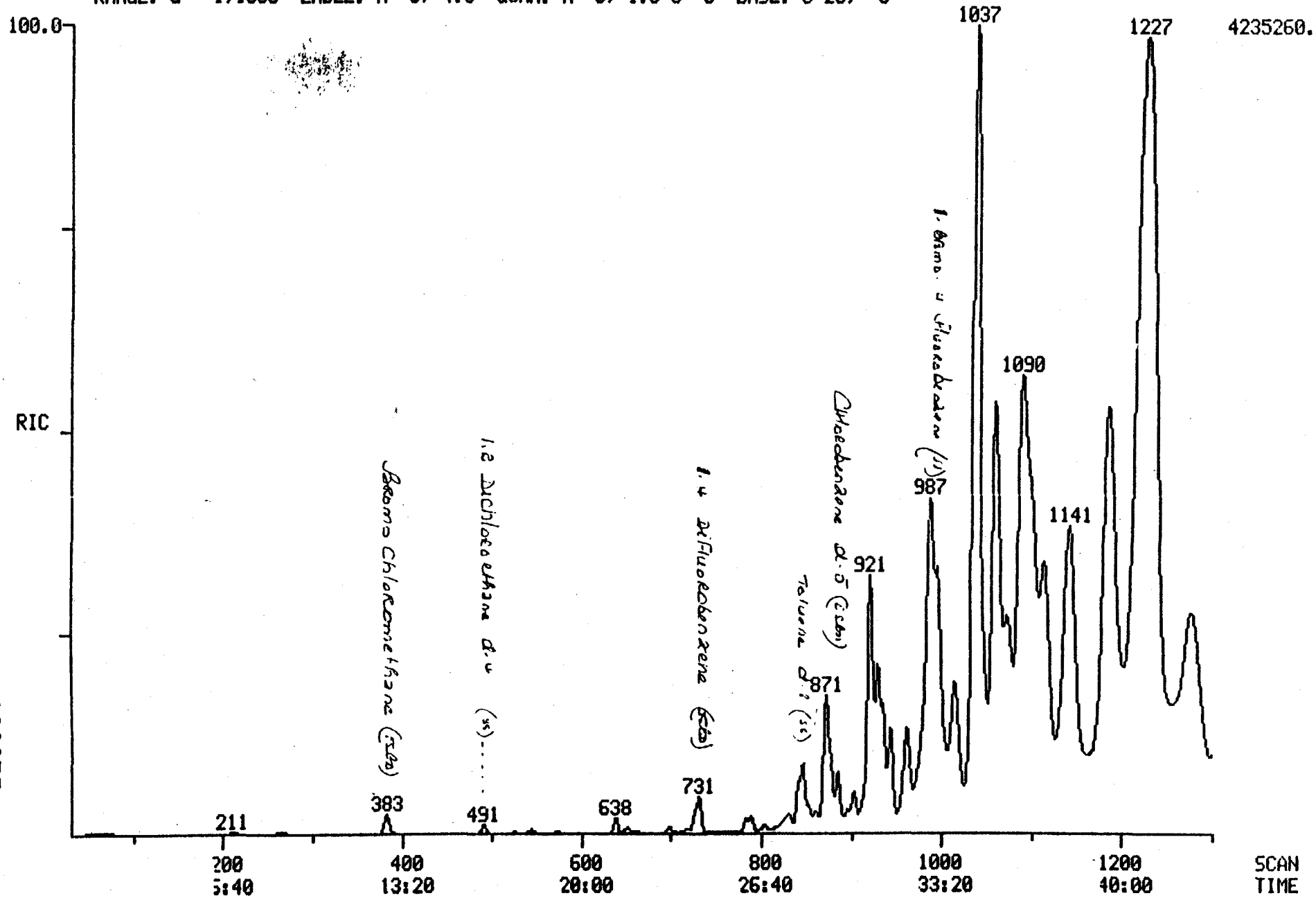
Concentration: Low Medium (Circle One)
Date Extracted/Prepared:10/10/89
Date Analyzed:10/14/89
Conc/Dil Factor: 1
Percent Moisture not decanted: 0

GPC Cleanup__Yes _X_ No
Separatory Funnel Extraction __ Yes
Continuous Liquid-liquid Extraction __Yes

1

CAS Number		ug/l or ug/Kg (Circle One)
12674-11-2	Aroclor-1016	1200.00 U
11104-28-2	Aroclor-1221	1200.00 U
11141-16-5	Aroclor-1232	1200.00 U
53469-21-9	Aroclor-1242	1200.00 U
12672-29-6	Aroclor-1248	81000000.00
11097-69-1	Aroclor-1254	2400.00 U
11096-82-5	Aroclor-1260	2400.00 U

RIC DATA: C7612 #1 SCANS 30 TO 1300
10/11/89 14:48:00 CALI: C7612 #2
SAMPLE: DIRECT ENVIRONMENTAL,0-3/N2644-007,REC'D 10/4/89, LOGIN 2644
CONDS.: 4G/10ML MEOH,10UL/5ML,INST:C
RANGE: G 1,1300 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3



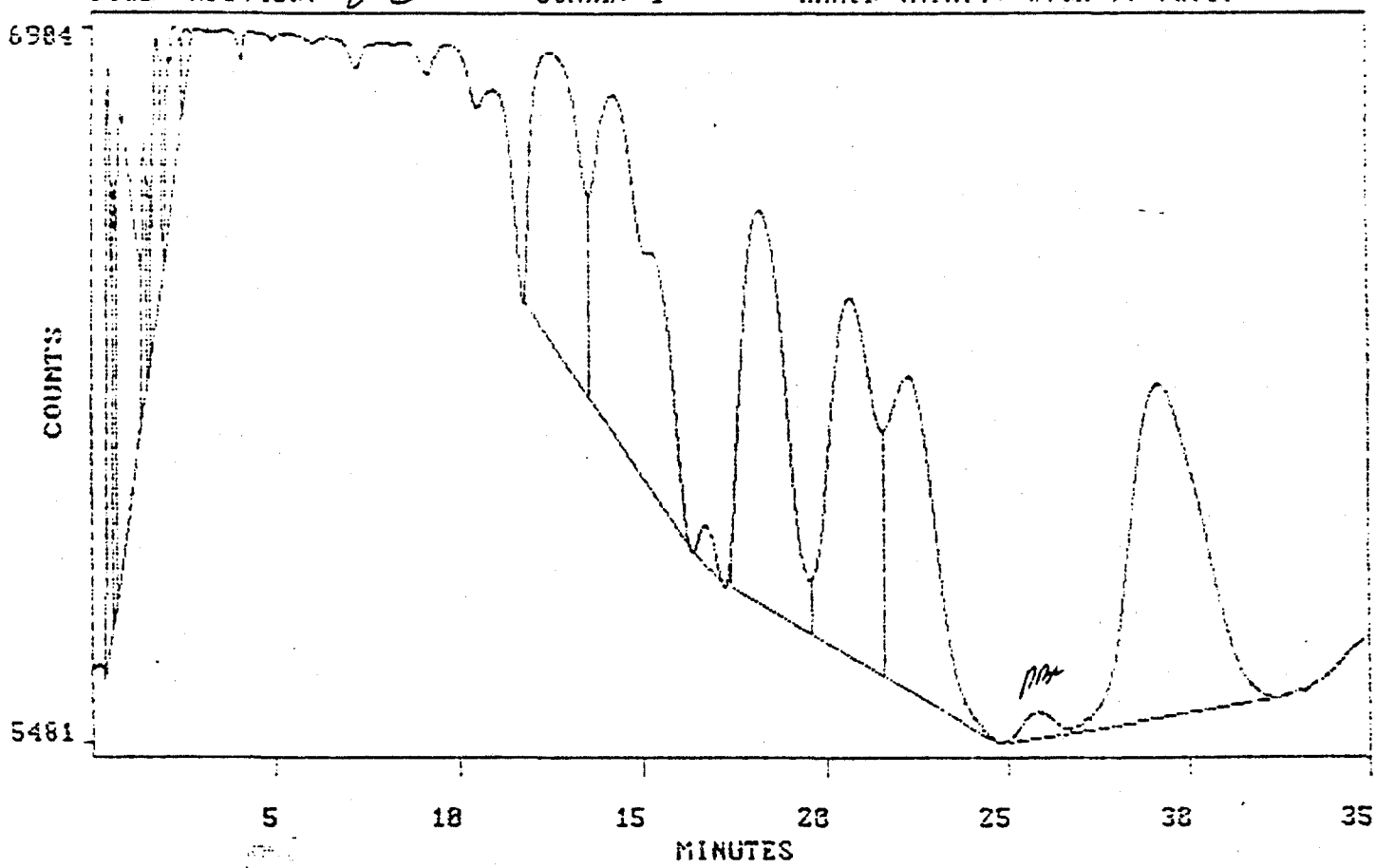
100975

RECONSTRUCT SCREEN DUMP
Data Acquisition

Time:13:23:53 Date:SAT 14 OCT 87

Time:12:46:32 Date:SAT 14 OCT 87
Method:A2

FILE: M2644887 0-3 SCALE: 1 RANGE (MIN.): 0.92 TO 35.00



100976

Channel #.....2 Time.13.22.14 Date.SAT 14 OCT 89
Run #4 of 6

Sample name.....DIRECT ENV 10/4-10/10/89
Data file.....D6:N2644007
Method name.....A2

Author.....METHOD 608 /// 80801 JCR
Instrument.....TRACOR 222 W.ECD
Column.....1.5%SP2250/1.95%SP2401 on 100/120 sup.
Notes.....
2UL 1GM/50ML N2644004 IS BLANK

Run time.....35.00 min. Delay time...0.00 min.
Acq. time.....12:46:32 Acq. date....SAT 14 OCT 89
Start PW.....10.00 sec. End PW.....40.00 sec.
Slope sens.....1.75 uv/sec.

Area reject....100
peaks found..16

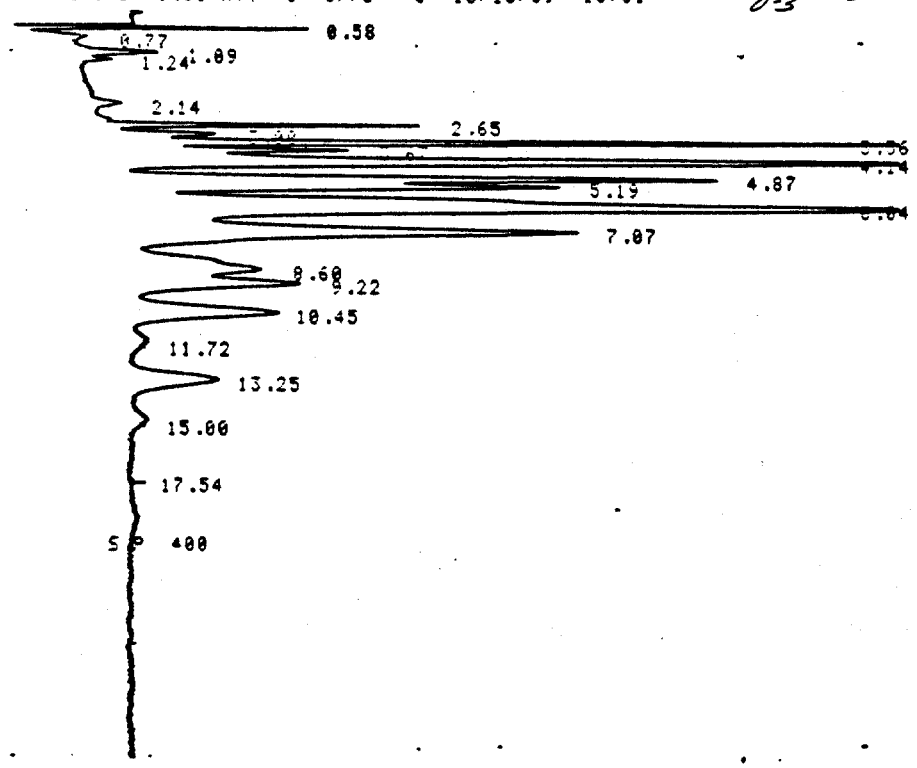
AREA PERCENT REPORT

Peak	R.T.(min)	R/S	Peak name	Area %	Area	Peak Ht.	BL
1	0.459			1.942	9100	1184	BV
2	0.590			1.075	5036	892	VV
3	0.775			6.015	28181	923	VV
4	1.465			0.951	4457	514	VV
5	1.581			0.467	2189	379	VV
6	1.783			1.612	7550	556	VB
7	2.258			1.762	8255	316	BV
8	2.592			0.372	1745	112	VB
9	12.506			11.115	52073	573	BV
10	14.250			16.084	75331	675	VB
11	16.750			0.441	2067	76	BB
12	18.250			13.382	62690	780	BV
13	20.700			13.005	60925	713	VV
14	22.328			11.655	54599	626	VB
15	25.850			0.643	3012	51	BV
16	29.242			19.477	91246	664	VB
TOTALS				100.000	468476		

100977

5.J DIRECT ENVIRONMENTAL N2644-007 (1:1200ml) 10/4-10/18/89 15m 5ml

CH. 2 C.S 5.00 ATT 0 OFFS 0 10/18/89 10:01 0-3



TEMP ISO 200
1.5%SP2250/1.95%SP2401
6FT 4MM
TRACOR 222 ECD

D-2000 10/18/89 10:01

SAMPLE: TAG: 45 CH: 2

FILE: 1 CALC-METHOD: AREA% TABLE: 0 CONC: AREA

NO.	RT	AREA	HEIGHT	RRT	BC	NAME
1	0.58	1495	393	0.58	BV	
2	0.77	327	45	0.77	TBB	
3	1.09	651	96	1.09	BV	
4	1.24	77	29	1.24	TBB	
5	2.14	193	33	2.14	BB	
6	2.65	3772	389	2.65	BV	
7	3.00	922	93	3.00	TBB	
8	3.36	9888	1012	3.36	VV	
9	3.67	3185	298	3.67	VV	
10	4.14	10318	1027	4.14	VB	
11	4.87	10301	716	4.87	BV	
12	5.19	7417	504	5.19	VV	
13	6.04	25372	944	6.04	VB	
14	7.07	11968	486	7.07	BB	
15	8.60	2828	85	8.60	BB	
16	9.22	2921	141	9.22	BB	
17	10.45	5506	176	10.45	BB	
18	11.72	149	12	11.72	BB	
19	13.25	2677	88	13.25	BB	
20	15.00	284	14	15.00	PB	
TOTAL		108258	6571			

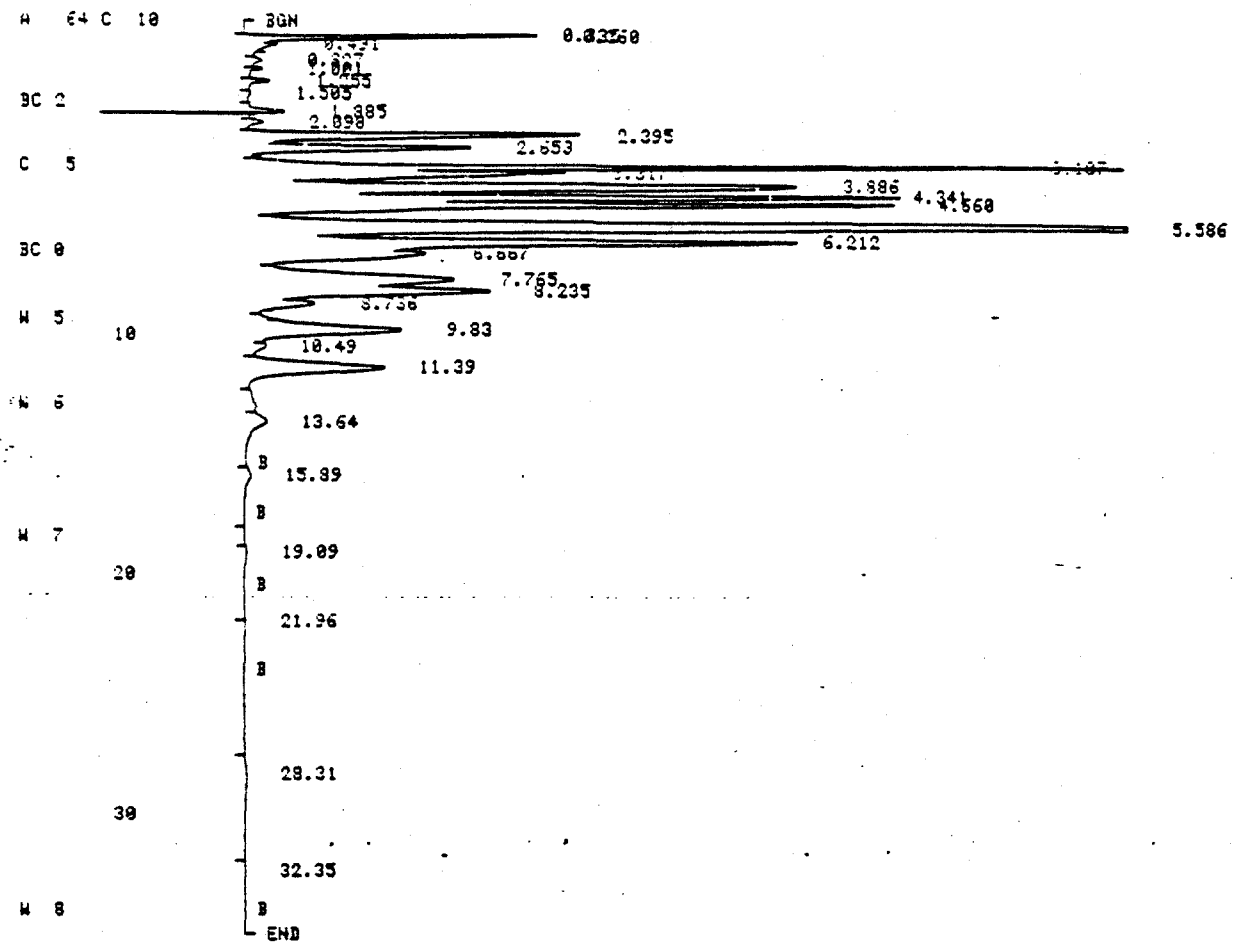
PEAK REJ : 0

100978

1W DIRECT ENVIRONMENTAL N2644-007 (1.00mL) 10/4/89 10/11/89 11K 0-3
SUM1

RUN 21 9:58 89/10/18

METHOD 1 MODIFIED



RUN 21 9:58 89/10/18

METHOD 1 MODIFIED CALCULATION: %

RT	AREA	BC	AREA %
0.335	3.6955	T	0.3117
0.360	19.2338	T	1.6225
0.491	0.7006	TS	0.0591
0.827	0.7846	TS	0.0661
1.001	0.4792	TS	0.0404
1.255	1.0025	TS	0.0845
1.505	0.2074	TS	0.0174
1.885	2.5781	TS	0.2174
2.098	1.0999	TS	0.0927
2.395	28.1314	T	2.3731
2.653	19.1773	T	1.6178
3.107	95.2303	T	8.0336
3.317	64.9984	T	5.4832
3.886	132.4514	T	11.1736
4.341	103.4848	T	8.7299
4.660	113.5661	T	9.5804
5.586	266.2563	T	22.4614
6.212	155.5245	T	13.1200
6.667	17.0585	VS	1.4390
7.765	26.4196	V	2.2287
8.235	28.8674	V	2.4352
8.736	6.6068	V	0.5573
9.83	37.5320	V	3.1662
10.49	1.5090	V	0.1273
11.39	45.8260	V	3.8658
11.64	4.2466	[illegible]	0.3581
15.89	2.3409		0.1974
19.09	1.4787		0.1247
21.96	0.6852		0.0578
28.31	3.7504	V	0.3163
32.35	0.4690		0.0395

31 PEAKS > AREA/HT REJECT

100979

ORGANICS ANALYSIS DATA SHEET

SAMPLE NUMBER:O-4

Contractor: NYTEST ENVIRONMENTAL INC.
Lab Sample ID No:2644008
Sample Matrix:Oil
Data Release Authorized By:

Project No:89-16154
Date Sample Received:10/4/89

VOLATILE COMPOUNDS

Concentration: Low Medium (Circle One)
Date Extracted/Prepared: NA
Date Analyzed:10/11/89
Conc/Dil Factor: 312.5
Percent Moisture Not Decanted:

CAS Number		ug/kg
74-87-3	Chloromethane	3125.0 U
74-83-9	Bromomethane	3125.0 U
75-01-4	Vinyl Chloride	3125.0 U
75-00-3	Chloroethane	3125.0 U
75-09-2	Methylene Chloride	1563.0 U
67-64-1	Acetone	3125.0 U
75-15-0	Carbon Disulfide	1563.0 U
75-35-4	1,1-Dichloroethene	1563.0 U
75-34-3	1,1-Dichloroethane	1563.0 U
540-59-0	Total-1,2-Dichloroethene	1563.0 U
67-66-3	Chloroform	1563.0 U
107-06-2	1,2-Dichloroethane	1563.0 U
78-93-3	2-Butanone	3125.0 U
71-55-6	1,1,1-Trichloroethane	1563.0 U
56-23-5	Carbon Tetrachloride	1563.0 U
108-05-4	Vinyl Acetate	3125.0 U
75-27-4	Bromodichloromethane	1563.0 U

CAS Number		ug/kg
79-34-5	1,1,2,2-Tetrachloroethane	1563.0 U
78-87-5	1,2-Dichloropropane	1563.0 U
10061-02-6	Trans-1,3-Dichloropropene	1563.0 U
79-01-6	Trichloroethene	1563.0 U
124-48-1	Dibromochloromethane	1563.0 U
79-00-5	1,1,2-Trichloroethane	1563.0 U
71-43-2	Benzene	1200.0
10061-01-5	cis-1,3-Dichloropropene	1563.0 U
110-75-8	2-Chloroethylvinylether	3125.0 U
75-25-2	Bromoform	1563.0 U
591-78-6	2-Hexanone	3125.0 U
108-10-1	4-Methyl-2-Pentanone	3125.0 U
127-18-4	Tetrachloroethene	1563.0 U
108-88-3	Toluene	7700.0
108-90-7	Chlorobenzene	1563.0 U
100-41-4	Ethylbenzene	2300.0
100-42-5	Styrene	3125.0 U
	Total Xylenes	11400.0
	Total Dichlorobenzene	9375.0 U

Data Reporting Qualifiers

For reporting results to EPA, the following results qualifiers are used. Additional flags or footnotes explaining results are encouraged. However, the definition of each flag must be explicit.

VALUE If the result is a value greater than or equal to the detection limit, report the value.

U Indicates compound was analyzed for but not detected. Report the minimum detection limit for the sample with the U (e.g. 10U), based on necessary concentration dilution actions. (This is not necessarily the instrument detection limit.) The footnote should read U-Compound was analyzed for but not detected. The number is the minimum attainable detection limit for the sample.

J Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed or when the mass spectral data indicates the presence of a compound that meets the identification criteria but the result is less than the specified detection limit but greater than zero (e.g. 10J).

C This flag applies to pesticide parameters where the identification ha been confirmed by GC/MS Single component pesticides greater than or equal to 10 ug/l in the final extract should be confirmed by GC/MS.

B This flag is used when the analyte is found in the blank as well as a sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

Other specific flags and footnotes may be required to properly defin the results. If used, they must be fully described and such descrip tion attached to the data summary report.

nytest environmental inc

ORGANICS ANALYSIS DATA SHEET

Contractor: NYTEST ENVIRONMENTAL INC.
Project No: 89-16154

SAMPLE NUMBER: O-4
Lab Sample ID No.:2644008

Tentatively Identified Compounds

CAS Number	Compound Name	Fraction	RT or Scan Number	Estimated Concentration (ug/l or ug/Kg)
1	Unknown	VOA	8:56	2200 J
2	Unknown	VOA	33:58	4000 J
3	Unknown	VOA	36.16	12000 J
4	Unknown	VOA	36:50	7900 J
5	Unknown Alkene	VOA	37:54	29000 J
6	Unknown Aromatic	VOA	39:30	1600 J
7	Unknown Aromatic	VOA	40:34	22000 J
8	Unknown	VOA	42:28	7900 J
9				
10				
11				
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ORGANICS ANALYSIS DATA SHEET

SAMPLE NUMBER:O-4
(2644008)

Contractor: NYTEST ENVIRONMENTAL INC.
Project No:89-16154

PESTICIDE/PCBs

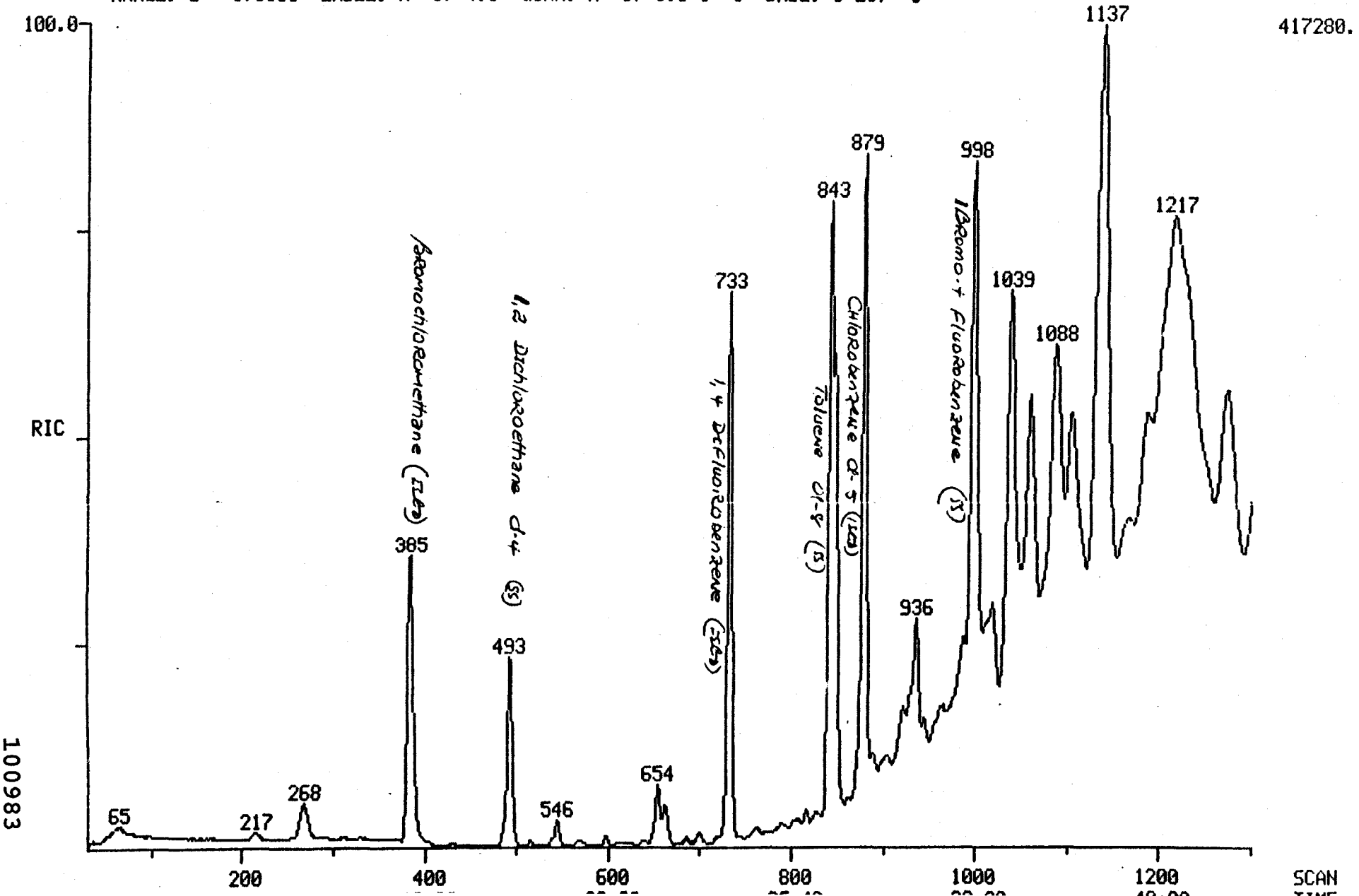
Concentration: Low Medium (Circle One)
Date Extracted/Prepared:10/10/89
Date Analyzed:10/14/89
Conc/Dil Factor: 1
Percent Moisture not decanted: 0

GPC Cleanup__Yes _X_ No
Separatory Funnel Extraction __ Yes
Continuous Liquid-liquid Extraction __Yes

1

CAS Number		ug/l or ug/Kg (Circle One)
12674-11-2	Aroclor-1016	1200.00 U
11104-28-2	Aroclor-1221	1200.00 U
11141-16-5	Aroclor-1232	1200.00 U
53469-21-9	Aroclor-1242	1200.00 U
12672-29-6	Aroclor-1248	1200.00 U
11097-69-1	Aroclor-1254	2400.00 U
11096-82-5	Aroclor-1260	2400.00 U

RIC DATA: C7613 #1 SCANS 30 TO 1300
10/11/89 16:49:00 CALI: C7613 #2
SAMPLE: DIRECT ENVIRONMENTAL,0-4/N2644-008,REC'D 10/4/89
CONDS.: 4G/10MLS,40UL/5MLS,INST.C
RANGE: G 1,1300 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3



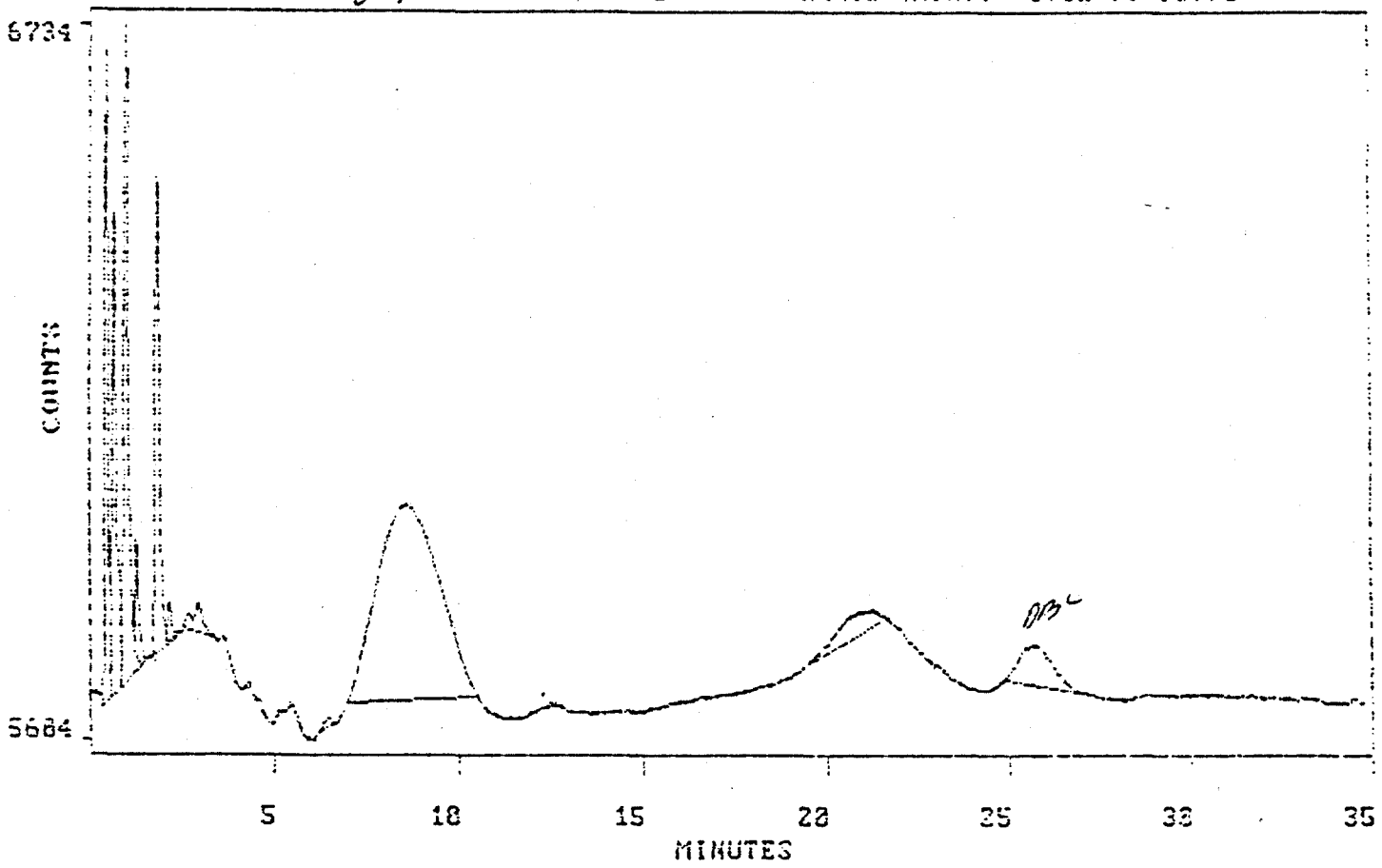
100983

RECONSTRUCT SCREEN DUMP
Data Acquisition

Time:14:00:51 Date:SAT 14 OCT 89

Time:13:23:07 Date:SAT 14 OCT 89
Method:A2

FILE: N2644808 0-4 SCALE: 1 RANGE (MIN.): 0.00 TO 35.00



100984

Channel #.....2 Time:13:58:50 Date:SAT 14 OCT 89
Run #5 of 6

Sample name.....DIRECT ENV 10/4-10/10/89
Data file.....D6:N2644008
Method name.....A2

Author.....METHOD 608 /// 80801 JCR
Instrument.....TRACOR 222 w.ECD
Column.....1.5%SP2250/1.95%SP2401 on 100/120 sup.
Notes.....
2UL 1GM/50ML N2644004 IS BLANK

Run time.....35.00 min. Delay time...0.00 min.
Acq. time.....13:23:07 Acq. date....SAT 14 OCT 89
Start FW.....10.00 sec. End FW.....40.00 sec.
Slope sens.....1.75 uv/sec.

Area reject....100
peaks found..12

AREA PERCENT REPORT

Peak	R.T.(min)	R/S	Peak name	Area %	Area	Peak Ht.	BL
1	0.461			7.866	5926	1038	BV
2	0.641			7.757	5844	786	VV
3	0.967			13.327	10040	1041	VB
4	1.285			1.858	1400	188	BB
5	1.835			8.442	6360	754	BB
6	2.152			0.601	453	62	BB
7	2.942			1.144	862	43	BB
8	4.300			0.327	246	12	BB
9	6.475			0.235	177	12	BB
10	8.592			48.881	36826	310	BB
11	21.283			3.768	2839	26	BB
12	25.725			5.794	4365	66	BB
TOTALS				100.000	75338		

100985

ORGANICS ANALYSIS DATA SHEET

SAMPLE NUMBER:O-5

Contractor: NYTEST ENVIRONMENTAL INC.
Lab Sample ID No:2644009
Sample Matrix:Oil
Data Release Authorized By:

Project No:89-16154
Date Sample Received:10/4/89

VOLATILE COMPOUNDS

Concentration: Low Medium (Circle One)
Date Extracted/Prepared: NA
Date Analyzed:10/11/89
Conc/Dil Factor: 1250
Percent Moisture Not Decanted:

CAS Number		ug/kg
74-87-3	Chloromethane	12500.0 U
74-83-9	Bromomethane	12500.0 U
75-01-4	Vinyl Chloride	12500.0 U
75-00-3	Chloroethane	12500.0 U
75-09-2	Methylene Chloride	6250.0 U
67-64-1	Acetone	12500.0 U
75-15-0	Carbon Disulfide	6250.0 U
75-35-4	1,1-Dichloroethene	6250.0 U
75-34-3	1,1-Dichloroethane	6250.0 U
540-59-0	Total-1,2-Dichloroethene	6250.0 U
67-66-3	Chloroform	6250.0 U
107-06-2	1,2-Dichloroethane	6250.0 U
78-93-3	2-Butanone	12500.0 U
71-55-6	1,1,1-Trichloroethane	6250.0 U
56-23-5	Carbon Tetrachloride	6250.0 U
108-05-4	Vinyl Acetate	12500.0 U
75-27-4	Bromodichloromethane	6250.0 U

CAS Number		ug/kg
79-34-5	1,1,2,2-Tetrachloroethane	6250.0 U
78-87-5	1,2-Dichloropropane	6250.0 U
10061-02-6	Trans-1,3-Dichloropropene	6250.0 U
79-01-6	Trichloroethene	23000.0
124-48-1	Dibromochloromethane	6250.0 U
79-00-5	1,1,2-Trichloroethane	6250.0 U
71-43-2	Benzene	9000.0
10061-01-5	cis-1,3-Dichloropropene	6250.0 U
110-75-8	2-Chloroethylvinylether	12500.0 U
75-25-2	Bromoform	6250.0 U
591-78-6	2-Hexanone	12500.0 U
108-10-1	4-Methyl-2-Pentanone	12500.0 U
127-18-4	Tetrachloroethene	6250.0 U
108-88-3	Toluene	48000.0
108-90-7	Chlorobenzene	6250.0 U
100-41-4	Ethylbenzene	130000.0
100-42-5	Styrene	3125.0 U
	Total Xylenes	1200000.0
	Total Dichlorobenzene	37500.0 U

Data Reporting Qualifiers

For reporting results to EPA, the following results qualifiers are used. Additional flags or footnotes explaining results are encouraged. However, the definition of each flag must be explicit.

VALUE If the result is a value greater than or equal to the detection limit, report the value.

U Indicates compound was analyzed for but not detected. Report the minimum detection limit for the sample with the U (e.g. 10U), based on necessary concentration dilution actions. (This is not necessarily the instrument detection limit.) The footnote should read U-Compound was analyzed for but not detected. The number is the minimum attainable detection limit for the sample.

J Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed or when the mass spectral data indicates the presence of a compound that meets the identification criteria but the result is less than the specified detection limit but greater than zero (e.g. 10J).

C This flag applies to pesticide parameters where the identification has been confirmed by GC/MS Single component pesticides greater than or equal to 10 ug/l in the final extract should be confirmed by GC/MS.

B This flag is used when the analyte is found in the blank as well as a sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

Other specific flags and footnotes may be required to properly define the results. If used, they must be fully described and such description attached to the data summary report.

nytest environmental inc.

ORGANICS ANALYSIS DATA SHEET

Contractor: NYTEST ENVIRONMENTAL INC.
Project No: 89-16154

SAMPLE NUMBER: O-5
Lab Sample ID No.:2644009

Tentatively Identified Compounds

CAS Number	Compound Name	Fraction	RT or Scan Number	Estimated Concentration (ug/l or ug/Kg)
1	Unknown Alkane	VOA	26.10	18000 J
2	Unknown Alcohol	VOA	26.22	170000 J
3	Unknown Alkane	VOA	29.32	13000 J
4	Unknown Alkane	VOA	30.44	93000 J
5	Unknown Alkane	VOA	31.00	53000 J
6	Unknown Alkane	VOA	31.30	21000 J
7	Unknown Aromatic	VOA	32.06	33000 J
8	Unknown	VOA	33.50	46000 J
9	Unknown	VOA	35.46	25000 J
10	Unknown Aromatic	VOA	36.22	270000 J
11	Unknown Alkane	VOA	37.08	92000 J
12	Unknown	VOA	38.02	170000 J
13	Unknown	VOA	39.30	180000 J
14	Unknown	VOA	40.54	570000 J
15	Unknown Alkane	VOA	42.32	100000 J
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ORGANICS ANALYSIS DATA SHEET

SAMPLE NUMBER:0-5
(2644009)

Contractor: NYTEST ENVIRONMENTAL INC.
Project No:89-16154

PESTICIDE/PCBs

Concentration: Low Medium (Circle One)
Date Extracted/Prepared:10/10/89
Date Analyzed:10/14/89
Conc/Dil Factor: 1
Percent Moisture not decanted: 0

GPC Cleanup__Yes _X_ No
Separatory Funnel Extraction __ Yes
Continuous Liquid-liquid Extraction __Yes

1

CAS Number		ug/l or ug/Kg (Circle One)
12674-11-2	Aroclor-1016	1200.00 U
11104-28-2	Aroclor-1221	1200.00 U
11141-16-5	Aroclor-1232	1200.00 U
53469-21-9	Aroclor-1242	1200.00 U
12672-29-6	Aroclor-1248	1200.00 U
11097-69-1	Aroclor-1254	2400.00 U
11096-82-5	Aroclor-1260	2400.00 U

→ NEI

CHAIN OF CUSTODY / FIELD DATA SHEET

Direct Environmental, Inc.
290 Sanford St., East Orange, N.J. 07018
201/677-1800 ■ FAX: 201/675-5919

CLIENT: DIRECT ENVIRONMENTAL

CLIENT/PROJECT SITE: LI TUNGSTEN
HART ENVIRONMENTAL

PAGE: 1 OF: 1

CLIENT CONTACT: J.S. THOMPSON

PROJECT JOB NO.:

SAMPLE DESCRIPTION/LOCATION	TYPE GRB	TYPE COMP	MATRIX TYPE	DATE SAMPLED	TIME	PRESERVATIVE	NUMBER OF CONTAINERS	COLLECTED BY:	ANALYSIS REQUESTED
A-7		x	liq	10·18		ice	1	RBT	TOTAL: As, Ba, Cd, Cr, Pb, Hg, Se, Ag, W, Cu, cyanide, sulfide, flouride, sp. gr. pH.
B-4		x	liq	10·18		"	1	RBT	TOTAL: Na, K, CN, OH, As, Ba, Ca, Cr, Pb, Hg, Se, Ag, W, Cu, pH, sulfide.
O-1A		x	liq	10·18		"	2	RBT	VO, EP tox, PCB, flash, metals, OTV, CIT,
T-~~26~~ 28 BT	x		liq	10·18		"	1	RBT	PCB
T-~~27~~ 29 BT.	x		liq	10·18		"	1	RBT	PCB
T-19	x		liq	10·18		"	1	RBT	PCB
O-10	x		liq	10·18		"	1	RBT	PCB
C-23	x		liq	10·18		"	1	RBT	PCB
C-24	x		liq	10·18		"	1	RBT	PCB
206		x	solid	10·18		"	1	RBT	EP tox metals, VV, reactivity

REMARKS:

SHIPPED BY:
UPS: CLIENT VEHICLE
FEDX: LAB VEHICLE
OTHER: DEI VEHICLE: X

RELINQUISHED BY:	RECEIVED BY:	DATE:	TIME:	REASON:	RELINQUISHED TO LABORATORY BY:	ACCEPTED FOR LAB BY:	DATE	TIME
RBT	[illegible]	10/18	11:45	Transfer	[illegible]	[illegible]	10/18	1:45 pm

LABORATORY COMMENTS:

100989

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nytest environmental

Laboratory Chronicle

Project No: 89-19154

Client Name: Direct Environmental Inc.

Date Received: 10/18/89
Sample ID: As per Chain of Custody

Organics Extraction:

1. Acids _____
2. Base/Neutrals _____
3. Pesticides/PCBs 10/23/89
4. Dioxin _____

Analysis:

1. Volatiles 10/26/89
2. Acids _____
3. Base/Neutrals _____
4. Pesticides/PCBs 10/24/89
5. Dioxin _____

Section Supervisor
Review & Approval _____

Inorganics:

1. Metals 11/1/89
2. Cyanides 10/20/89
3. Phenols _____

Other Analysis:

_____

_____

_____

Section Supervisor
Review & Approval _____

Quality Control Supervisor
Review & Approval _____

100990

If fractions are re-extracted and re-analyzed include dates for both.

nytest environmental inc

NON-CONFORMANCE SUMMARY
(Case Narrative)

Project Number: 89-16154

GENERAL COMMENTS

All results reported are on a wet weight basis, no results have been corrected for moisture content due to the nature of the samples.

VOLATILE FRACTION

Sample O -1A was analyzed at medium level with an additional 500 dilution due to high concentrations of both targeted and non-targeted compounds.

PESTICIDE/PCB FRACTION

Surrogate Dibutylchloroendate fell outside QC limits for sample O-1A due to interference of compound containing similar chemical properties. Please note limits are advisory only.

NYTEST ENVIRONMENTAL INC.

AQUEOUS SAMPLE PREPARATION [See reference 1 and 2]	METHOD
BNA, Pesticides / PCB's Extraction (2)	3510
AA/ICP Sample Preparation (1)	200.7
Furnace Sample Preparation (1)	200.0
Mercury Sample Preparation (1)	245.1
Hexavalent Chromium Sample Preparation (1)	218.5

NON-AQUEOUS EXTRACTIONS [See reference 2]

SOIL AND SEDIMENT SAMPLES:

BNA, Pesticides / PCB's Extraction	3550
AA/ICP Sample Preparation	3050
Furnace Sample Preparation	3050
Mercury Sample Preparation	7471

SLUDGE / PETROLEUM BASED SAMPLES: [See reference 2]

AA/ICP Sample Preparation	3050
Furnace Sample Preparation	3020 / 3030 / 3050
Mercury Sample Preparation	7471

ICP (INDUCTIVELY COUPLED PLASMA):

	REFERENCE 1a/REFERENCE 2a
ALUMINUM	200.7/6010
ANTIMONY	200.7/6010
BARIUM	200.7/6010
BERYLLIUM	200.7/6010
CADMIUM	200.7/6010
CALCIUM	200.7/6010
CHROMIUM	200.7/6010
COBALT	200.7/6010
COPPER	200.7/6010
IRON	200.7/6010
LEAD	200.7/6010
MAGNESIUM	200.7/6010
MANGANESE	200.7/6010
MOLYBDENUM	200.7/6010
NICKEL	200.7/6010
POTASSIUM	200.7/6010
SILVER	200.7/6010
SODIUM	200.7/6010
TIN	200.7/6010
TITANIUM	200.7/6010
VANADIUM	200.7/6010
ZINC	200.7/6010

METHODOLOGY SUMMARY
NYTEST ENVIRONMENTAL INC.

FURNACE AA:	REFERENCE 1 / REFERENCE 2
ANTIMONY	204.1 / 7041
ARSENIC	206.2 / 7060
LEAD	239.2 / 7421
SELENIUM	270.2 / 7740
THALLIUM	279.2 / 7841
TIN	282.2
VANADIUM	286.2 / 7911
MERCURY	245.1 / 7470

AQUEOUS METHODOLOGIES: [See reference 3]

Organochlorine Pesticides and PCB's by Gas Chromatography	608
Herbicides by Gas Chromatography	362
Purgeable Organics by GC/MS	624
Base/Neutral, Acids by GC/MS	625
2,3,7,8 - TCDD by GC/MS	613 / 625

NON - AQUEOUS METHODOLOGIES: [See reference 2]

Gas Chromatography / Mass Spectrometry for:

Purgeable Organics	8240
Base / Neutral and Acid Extractables	8270

Organochlorine Pesticides and PCB's by Gas Chromatography	8080

MISCELLANEOUS ANALYSIS: [See reference 2]

Extraction Procedure Toxicity	1310
Ignitability	1010
Corrosivity	1110
Reactivity	CHAPTER 8.3

Toxicity Characteristic Leaching Procedure (TCLP) [Reference 5]

METHODOLOGY SUMMARY
NYTEST ENVIRONMENTAL INC.

ADDITIONAL INORGANIC PARAMETERS

PARAMETER	REFERENCE 1	REFERENCE 2
BROMIDE	320.1	
COLOR	110.2	
CONDUCTANCE	120.1	
CONDUCTANCE		9050
ODOR	140.1	
pH	150.1	
pH		9040
TDS	160.2	
TSS	160.2	
TS	160.3	
HARDNESS	130.1	
TEMPERATURE	170.1	
TURBIDITY	180.1	
ACIDITY	305.1	
ALKALINITY	310.1	
AMMONIA	350.2,.3	
CHLORIDE	325.3	
CHLORIDE		9252
RESIDUAL CHLORINE	330.2	
COD	410.3,405.1	
CYANIDE	335.3	
OIL AND GREASE	413.1,.2	
OIL AND GREASE		9070
FLUORIDE	340.2	
TKN	351.2	
NO2/NO3	353.2	
D.O.	360.2	
PETROLEUM-HYDROCARBONS (see reference 4)	418.1	
PHENOL	420.2	
PHOSPHORUS	365.1	
SILICA	370.1	
SULFATE	375.4,.2	
SULFIDE	376.1	
SURFACTANTS	425.1	
TOC	415.1	

REFERENCES:

(1) - 600 / 4-79-002 Methods for Chemical Analysis of Water and Waste
(1a) - 600 / 4-79-002 Methods for Chemical Analysis of Water and Waste As modified by the EPA CLP Statement of Work 787
(2) - SW 846 Test Methods for Evaluating Solid Waste
(2a) - SW 846 Test Methods for Evaluating Solid Waste As modified by the EPA CLP Statement of Work 787
(3) - 40 CFR Part 136, VOL. 49, No. 209 Test Parameters for the Analysis of Pollutants
(4) - as modified by NJDEP - BISE (for non aqueous samples)
(5) Federal Register Vol 51 No. 216 Friday 11/7/86 p.40643 - 40652

ORGANIC DATA REPORTING QUALIFIERS

U Indicates compound was analyzed for but not detected. Report the minimum detection limit for the sample with the U (e.g. 10U) based on necessary concentration dilution actions. (This is not necessarily the instrument detection limit.) The footnote should read U-Compound was analyzed for but not detected. The number is the minimum attainable detected limit for the sample.

J Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed or when the mass spectral data indicates the presence of a compound that meets the identification criteria but the result is less than the specified detection limit but greater than zero (e.g.: If limit of detection is 10 ug/l and a concentration of 3 ug/l is calculated, report as 3J.)

B This flag is used when the analyte is found in the blank as well as a sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

T This flag indentifies all targeted compounds that were found above the method detection limits.

Note: Data on soil samples expressed on a dry weight basis.

1 A-T

NYTEST ENVIRONMENTAL INC.

TCL VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE MATRIX: SOIL	SAMPLE ID	:	0-1A
CONC. LEVEL: MED	LAB ID	:	2785003
ANALYSIS DATE: 10/26/89	DIL FACTOR	:	500.00
	% MOISTURE	:	NA

CMPD #	CAS Number	VOLATILE COMPOUNDS	UG/KG (DRY BASIS)
1	74-87-3	Chloromethane	625000.0 U.
2	74-83-9	Bromomethane	625000.0 U.
3	75-01-4	Vinyl Chloride	625000.0 U.
4	75-00-3	Chloroethane	625000.0 U.
5	75-09-2	Methylene Chloride	940000.0 TB
6	67-64-1	2-Propanone	4500000.0 TB
7	75-15-0	Carbon disulfide	312500.0 U.
8	75-35-4	1,1-Dichloroethene	312500.0 U.
9	75-34-3	1,1-Dichloroethane	312500.0 U.
10	540-59-0	1,2-Dichloroethene (total)	312500.0 U.
11	67-66-3	Chloroform	312500.0 U.
12	107-06-2	1,2-Dichloroethane	312500.0 U.
13	78-93-3	2-Butanone	625000.0 U.
14	71-55-6	1,1,1-Trichloroethane	29000000.0 T.
15	56-23-5	Carbon Tetrachloride	312500.0 U.
16	108-05-4	Vinyl Acetate	625000.0 U.
17	75-27-4	Bromodichloromethane	312500.0 U.
18	78-87-5	1,2-Dichloropropane	312500.0 U.
19	10061-01-5	cis-1,3-Dichloropropene	312500.0 U.
20	79-01-6	Trichloroethene	4000000.0 T.
21	124-48-1	Dibromochloromethane	312500.0 U.
22	79-00-5	1,1,2-Trichloroethane	312500.0 U.
23	71-43-2	Benzene	312500.0 U.
24	10061-02-6	Trans-1,3-Dichloropropene	312500.0 U.
25	75-25-2	Bromoform	312500.0 U.
26	108-10-1	4-Methyl-2-Pentanone	625000.0 U.
27	591-78-6	2-Hexanone	625000.0 U.
28	127-18-4	Tetrachloroethene	20000000.0 T.
29	79-34-5	1,1,2,2-Tetrachloroethane	312500.0 U.
30	108-88-3	Toluene	45000000.0 T.
31	108-90-7	Chlorobenzene	312500.0 U.
32	100-41-4	Ethylbenzene	2400000.0 T.
33	100-42-5	Styrene	9100000.0 T.
34	1330-20-7	Xylene (total)	9600000.0 T.
35			
36			
37			
38			
39			
40			
41			

1C

NYTEST ENVIRONMENTAL INC.

TENTATIVELY IDENTIFIED ORGANICS COMPOUND

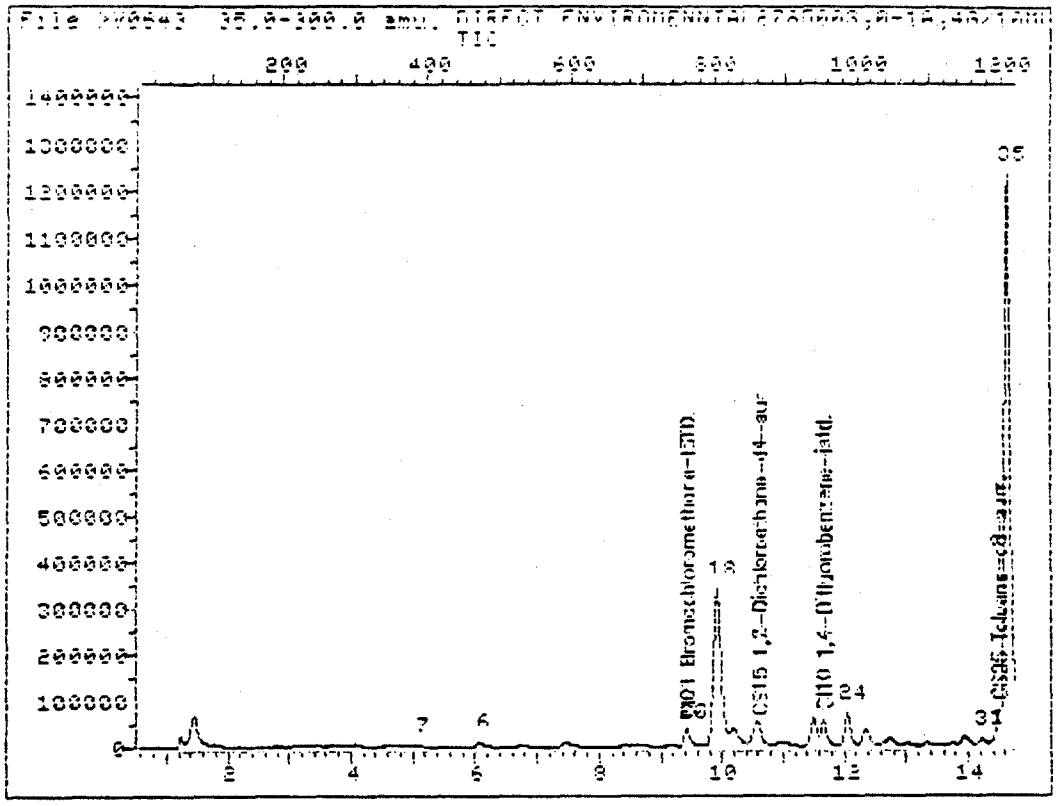
SAMPLE ID: 0-1A

LAB ID : 2785003

OF TIC FOUND: 8 MATRIX :SOIL FRACTION: VOA

	CAS Number	Compound Name	FRACTION	RT	Estimated Concentration UG/KG (DRY WT)
1	142825	HEPTANE	VOA	11.49	6200000 J
2	111842	NONANE	VOA	18.46	7300000 J
3	1678928	PROPYL CYCLOHEXANE	VOA	19.54	9400000 J
4		UNKNOWN ALKANE	VOA	20.41	11000000 J
5		ETHYLMETHYL BENZENE ISOMER	VOA	20.97	7600000 J
6		ETHYLMETHYL BENZENE ISOMER	VOA	21.18	9400000 J
7		UNKNOWN ALKANE	VOA	21.48	19000000 J
8		ETHYLMETHYL BENZENE ISOMER	VOA	21.99	17000000 J
9		.	.		.
10		.	.		.
11		.	.		.
12		.	.		.
13		.	.		.
14		.	.		.
15		.	.		.
16		.	.		.
17		.	.		.
18		.	.		.
19		.	.		.
20		.	.		.
21		.	.		.
22		.	.		.
23		.	.		.
24		.	.		.
25		.	.		.
26		.	.		.
27		.	.		.
28		.	.		.
29		.	.		.
30			.		.

TOTAL ION CHROMATOGRAM



Data File: >V0643::D1 Quant Output File: ^V0643::Q1
Name: DIRECT ENVIRONMENNTAL
Misc: 2785003,0-1A,4G/10ML,200UL/1ML,100UL/5ML,R 10/18,INST:V

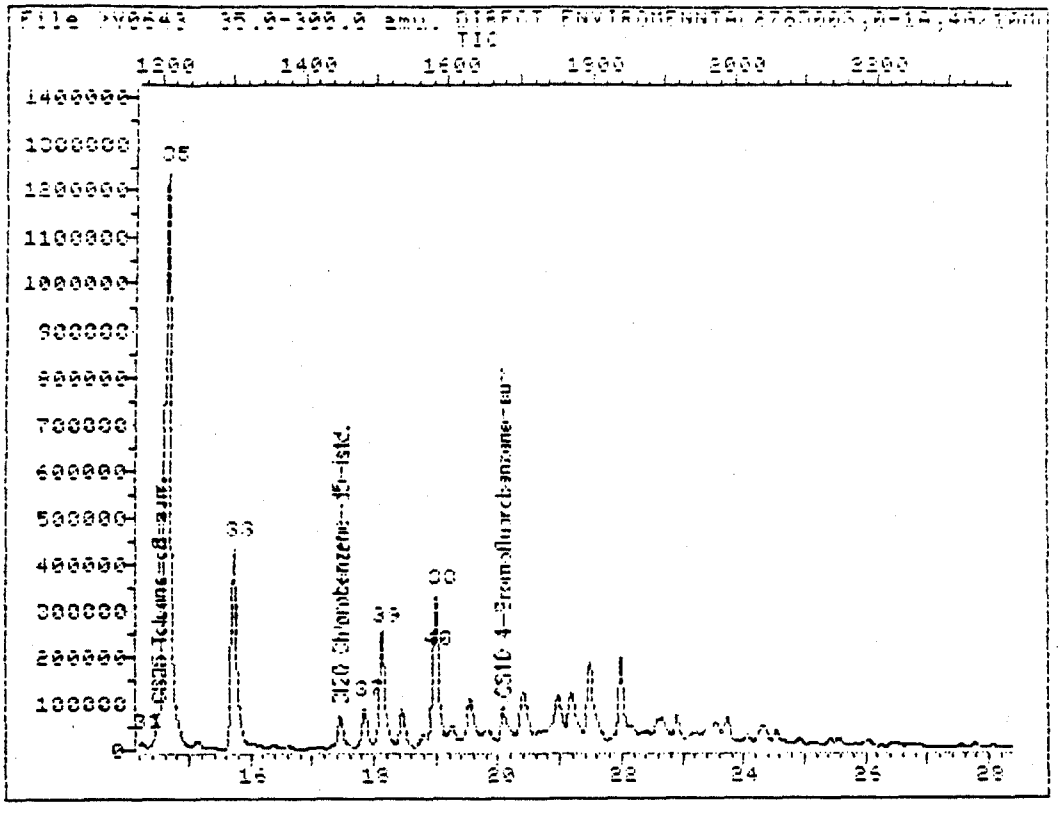
Id File: VWCLP::AP
Title: VOLATILE COMPOUND TARGETED (524.2)
Last Calibration: 891026 14:22

Operator ID: SHAH
Quant Time: 891026 15:15
Injected at: 891026 14:45

TIC page 1 of 2

100998

TOTAL ION CHROMATOGRAM



Data File: >V0643::D1 Quant Output File: ^V0643::Q1
Name: DIRECT ENVIRONMENTAL
Misc: 2785003,0-1A,46/10ML,200U/1ML,1000L/5ML,R 10/18,INST:V

Id File: VWCLP::AP
Title: VOLATILE COMPOUND TARGETED (524.2)
Last Calibration: 891026 14:22

Operator ID: SHAH
Quant Time: 891026 15:15
Injected at: 891026 14:45

TIC page 2 of 2

100999

Project No: 89-16154
Log in No: 2735

Sample Identification and Results

Sample No: O-1A
Lab Sample ID: 2785003

Results	Max. Allowable Levels	Found
Ignitability, F PM	140	80
Reactivity to Cyanide, PPM	-	NA
Reactivity to Sulfide, PPM	-	NA
Tungsten		NA

E P Toxicity (PPM)		
Arsenic	5.0	< .5
Barium	100.0	<10.0
Cadmium	1.0	< .1
Chromium	5.0	< .5
Lead	5.0	< .5
Mercury	0.2	< .02
Selenium	1.0	< .1
Silver	5.0	< .5

NO = None Detected
< = Less than

Project No: 89-16154
Log in No: 2735

Sample Identification and Results

Sample No: 206
Lab Sample ID: 2785004

Results	Max. Allowable Levels	Found
Ignitability, F PM	140	NA
Reactivity to Cyanide, PPM	-	< 1
Reactivity to Sulfide, PPM	-	< 1
Tungsten		*

E P Toxicity (PPM)		
Arsenic	5.0	< .5
Barium	100.0	<10.0
Cadmium	1.0	< .1
Chromium	5.0	0.73
Lead	5.0	< .5
Mercury	0.2	< .02
Selenium	1.0	1.2
Silver	5.0	< .5

* Result to follow.
ND = None Detected
< = Less than

nytest environmental inc

REPORT OF ANALYSIS

Project No.:89-16154

We find as follows:

Parameter(s)	Sample Identification	
	A-2 (2785001)	B-4 (2785002)
pH	0.81	12.6
Specific Gravity, g/cm3	1.0520	—
Results in ppm:		
Chloride	156902	—
Fluoride	2360	—
Sulfide	< 0.1	< 0.1
Cyanide	—	< 0.02

nytest environmental inc

REPORT OF ANALYSIS

Project No.:89-16154

We find as follows:
Results in mg/Kg (dry wt. basis)

Parameter(s)	Sample Identification	
	A-2 (2785001)	B-4 (2785002)
Silver	< 5.0	< 5.0
Arsenic	2.0	2.8
Barium	51.1	< 5.0
Calcium	1560	273
Chromiun	14.1	< 5.0
Copper	55.1	269
Mercury	< 0.1	0.29
Potassium	-	2830
Sodium	-	1640
Lead	13.8	< 5.0
Selenium	< 1.0	< 1.0
Tungsten	*	*

* Results to follow

nytest environmental inc

REPORT OF ANALYSIS

Project No.: 89-16154

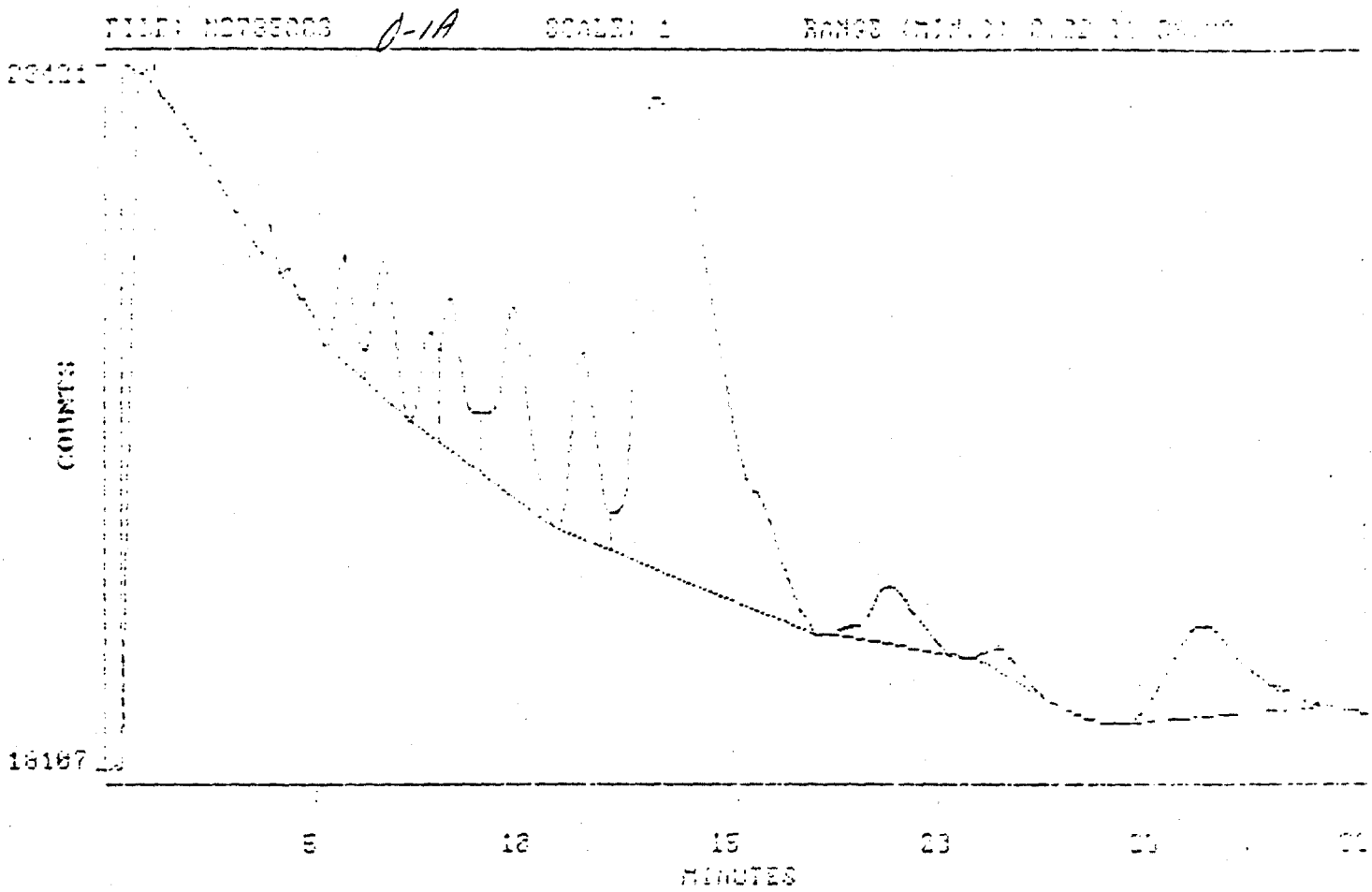
We find as follows:
Results in PPM (Wet weight basis).

Sample Identification		Parameter(s)
		Total PCB's
A-2	2785001	97.6
B-4	2785002	< 10
O-1A	2785003	13.0
206	2785004	< 10
T-28	2785005	< 10
T-29	2785006	< 10
T-19	2785007	< 10
O-10	2785008	< 10
C-23	2785009	< 10
C-24	2785010	< 10
Method Blank		< 10

RECONSTRUCT SCREEN DUMP
Data Acquisition

Time:14:07:34 Date:TUE 24 OCT 89

Time:12:41:26 Date:TUE 24 OCT 89
Method:A1



1001005

Channel #.....1 Time:13:12:13 Date:TUE 24 OCT 89
Run #2 of 2

Sample name.....DIRECT ENV 10/18-10/23/89
Data file.....D8:N2785003
Method name.....A1

Author.....METHOD 608 /// 80803 JCR
Instrument.....TRACOR 222 w. ECD
Column.....3% OV1
Notes.....
2UL1GM/50ML N2785002 IS BLANK

Run time.....30.00 min. Delay time...0.00 min.
Acq. time.....12:41:26 Acq. date....TUE 24 OCT 89
Start PW.....10.00 sec. End PW.....35.00 sec.
Actual PW....30.0
Slope sens.....1.25 uv/sec.

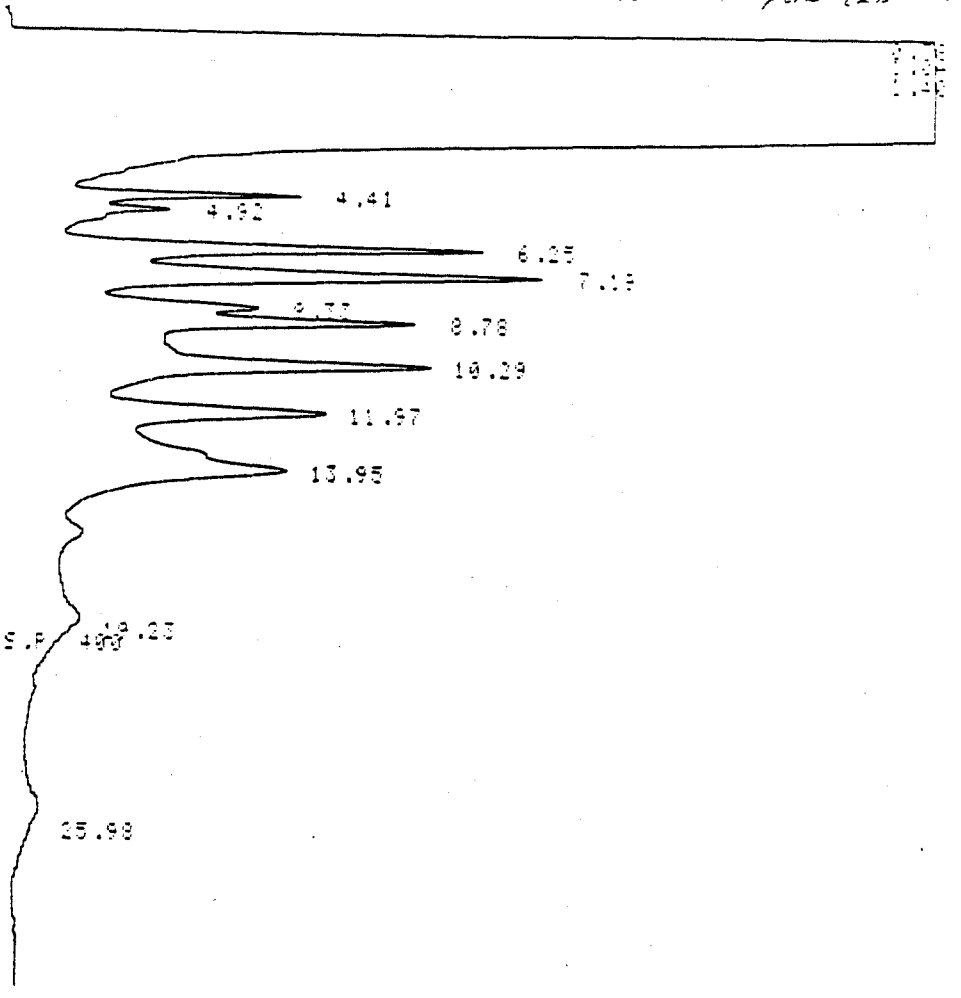
Area reject....499
peaks found..22

AREA PERCENT REPORT

Peak	R.T.(min)	R/S	Peak name	Area %	Area	Peak Ht.	BL
1	0.441			6.005	55965	4488	BB
2	0.975			0.070	657	76	BV
3	1.158			0.158	1470	179	VB
4	3.881			0.422	3931	278	BV
5	4.325			0.166	1550	116	VB
6	5.658			2.462	22942	806	BV
7	6.584			3.744	34890	1027	VB
8	7.683			2.306	21494	793	BV
9	8.178			4.583	42712	1173	VV
10	9.658			7.709	71840	1447	VB
11	11.308			6.128	57104	1419	BV
12	13.075			52.225	486702	3558	VB
13	17.580			0.101	937	72	BV
14	18.648			3.307	30817	429	VB
15	21.217			1.032	9621	181	BB
16	26.253			9.394	87543	699	BB
17	28.556			0.188	1750	29	BB
TOTALS				100.000	931925		

1001006

2nd DIRECT ENVIRONMENTAL H2785-003 (1 well) 10/15-10/23/89 GW S-
CH. 1 C.E 5.00 ATT 0 CPEE 0 10/27/89 13:00 FLUID CLEANING



TEMP 130 200
6FT: 4MM 3%OV-1
TRACOR 222 ECD

D-2000 10/27/89 13:00

SAMPLE: TAG: 63 CH: 1

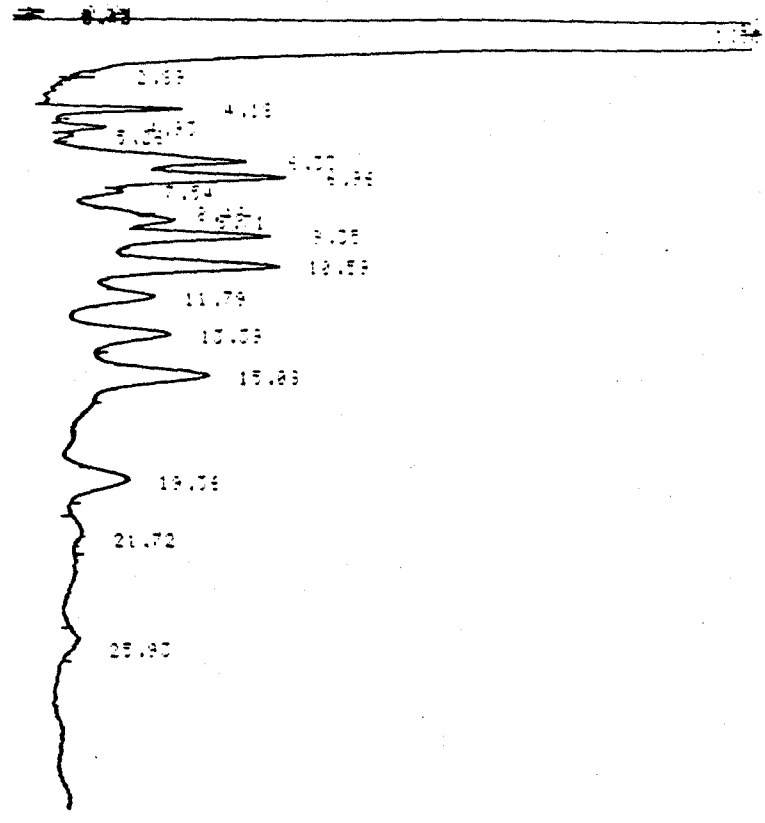
FILE: 1 CALC-METHOD: AREA% TABLE: 0 CONC: AREA

NO.	RT	AREA	HEIGHT	RRT	BC	NAME
1	0.78	346351	5025	0.78	BV	
2	1.04	15930	611	1.04	TBV	
3	1.40	28042	858	1.40	TVB	
4	4.41	3363	233	4.41	BV	
5	4.92	706	68	4.92	TBB	
6	6.25	9732	431	6.25	BV	
7	7.19	12356	474	7.19	VB	
8	8.33	3118	139	8.33	BV	
9	8.78	5912	287	8.78	VB	
10	10.29	6804	283	10.29	BB	
11	11.97	5826	212	11.97	BB	
12	13.95	3852	126	13.95	BB	
13	19.23	1188	22	19.23	BB	
14	25.98	1157	16	25.98	BB	
TOTAL		444337	8785			

PEAK REJ : 0

1001007

2nd DIRECT ENVIRONMENTAL N2755-003 [illegible]



TEMP ISO 200
1.5%SP2250/1.95%SP2401
6FT 4MM
TRACOR 222 ECD

D-2000 10 27 95 11:58

SAMPLE: TRG: 118 CH: 2

FILE: 1 CALC-METHOD: AREA% TABLE: 0 CONC: AREA

NO.	RT	AREA	HEIGHT	FRT	BC	NAME
1	0.21	148	24	0.21	BB	
2	0.35	24	18	0.35	BB	
3	0.40	22	23	0.40	BB	
4	0.42	24	20	0.42	BB	
5	0.46	23	23	0.46	BB	
6	0.62	330453	17611	0.62	BV	
7	1.06	242018	13899	1.06	VB	
8	2.89	30	34	2.89	BB	
9	4.13	2095	156	4.13	BB	
10	4.93	769	57	4.93	BB	
11	5.26	115	17	5.26	TBB	
12	6.33	3276	143	6.33	BB	
13	6.96	3567	181	6.96	BB	
14	7.54	311	26	7.54	BB	
15	8.46	101	23	8.46	BB	
16	8.71	582	41	8.71	BB	
17	9.35	3642	174	9.35	BB	
18	10.59	5686	206	10.59	BB	
19	11.79	1531	63	11.79	BB	
20	13.39	2780	94	13.39	BB	
21	15.08	3746	117	15.08	BB	
22	19.36	2426	60	19.36	BB	
23	21.72	624	16	21.72	BB	
24	25.93	577	15	25.93	BB	
TOTAL		604670	33851			

PEAK REJ : 0

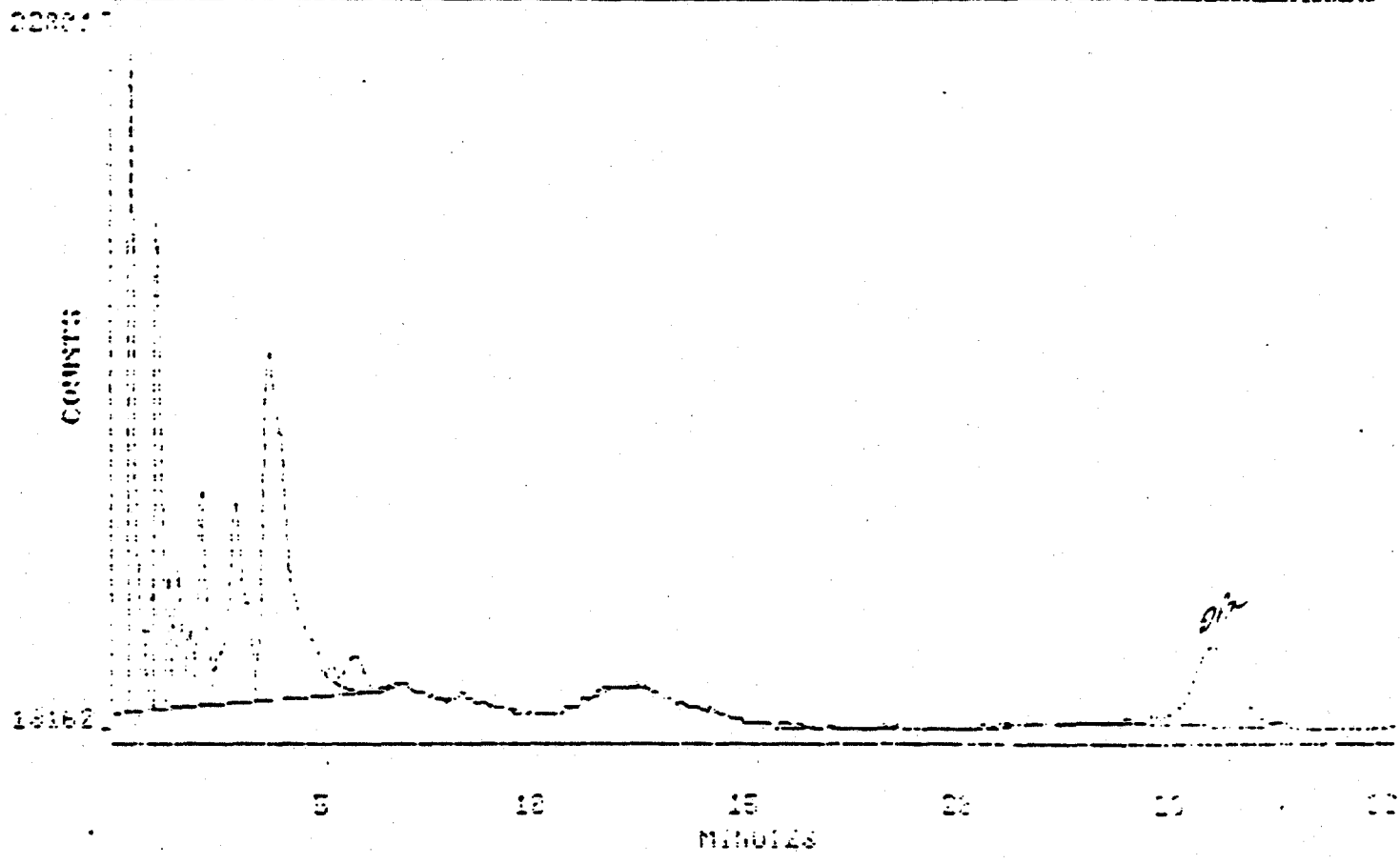
1001008

RECONSTRUCT SCREEN DUMP
Data Acquisition

Time:14:11:22 Date:TUE 24 OCT 89

Time:13:15:27 Date:TUE 24 OCT 89
Method:A1

FILE: MCT05025 T-2B SCALE: 1 RANGE (MIN.): 0.00 TO 30.00



1001009

Channel #.....1 Time:13:46.18 Date.TUE 24 OCT 89
Run #1 of o

Sample name.....DIRECT ENV 10/18-10/23/89
Data file.....D8:N2785005
Method name.....A1

Author.....METHOD 608 /// 80801 JCR
Instrument.....TRACOR 222 w. ECD
Column.....3% OV1
Notes.....
2UL1GM/50ML N2785002 IS BLANK

Run time.....30.00 min. Delay time...0.00 min.
Acq. time.....13:15:27 Acq. date....TUE 24 OCT 89
Start PW.....10.00 sec. End PW.....35.00 sec.
Actual PW....30.0
Slope sens.....1.25 uv/sec.

Area reject....499
peaks found..45

AREA PERCENT REPORT

Peak	R.T.(min)	R/S	Peak name	Area %	Area	Peak Ht.	BL
1	0.444			12.742	38781	4546	BE
2	0.915			2.069	6297	766	EV
3	1.050			11.939	36337	3155	VV
4	1.318			1.878	5715	853	VV
5	1.527			3.627	11038	898	VV
6	1.791			1.603	4878	493	VV
7	2.083			6.106	18584	1403	VV
8	2.862			12.529	38135	1315	VV
9	3.642			30.852	93904	2230	VE
10	5.075			0.538	1638	113	EV
11	5.635			2.025	6164	215	EB
12	6.583			0.199	605	19	BE
13	10.870			0.201	613	71	BV
14	11.526			0.231	704	26	VE
15	15.550			0.200	608	33	BV
16	15.872			0.166	506	30	VE
17	23.783			0.190	577	32	BV
18	24.189			0.413	1258	66	VV
19	24.445			0.235	716	68	VV
20	24.625			0.299	910	71	VV
21	25.743			11.959	36398	523	VB
TOTALS				100.000	304366		

00022

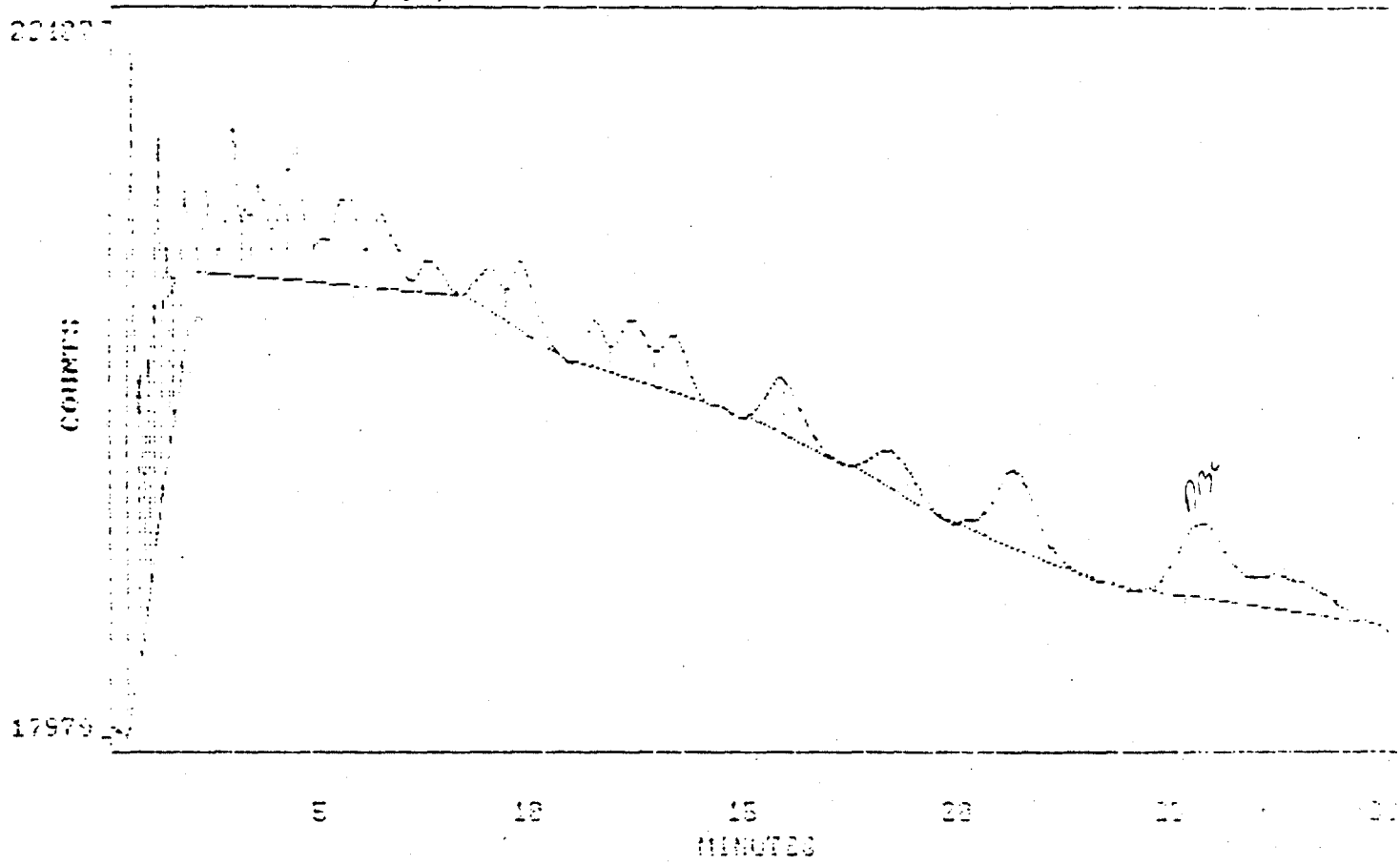
1001010

RECONSTRUCT SCREEN DUMP
Data Acquisition

Time:14:39:02 Date:TUE 24 OCT 89

Time:14:05:18 Date:TUE 24 OCT 89
Method:A1

FILE: MOT05A08 T-29 SCALE: 1 RANGE (MIN.): [illegible]



1001011

Channel #.....1 Time:14:36:10 Date:TUE 24 OCT 89
Run #2 of 6

Sample name.....DIRECT ENV 10/18-10/23/89
Data file.....D8:N2785006
Method name.....A1

Author.....METHOD 608 /// 80801 JCR
Instrument.....TRACOR 222 w. ECD
Column.....3% OV1
Notes.....
2UL1GM/50ML N2785002 IS BLANK

Run time.....30.00 min. Delay time...0.00 min.
Acq. time.....14:05:18 Acq. date....TUE 24 OCT 89
Start PW.....10.00 sec. End PW.....35.00 sec.
Actual PW....30.0
Slope sens.....1.25 uv/sec.

Area reject....499
peaks found..33

AREA PERCENT REPORT

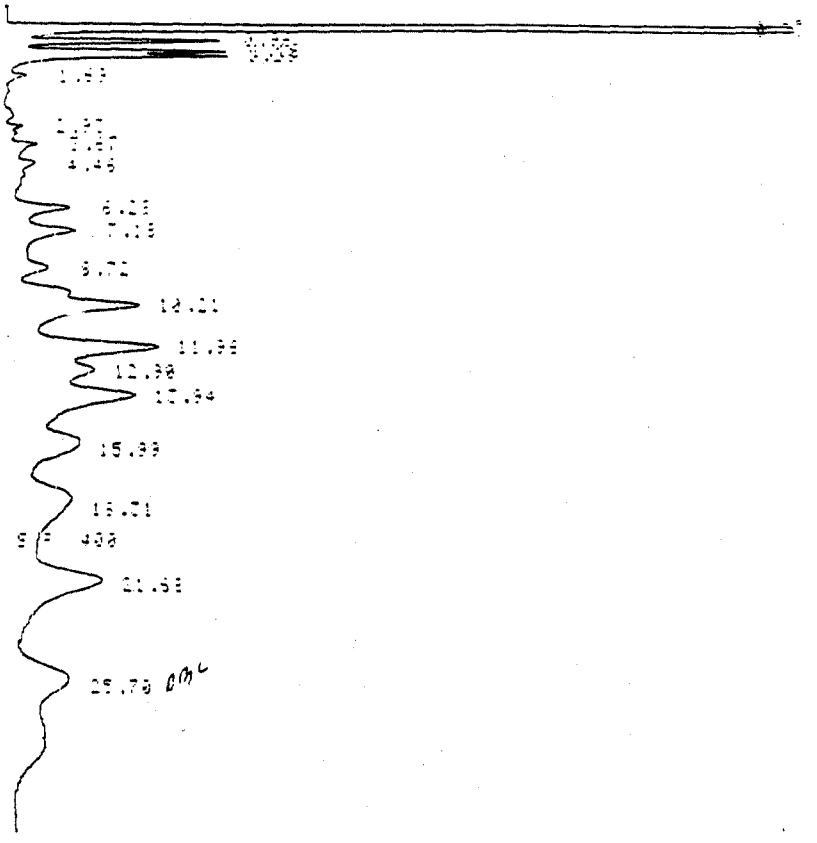
Peak	R.T.(min)	R/S	Peak name	Area %	Area	Peak Ht.	BL
1	0.444			8.896	40449	4343	BV
2	0.681			2.596	11806	1724	VV
3	0.879			2.013	9154	1477	VV
4	1.013			2.209	10046	1567	VV
5	1.107			4.740	21552	2525	VV
6	1.312			2.738	12451	1461	VV
7	1.446			1.286	5847	1010	VV
8	1.595			1.552	7058	880	VV
9	1.712			2.418	10996	1088	VB
10	2.245			1.753	7971	549	BV
11	2.834			3.489	15866	928	VV
12	3.131			1.322	6013	437	VV
13	3.425			2.810	12775	594	VV
14	4.088			2.582	11740	700	VV
15	4.325			4.245	19302	836	VV
16	5.547			6.228	28304	572	VV
17	6.274			4.086	18579	499	VV
18	7.308			1.455	6618	172	VB
19	8.813			2.352	10695	288	BV
20	9.508			3.683	16746	411	VB
21	11.287			1.884	8566	289	BV
22	12.150			3.782	17198	366	VV
23	13.058			3.334	15158	344	VB
24	15.542			2.023	9199	328	BV
25	15.695			2.064	9384	342	VB

00024

26	17 823	[illegible]	[illegible]	161	BV
27	18 089	2.592	11787	215	VB
28	21.043	7 270	33056	481	BB
29	25 574	9.129	41508	472	BV
30	27 145	4 901	22287	226	VB
TOTALS		100.000	454707		

1001013

DIRECT ENVIRONMENTAL N2785-001 [illegible]



TEMP ISO 200
GPT: 4MM 3%OV-1
TRACOR 222 ECD

D-2000 10-17-89 17:03

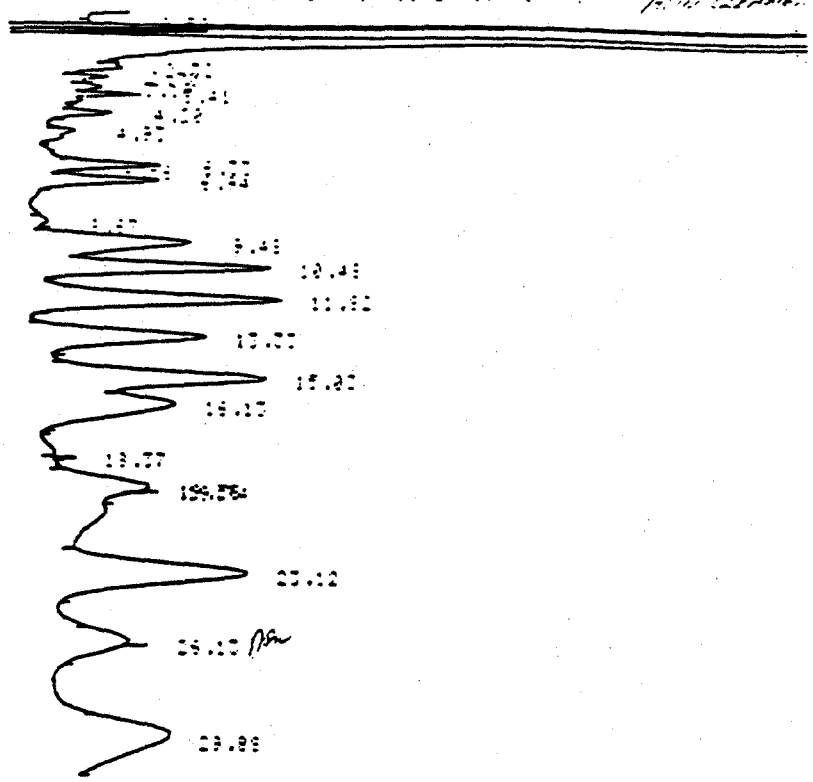
SAMPLE: TAB: 63 CH: 1

FILE: 1 CPLC-METHOD: AREA% TABLE: 0 CONC: AREA

NO.	RT	AREA	HEIGHT	RRT	BC	NAME
1	0.67	11623	1782	0.67	BB	
2	0.73	367	211	0.73	TBB	
3	0.96	1118	239	0.96	TBB	
4	1.18	1141	256	1.18	TBV	
5	1.28	1787	262	1.28	TVB	
6	1.69	124	23	1.69	TBB	
7	2.95	155	18	2.95	BB	
8	3.67	248	25	3.67	BB	
9	4.46	296	19	4.46	BB	
10	6.28	883	53	6.28	BB	
11	7.18	961	50	7.18	BB	
12	8.72	546	27	8.72	BB	
13	10.21	2510	97	10.21	BB	
14	11.96	3139	116	11.96	BB	
15	12.90	589	27	12.90	BB	
16	13.94	2101	63	13.94	BB	
17	15.99	1423	36	15.99	BB	
18	18.31	2293	37	18.31	BB	
19	21.63	4092	73	21.63	BB	
20	25.70	2697	44	25.70	BB	
TOTAL		37879	3463			

PEAK REJ : 0

1001014



TEMP ISO 200
1.5%SP2250/1.95%SP2401
6FT 4MM
TRACOR 222 ECD

D-2000 10 27 89 14:40

SAMPLE: TAG: 119 CH: 2

FILE: 1 CALC-METHOD: AREA% TABLE: 0 CONC: AREA

NO.	RT	AREA	HEIGHT	RRT	BC	NAME
1	0.50	461	117	0.50	BB	
2	0.58	9752	2294	0.58	BB	
3	0.80	1184	275	0.80	TBB	
4	1.13	54734	6325	1.13	BB	
5	1.32	832	42	1.32	BB	
6	1.70	315	41	1.70	BB	
7	2.10	329	31	2.10	BB	
8	3.41	994	85	3.41	VB	
9	4.20	774	61	4.20	BB	
10	4.95	686	28	4.95	BB	
11	5.35	1978	120	5.35	BB	
12	6.56	61	31	6.56	BB	
13	6.94	2663	159	6.94	BB	
14	8.67	189	11	8.67	BB	
15	9.43	5014	159	9.43	BB	
16	10.43	6468	258	10.43	BB	
17	11.82	8475	292	11.82	BB	
18	13.35	7835	202	13.35	BB	
19	15.05	14763	262	15.05	BV	
20	16.13	4939	184	16.13	TBB	
21	18.37	132	30	18.37	BB	
22	19.53	3896	84	19.53	BV	
23	19.74	698	88	19.74	VB	
24	20.12	13365	227	20.12	BB	
25	26.13	3052	92	26.13	BB	
26	29.28	8272	181	29.28	BB	
TOTAL		149499	11442			

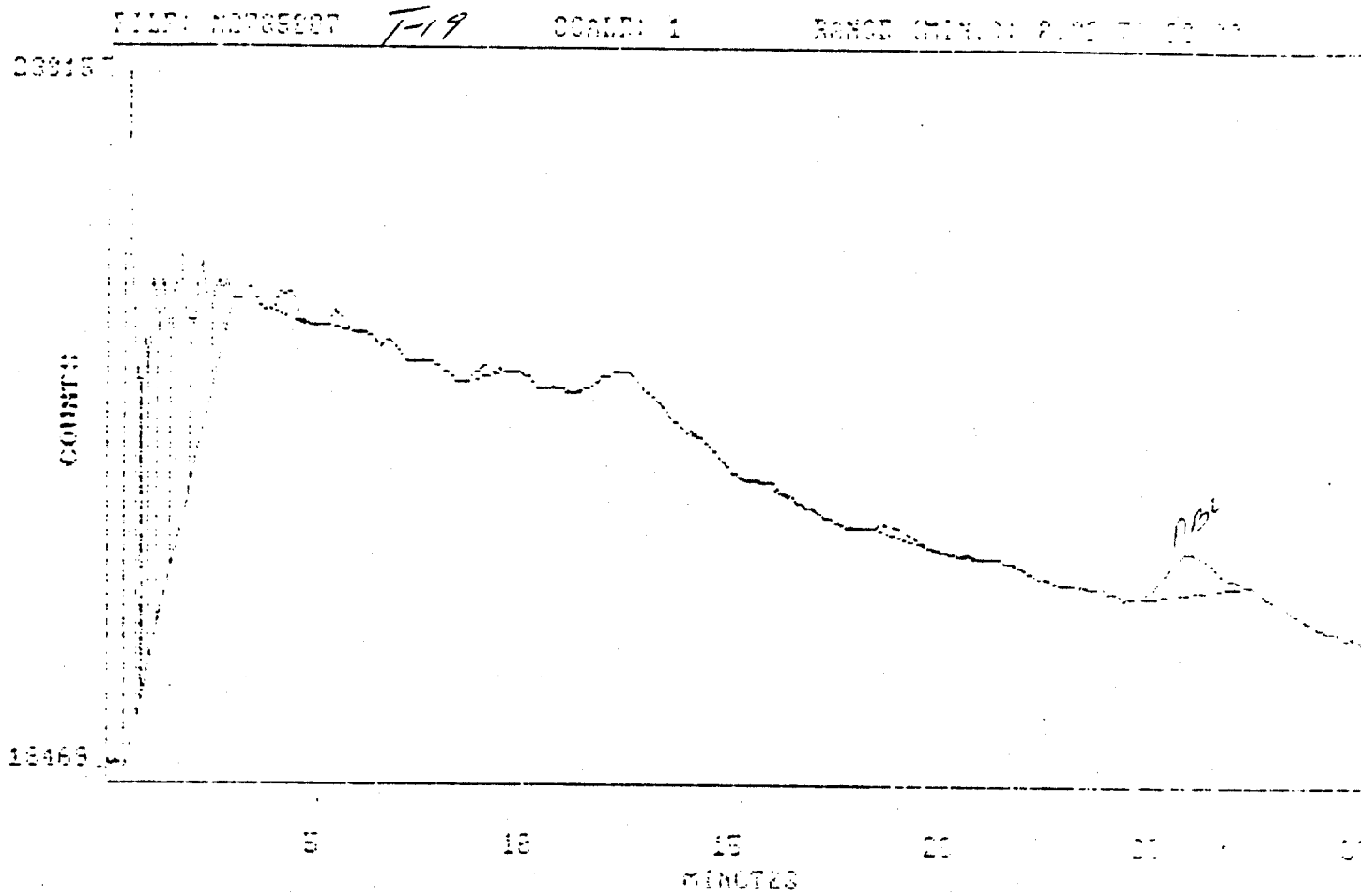
PEAK REJ : 0

1001015

RECONSTRUCT SCREEN DUMP
Data Acquisition

Time:15:12:03 Date:TUE 24 OCT 89

Time:14:38:21 Date:TUE 24 OCT 89
Method:A1



1001016

Channel #.....1 Time:15:09:05 Date:TUE 24 OCT 89
Run #3 of 6

Sample name.....DIRECT ENV 10/18-10/23/89
Data file.....D8:N2785007
Method name.....A1

Author.....METHOD 608 /// 80801 JCR
Instrument.....TRACOR 222 w. ECD
Column.....3% OV1
Notes.....
20L1GM/50ML N2785002 IS BLANK

Run time.....30.00 min. Delay time...0.00 min.
Acq. time.....14:38:21 Acq. date....TUE 24 OCT 89
Start PW.....10.00 sec. End PW.....35.00 sec.
Actual PW....30.0
Slope sens.....1.25 uv/sec.

Area reject....499
peaks found..28

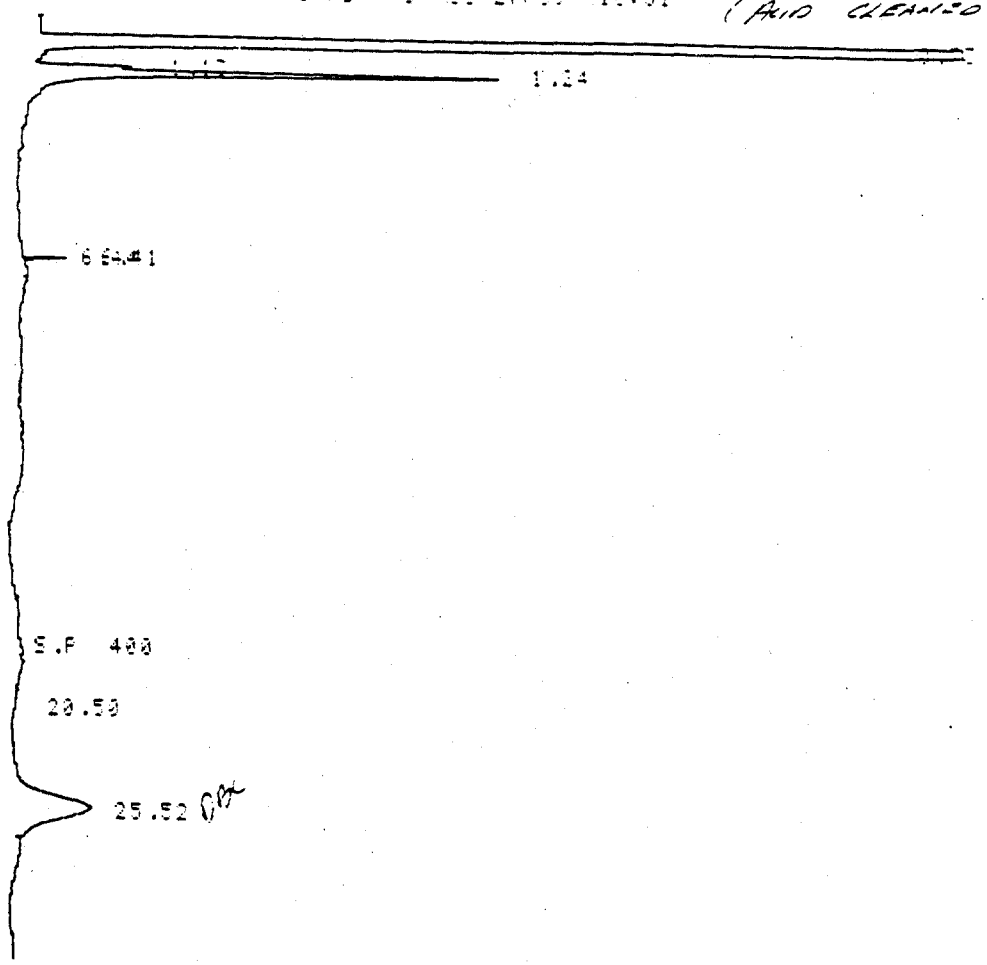
AREA PERCENT REPORT

Peak	R.T.(min)	R/S	Peak name	Area %	Area	Peak Ht.	BL
1	0.482			20.142	52424	4434	BV
2	0.703			3.828	9962	2190	VV
3	0.782			2.167	5639	2022	VV
4	0.868			6.792	17678	2178	VV
5	1.081			11.312	29443	2336	VV
6	1.306			13.122	34154	2081	VV
7	1.693			16.089	41876	1854	VV
8	2.223			10.453	27207	1111	VV
9	2.608			3.024	7871	533	VV
10	2.808			1.073	2792	299	VB
11	4.058			0.625	1627	117	VV
12	4.275			0.858	2232	141	VB
13	5.379			0.806	2097	111	BB
14	8.869			0.605	1574	67	BV
15	15.533			0.328	854	16	BB
16	18.300			1.086	2826	48	BB
17	25.650			7.691	20018	248	VB
TOTALS				100.000	260274		

1001017

2nd DIRECT ENVIRONMENTAL N2785-007 10/18-10/23/89 1 L/m 50ml T-19
(ACID CLEANED

CH. 1 0.5 5.00 ATT 0 OFFS 0 10/27/89 16:31



TEMP ISO 200
6FT; 4MM 3%OV-1
TRACOR 222 ECD

D-2000 10/27/89 16:31

SAMPLE: TAG: 67 CH: 1

FILE: 1 CALC-METHOD: AREA% TABLE: 0 CONC: AREA

NO.	RT	AREA	HEIGHT	RRT	BC	NAME
1	0.73	20479	2907	0.73	BB	
2	1.13	365	103	1.13	BV	
3	1.24	2935	493	1.24	VB	
4	6.41	56	45	6.41	BB	
5	6.44	21	29	6.44	BB	
6	20.50	1205	11	20.50	BB	
7	25.52	2891	65	25.52	BB	
TOTAL		27952	3653			

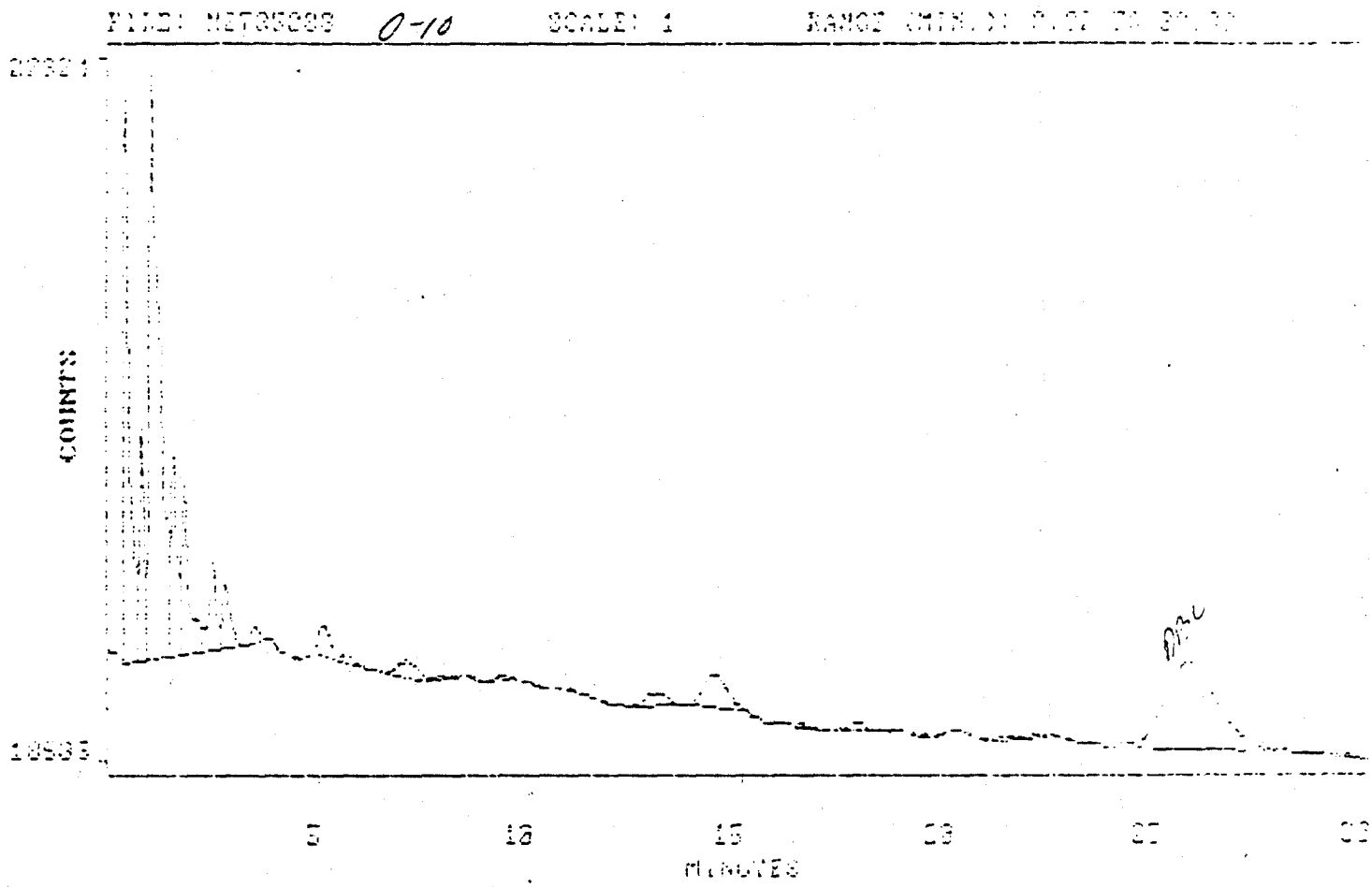
PEAK REJ : 0

1001018

RECONSTRUCT SCREEN DUMP
Data Acquisition

Time:15:42.39 Date.TUE 24 OCT 89

Time:15:10:35 Date:TUE 24 OCT 89
Method:A1



1001019

Channel #.....1 Time:15:41:23 Date:TUE 24 OCT 89
Run #4 of 6

Sample name.....DIRECT ENV 10/18-10/23/89
Data file.....D8:N2785008
Method name.....A1

Author.....METHOD 608 /// 80803 JCR
Instrument.....TRACOR 222 w. ECD
Column.....3% OV1
Notes.....
2UL1GM/50ML N2785002 IS BLANK

Run time.....30.00 min. Delay time...0.00 min.
Acq. time.....15:10:35 Acq. date....TUE 24 OCT 89
Start PW.....10.00 sec. End PW.....35.00 sec.
Actual PW....30.0
Slope sens.....1.25 uv/sec.

Area reject....499
peaks found..42

AREA PERCENT REPORT

Peak	R.T.(min)	R/S	Peak name	Area %	Area	Peak Ht.	BL
1	0.440			15.279	27666	3269	BV
2	0.822			5.152	9328	1232	VV
3	1.058			29.207	52885	3200	VV
4	1.565			5.439	9848	1085	VV
5	1.818			6.194	11216	914	VV
6	2.497			3.240	5867	480	VV
7	2.792			2.659	4815	344	VB
8	3.458			0.542	982	86	BB
9	5.099			2.274	4117	160	BB
10	6.837			0.339	613	68	BV
11	7.001			0.319	577	97	VV
12	7.127			0.777	1407	93	VB
13	7.996			0.277	501	27	BB
14	9.192			0.295	534	29	BB
15	12.816			0.376	681	82	VV
16	12.950			0.892	1616	70	VB
17	14.353			3.843	6959	182	BB
18	17.783			0.365	661	32	BB
19	25.661			22.532	40799	456	VB
TOTALS				100.000	181072		

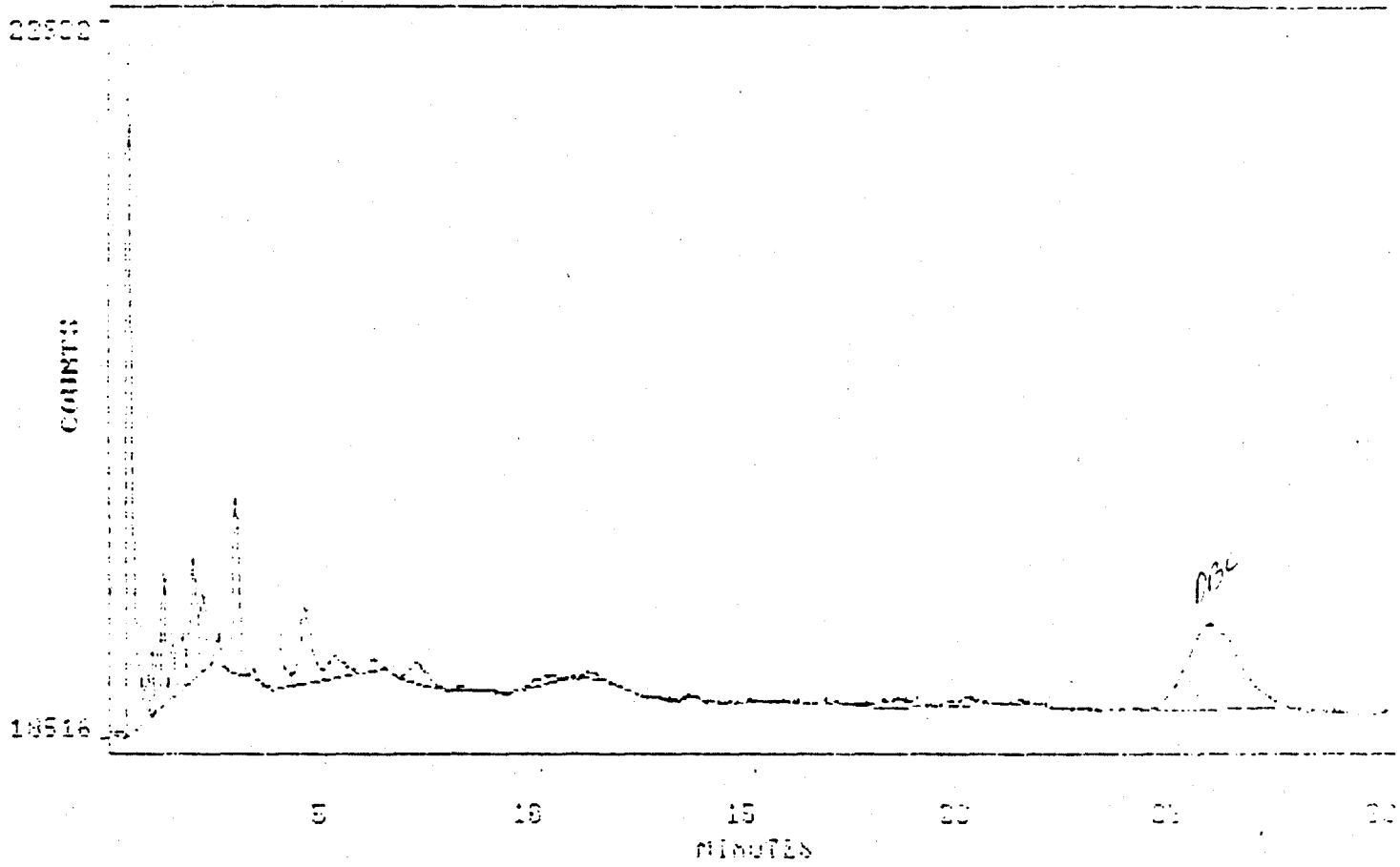
1001020

RECONSTRUCT SCREEN DUMP
Data Acquisition

Time:16:19:38 Date:TUE 24 OCT 89

Time:15:41:53 Date:TUE 24 OCT 89
Method:A1

FILE: M2785089 C-23 SCALE: 1 RANGE (MIN.): [illegible]



1001021

Channel #.....1 Time:16:12:46 Date:TUE 24 OCT 89
Run #5 of 6

Sample name.....DIRECT ENV 10/18-10/23/89
Data file.....D8:N2785009
Method name.....A1

Author.....METHOD 608 /// 80803 JCR
Instrument.....TRACOR 222 w. ECD
Column.....3% OV1
Notes.....
2UL1GM/50ML N2785002 IS BLANK

Run time.....30.00 min. Delay time...0.00 min.
Acq. time.....15:41:53 Acq. date....TUE 24 OCT 89
Start PW.....10.00 sec. End PW.....35.00 sec.
Actual PW....30.0
Slope sens.....1.25 uv/sec.

Area reject....499
peaks found..57

AREA PERCENT REPORT

Peak	R.T.(min)	R/S	Peak name	Area %	Area	Peak Ht.	BL
1	0.441			22.270	30771	4169	BE
2	0.894			1.295	1789	205	EV
3	0.968			1.695	2342	373	EV
4	1.196			2.710	3745	435	EV
5	1.265			3.323	4592	759	EV
6	1.456			1.699	2348	301	VV
7	1.680			1.693	2339	310	VV
8	1.938			5.696	7870	699	VV
9	2.170			3.244	4482	419	VB
10	2.922			7.442	10283	989	BB
11	3.902			3.937	5440	344	BV
12	4.525			5.817	8038	419	VV
13	5.192			2.613	3611	121	VB
14	6.099			0.973	1344	80	BB
15	7.032			2.533	3500	111	BB
16	10.084			0.751	1038	55	VV
17	17.976			0.403	557	45	BV
18	18.335			0.564	779	50	VV
19	18.537			0.375	518	44	VV
20	18.808			0.412	569	46	VV
21	19.539			0.365	505	25	VV
22	19.911			0.599	828	46	VV
23	25.717			29.590	40885	469	VB

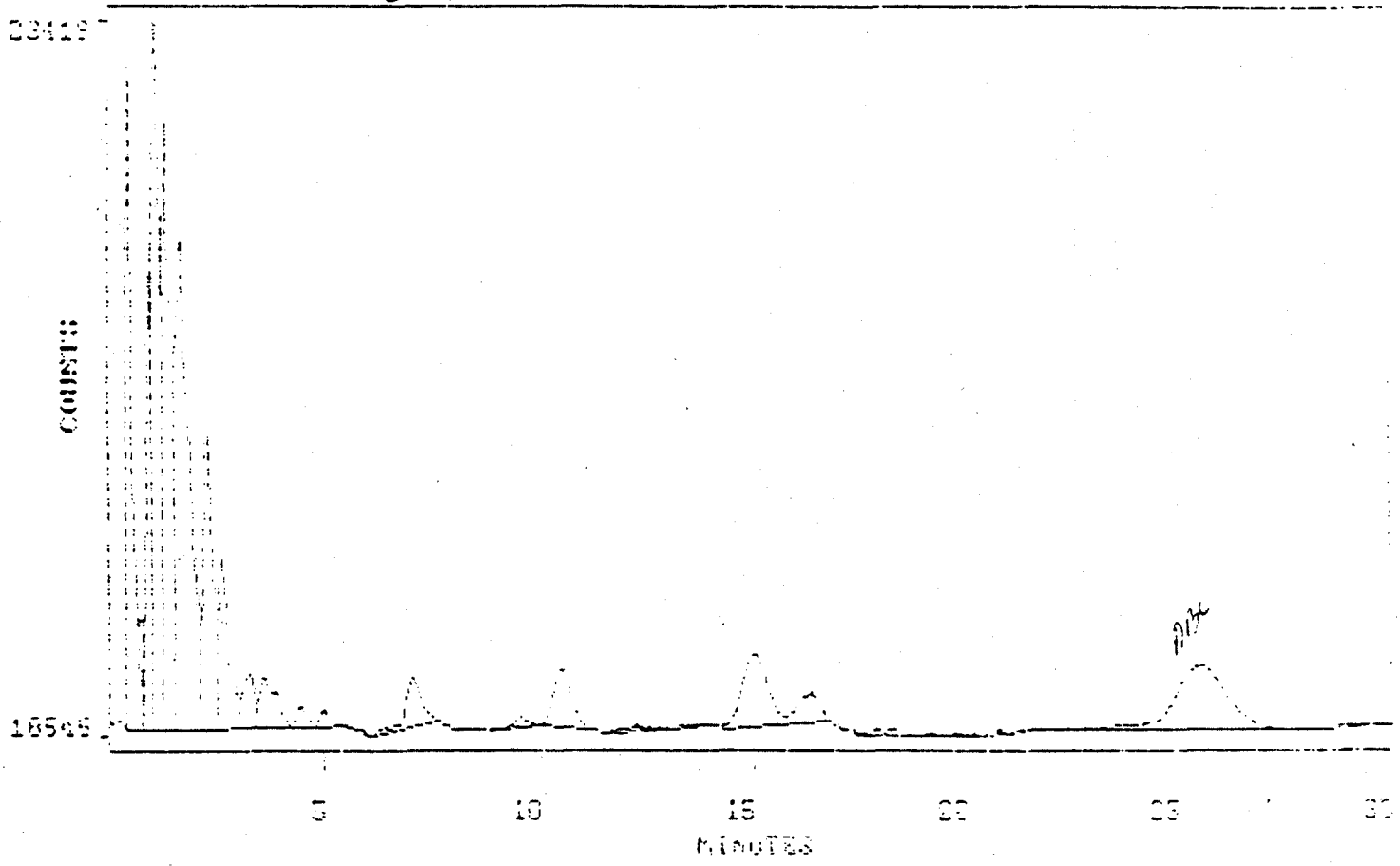
00034

RECONSTRUCT SCREEN DUMP
Data Acquisition

Time:16:52:00 Date:TUE 24 OCT 89

Time:16:18:43 Date:TUE 24 OCT 89
Method:A1

FILE: HCT35810 C-24 SCALE: 1 RANGE (MIN.): 0.00 TO 30.00



1001023

Channel #. . . . . 1 Time 16.49 37 Date TUE 24 OCT 89
Run #6 of 6

Sample name. . . . . DIRECT ENV 10/18-10/23/89
Data file. D8:N2785010
Method name. A1

Author. . . . . METHOD 608 /// 80803 JCR
Instrument. . . . TRACOR 222 w. ECD
Column. 3% OV1
Notes. . . . . .
2UL1GM/50ML N2785002 IB BLANK

Run time. . . . . 30.00 min. Delay time. . . 0.00 min.
Acq time. . . . . 16.18.43 Acq. date. . . TUE 24 OCT 89
Start PW. . . . . 10.00 sec. End PW. . . . . 35.00 sec.
Actual PW. . . 30.0
Slope sens. . . . 1.25 uv/sec

Area reject . 499
peaks found . 54

AREA PERCENT REPORT

Peak	R.T. (min)	R/S	Peak name	Area %	Area	Peak Ht	BL
1	0.451			9.224	38354	4674	BE
2	0.710			0.863	3575	537	EV
3	0.782			0.751	3123	780	EV
4	0.950			5.583	23215	3178	VV
5	1.068			14.614	60767	4825	VV
6	1.316			12.871	53520	4178	VV
7	1.657			18.266	75951	3443	VV
8	2.293			7.204	29956	2053	VV
9	2.624			4.329	18000	1173	VV
10	3.242			1.535	6383	369	VV
11	3.598			2.174	9041	354	VV
12	4.452			0.566	2354	140	VV
13	4.986			0.367	1528	112	VB
14	7.033			1.996	8301	331	VB
15	9.574			0.381	1583	84	VV
16	10.483			2.801	11645	397	BB
17	12.225			0.272	1132	48	BV
18	15.027			4.915	20437	494	VV
19	16.335			1.685	7007	197	VB
20	18.167			0.160	666	33	VB
21	24.378			0.584	2428	62	VV
22	25.604			8.621	35845	447	VE
23	29.350			0.234	975	15	VB
TOTALS				100.000	415806		

00036

1A-P

NYTEST ENVIRONMENTAL INC.

VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE MATRIX: SOIL
CONC. LEVEL: MEDIUM
ANALYSIS DATE: 10/26/89

SAMPLE ID : VBLK VII
LAB ID : V0643
DIL FACTOR : 1.00
% MOISTURE : NA

CMPD #	CAS Number	VOLATILE COMPOUNDS	UG/KG (DRY BASIS)
1	74-87-3	Chloromethane	1250.0 U.
2	74-83-9	Bromomethane	1250.0 U.
3	75-01-4	Vinyl Chloride	1250.0 U.
4	75-00-3	Chloroethane	1250.0 U.
5	75-09-2	Methylene Chloride	690.0 T.
6	67-64-1	2-Propanone	390.0 J.
7	75-15-0	Carbon disulfide	625.0 U.
8	75-35-4	1,1-Dichloroethene	625.0 U.
9	75-34-3	1,1-Dichloroethane	625.0 U.
10	540-59-0	1,2-Dichloroethene (total)	625.0 U.
11	67-66-3	Chloroform	625.0 U.
12	107-06-2	1,2-Dichloroethane	625.0 U.
13	78-93-3	2-Butanone	1250.0 U.
14	71-55-6	1,1,1-Trichloroethane	625.0 U.
15	56-23-5	Carbon Tetrachloride	625.0 U.
16	108-05-4	Vinyl Acetate	1250.0 U.
17	75-27-4	Bromodichloromethane	625.0 U.
18	78-87-5	1,2-Dichloropropane	625.0 U.
19	10061-01-5	cis-1,3-Dichloropropene	625.0 U.
20	79-01-6	Trichloroethene	625.0 U.
21	124-48-1	Dibromochloromethane	625.0 U.
22	79-00-5	1,1,2-Trichloroethane	625.0 U.
23	71-43-2	Benzene	625.0 U.
24	10061-02-6	Trans-1,3-Dichloropropene	625.0 U.
25	75-25-2	Bromoform	625.0 U.
26	108-10-1	4-Methyl-2-Pentanone	1250.0 U.
27	591-78-6	2-Hexanone	1250.0 U.
28	127-18-4	Tetrachloroethene	625.0 U.
29	79-34-5	1,1,2,2-Tetrachloroethane	625.0 U.
30	108-88-3	Toluene	625.0 U.
31	108-90-7	Chlorobenzene	625.0 U.
32	100-41-4	Ethylbenzene	625.0 U.
33	100-42-5	Styrene	625.0 U.
34	1330-20-7	Xylene (total)	625.0 U.
35	107-02-8	Acrolein	12500.0 U.
36	107-13-1	Acrylonitrile	12500.0 U.
37	110-75-8	2-Chloroethylvinylether	1250.0 U.
38		Dichlorodifluoromethane	1250.0 U.
39		Dichlorobenzene (total)	3750.0 U.
40			
41			

1C

NYTEST ENVIRONMENTAL INC.

TENTATIVELY IDENTIFIED ORGANICS COMPOUND

SAMPLE ID: VBLK VII

LAB ID : V0643

OF TIC FOUND: 1 MATRIX :SOIL FRACTION: VOA

CAS Number	Compound Name	FRACTION	RT	Estimated Concentration UG/KG (DRY WT)
1	UNKNOWN	VOA	16.11	680 J
2	.	.		.
3	.	.		.
4	.	.		.
5	.	.		.
6	.	.		.
7	.	.		.
8	.	.		.
9	.	.		.
10	.	.		.
11	.	.		.
12	.	.		.
13	.	.		.
14	.	.		.
15	.	.		.
16	.	.		.
17	.	.		.
18	.	.		.
19	.	.		.
20	.	.		.
21	.	.		.
22	.	.		.
23	.	.		.
24	.	.		.
25	.	.		.
26	.	.		.
27	.	.		.
28	.	.		.
29	.	.		.
30		.		.

2 A

NYTEST ENVIRONMENTAL INC.

VOLATILE SURROGATE RECOVERY

LOG IN #: 2785 PAGE #: 1

MATRIX: SOIL

	SAMPLE #	1,2-DICHLORO ETHANE-D4	TOLUENE -D8	BFB	VOAS OUT
		<<<<<<<<<<<<< VOLATILE		>>>>>>>>>>>	
01	VBLK VII	100 OK	105 OK	101 OK	0
02	O-1A	99 OK	102 OK	92 OK	0
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					

	LIMITS
1,2-DICHLOROETHANE-D4	73 -134
TOLUENE- D8	76 -133
BFB	82 -124

* SURROGATES OUTSIDE QC LIMITS

2 D

NYTEST ENVIRONMENTAL INC.

PESTICIDE SURROGATE RECOVERY

LOG IN #: 2785 PAGE #: 1

MATRIX: SOIL

|<<<PESTICIDE>>> |

	SAMPLE #	DBC	PEST OUT
01	BLANK	69 OK	0
02	O-1A	356 *	1
03	T-28	148 OK	0
04	T-29	169 OK	0
05	T-19	82 OK	0
06	O-10	165 OK	0
07	C-23	166 OK	0
08	C-24	146 OK	0
09			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			

	LIMITS
DBC	6 - 170

* SURROGATES OUTSIDE QC LIMITS

3 A

NYTEST ENVIRONMENTAL INC.

VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

LOGIN #: 2785 MATRIX: SOIL PAGE: 1

FRACTION	COMPOUND	CONC. SPIKE ADDED (ug)	SAMPLE RESULT	CONC. MS	% RECOVERY	CONC. MSD	% RECOVERY	RPD	QC LIMITS RPD	QC LIMITS RECOVERY
	1,1-DICHLOROETHENE	50	0.00	36.25	72.51 OK	38.12	76.25 OK	5.03 OK	10	42 -136
SAMPLE #	TRICHLOROETHENE	50	0.00	37.20	74.39 OK	36.26	72.52 OK	2.55 OK	83	34 -139
	CHLOROBENZENE	50	7.91	53.17	90.51 OK	55.47	95.12 OK	4.97 OK	16	44 -143
NYTEST #	TOLUENE	50	5.73	49.46	87.45 OK	50.54	89.62 OK	2.45 OK	10	67 -123
	BENZENE	50	9.54	51.60	84.13 OK	54.01	88.96 OK	5.58 OK	11	54 -156

OF % MS/MSD 0 OF 10
VOA OUT: —

OF RPD 0 OF 5
VOA OUT: —

1001029

3 D

NYTEST ENVIRONMENTAL INC.

PESTICIDE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

LOGIN #: 2785 MATRIX: SOIL PAGE#: 1

FRACTION	COMPOUND	CONC. SPIKE ADDED (ug)	SAMPLE RESULT	CONC. MS	% RECOVERY	CONC. MSD	% RECOVERY	RPD	QC LIMITS RPD	QC LIMITS RECOVERY
	LINDANE	800	0.00	250.55	31.32 *	276.62	34.58 *	9.89 OK	35	36 -105
SAMPLE #	HEPTACHLOR	800	0.00	364.79	45.60 OK	398.81	49.85 OK	8.91 OK	28	40 -134
	ALDRIN	800	0.00	348.92	43.62 OK	383.50	47.94 OK	9.44 OK	38	40 -164
NYTEST #	DIELDRIN	2000	0.00	938.13	46.91 *	980.48	49.02 *	4.41 OK	33	50 -116
	ENDRIN	2000	0.00	1072.30	53.62 OK	1155.49	57.77 OK	7.47 OK	19	49 -138
	4,4- DDT	2000	0.00	462.57	23.13 *	534.63	26.73 *	14.45 *	12	38 -144

OF % MS/MSD 6 OF 12
PEST OUT: —

OF RPD 1 OF 6
PEST OUT: —

1001030

BROMOFLUOROBENZENE (BFB)

Contractor: NYTEST ENVIRONMENTAL INC.
Instrument ID: V Date: 10/25/89 Time: 12:41
Lab ID: V0618 Data Release Authorized By:

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
50	15.0 - 40.0% of the base peak	21.4
75	30.0 - 60.0% of the base peak	50.0
95	Base peak, 100% relative abundance	100.0
96	5.0 - 9.0% of the base peak	6.5
173	Less than 2.0% of mass 174	0.0 [0.0] *
174	Greater than 50.0% of the base peak	75.4
175	5.0 - 9.0% of mass 174	6.4 [8.5] *
176	Greater than 95.0%, but less than 101.0% of mass 174	72.1 [95.7] *
177	5.0 - 9.0% of mass 176	5.2 [7.2] **

* Value in parenthesis is % mass 174.
** Value in parenthesis is % mass 176.

THIS PERFORMANCE TUNE APPLIES TO THE FOLLOWING SAMPLES, BLANKS AND STANDARDS.

SAMPLE ID	LAB ID	DATE OF ANALYSIS	TIME OF ANALYSIS
Performance Standard	V0618	10/25/89	12:41
VSTD020	V0620	10/25/89	13:53
VSTD050	V0619	10/25/89	12:58
VSTD100	V0621	10/25/89	14:36
VSTD150	V0622	10/25/89	15:24
VSTD200	V0623	10/25/89	15:59

GC/MS TUNING AND MASS CALIBRATION
BROMOFLUOROBENZENE (BFB)

Contractor: NYTEST ENVIRONMENTAL INC.
Instrument ID: V Date: 10/26/89 Time: 8:12
Lab ID: V0635 Data Release Authorized By:

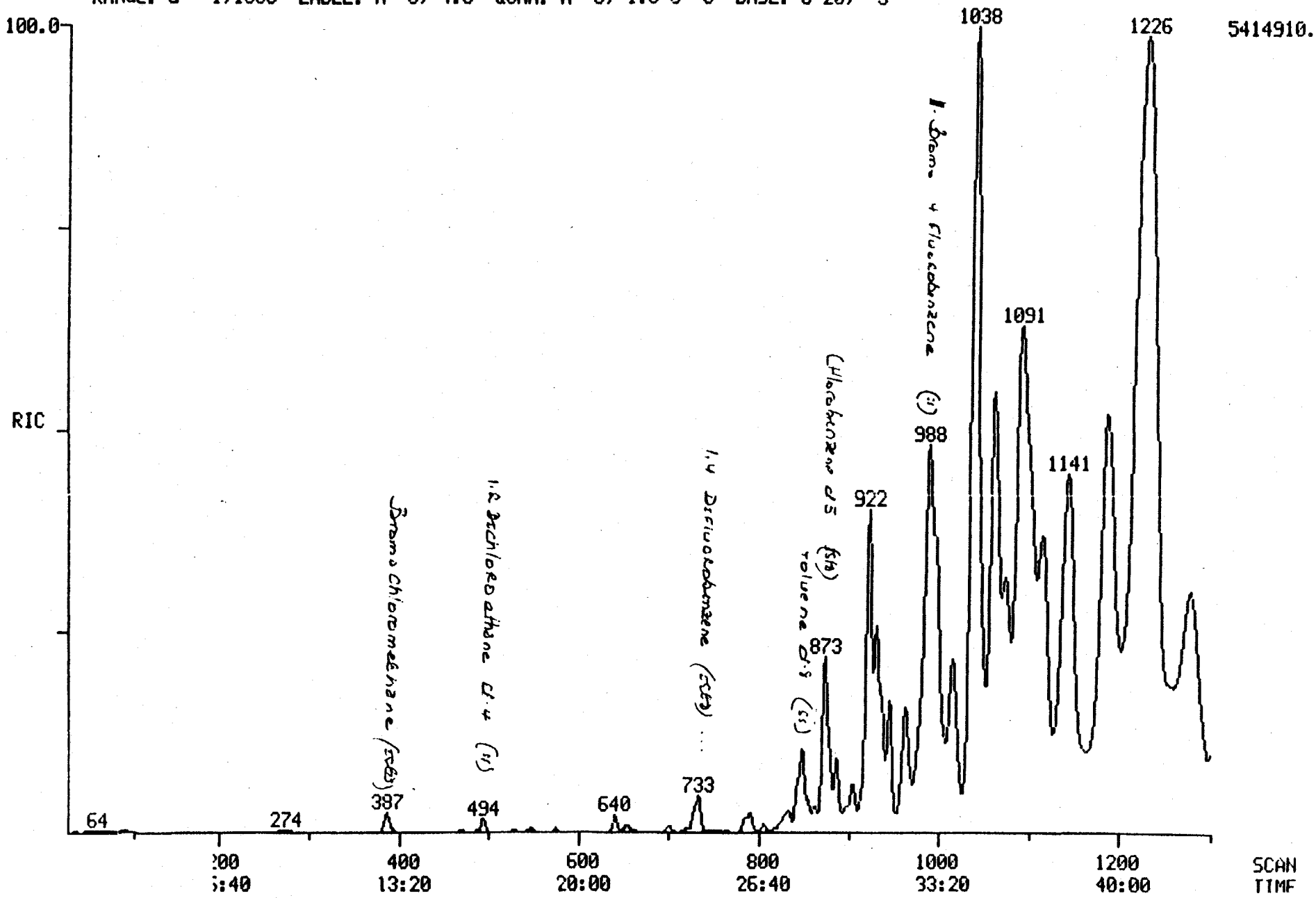
m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
50	15.0 - 40.0% of the base peak	21.7
75	30.0 - 60.0% of the base peak	50.0
95	Base peak, 100% relative abundance	100.0
96	5.0 - 9.0% of the base peak	8.1
173	Less than 2.0% of mass 174	0.0 [0.0] *
174	Greater than 50.0% of the base peak	79.1
175	5.0 - 9.0% of mass 174	6.0 [7.6] *
176	Greater than 95.0%, but less than 101.0% of mass 174	78.2 [98.8] *
177	5.0 - 9.0% of mass 176	5.1 [6.6] **

* Value in parenthesis is % mass 174.
** Value in parenthesis is % mass 176.

THIS PERFORMANCE TUNE APPLIES TO THE FOLLOWING SAMPLES, BLANKS AND STANDARDS.

SAMPLE ID	LAB ID	DATE OF ANALYSIS	TIME OF ANALYSIS
Performance Standard	V0635	10/26/89	8:12
WORKING STD	V0636	10/26/89	8:47
METHOD BLANK	V0643	10/26/89	14:00
O-1A	2785003	10/26/89	14:45

RIC DATA: C7614 #1 SCANS 30 TO 1300
10/11/89 19:17:00 CALI: C7614 #2
SAMPLE: DIRECT ENVIRONMENTAL,0-5,REC'D 10/04/89,N2644-009,LOGIN 2644
CONDS.: 10UL(4G/10ML)5MLS,INST:C
RANGE: G 1,1300 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3



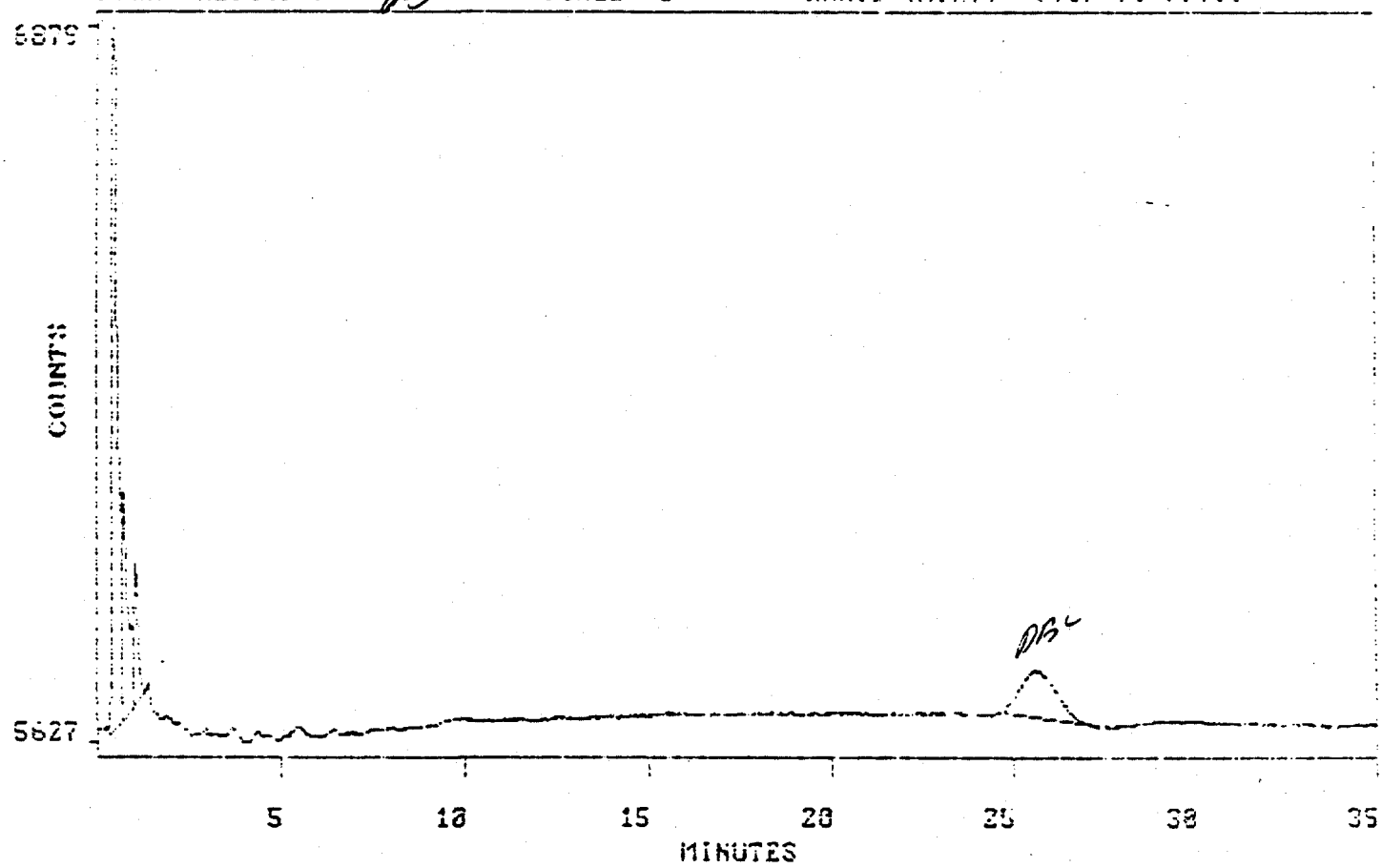
1001033

RECONSTRUCT SCREEN DUMP
Data Acquisition

Time.15.06.42 Date.SAT 14 OCT 87

Time:14.00:08 Date:SAT 14 OCT 87
Method.A2

FILE: M2544000 05 SCALE: 1 RANGE (MIN.): 0.02 TO 35.00



1001034

Channel #.....2 Time.14 00 03 Date SAT 14 OCT 87
Run #o 2 4

Sample name.....DIRECT ENV 10/4-10/10/87
Data file.....D6.N2644007
Method name.....A2

Author.....METHOD 608 /// 80801 JCR
Instrument.....TRACOR 222 w.ECD
Column.....1.5%SP2250/1.95%SP2401 on 100/120 sup.
Notes.....
2UL 10M/50ML N2644004 IS BLANK

Run time.....35.00 min. Delay time...0.00 min.
Acq. time.....14:00:03 Acq. date....SAT 14 OCT 87
Start PW.....10.00 sec. End PW.....40.00 sec.
Slope sens.....1.75 uv/sec.

Area reject....100
peaks found..5

AREA PERCENT REPORT

Peak	R.T.(min)	R/S	Peak name	Area %	Area	Peak Ht.	BL
1	0.460			50.545	12110	1236	BV
2	0.698			17.421	4174	404	VV
3	1.025			9.320	2233	251	VB
4	25.633			22.714	5442	79	BB
TOTALS				100.000	23959		

1001035

ORGANICS ANALYSIS DATA SHEET

SAMPLE NUMBER:OW-1

Contractor: NYTEST ENVIRONMENTAL INC.
Lab Sample ID No:2644013
Sample Matrix:Oil
Data Release Authorized By:

Project No:89-16154
Date Sample Received:10/4/89

VOLATILE COMPOUNDS

Concentration: Low Medium (Circle One)
Date Extracted/Prepared: NA
Date Analyzed:10/11/89
Conc/Dil Factor: 1250
Percent Moisture Not Decanted:

CAS Number		ug/kg
74-87-3	Chloromethane	12500.0 U
74-83-9	Bromomethane	12500.0 U
75-01-4	Vinyl Chloride	12500.0 U
75-00-3	Chloroethane	12500.0 U
75-09-2	Methylene Chloride	6250.0 U
67-64-1	Acetone	12500.0 U
75-15-0	Carbon Disulfide	6250.0 U
75-35-4	1,1-Dichloroethene	6250.0 U
75-34-3	1,1-Dichloroethane	6250.0 U
540-59-0	Total-1,2-Dichloroethene	6250.0 U
67-66-3	Chloroform	6250.0 U
107-06-2	1,2-Dichloroethane	6250.0 U
78-93-3	2-Butanone	12500.0 U
71-55-6	1,1,1-Trichloroethane	6250.0 U
56-23-5	Carbon Tetrachloride	6250.0 U
108-05-4	Vinyl Acetate	12500.0 U
75-27-4	Bromodichloromethane	6250.0 U

CAS Number		ug/kg
79-34-5	1,1,2,2-Tetrachloroethane	6250.0 U
78-87-5	1,2-Dichloropropane	6250.0 U
10061-02-6	Trans-1,3-Dichloropropene	6250.0 U
79-01-6	Trichloroethene	23000.0 U
124-48-1	Dibromochloromethane	6250.0 U
79-00-5	1,1,2-Trichloroethane	6250.0 U
71-43-2	Benzene	6250.0 U
10061-01-5	cis-1,3-Dichloropropene	6250.0 U
110-75-8	2-Chloroethylvinylether	12500.0 U
75-25-2	Bromoform	6250.0 U
591-78-6	2-Hexanone	12500.0 U
108-10-1	4-Methyl-2-Pentanone	12500.0 U
127-18-4	Tetrachloroethene	6250.0 U
108-88-3	Toluene	6250.0 U
108-90-7	Chlorobenzene	6250.0 U
100-41-4	Ethylbenzene	6250.0 U
100-42-5	Styrene	6250.0 U
	Total Xylenes	6250.0 U
	Total Dichlorobenzene	37500.0 U

Data Reporting Qualifiers

For reporting results to EPA, the following results qualifiers are used. Additional flags or footnotes explaining results are encouraged. However, the definition of each flag must be explicit.

VALUE If the result is a value greater than or equal to the detection limit, report the value.

U Indicates compound was analyzed for but not detected. Report the minimum detection limit for the sample with the U (e.g. 10U), based on necessary concentration dilution actions. (This is not necessarily the instrument detection limit.) The footnote should read U-Compound was analyzed for but not detected. The number is the minimum attainable detection limit for the sample.

J Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed or when the mass spectral data indicates the presence of a compound that meets the identification criteria but the result is less than the specified detection limit

C This flag applies to pesticide parameters where the identification ha been confirmed by GC/MS Single component pesticides greater than or equal to 10 ug/l in the final extract should be confirmed by GC/MS.

B This flag is used when the analyte is found in the blank as well as a sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

Other specific flags and footnotes may be required to properly define the results. If used, they must be fully described and such description attached to the data summary report.

nytest environmental inc

ORGANICS ANALYSIS DATA SHEET

Contractor: NYTEST ENVIRONMENTAL INC.
Project No: 89-16154

SAMPLE NUMBER: OW-1
Lab Sample ID No.:2644013

Tentatively Identified Compounds

CAS Number	Compound Name	Fraction	RT or Scan Number	Estimated Concentration (ug/l or ug/Kg)
1	Unknown	VOA	34:00	10000 J
2	Unknown Alkane	VOA	34:52	18000 J
3	Unknown Alkene	VOA	35:20	11000 J
4	Unknown	VOA	36:16	32000 J
5	Unknown	VOA	36:54	13000 J
6	Unknown	VOA	37:50	22000 J
7	Unknown Alkene	VOA	40:32	37000 J
8	Unknown	VOA	40:58	12000 J
9	Unknown	VOA	42:28	13000 J
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				

ORGANICS ANALYSIS DATA SHEET

SAMPLE NUMBER:OW-1
(2644013)

Contractor: NYTEST ENVIRONMENTAL INC.
Project No:89-16154

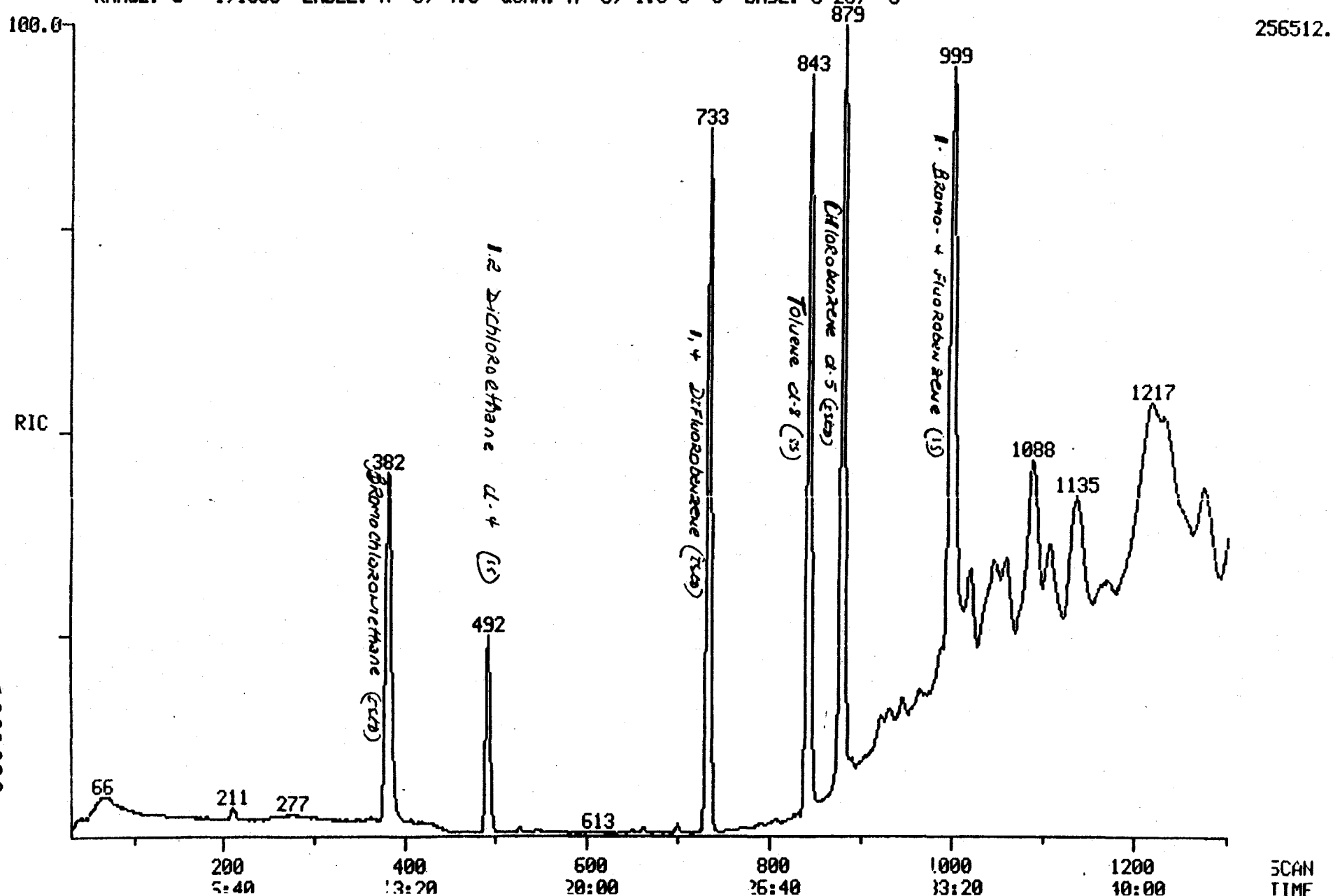
PESTICIDE/PCBs

Concentration: Low Medium (Circle One)
Date Extracted/Prepared:10/10/89
Date Analyzed:10/14/89
Conc/Dil Factor: 1
Percent Moisture not decanted: 0

GPC Cleanup__Yes _X_ No
Separatory Funnel Extraction __ Yes
Continuous Liquid-liquid Extraction __Yes

CAS Number		ug/l or ug/Kg (Circle One)
12674-11-2	Aroclor-1016	1200.00 U
11104-28-2	Aroclor-1221	1200.00 U
11141-16-5	Aroclor-1232	1200.00 U
53469-21-9	Aroclor-1242	1200.00 U
12672-29-6	Aroclor-1248	1200.00 U
11097-69-1	Aroclor-1254	33000.00
11096-82-5	Aroclor-1260	2400.00 U

RIC DATA: C7615 #1 SCANS 30 TO 1300
10/11/89 20:54:00 CALI: C7615 #2
SAMPLE: DIRECT ENVIRONMENTAL,OW-1/N2644-013,REC'D 10/4/89
CONDS.: 4G/10ML MEOH,10UL/5ML,INST:C
RANGE: G 1,1300 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3



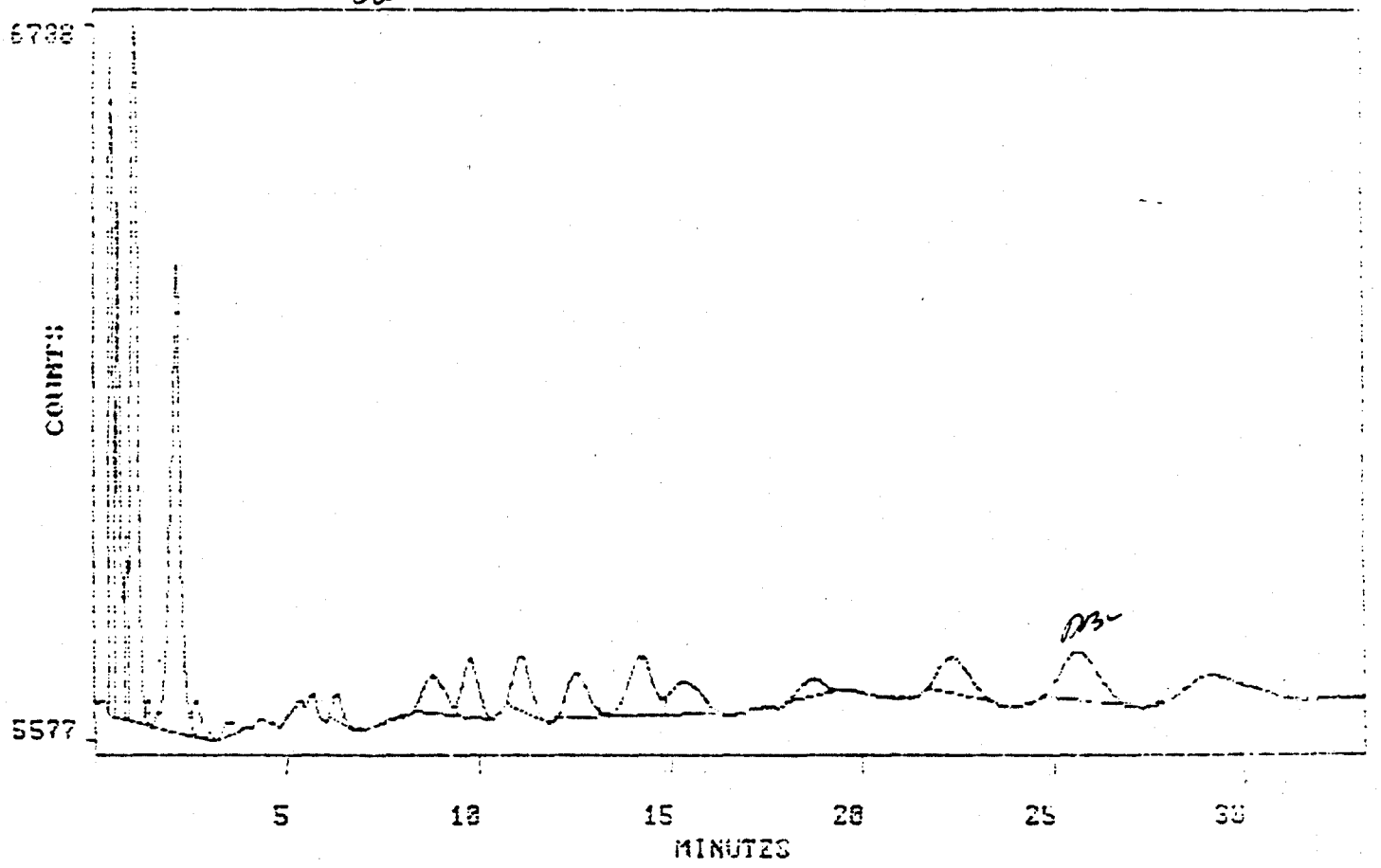
1001039

RECONSTRUCT SCREEN DUMP
Data Acquisition

Time:10:04:18 Date:MON 16 OCT 89

Time:14:40:21 Date:SAT 14 OCT 89
Method:A2

FILE: N8914013 OW-1 SCALE: 1 RANGE (MIN.): 0.02 TO 33.15



1001040

Channel #.....2 Time 15.14.11 Date.SAT 14 OCT 89
Run #1

Sample name.....DIRECT ENV 10/4-10/10/89
Data file.....D6.N2644013
Method name A2

Author..... METHOD 608 /// 80801 CCR
Instrument ....TRACOR 222 w.ECD
Column.. .....1.5%SP2250/1.75%SP2401 on 100/120 sup
Notes.....
2UL 10M/50ML N2644004 IS BLANK

Run time.....30.17 min. Delay time...0.00 min.
Acq. time.... 14.40.21 Acq. date.. SAT 14 OCT 89
Start PW.....10.00 sec. End PW.....40.00 sec.
Slope sens.....1.75 uv/sec.

Area reject....100
peaks found..19

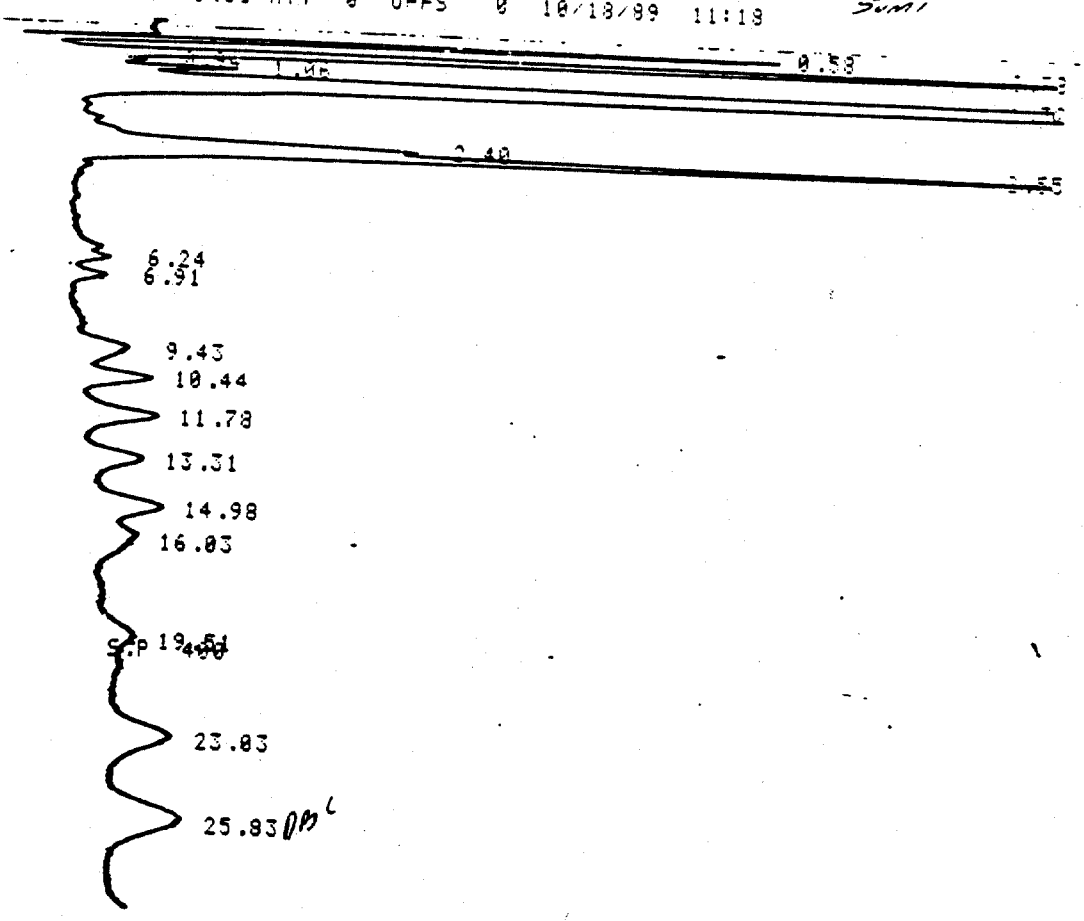
AREA PERCENT REPORT

Peak	R.T.(min)	R/S	Peak name	Area %	Area	Peak Ht.	BL
1	0.457			9.100	6873	1130	BV
2	0.591			8.678	6554	903	VV
3	0.818			2.226	1681	310	VV
4	1.031			20.256	15298	1179	VB
5	1.394			0.286	216	42	BB
6	2.140			19.667	14853	807	BB
7	2.662			1.037	783	57	BB
8	2.996			0.166	125	17	BB
9	3.386			0.633	478	27	BB
10	6.275			1.014	766	45	BB
11	8.721			3.190	2409	61	BV
12	9.703			3.473	2623	96	VB
13	11.075			3.583	2706	90	BB
14	12.500			3.686	2784	73	BV
15	14.217			6.072	4586	99	VV
16	15.267			3.860	2913	34	VB
17	18.650			1.651	1247	31	BB
18	22.403			4.246	3207	60	BB
19	25.704			7.177	5420	82	BB
TOTALS				100.000	75524		

1001041

2nd DIRECT ENVIRONMENTAL N2G1-013 14-10/10/89 15MB 10-1

CH. 2 C.S 5.00 ATT 0 OFFS 0 10/18/89 11:18



TEMP ISO 200
1.5%SP2250/1.95%SP2401
6FT 4MM
TRACOR 222 ECD

D-2000

10/18/89 11:18

SAMPLE: TAG: 47 CH: 2

FILE: 1 CALC-METHOD: AREA% TABLE: 0 CONC: AREA

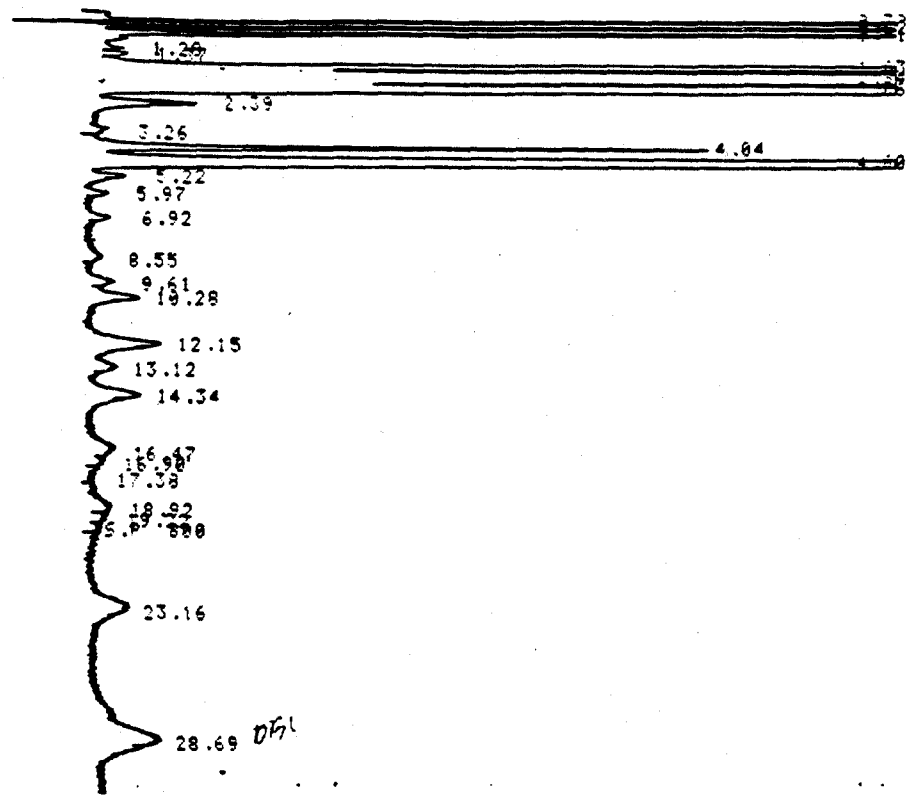
NO.	RT	AREA	HEIGHT	RRT	BC	NAME
1	0.58	2761	822	0.58	BV	
2	0.78	8394	1352	0.78	VV	
3	0.94	50	23	0.94	TBB	
4	1.06	330	98	1.06	TBB	
5	1.32	44679	6537	1.32	VB	
6	2.40	2405	334	2.40	BV	
7	2.55	11152	1216	2.55	VB	
8	6.24	856	33	6.24	BB	
9	6.91	357	27	6.91	BB	
10	9.43	1485	46	9.43	BB	
11	10.44	1109	52	10.44	BB	
12	11.78	1397	56	11.78	BB	
13	13.31	1109	41	13.31	BB	
14	14.98	1223	44	14.98	BB	
15	16.03	758	19	16.03	BB	
16	19.51	823	23	19.51	BB	
17	23.03	2228	50	23.03	BB	
18	25.83	3178	60	25.83	BB	
TOTAL		84294	10833			

PEAK REJ : 0

1001042

N DIRECT ENVIRONMENTAL N2644-013 10/6-10/10/89 UM OW-1

CH. 1 C.S 5.00 ATT 0 OFFS 0 10/18/89 12:17



TEMP: ISO 200 C
CH: OW-1
SET:4MM ID ECD
TRACOR 550A -1
METH'S 608 /509B /8080 /8150

D-2000 10/18/89 12:17

SAMPLE: TAG: 58 CH: 1

FILE: 2 CALC-METHOD: AREA% TABLE: 0 CONC: AREA

NO.	RT	AREA	HEIGHT	RRT	BC	NAME
1	0.38	32177	7414	0.38	BB	
2	0.62	37480	6697	0.62	BV	
3	0.91	13478	3248	0.91	TBB	
6	1.63	17480	3618	1.63	VV	
7	1.84	76794	7423	1.84	VV	
8	2.06	32290	4405	2.06	VV	
9	2.39	1495	152	2.39	VB	
10	3.26	388	24	3.26	BB	
11	4.04	6428	761	4.04	BV	
12	4.60	53065	3585	4.60	VB	
13	5.22	629	43	5.22	DB	
14	5.97	357	26	5.97	BB	
15	6.92	356	24	6.92	BB	
16	8.55	374	19	8.55	BB	
17	9.61	527	28	9.61	BB	
18	10.28	903	51	10.28	BB	
19	12.15	2430	84	12.15	BB	
20	13.12	394	24	13.12	BB	
21	14.34	1876	60	14.34	BB	
22	16.47	780	28	16.47	BB	
23	16.90	494	21	16.90	BB	
25	18.92	480	22	18.92	BB	
27	23.16	2094	43	23.16	BB	
28	28.69	3359	66	28.69	BB	
TOTAL		286000	37868			

PEAK REJ : 299

1001043

ORGANICS ANALYSIS DATA SHEET

SAMPLE NUMBER:VBlank

Contractor: NYTEST ENVIRONMENTAL INC.
Lab Sample ID No:C7609
Sample Matrix: WATER
Data Release Authorized By:

Project No:89-16154
Date Sample Received:10/4/89

VOLATILE COMPOUNDS

Concentration: Low Medium (Circle One)
Date Extracted/Prepared: NA
Date Analyzed:10/11/89
Conc/Dil Factor: 1 pH:
Percent Moisture (Not Decanted): NA

CAS Number		ug/l or ug/Kg (Circle One)
74-87-3	Chloromethane	10.0 U
74-83-9	Bromomethane	10.0 U
75-01-4	Vinyl Chloride	10.0 U
75-00-3	Chloroethane	10.0 U
75-09-2	Methylene Chloride	5.0 J
67-64-1	Acetone	8.0
75-15-0	Carbon Disulfide	5.0 U
75-35-4	1,1-Dichloroethene	5.0 U
75-34-3	1,1-Dichloroethane	5.0 U
540-59-0	Total-1,2-Dichloroethene	5.0 U
67-66-3	Chloroform	5.0 U
107-06-2	1,2-Dichloroethane	5.0 U
78-93-3	2-Butanone	10.0 U
71-55-6	1,1,1-Trichloroethane	5.0 U
56-23-5	Carbon Tetrachloride	5.0 U
108-05-4	Vinyl Acetate	10.0 U
75-27-4	Bromodichloromethane	5.0 U

CAS Number		ug/l or ug/Kg (Circle One)
79-34-5	1,1,2,2-Tetrachloroethane	5.0 U
78-87-5	1,2-Dichloropropane	5.0 U
10061-02-6	Trans-1,3-Dichloropropene	5.0 U
79-01-6	Trichloroethene	5.0 U
124-48-1	Dibromochloromethane	5.0 U
79-00-5	1,1,2-Trichloroethane	5.0 U
71-43-2	Benzene	5.0 U
10061-01-5	cis-1,3-Dichloropropene	5.0 U
110-75-8	2-Chloroethylvinylether	10.0 U
75-25-2	Bromoform	5.0 U
591-78-6	2-Hexanone	10.0 U
108-10-1	4-Methyl-2-Pentanone	10.0 U
127-18-4	Tetrachloroethene	5.0 U
108-88-3	Toluene	5.0 U
108-90-7	Chlorobenzene	5.0 U
100-41-4	Ethylbenzene	5.0 U
100-42-5	Styrene	5.0 U
	Total Xylenes	5.0 U
	Total Dichlorobenzene	30.0 U

Data Reporting Qualifiers

For reporting results to EPA, the following results qualifiers are used. Additional flags or footnotes explaining results are encouraged. However, the definition of each flag must be explicit.

VALUE If the result is a value greater than or equal to the detection limit, report the value.

U Indicates compound was analyzed for but not detected. Report the minimum detection limit for the sample with the U (e.g. 10U), based on necessary concentration dilution actions. (This is not necessarily the instrument detection limit.) The footnote should read U-Compound was analyzed for but not detected. The number is the minimum attainable detection limit for the sample.

J Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1 1 response is assumed or when the mass spectral data indicates the presence of a compound that meets the identification criteria but the result is less than the specified detection limit but greater than zero (e.g. 10J).

C This flag applies to pesticide parameters where the identification has been confirmed by GC/MS Single component pesticides greater than or equal to 10 ng/ul in the final extract should be confirmed by GC/MS.

B This flag is used when the analyte is found in the blank as well as a sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

Other specific flags and footnotes may be required to properly define the results. If used, they must be fully described and such description attached to the data summary report.

nytest environmental inc.

ORGANICS ANALYSIS DATA SHEET

SAMPLE NUMBER: VBlank
Lab Sample ID No.:

Contractor: NYTEST ENVIRONMENTAL INC.
Project No: 89-16154

Tentatively Identified Compounds

CAS Number	Compound Name	Fraction	RT or Scan Number	Estimated Concentration (ug/l or ug/Kg)
1	No Compounds Found	VOA		
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				

ORGANICS ANALYSIS DATA SHEET

SAMPLE NUMBER:Blank

Contractor: NYTEST ENVIRONMENTAL INC.
Project No:89-16154

PESTICIDE/PCBs

Concentration: Low Medium (Circle One)
Date Extracted/Prepared:10/10/89
Date Analyzed:10/14/89
Conc/Dil Factor: 1
Percent Moisture not decanted: 0

GPC Cleanup__Yes _X_ No
Separatory Funnel Extraction __ Yes
Continuous Liquid-liquid Extraction __Yes

1

CAS Number		ug/l or ug/Kg (Circle One)
12674-11-2	Aroclor-1016	1200.00 U
11104-28-2	Aroclor-1221	1200.00 U
11141-16-5	Aroclor-1232	1200.00 U
53469-21-9	Aroclor-1242	1200.00 U
12672-29-6	Aroclor-1248	1200.00 U
11097-69-1	Aroclor-1254	2400.00 U
11096-82-5	Aroclor-1260	2400.00 U

nytest environmental inc.

SURROGATE PERCENT RECOVERY SUMMARY

Laboratory: NYTEST ENVIRONMENTAL INC. Project No:89-16154

	<<<<<<<<<<< VOLATILE >>>>>>>>>>>			<<<<<<<<<<< BASE NEUTRAL >>>>>>>>>>>			<<<<<<<<<<< ACIDS >>>>>>>>>>>			<<PESTICIDES>>
SMO TRAFFIC NO.	TOLUENE-D8 (75-130)	BFB (75-130)	1,2 DICHLORO-ETHANE-D4 (75-130)	NITRO-BENZENE-D5 (10-150)	2-FLUORO-BIPHENYL (10-150)	TERPHENYL-D14 (10-150)	PHENOL-D5 (10-150)	2-FLUORO-PHENOL (10-150)	2,4,6 TRIBROMO-PHENOL (10-150)	** DIBUTYL-CHLORENDATE (10-160)
VBLANK	101	104	86							133
O-1	103	102	88							92
O-2	102	108	97							93
O-3	102	197*	89							38
O-4	107	110	96							55
O-5	106	210*	124							68
OW-1	107	105	94							68

* OUTSIDE QC LIMITS
** ADVISORY LIMITS ONLY

Volatiles 2 out of 21 ; outside of QC limits
Semi-Volatiles out of ; outside of QC limits
Pesticides: 0 out of 7 ; outside of QC limits

Comments:

1001047

nytest environmental inc.

SOIL MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Contractor:NYTEST ENVIRONMENTAL INC.

Project No:89-16154

FRACTION	COMPOUND	CONC. SPIKE ADDED (ug)	SAMPLE RESULT	CONC. MS	% RECOVERY	CONC. MSD	% RECOVERY	RPD	QC LIMITS * RPD	QC LIMITS * RECOVERY
VOA	1,1-Dichloroethene	50.00	0.00	23.32	46.65 *	19.02	38.05 *	21.00	22	59-172
SMO	Trichloroethene	50.00	0.00	47.87	95.75	47.98	95.97	0.00	24	62-137
SAMPLE NO.	Chlorobenzene	50.00	0.00	49.34	98.68	48.46	96.93	2.00	21	60-133
	Toluene	50.00	33.14	84.04	101.79	76.52	86.76	16.00	21	59-139
PSC-BH-3A	Benzene	50.00	0.00	49.39	98.77	48.41	96.81	2.00	21	66-142
B/N	1,2,4-Trichlorobenzene								23	38-107
SMO	Acenaphthene								19	31-137
SAMPLE NO.	2,4-Dinitrotoluene								47	28-89
	Pyrene								36	35-142
	N-Nitroso-Di-n-Propylamine								38	41-126
	1,4-Dichlorobenzene								27	28-104
ACID	Pentachlorophenol								47	17-109
SMO	Phenol								35	26-90
SAMPLE NO.	2-Chlorophenol								50	25-102
	4-Chloro-3-Methylphenol								33	26-103
	4-Nitrophenol								50	11-114
	Lindane	800.00	0.00	250.55	31.32 *	276.62	34.58 *	12.00	50	46-127
PEST	Heptachlor	800.00	0.00	364.79	45.60	398.81	49.85	8.00	31	35-130
SMO	Aldrin	800.00	0.00	348.92	43.62	383.50	47.94	9.00	43	34-132
SAMPLE NO.	Dieldrin	2000.00	0.00	938.13	46.91	980.48	49.02	4.00	38	31-134
	Endrin	2000.00	0.00	1072.30	53.62	1155.49	57.77	7.00	45	42-139
ID 27	4,4'-DDT	2000.00	0.00	462.57	23.13	534.63	26.73	16.00	50	23-134

* ASTERISKED VALUES ARE OUTSIDE QC LIMITS.

RPD:	VOAs	0	out of	5 ;outside QC limits	RECOVERY VOA'S	2	out of	10	;outside QC limits
	B/N		out of	;outside QC limits	B/N		out of		;outside QC limits
	ACID		out of	;outside QC limits	ACIDS		out of		;outside QC limits
	PEST	0	out of	6 ;outside QC limits	PEST	2	out of	12	;outside QC limits

Comments:

1001048

GC/MS TUNING AND MASS CALIBRATION
BROMOFLUOROBENZENE (BFB)

Contractor: NYTEST ENVIRONMENTAL INC.
Instrument ID: E Date: 9/16/89
Lab ID: E4861 Data Release Authorized By: Time: 8:49

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
50	15.0 - 40.0% of the base peak	22.62
75	30.0 - 60.0% of the base peak	45:71
95	Base peak, 100% relative abundance	100.00
96	5.0 - 9.0% of the base peak	8.38
173	Less than 2.0% of mass 174	0.00 [0.00]
174	Greater than 50.0% of the base peak	79.64
175	5.0 - 9.0% of mass 174	5.55 (6.97)1
176	Greater than 95.0%, but less than 101.0% of mass 174	76.55 (96.11)1
177	5.0 - 9.0% of mass 176	5.62 (7.34)2

* Value in parenthesis is % mass 174.
** Value in parenthesis is % mass 176.

THIS PERFORMANCE TUNE APPLIES TO THE FOLLOWING SAMPLES, BLANKS AND STANDARDS.

SAMPLE ID	LAB ID	DATE OF ANALYSIS	TIME OF ANALYSIS
PERFORMANCE STANDARD	E4861	9/16/89	8:49
VST0050	E4862	9/16/89	9:29
VST0080	E4863	9/16/89	10.17
VST0100	E4864	9/16/89	11:04
VST0150	E4865	9/16/89	11:54
VST0200	E4860	9/16/89	12:42

GC/MS TUNING AND MASS CALIBRATION
BROMOFLUOROBENZENE (BFB)

Contractor:NYTEST ENVIRONMENTAL INC.
Instrument ID: C Date: 10/11/89 Time: 9:07
Lab ID: C7607 Data Release Authorized By: Y

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
50	15.0 - 40.0% of the base peak	19.01
75	30.0 - 60.0% of the base peak	39.48
95	Base peak, 100% relative abundance	100.00
96	5.0 - 9.0% of the base peak	8.55
173	Less than 2.0% of mass 174	0.00 [0.00]*
174	Greater than 50.0% of the base peak	72.49
175	5.0 - 9.0% of mass 174	4.34 [5.98]*
176	Greater than 95.0%, but less than 101.0% of mass 174	71.49 [98.61]*
177	5.0 - 9.0% of mass 176	4.57 [6.39]**

* Value in parenthesis is % mass 174.
** Value in parenthesis is % mass 176.

THIS PERFORMANCE TUNE APPLIES TO THE FOLLOWING SAMPLES, BLANKS AND STANDARDS.

SAMPLE ID	LAB ID	DATE OF ANALYSIS	TIME OF ANALYSIS
Performance Standard	C7607	10/11/89	9:07
WORKING STANDARD	C7608	10/11/89	9:43
METHOD BLANK	C7609	10/11/89	10:36
0-1	2644005	10/11/89	11:30
0-2	2644006	10/11/89	12:55
0-3	2644007	10/11/89	14:48
0-4	2644008	10/11/89	16:49
0-5	2644009	10/11/89	19:17
OW-1	2644013	10/11/89	20:54

REFERENCE NO. 37

PRELIMINARY RADIOLOGICAL ASSESSMENT
OF THE
LI TUNGSTEN FACILITY, GLEN COVE, NY

December, 1989

the NDL rganization, inc.

post office box 791 ▪ peekskill, new york 10566 ▪ (914) 737-7200

1001052

PRELIMINARY RADIOLOGICAL ASSESSMENT

OF THE

LI TUNGSTEN FACILITY, GLEN COVE, NY

Prepared for:

Glen Cove Development Corp.
34 Market Place
Baltimore, Maryland 21202

Prepared by:

The NDL Organization, Inc.
PO Box 791
Peekskill, NY 10566

December, 1989

EXECUTIVE SUMMARY

The tungsten refining process at Li Tungsten utilized ores containing low levels of natural thorium and uranium at concentrations averaging 10 to 20 pCi/g. About 2000 cubic yards of unprocessed and semi-processed ore are stored in and around the main factory on parcel A in thousands of decaying drums and crates. Ambient gamma fields near this material ranges from 10 to 30 uR/hr with levels in the 50-500 uR/hr range at 1 cm. Radon, thoron, and airborne long-lived alpha levels measured in the main (Dice) Building are within acceptable levels. The unprocessed and semi-processed ores thus do not present a significant radiological hazard.

After tungsten is removed from these ores, the radionuclides become more concentrated in the waste products which take the form of hard, concrete-like rocks, or slag, and various type of granular material. Radionuclide levels in the waste products approach 1000 pC/g and thus pose an internal radiation hazard if dusts become airborne, and an external radiation hazard by emission of beta-gamma radiation at levels in the 1 to 10 mR/hr range. There are about 500 to 1000 cubic yards of these higher level waste products piled on the ground on all 3 parcels. About 10,000 cubic yards of lower radioactivity soils and other waste materials are also piled on parcels B and C. The presence of any higher activity materials buried at greater depths under these piles is presently unknown. No significant radionuclide migration from the site via surface water run-off was detected.

A small amount of thorium metal processing also was performed at Li Tungsten. About 200 lbs of thorium metal (reading 65 mR/hr), several pails of what may be monazite or zircon sand, and 3 small furnaces with gamma levels in the 10-20 mR/hr range were found. These thorium process materials pose a greater radiological hazard than do the tungsten process materials. Fortunately, there is a small quantity of thorium materials which can be easily packaged and disposed. As of December 11, 1989, 113 cu.ft. of these highly contaminated materials and equipment have been removed from the site. Areas of thorium contamination remaining at the site include: a 1000 sq.ft. asphalted area in parcel A contaminated to 4500 dpm alpha/100 sq. cm.; a 2000 sq.ft. heavily vegetated area in parcel C with soil contaminated to about 1000 pCi/g; and a brick-lined pit behind the laboratory where thorium solutions were known to have been stored.

1001054

This survey identifies 9 specific areas of concern: 7 completely within the controlled area and 2 near the perimeter fence affecting both the controlled and uncontrolled areas. Five of these areas have been remediated in December, 1989. The data presented in this report shows pre-remediation radiation levels, however, when remediated areas are discussed, they are marked with "remediated". The 4 remaining areas include: the heavily vegetated area on parcel C discussed in the preceeding paragraph (~3-5 mR/hr), a pile of 6-12" slag rocks on the northern end of parcel C (~1-3 mR/hr), a pile of large (3 ft diameter) slag rocks along the northern fence of parcel A (~1-3 mR/hr) causing 160 uR/hr through the fence, and buried waste under the north fence of parcel A causing 300 uR/hr near the ground surface on the uncontrolled side of the fence. Remediation of these areas will require excavation with heavy equipment.

In general, the building structural components and factory equipment are not significantly contaminated. Most horizontal surfaces have an easily removable layer of ore dust. However, radiation measurements from many vats and tanks, indicate that their internal surfaces may have been contaminated with radionuclides during the various heating and chemical processing stages of tungsten refining. Closer investigation of the tank and vat interiors should be performed after their contents are characterized and removed.

Standard contamination control procedures outlined in the site safety manual will adequately protect chemical and radiological remediation teams from internal radiation exposure at the site. The remaining sources of significant external radiation (>2 mR/hr) have been roped-off.

Potential for exposure of the public is very low. The 2 areas of concern at the northern fence of the main parcel along Herb Hill Road have elevated radiation levels (0.1-0.3 mR/hr) on the grassy area between the road and the fence. Radiation levels from these sources drop off to background within 4-6 feet of the fence and pose no hazard for persons on foot or in vehicles on Herb Hill Road.

1001055

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1.0 INTRODUCTION

The Li Tungsten facility consists of 26 acres on which exist buildings (over 300,000 sq.ft. of floor area), forested areas, ponds and swampy areas. The site was operated from the 1940's to the 1980's as a tungsten refining and processing facility and is now abandoned.

Tungsten ore, or schelite, was obtained by Li Tungsten from mines in Canada and China. In addition to tungsten, schelite contains the naturally-occurring, thorium and uranium series of radionuclides. These radionuclides are concentrated by the tungsten refining process so that the intermediate and waste products may pose a radiation hazard.

Schematics of the Thorium-232 and Uranium-238 decay series are shown in Figures 1.1 and 1.2. The Uranium-235, or Actinium, series is also present with the U-238 series, but at much lower levels. Radionuclides from these 3 series emit alpha, beta, and gamma radiation and thus pose both external and internal radiation hazards when found in high concentrations.

Approximately 12,000 cu.yards of ores and slags have been found on site. Most of this material occurs in piles on the two forested parcels of land. However, about 2000 cu.yards of material is contained in thousands of decaying drums and crates located in the main plant building.

Thorium occurs naturally in soil at a background level of about 1 pCi/g, or about 9 ppm (ref: NCRP 45). Uranium-238 and its progeny, including Radium-226, occur naturally in soil at a concentration of 0.6 pCi/g (ref: NCRP 45). Thorium concentrations in the various ore samples from the site range from background to 10's of pCi/g. Concentrations in slag, sludge, and other waste products range from 100's to 1000's of pCi/g. For comparison, the limit for unrestricted use, or "clean", soil in New York State Code Rule 38, Table 5 is 500 ppm source material, or 55 pCi/g Thorium or 180 pCi/g Uranium. The limit for radium in soil affected by uranium mines and mills is 5 pCi/g from the surface to 15 cm deep and 15 pCi/g below 15 cm (ref: EPA, 40CFR192 Uranium Mill Tailings Control Act).

Pure thorium is used in metal alloys, as optical coatings on camera lens, in vacuum tubes, and in arc lamps. It historically has been thought of as a bulk, low radioactivity material. "Source material" is a general term referring to thorium or uranium as metal, ore or bulk material. Any industrial or educational institution may possess up to 15 lbs of source material under a general license without regard to specific licensing or regulatory authority except disposal (Ref: NYS Code Rule 38 and NYS Sanitary Code Part 16). Also, possession of ores or products containing less than 500 parts per million (ppm) source material are exempt from licensing (NYS Code Rule 38).

1001057

The predecessor company to Li Tungsten, Wah Chang Trading Company, had a NYS Dept. of Labor radioactive materials license to work with pure thorium and high level thorium ores. About 10 pails and drums of material having thorium series concentrations in the 10,000 pCi/g range have been found. One drum contained about 200 lbs of thorium metal. These are likely remnants of the thorium work which should have been discontinued when the license was terminated in the early 1970's.

2.0 OBJECTIVES

The objectives of this survey are to:

1. assess the types, quantities, and concentrations of radionuclides present at the site;

2. identify radiological hazards that may be encountered by chemical and radiological remediation teams; and

3. identify radiological hazards that may cause exposure to the general public.

4. identify for subsequent removal and disposal up to 15 drums material exhibiting elevated radiation levels over 1 mR/hr.

The present project is intended to be an initial screening survey utilizing survey instruments and approximately 150 soil/process material samples.

3.0 MEASUREMENTS PERFORMED

A map of the site was overlaid with a 25'x25' grid. Gamma radiation exposure levels were measured using a NaI probe, or microR meter, at site locations within each section of the grid. Exposure rates from many radiation sources were investigated and recorded along with ambient exposure rates. A Geiger-Mueller probe in a large area configuration (pancake probe) was also used to investigate the many types of sources found. This probe is sensitive to alpha, beta, and gamma radiation and is more directional then the microR meter. The pancake probe is useful to measure specific sources in the presence of other interfering sources.

An alpha scintillation detector was also used to measure fixed alpha contamination. However, these measurements were of limited use because the source of alpha radiation, the ore, caused self-attenuation of the alpha particles, thus preventing efficient detection. Significant fixed alpha activity was found only in a few areas.

Wipe tests were performed on floors and equipment in the Offices, Laboratory, Wire Plant, and Dice Building to assess removable alpha and beta contamination. They also proved to be of limited usefulness because most of the contamination occurred in the form of low specific activity, ore dust which is not collected by wipes in sufficient quantities to be detected.

Radionuclide concentrations in solid material were investigated by the collection of 152 samples. They included samples of ores, slag, intermediate materials, pond/swamp sediment, and soil. Soil samples were collected both within the plant boundaries and around the perimeter. Normally, 3 samples were collected from each soil sampling location: surface, 6-12", and 12-24" deep. In this way, data concerning radionuclide leaching, migration or burial could be obtained.

The soil and process material samples were analyzed with a gamma spectroscopy system using a high purity germanium detector. Gamma rays from Ac-228 were used to determine the Th-232 concentration, that of Th-234 and Pa-234m were used to determine U-238, and that of Pb-214 and Bi-214 were to determine Ra-226. Gamma rays from other nuclides in the decay chains were analyzed but the results are not listed in this report unless unusual chain equilibria were found. These analyses are useful not only to compare radionuclide concentrations with regulatory guidelines, but also to gain information on the types of processes and materials that were used at Li Tungsten.

Several air samples were collected and analyzed for long lived alpha emitters. The Dept. of Energy's Environmental Measurements Laboratory also conducted thoron (radon-220) measurements in the main plant building. The purpose of air sampling and analyses was to assist in establishing appropriate levels of protection for on-site workers during implementation of remedial actions at the site.

The survey was performed during the period June to September, 1989.

1001059

4.0 RESULTS

4.1 EXTERNAL RADIATION SURVEY

Readings from the microR and GM pancake meters are shown in Appendix A. The microR data is plotted on maps of the plant in Figures 4.1 through 4.4 as a graphical representation using cross hatching of grid sections in which elevated gamma radiation levels were detected.

4.2 WIPE TESTS

The results of wipe samples are shown in Appendix C. Only 2 of the 274 wipes showed significant removable activity.

4.3 AIR SAMPLES

Results of 4 air samples for long-lived alpha activity collected in the Dice Building are shown below:

Table 4.2 - Airborne Alpha Radioactivity Measurements

Sample#	Date	Location	Gross Alpha Conc.
RAD/A-1	6/27/89	Dice Bldg near ore pile	$< 1.7 \times 10^{-13}$ uCi/ml
RAD/A-2	6/27/89	Dice Bldg near roto kiln	$< 1.8 \times 10^{-13}$ uCi/ml
RAD/A-3	6/30/89	Dice Bldg in mixing room	$< 3.8 \times 10^{-13}$ uCi/ml
RAD/A-4	6/30/89	Dice Bldg in mixing room	$< 2.8 \times 10^{-13}$ uCi/ml

NYS Code Rule 38 limit

Public:	2×10^{-12} uCi/ml Th-nat
Occupational:	6×10^{-11} uCi/ml Th-nat

Radon-222 and Radon-220 (Thoron) results obtained by the Dept. of Energy are shown in Table 4.3.

4.4 SOIL/PROCESS MATERIAL SAMPLING

The locations of sample collection are shown in Appendix B. The results of the samples analysis are shown in Table 4.1.

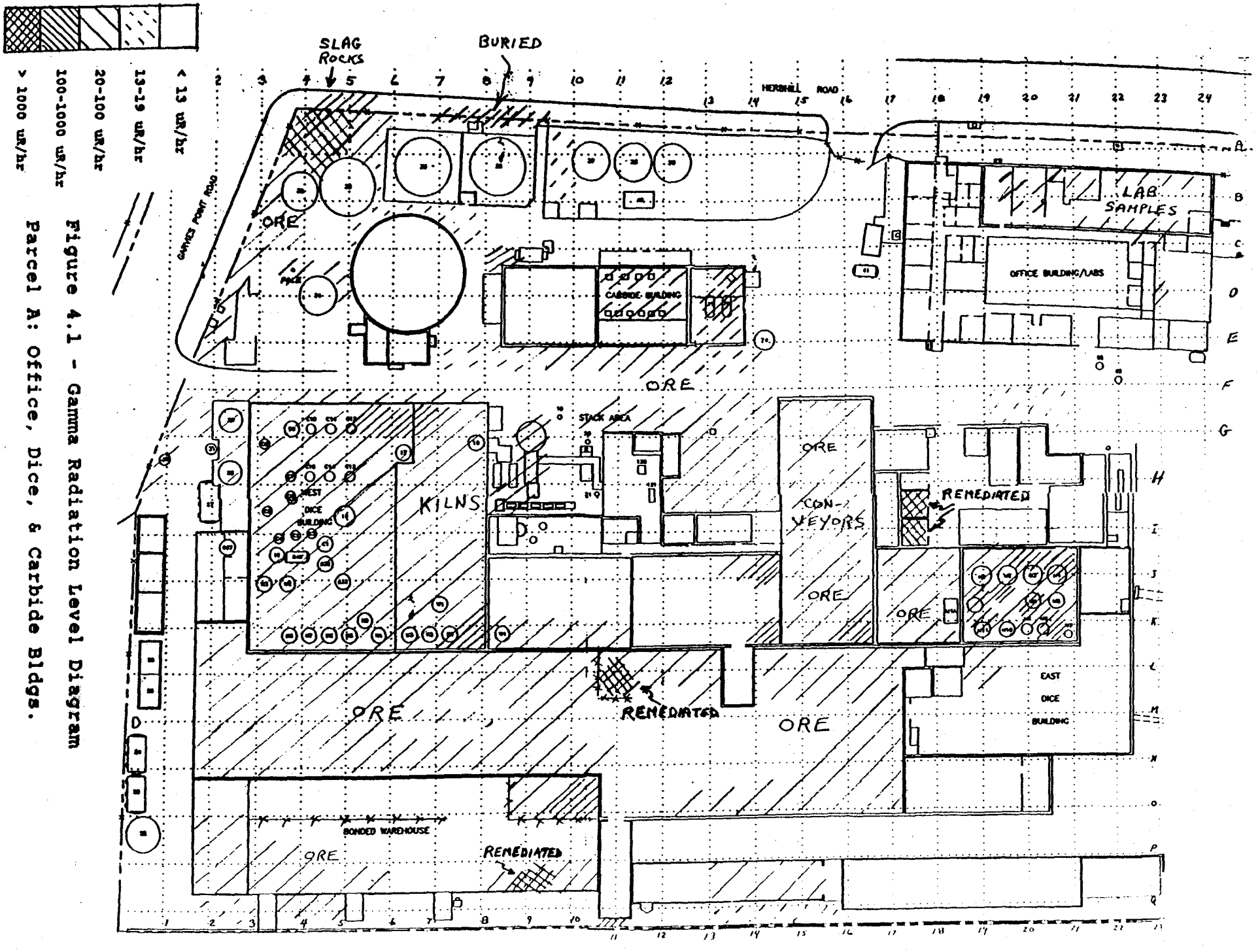


Figure 4.1 - Gamma Radiation Level Diagram

Parcel A: Office, Dice, & Carbide Bldgs.

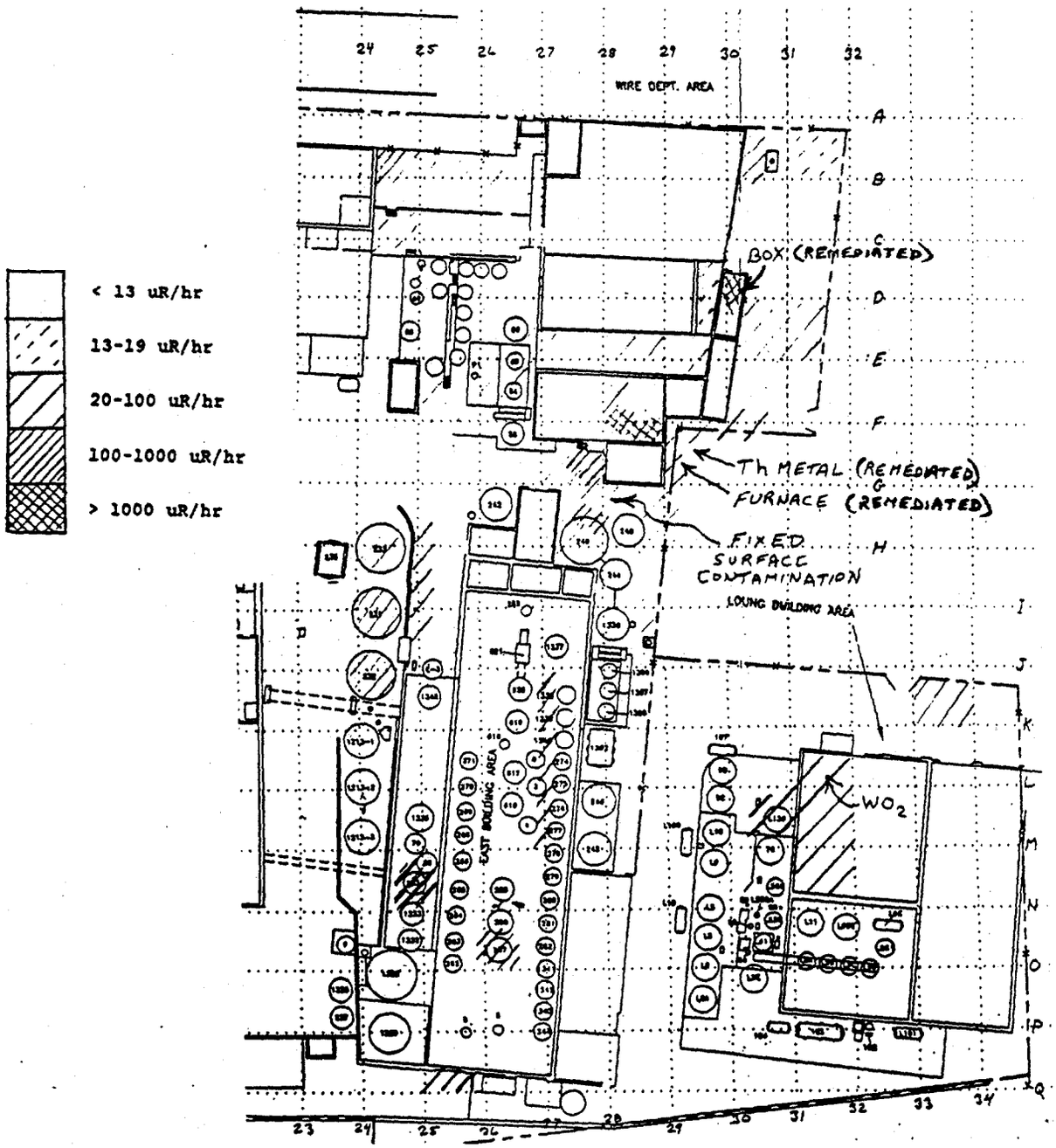


Figure 4.2 - Gamma Radiation Level Diagram

Parcel A: Wire Plant, East Bldg, & Loung Area

101062

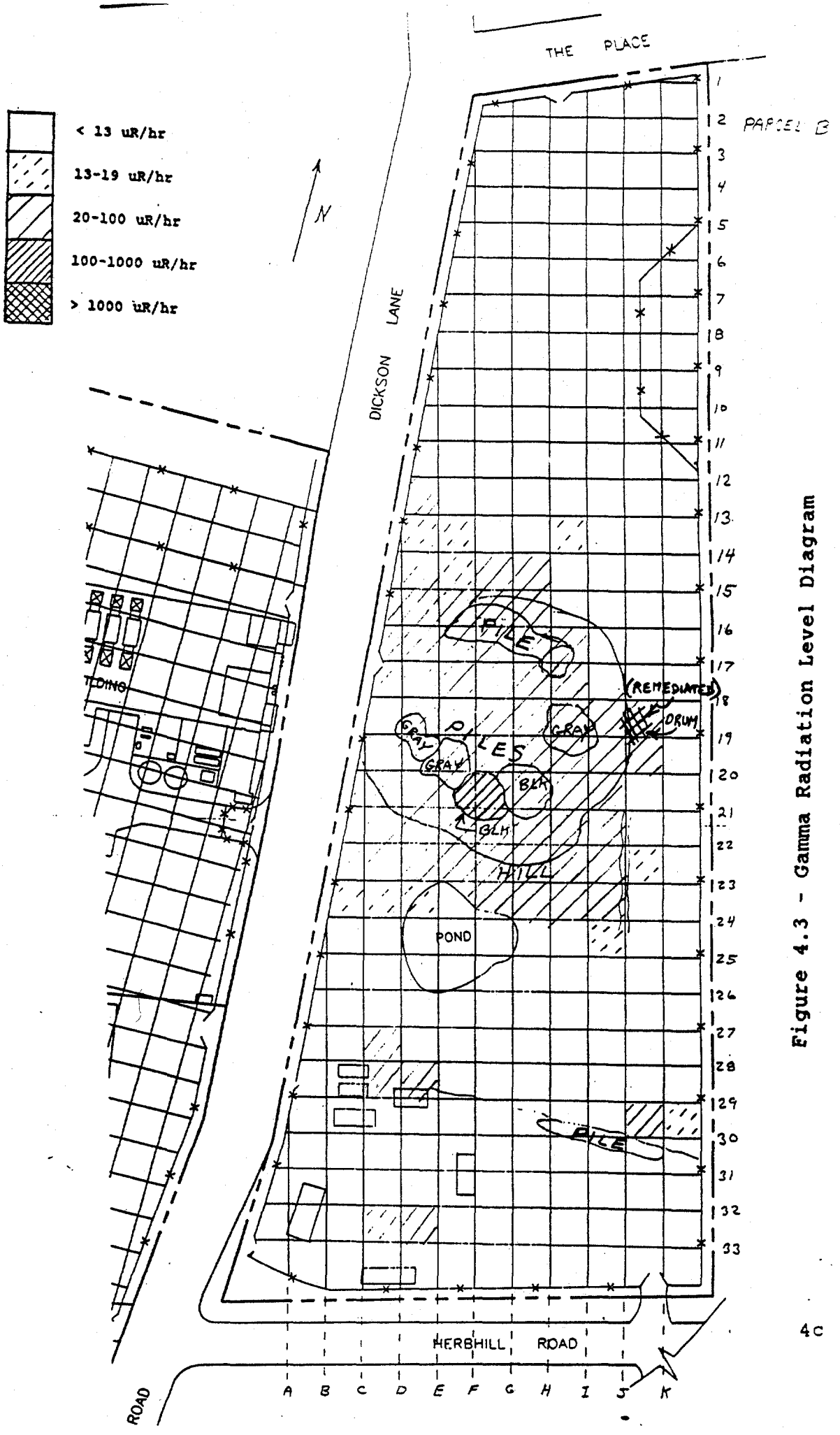


Figure 4.3 - Gamma Radiation Level Diagram

Parcel B

101063

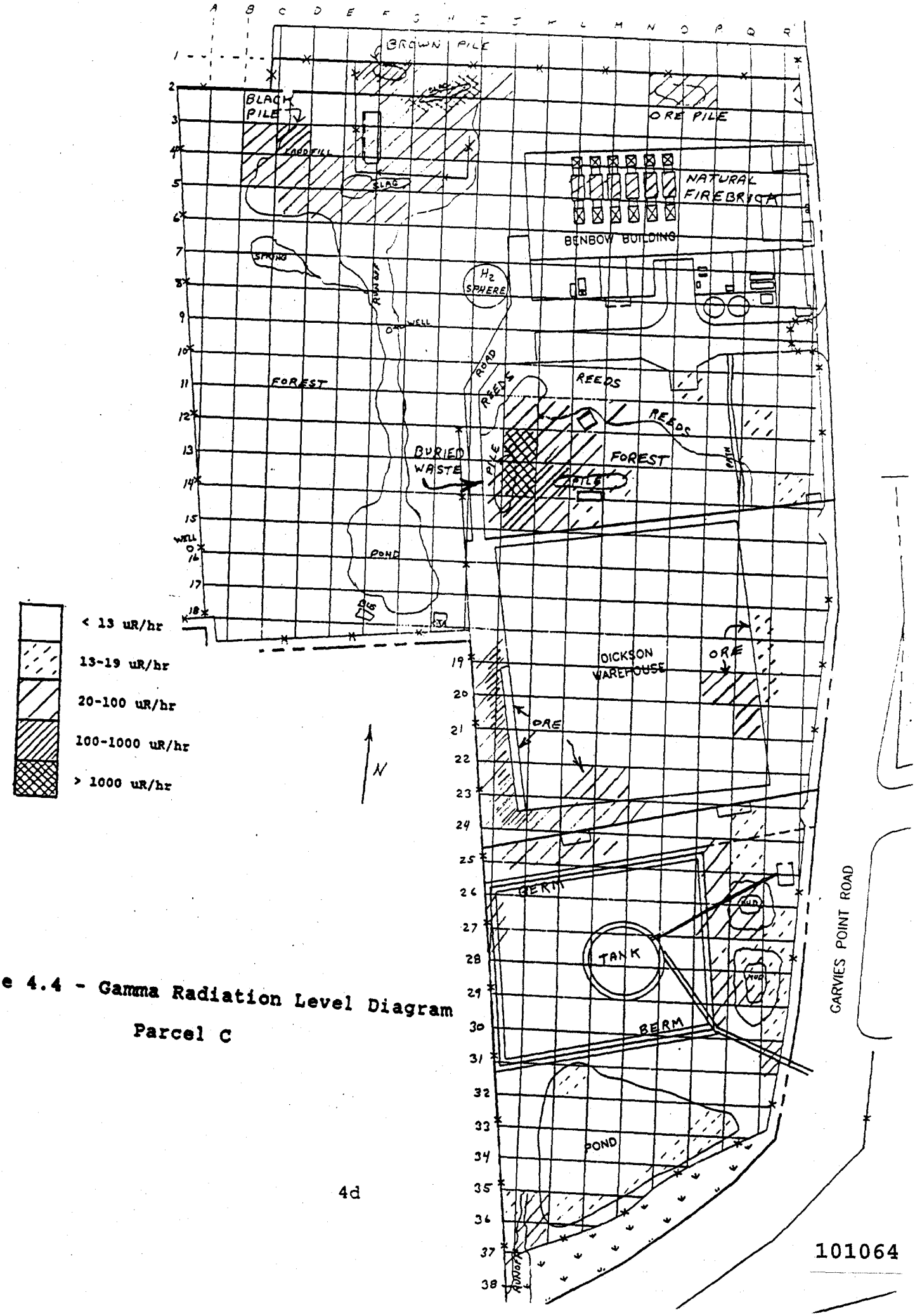


Figure 4.4 - Gamma Radiation Level Diagram

Parcel C

101064

Table 4.1

LI TUNGSTEN SOIL / PROCESS MATERIAL
ANALYSIS

SAMPLE #	WT (g)	PAR-CEL	GRID #	TH-232+ DAUGHTERS (pCi/g)	U-238 + DAUGHTERS (pCi/g)	RA-226 (pCi/g)	CPM READING	uR/hr	SAMPLE DESCRIPTION
P1	105.9	B	D25	1.3 +- 0.4	<1.5 +- 0.0	0.6 +- 0.2	60	10	POND SEDIMENT W SIDE OF POND
P2	108.0	B	G26	1.0 +- 0.4	<2.1 +- 0.0	0.6 +- 0.1	60	28	POND SEDIMENT - E SIDE OF POND
P3	74.7	C	L35	2.5 +- 0.5	<3.0 +- 0.0	1.1 +- 0.2	60	10	POND SEDIMENT - SW SIDE OF POND NEAR OIL TANK
P4	106.0	C	N34	5.2 +- 1.8	19.6 +- 3.7	6.4 +- 0.5	60	14	POND SEDIMENT - E SIDE OF POND NEAR OIL TANK
P5	143.5	C	F17	1.6 +- 0.3	<1.7 +- 0.0	1.0 +- 0.1	60	10	POND SEDIMENT - E OF DICKSON, RUNOFF FROM LANDFILL
1	145.0	A	A5	7.9 +- 0.0	15.6 +- 0.0	2.5 +- 0.3	200	22	BLACK ORE SPILLED - NW CORNER
2	121.0	A	B3	2.6 +- 0.4	<3.3 +- 0.0	2.4 +- 0.2	100	22	BROWN ORE - NW CORNER
3	136.5	A	B4	6.8 +- 2.0	54.0 +- 5.6	64.0 +- 1.0	1000	900	BLACK ORE - NW CORNER
4	126.0	A	C3	4.7 +- 0.0	5.2 +- 0.0	3.2 +- 0.3	100	20	GRAY ORE - NW CORNER
5	110.0	A	F3	9.5 +- 0.0	<9.8 +- 0.0	<2.3 +- 0.0	100	30	LT. BROWN POWDER - NEAR WEST DICE
6	122.0	A	G4	9.1 +- 0.0	96.0 +- 0.0	42.1 +- 0.9	600	25	DK. BROWN GRANULAR - NEAR WEST DICE
7	132.5	A	G5	9.5 +- 1.6	<22.7 +- 0.0	29.9 +- 0.8	600	20	GRAY BROWN POWDER - NEAR WEST DICE
8	167.0	A	A4	175.0 +- 2.0	<90.0 +- 0.0	59.9 +- 1.1	4000	1400	LARGE SLAG BOULDER - NW CORNER
9	146.0	A	F9	12.8 +- 0.9	8.5 +- 2.8	8.7 +- 0.4	300	60	DK. GRAY STONE/GRANULAR
10	143.0	A	F13	3.7 +- 0.2	<3.4 +- 0.0	3.8 +- 0.1	300	20	RED/BROWN IN CRATE
11	113.5	A	K17	80.4 +- 1.9	<32.0 +- 0.0	<2.4 +- 0.0	1000	100	GRAY/BROWN/WHITE IN CRATE P0163 D8 - DICE
12	214.5	A	L16	137.0 +- 2.0	<27.3 +- 0.0	<5.0 +- 0.0	1500	150	GRAY CHUNKS IN PILE - DICE
13	123.5	A	K7	5.4 +- 1.5	<6.2 +- 0.0	6.3 +- 0.4	150	20	GRAY POWDER DRUM D27 - DICE KILN BAY
14	159.5	A	K4	8.9 +- 1.1	<5.6 +- 0.0	6.8 +- 0.4	100	40	BLACK FLOOR DIRT - WEST DICE
15	236.5	A	L3	<1.4 +- 0.0	<4.9 +- 0.0	<1.1 +- 0.0	30	20	BLACK METALLIC FINES F3 - DICE
16	288.3	A	L11	1220.0 +- 5.0	<144.0 +- 0.0	52.1 +- 1.7	10000	1400	GRAY SLAG ROCKS IN DRUM IN FENCE AREA - DICE
17A	191.5	A	Q11	3.9 +- 0.9	<3.6 +- 0.0	1.7 +- 0.3	300	200	SOIL AT BULKHEAD DICE LOADING DOCK - SURFACE
17B	159.5	A	Q11	3.0 +- 1.1	<6.2 +- 0.0	<1.6 +- 0.0	300	300	SOIL AT BULKHEAD DICE LOADING DOCK - 6'
17C	181.5	A	Q11	<4.0 +- 0.0	<4.2 +- 0.0	1.1 +- 0.3	0	80	SOIL AT BULHEAD DICE LOADING DOCK - 12'
18	145.3	A	O14	2.5 +- 0.4	<3.6 +- 0.0	1.7 +- 0.1	60	8	DRAIN IN ALLEYWAY - DICE
19A	185.0	A	Q24	1.6 +- 0.8	<4.6 +- 0.0	1.4 +- 0.2	60	6	SOIL AT BULKHEAD AT EAST BLDG - SURFACE
19B	183.0	A	Q24	<2.6 +- 0.0	4.3 +- 1.2	<1.6 +- 0.0	60	10	SOIL AT BULKHEAD AT EAST BLDG - 12'
19C	172.0	A	Q24	1.2 +- 0.2	<1.6 +- 0.0	0.6 +- 0.1	60	10	SOIL AT BULKHEAD AT EAST BLDG - 24'
20A	140.0	A	B14	5.6 +- 1.1	<4.4 +- 0.0	1.8 +- 0.6	60	10	SOIL NEAR FRONT GATE INSIDE FENCE - SURFACE
20B	171.0	A	B14	1.7 +- 0.2	<1.1 +- 0.0	0.6 +- 0.1	60	10	SOIL NEAR FRONT GATE INSIDE FENCE - 12'
20C	162.3	A	B14	0.9 +- 0.3	<1.2 +- 0.0	0.5 +- 0.1	60	10	SOIL NEAR FRONT GATE INSIDE FENCE - 24'
21A	104.5	A	A8	20.1 +- 1.2	30.2 +- 4.3	10.2 +- 0.5	1300	400	SOIL AT HOT SPOT UNDER NORTH FENCE - SURFACE
21B	135.8	A	A8	114.0 +- 2.3	144.0 +- 9.0	104.0 +- 1.4	3000	600	SOIL AT HOT SPOT UNDER NORTH FENCE - 6'.
21C	138.0	A	A8	111.0 +- 2.0	103.0 +- 8.0	103.0 +- 1.4	0	200	SOIL AT HOT SPOT UNDER NORTH FENCE - 15'
22A	84.7	A	C4	3.2 +- 0.5	<3.4 +- 0.0	1.6 +- 0.1	800	120	SOIL AT UTILITY POLE NEAR POOL - SURFACE
22B	204.0	A	C4	4.4 +- 0.3	<4.5 +- 0.0	1.9 +- 0.1	800	120	SOIL AT UTILITY POLE NEAR POOL - 6'
23A	100.0	A	Q1	4.7 +- 1.4	<6.0 +- 0.0	<2.1 +- 0.0	60	10	SOIL AT BULKHEAD SW CORNER - SURFACE
23B	180.5	A	Q1	3.2 +- 0.8	<3.6 +- 0.0	<2.0 +- 0.0	60	10	SOIL AT BULKHEAD SW CORNER - 6'
23C	215.5	A	Q1	<2.2 +- 0.0	<2.9 +- 0.0	<1.6 +- 0.0	60	10	SOIL AT BULKHEAD SW CORNER - 12' HIT SOLID
24A	166.5	A	G1	22.2 +- 1.0	10.6 +- 2.8	1.3 +- 0.6	60	50	SOIL AT WEST FENCE - SURFACE
24B	194.5	A	G1	30.9 +- 1.0	<13.3 +- 0.0	<1.3 +- 0.0	80	70	SOIL AT WEST FENCE - 4' HIT CONCRETE
25A	163.5	A	Q29	2.4 +- 0.2	<2.1 +- 0.0	1.3 +- 0.1	60	10	SOIL AT BULKHEAD LOUNGE - SURFACE
25B	160.0	A	Q29	1.8 +- 0.4	<2.0 +- 0.0	0.7 +- 0.2	60	20	SOIL AT BULKHEAD LOUNGE - 12'
25C	137.0	A	Q29	8.3 +- 1.4	<15.0 +- 0.0	3.5 +- 0.3	0	20	SOIL AT BULKHEAD LOUNGE - 24'
26A	107.5	A	E31	1.6 +- 0.4	<1.5 +- 0.0	0.7 +- 0.1	60	15	SOIL BEHIND WIRE DEPT. SOUTH - SURFACE
26B	320.5	A	E31	6.9 +- 0.4	<3.2 +- 0.0	1.8 +- 0.2	60	20	SOIL BEHIND WIRE DEPT. SOUTH - 12'
26C	162.5	A	E31	3.0 +- 1.0	<5.1 +- 0.0	<1.0 +- 0.0	0	40	SOIL BEHIND WIRE DEPT. SOUTH - 24'
27A	181.5	A	B30	2.2 +- 0.7	<6.4 +- 0.0	<1.5 +- 0.0	60	10	SOIL BEHIND WIRE DEPT. NORTH - SURFACE
27B	137.5	A	B30	<2.4 +- 0.0	<7.0 +- 0.0	1.3 +- 0.4	60	20	SOIL BEHIND WIRE DEPT. NORTH - 6'
27C	187.0	A	B30	4.1 +- 0.7	<6.0 +- 0.0	1.4 +- 0.2	0	20	SOIL BEHIND WIRE DEPT. NORTH - 12'

28A	158.0	A	B24	3.9 +- 0.4	<6.5 +- 0.0	1.7 +- 0.1	60	10	SOIL BEHIND LAB NEAR SUMP - SURFACE
28B	225.5	A	B24	3.2 +- 0.7	<3.4 +- 0.0	<0.9 +- 0.0	60	10	SOIL BEHIND LAB NEAR SUMP - 12"
28C	207.5	A	B24	1.5 +- 0.6	<3.3 +- 0.0	1.0 +- 0.1	60	10	SOIL BEHIND LAB NEAR SUMP - 24"
29	165.0	A	B24	18.2 +- 0.9	<5.8 +- 0.0	<2.6 +- 0.0	600	200	SOIL FROM BRICK SUMP BEHIND LAB
30A	215.1	A	G27	2930.0 +- 10.0	<142.0 +- 0.0	<12.0 +- 0.0	100	400	YARD DIRT UNDER OUTDR STAIR AT WIRE DEPT
30B	151.3	A	G27	21.0 +- 0.0	<20.0 +- 0.0	<1.3 +- 0.0	1500	400	1" ASPHLT @ STAIR WIRE DEPT 4500 DPM/100SQCM ALPHA
31A	243.5	A	H27	1.7 +- 0.0	<6.0 +- 0.0	2.0 +- 0.2	200	50	YARD DIRT UNDER TANK BETWEEN EAST BLDG & WIRE DEPT
32A	240.0	A	H28	256.0 +- 2.0	<21.6 +- 0.0	<2.8 +- 0.0	200	140	DIRT/SAND AT EAST FENCE NEAR LILCO
33A	120.0	A	C25	3.2 +- 0.7	2.7 +- 1.3	0.8 +- 0.2	200	20	SOIL BEHIND LAB AT END OF PORCH
34	209.3	A	F26	24.7 +- 0.7	18.4 +- 3.3	141.0 +- 0.5	500	80	GRAY POWDER FROM SCOOP ELEVATOR WIRE YARD
35A	130.3	B	K34	1.5 +- 1.1	<3.3 +- 0.0	10.9 +- 0.2	60	10	SOIL SE CORNER - SURFACE
35B	186.0	B	K34	2.1 +- 0.5	<4.2 +- 0.0	1.2 +- 0.1	60	15	SOIL SE CORNER - 6" (UNDERGRD WATER)
35C	170.3	B	K34	1.7 +- 0.8	<2.2 +- 0.0	1.2 +- 0.1	60	15	SOIL SE CORNER - 12" (UNDERGRD WATER)
36A	224.5	B	F34	1.7 +- 0.4	<2.2 +- 0.0	1.4 +- 0.1	60	10	SOIL S SIDE - SURFACE (WET AREA)
36B	298.0	B	F34	1.7 +- 0.4	<3.8 +- 0.0	1.0 +- 0.1	60	12	SOIL S SIDE - 6" (WET AREA)
36C	160.8	B	F34	2.5 +- 0.6	<2.4 +- 0.0	1.7 +- 0.1	60	12	SOIL S SIDE - 12" (WET AREA)
37A	192.5	B	A34	1.3 +- 0.4	<2.7 +- 0.0	0.8 +- 0.1	60	10	SOIL SW CORNER - SURFACE
37B	191.1	B	A34	1.2 +- 0.6	<2.8 +- 0.0	1.0 +- 0.1	60	12	SOIL SW CORNER - 6"
37C	189.5	B	A34	1.3 +- 0.5	<2.0 +- 0.0	0.9 +- 0.1	60	12	SOIL SW CORNER - 12"
38	184.5	B	G21	2.2 +- 0.5	19.2 +- 1.6	1.0 +- 0.1	200	50	BLACK PILE AT 2 0'C
39A	215.0	B	F22	3.6 +- 0.3	<6.2 +- 0.0	2.0 +- 0.1	250	40	SOIL BEHIND RAD/S38 PILE - SURFACE
39B	158.6	B	F22	2.6 +- 0.4	<3.2 +- 0.0	1.8 +- 0.1	250	60	SOIL BEHIND RAD/S38 PILE - 6"
39C	133.0	B	F22	6.0 +- 0.5	<5.0 +- 0.0	2.9 +- 0.2	250	60	SOIL BEHIND RAD/S38 PILE - 12"
40A	137.5	B	D23	22.4 +- 1.3	29.7 +- 4.9	42.8 +- 0.8	300	50	SOIL BETWEEN DROP OFF & POND - SURFACE
40B	222.0	B	D23	3.9 +- 0.7	<7.7 +- 0.0	2.6 +- 0.2	250	30	SOIL BETWEEN DROP OFF & POND - 6"
40C	170.5	B	D23	<4.5 +- 0.0	4.8 +- 2.0	2.8 +- 0.3	200	30	SOIL BETWEEN DROP OFF & POND - 12"
41	147.2	B	F21	20.1 +- 0.9	187.0 +- 5.0	110.0 +- 7.0	1000	250	BLACK PILE AT 3 0'C
42	127.7	B	E20	2.2 +- 0.5	<2.9 +- 0.0	1.2 +- 0.3	60	15	GRAY PILE AT 4 0'C
43	129.3	B	D20	8.7 +- 1.4	<12.5 +- 0.0	1.5 +- 0.5	100	25	GRAY SHALE-LIKE PILE AT 5 0'C
44A	187.2	B	E18	<3.3 +- 0.0	<3.2 +- 0.0	1.1 +- 0.4	60	20	SOIL IN CENTER OF RING OF PILES - SURFACE
44B	198.0	B	E18	1.7 +- 1.0	<6.8 +- 0.0	1.3 +- 0.3	60	17	SOIL IN CENTER OF RING OF PILES - 12"
44C	171.5	B	E18	3.5 +- 0.9	<5.2 +- 0.0	<2.1 +- 0.0	60	17	SOIL IN CENTER OF RING OF PILES - 24"
45	118.0	B	H19	6.0 +- 1.4	6.6 +- 2.3	4.7 +- 0.4	60	25	GRAY PILE AT 12 0'C
46A	133.0	B	I18	4.9 +- 1.2	20.6 +- 3.5	20.4 +- 0.6	200	40	SOIL BEHIND PILES AT 11 0'C - SURFACE
46B	160.0	B	I18	2.6 +- 0.8	<8.9 +- 0.0	3.1 +- 0.3	100	30	SOIL BEHIND PILES AT 11 0'C - 12"
46C	170.5	B	I18	3.4 +- 0.8	5.5 +- 1.9	3.2 +- 0.5	100	30	SOIL BEHIND PILES AT 11 0'C - 24"
47A	152.2	B	F17	<1.6 +- 0.0	<2.2 +- 0.0	<0.4 +- 0.0	100	18	PILE OF SOIL AT 9 0'C
48A	185.0	B	E15	2.2 +- 0.5	<2.0 +- 0.0	1.3 +- 0.1	60	15	SOIL BEHIND PILES AT 9 0'C - SURFACE
48B	195.0	B	E15	1.2 +- 0.7	<1.9 +- 0.0	1.2 +- 0.1	60	12	SOIL BEHIND PILES AT 9 0'C - 6"
48C	200.0	B	E15	1.2 +- 0.7	<2.0 +- 0.0	0.9 +- 0.1	60	12	SOIL BEHIND PILES AT 9 0'C - 12"
49A	169.3	B	H18	16.2 +- 1.1	25.9 +- 3.6	35.3 +- 0.7	400	80	SOIL FROM HOT SPOT AT 11 0'C
50A	110.0	B	F2	1.4 +- 0.4	<3.1 +- 0.0	0.6 +- 0.1	60	10	SOIL FROM NW CORNER - SURFACE
50B	130.0	B	F2	1.8 +- 0.4	<1.3 +- 0.0	0.7 +- 0.1	60	15	SOIL FROM NW CORNER - 12"
50C	157.0	B	F2	1.3 +- 0.3	<2.6 +- 0.0	0.7 +- 0.1	60	15	SOIL FROM NW CORNER - 24"
51A	129.3	B	L1	1.5 +- 0.3	<1.3 +- 0.0	0.6 +- 0.1	60	10	SOIL FROM NE CORNER - SURFACE
51B	159.5	B	L1	1.2 +- 0.3	<2.2 +- 0.0	0.6 +- 0.1	60	15	SOIL FROM NE CORNER - 12"
51C	173.6	B	L1	1.4 +- 0.2	<1.0 +- 0.0	0.6 +- 0.1	60	15	SOIL FROM NE CORNER - 24"
52A	105.2	A	A3	1.8 +- 0.8	<5.5 +- 0.0	<1.5 +- 0.0	60	10	SOIL FROM NE CORNER OUTSD FENCE - SURFACE
52B	205.5	A	A3	0.9 +- 0.2	<1.9 +- 0.0	0.4 +- 0.1	60	17	SOIL FROM NE CORNER OUTSD FENCE - 12"
52C	168.0	A	A3	<1.2 +- 0.0	<1.0 +- 0.0	0.5 +- 0.1	60	17	SOIL FROM NE CORNER OUTSD FENCE - 24"
53A	244.0	A	J29	3.1 +- 0.6	<3.4 +- 0.0	<1.3 +- 0.0	60	10	SOIL BETWEEN EAST & LOUNGE BLDGS - SURFACE
53B	147.0	A	J29	3.3 +- 1.3	<6.8 +- 0.0	1.8 +- 0.3	60	25	SOIL BETWEEN EAST & LOUNGE BLDGS - 12"
53C	140.5	A	J29	6.0 +- 1.2	<9.0 +- 0.0	1.6 +- 0.5	60	25	SOIL BETWEEN EAST & LOUNGE BLDGS - 24"
54A	235.4	C	K38	<2.7 +- 0.0	<5.3 +- 0.0	1.4 +- 0.2	60	10	SOIL FROM RUNOFF N CORNER OUTSD FENCE - SURFACE
54B	228.1	C	K38	<0.6 +- 0.0	<0.8 +- 0.0	0.7 +- 0.1	60	15	SOIL FROM RUNOFF N CORNER OUTSD FENCE - 12"
54C	187.6	C	K38	<0.5 +- 0.0	<1.1 +- 0.0	0.5 +- 0.1	60	15	SOIL FROM RUNOFF N CORNER OUTSD FENCE - 24"
55A	254.0	C	S31	<1.9 +- 0.0	<3.1 +- 0.0	0.6 +- 0.2	60	10	SOIL BY SE FENCE AT UNDGRD OIL PIPE - SURFACE
55B	283.0	C	S31	<1.4 +- 0.0	<3.8 +- 0.0	<0.7 +- 0.0	60	10	SOIL BY SE FENCE AT UNDGRD OIL PIPE - 12"

55C	245.5	C	S31	<1.7 +- 0.0	<2.4 +- 0.0	<1.1 +- 0.0	60	10	SOIL BY SE FENCE AT UNDGRD OIL PIPE - 24'
56A	190.5	C	S24	1.5 +- 0.8	<3.2 +- 0.0	<1.7 +- 0.0	60	10	SOIL BY E FENCE AT GATE E OF DICKSON - SURFACE
56B	174.5	C	S24	1.0 +- 0.4	<1.5 +- 0.0	0.6 +- 0.1	60	18	SOIL BY E FENCE AT GATE E OF DICKSON - 12'
56C	188.0	C	S24	<0.7 +- 0.0	<1.2 +- 0.0	0.5 +- 0.1	60	18	SOIL BY E FENCE AT GATE E OF DICKSON - 24'
57A	233.0	C	S10	<2.1 +- 0.0	<5.1 +- 0.0	0.8 +- 0.4	60	12	SOIL BY E FENCE AT BENBOW GATE - SURFACE
57B	221.2	C	S10	2.4 +- 0.8	<3.1 +- 0.0	<1.6 +- 0.0	60	20	SOIL BY E FENCE AT BENBOW GATE - 12'
57C	228.1	C	S10	1.8 +- 0.7	<3.2 +- 0.0	0.8 +- 0.3	60	20	SOIL BY E FENCE AT BENBOW GATE - 24'
58A	163.8	C	R1	<0.6 +- 0.0	<1.2 +- 0.0	0.7 +- 0.1	60	10	SOIL NE CORNER - SURFACE
58B	172.6	C	R1	0.8 +- 0.4	<1.1 +- 0.0	0.5 +- 0.1	60	15	SOIL NE CORNER - 12'
59A	211.5	C	AA2	<1.0 +- 0.0	<0.9 +- 0.0	<0.4 +- 0.0	60	10	SOIL NW CORNER OUTSD FENCE - SURFACE
59B	198.7	C	AA2	0.5 +- 0.3	<1.0 +- 0.0	0.5 +- 0.1	60	15	SOIL NW CORNER OUTSD FENCE - 12'
59C	209.8	C	AA2	<1.4 +- 0.0	<2.0 +- 0.0	0.5 +- 0.1	60	15	SOIL NW CORNER OUTSD FENCE - 24'
60A	212.0	C	O30	<0.5 +- 0.0	<0.9 +- 0.0	0.6 +- 0.1	60	10	SOIL IN OIL TANK BASIN - SURFACE
60B	203.2	C	O30	<0.9 +- 0.0	<1.0 +- 0.0	0.7 +- 0.1	60	10	SOIL IN OIL TANK BASIN (OILY) - 6'
61A	180.5	C	P27	1.9 +- 0.8	<4.2 +- 0.0	<1.5 +- 0.0	1000	160	SOIL FROM HOT SPOT ON OIL BASIN BERM - SURFACE
61B	194.0	C	P27	5.4 +- 0.0	<6.4 +- 0.0	1.6 +- 0.3	300	80	SOIL FROM HOT SPOT ON OIL BASIN BERM - 12'
61C	177.5	C	P27	<2.1 +- 0.0	<3.3 +- 0.0	<1.5 +- 0.0	300	80	SOIL FROM HOT SPOT ON OIL BASIN BERM - 24'
62A	95.0	C	K13	948.0 +- 7.0	<113.0 +- 0.0	<23.0 +- 0.0	2000	1500	SOIL FROM HOT SPOT IN FOREST N OF DICKSON-SURFACE
62B	179.2	C	K13	278.0 +- 3.0	<45.0 +- 0.0	<3.8 +- 0.0	11000	3000	SOIL FROM HOT SPOT IN FOREST N OF DICKSON - 6'
62C	124.4	C	K13	92.0 +- 2.0	<33.0 +- 0.0	<3.8 +- 0.0	10000	1700	SOIL FROM HOT SPOT IN FOREST N OF DICKSON - 12'
63A	181.0	C	O13	2.9 +- 0.8	<5.2 +- 0.0	1.1 +- 0.4	60	10	SOIL FROM SANDY SPOT N OF DICKSON -SURFACE
63B	141.0	C	O13	<3.9 +- 0.0	<4.8 +- 0.0	1.7 +- 0.5	60	10	SOIL FROM SANDY SPOT N OF DICKSON - 12'
63C	200.7	C	O13	<3.7 +- 0.0	<5.5 +- 0.0	1.1 +- 0.3	60	10	SOIL FROM SANDY SPOT N OF DICKSON - 24'
64A	247.8	C	F10	1.5 +- 0.6	<2.7 +- 0.0	1.1 +- 0.3	60	10	SOIL FROM LANDFILL RUNOFF NEAR SPHERE - SURFACE
64B	189.0	C	F10	1.3 +- 0.0	<3.2 +- 0.0	<0.7 +- 0.0	60	12	SOIL FROM LANDFILL RUNOFF NEAR SPHERE - 6'
64C	207.5	C	F10	<2.1 +- 0.0	<5.6 +- 0.0	0.9 +- 0.3	60	12	SOIL FROM LANDFILL RUNOFF NEAR SPHERE - 12'
65A	177.5	C	C8	<2.6 +- 0.0	<3.0 +- 0.0	<0.8 +- 0.0	60	10	SOIL FROM SPRING S OF LANDFILL
66	207.0	C	E5	2.5 +- 0.7	4.6 +- 1.4	3.1 +- 0.3	200	20	SLAG ROCKS FROM LANDFILL S OF PROPANE TANK
67	217.5	C	C5	<2.0 +- 0.7	<2.7 +- 0.0	1.3 +- 0.3	60	12	SAND FROM LANDFILL SW OF PROPANE TANK
68	209.0	C	E3	<2.2 +- 0.0	<3.8 +- 0.0	1.5 +- 0.2	60	10	MATERIAL FROM LANDFILL AT FENCE NEAR PROPANE TK
69	144.0	C	C4	173.0 +- 3.0	120.0 +- 10.0	134.0 +- 2.0	4000	1000	BLACK PILE IN LANDFILL E OF PROPANE TANK
70	200.5	C	F2	38.3 +- 1.3	<18.0 +- 0.0	88.2 +- 1.0	2000	400	BROWN PILE IN LANDFILL N OF PROPANE TANK
71	161.4	C	H2	283.0 +- 3.0	256.0 +- 15.0	192.0 +- 2.0	10000	1400	SLAG ROCKS FROM LONG PILE NE OF PROPANE TANK
72	235.0	C	G4	<1.7 +- 0.0	<4.3 +- 0.0	1.5 +- 0.2	60	20	MATERIAL FROM LANDFILL IN GULLY E OF PROPANE TANK
73A	238.5	C	L2	<2.6 +- 0.0	<5.4 +- 0.0	1.0 +- 0.3	60	11	SOIL FRM RUNOFF BETWEEN LANDFILL & DICKSON LANE
74A	231.2	C	G13	1.2 +- 0.7	<2.8 +- 0.0	<1.6 +- 0.0	60	10	SOIL FROM LANDFILL RUNOFF NEAR LOWER POND - SURFAC
75A	161.0	C	A18	<0.9 +- 0.0	<1.2 +- 0.0	0.6 +- 0.1	60	10	SOIL FROM MID-SE CORNER
76A	176.0	C	A10	0.7 +- 0.4	<1.3 +- 0.0	0.5 +- 0.1	60	10	SOIL FROM W SIDE AT FENCE
80A	150.0	C	Q27	<2.5 +- 0.0	<8.3 +- 0.0	1.6 +- 0.3	100	20	SOIL FROM MUD POOL S OF WAREHOUSE
81A	202.0	C	Q29	6.2 +- 0.8	<7.3 +- 0.0	5.1 +- 0.3	60	30	SOIL FROM 2ND MUD POOL S OF WAREHOUSE
82	185.9	C	M25	11.0 +- 0.8	9.2 +- 3.5	10.8 +- 0.4	250	20	SPILLED BLACK ORE S OF WAREHOUSE
83A	136.3	C	J27	5.8 +- 1.2	<5.8 +- 0.0	7.7 +- 0.4	60	20	SOIL FROM OIL TANK BERM SW OF WAREHSE, W OF TANK
84A	178.0	C	J31	<3.3 +- 0.0	<3.2 +- 0.0	0.7 +- 0.3	60	10	SOIL FROM OIL TANK BERM, SW OF TANK
85A	324.7	C	K37	0.9 +- 0.5	<1.8 +- 0.0	1.3 +- 0.1	60	20	SOIL FROM SW CORNER POND RUNOFF INSIDE FENCE

TABLE 4.3

LI TUNGSTEN CO., DICE BUILDING

RADON/THORON PROGENY AIRBORNE CONCENTRATIONS

TIME	LOCATION	RADON/THORON AIRBORNE CONCENTRATIONS Bq/m^3 (pCi/l)					WORKING LEVEL(WL)	
		Po-218	Pb-214	Bi-214	Pb-212	Bi-212	GRAB*	INTEGRATING**
8/29/89 10:54 am	East Dice	36.6 (1.0)	8.1 (0.22)	7.4 (0.2)	65.6 (1.8)	11.7 (0.32)	0.23	0.33
8/29/89 11:39 am	West Dice	39.9 (1.1)	32.7 (0.88)	27.2 (.74)	18.2 (.49)	9.95 (.27)	0.07	
8/29/89 12:20 pm	Central Dice	39.6 (1.1)	32.2 (.87)	20.2 (.55)	14.0 (.38)	3.0 (.08)	0.06	0.09
8/29/89 1:00 pm	Outside Entrance	1.72 (.05)	1.3 (.04)	1.1 (.03)	0.01 (.0003)	0.03 (.0008)	4.0E-04	

* Grab filter sample -- Sampling time 30 minutes; Total WL (Rn-222 and Rn-220 progeny)

** Alpha Prism Integrating Monitor -- Sampling time 16.5 hours; Thoron WL (Rn-220 progeny)

Applicable limits for non-occupational exposure:

111 Bq/m^3 (3 pCi/l) Rn-222 and progeny (NYS CR 38)

370 Bq/m^3 (10 pCi/l) Rn-220 and progeny (NYS CR 38)

148 Bq/m^3 (4 pCi/l) Rn-222 and progeny (EPA guidline)

The data in this table were provided by the US Dept. of Energy, Environmental Measurements Laboratory.

5.0 DISCUSSION

5.1 EXTERNAL RADIATION LEVELS

Some materials and equipment have been found to cause gamma radiation levels of 1 to 3 mR/hr @ 1 cm and beta-gamma radiation levels estimated to be up to 65 mR/hr. Radiation levels drop off rapidly as one moves a few feet from a source. Ambient, whole body, gamma radiation fields range from 0.01 mR/hr to 0.03 mR/hr.

Eight specific locations were found to have gamma radiation levels significantly higher than other areas of the plant. These sources emitted gamma radiation levels greater than 1 mR/hr and beta-gamma levels greater than 3 mR/hr. One additional area exhibited elevated gamma levels beyond the property line. These 9 areas of concern are described below:

1. parcel A, grid A4: in yard area near north fence, large slag rocks (~1 meter in diameter) reading 1.4 mR/hr gamma, 10,000 cpm (approx. 3 mR/hr) beta-gamma, 175 pCi/g Th-232, and 60 pCi/g Ra-226; Gamma exposure through fence (property boundary on Herb Hill Road) is 160 uR/hr, dropping to background levels in the street.

2. parcel A, grid Q9 and L11: in Dice Bldg., 1-30 gal. drum and 6 two-gallon pails reading > 3 mR/hr gamma and 12,000 cpm (approx. 3.5 mR/hr) beta-gamma; (remediated)

3. parcel A, grid I17: in Dice Bldg., 1 three-gallon pail and 2 small furnaces (1'x1'x2') reading > 3 mR/hr gamma and 100,000 cpm (approx. 30 mR/hr) beta-gamma; (remediated)

4. parcel A, grid D30: in Wire Plant, 2 two-gallon pails and other bagged materials in a yellow radwaste box reading > 3 mR/hr gamma; (remediated)

5. parcel A, grid F28: in Wire Plant, a 30 gallon drum containing about 200 lbs of thorium metal chunks reading 65 mR/hr beta-gamma and 66,000 pCi/g Th-232 (ref: EPA analysis); and a furnace (3'x2'x2') reading 50,000 cpm (approx. 15 mR/hr) beta-gamma; (remediated)

6. parcel B, grid J19: in heavily vegetated area, corroded 55-gallon drum containing soil, reading > 3 mR/hr gamma and 40,000 cpm (approx. 12 mR/hr) beta-gamma; (remediated)

7. parcel C, grid H2: filled area on north portion, pile (approx 25'x 6' x 3' high) of small slag rocks reading 1.4 mR/hr gamma, 10,000 cpm (approx. 3 mR/hr) beta-gamma, 283 pCi/g Th-232, 256 pCi/g U-238, and 192 pCi/g Ra-226;

8. parcel C, grid J13-14: approx. 2000 sq.ft., heavily vegetated area north of Dickson Warehouse: soil contaminated with suspected pure thorium, reading 3 mR/hr gamma, 15,000 cpm (approx. 4.5 mR/hr) beta-gamma, 948 pCi/g Th-232, and no detectable U-238 or Ra-226;

9. Under north fence, parcel A, grid A8: contaminated soil under controlled area fence approx. 45' long x 4' wide, reading 0.7 mR/hr gamma, 300 cpm beta-gamma, 114 pCi/g Th-232, 144 pCi/g U-238, and 104 pCi/g Ra-226. Radiation levels on uncontrolled side of fence: 300 uR/hr at ground surface, dropping to background levels in the street.

5.2. SURFACE CONTAMINATION

Spilled ore and slag are not considered surface contamination because the radionuclides are trapped within the ore matrix and do not adhere to the surface on which the ore is located. Radionuclide concentrations in the ore and most slags are too low to be detected in quantities collected by wipe tests. Alpha scintillation measurements and wipe tests of surfaces covered with ore dust have not shown any significant radioactivity. The higher level slag rocks and intermediate process materials do show detectable alpha radiation emitted from their surfaces, however, the alpha levels are low relative to the beta-gamma levels emitted.

Only a few areas of the tungsten processing plants showed true surface contamination. Some steel vats in the mixing room of the Dice Building and 1 empty steel tank near the east building with an open inspection port showed total alpha contamination levels of 4000 to 8000 dpm/100 sq cm. Beta-gamma contamination of these surfaces were approximately 1.5 to 2 mR/hr at 1 cm. Contamination of these steel surfaces may have occurred from contact with the various radioactive elements while dissolved in the various acidic or basic solutions used in the tungsten refining process. Many other tanks and vats exhibiting elevated levels of gamma radiation may also prove to have internal surface contamination, however, gaining internal access to test all such items was not possible during this survey due to the presence of unknown and potentially hazardous chemicals.

More surface contamination of floors and equipment was expected in the laboratory and wire plant because about 200 lbs of thorium metal, a thorium process furnace, and thorium contaminated asphalt were found in and around the area. Only 2 wipe samples out of 274 showed any significant alpha contamination.

5.3 ASSESSMENT OF AIRBORNE RADIONUCLIDES

The four air samples collected in the Dice Building for long-lived radionuclides showed no detectable activity. This is expected because there were no machinery, furnaces or other processes operating that would have caused contaminated materials to become airborne.

Radon, an inert gas, will emanate from a stationary pile of radium bearing material even when no mechanical disturbance is occurring. Thus, easily detectable radon levels were found in the Dice Building where most of the ore is stored.

The Radon-220 and 222 daughter concentrations measured by the Dept. of Energy in the Dice Building were relatively low. The highest radon-220 (thoron) daughter concentration found was 1.8 pCi/l (as compared to NYS CR 38 limit of 10 pCi/l for the general public). The highest radon-222 daughter concentration found was 1.1 pCi/l (as compared to NYS CR 38 limit of 3 pCi/l and EPA guideline of 4 pCi/l for the general public).

5.4 RADIOACTIVITY IN SOIL AND PROCESS MATERIALS

5.1.1 Process Materials

There are many different types of ores, intermediate process materials, and waste products present at Li Tungsten. Their colors, densities, and grain size vary widely as can be seen in their descriptions in Table 4.1. These materials (ores, intermediate process materials and waste products) are identified as such from visual observations of containers, labels and their proximity to various types of process equipment.

Ores and intermediate process materials (samples 1-7, 9-15, and 34) stored in and around the Dice Building average 23 pCi/g thorium-232, 27 pCi/g uranium-238, and 21 pCi/g radium-226. Typical concentrations in raw, unprocessed ore are about 10 pCi/g for all thorium and uranium chain nuclides.

Materials thought to be waste products are present on all three parcels. They occur in piles seemingly discarded in out-of-the-way locations. They vary widely in consistency from brown and black powders to hard rocks of slag ranging from a few inches to several feet in diameter. Radionuclide concentrations range from background to over 1000 pCi/g thorium in these materials. Radionuclide concentrations in the waste products are generally greater than those in raw ore because as the tungsten is removed, the mass of the remaining material decreases thus concentrating the radionuclides. Other physical and chemical processes during tungsten refining cause further concentration of certain minerals and radionuclides to very high levels (i.e., > 1000 pCi/g) in selected waste products (see next section).

About 15 to 20 large slag rocks, 3' in diameter, were found on parcel A, having a concentrations of 175 pCi/g Th-232 and 59.9 pCi/g Ra-226.

5.1.2 Chain Equilibria

Samples of unprocessed ore showed both thorium and uranium chain equilibria, i.e., daughter radionuclides were found in approximately equal concentrations to that of the parent radionuclides. Samples of intermediate process materials and waste products showed highly disturbed uranium chain equilibria and slightly disturbed thorium chain equilibria. Uranium chain disequilibrium occurs because of the dissimilar physical properties of uranium and radium, e.g., radium (a calcium analog) will float to the surface of a furnace melt with the slag. The uranium, having a density equivalent to tungsten (19.3 g/cc), will sink to the bottom. Other such separations are likely in the various chemical ore digestion processes that may have been performed at Li Tungsten. Uranium chain disequilibrium will remain for thousands of years because of the long half-lives of the radionuclides.

Thorium chain equilibrium also will be disturbed by physical and chemical processes, however, equilibrium will be restored within 60 years or less because of the relatively short half-lives of the thorium daughter nuclides. Most process material samples at Li Tungsten show thorium chain nuclides to be near equilibrium probably because they are relatively old materials (20-30 yrs).

All process materials showed detectable levels of both uranium and thorium chain nuclides. However, some soil and asphalt samples showed thorium only. This contamination has probably resulted from purification and processing of thorium metals and/or solutions not related to the tungsten process. As discussed above, after thorium purification, the daughter nuclides will grow into equilibrium over a 60 year period. Thus, the age of a batch of pure thorium metal, or contamination resulting from such, can be estimated from the ratio of the daughters to the parent.

5.1.3 Soil

Soils tested around the perimeter of the plant contained radionuclides within normal background concentrations except for sample location 21, grid A8, parcel A. At this location, waste appears to have been buried or spilled along a 45' section of the fence next to Herb Hill Road. Because some of the contaminated soil appears to be outside of the fence, this area is of some concern. However, the contamination seems to covered by a layer of lower level radioactivity soil and sod which should prevent its spread until remediation is performed.

The soil around sample location #17 at the end of the Dice Building loading dock at the bulkhead, showed a general gamma radiation level of 300 uR/hr but near background radionuclide concentrations. The source or volume of contaminated soil may have been relatively small and thus was missed when the soil samples were collected.

One area of highly contaminated soil was found in the heavily vegetated area, north of Dickson Warehouse (sample location # 62). This area is cluttered with heavy debris such as concrete slabs, rusted drums, and piles of soil, wood, and rocks. Sample 62A (948 pCi/g thorium) consisted of rich, forest humus, not rocky slag as would be expected from observation of other hot spots. No U-238 or Ra-226 were detected in these samples. These facts indicate that a highly concentrated thorium powder or liquid were deposited there. Th-232 daughters were in about 75% equilibrium indicating that the age of the contaminant is about 30-40 years. This age range is also supported by the presence of trees growing from the contaminated area that are about a foot in diameter.

5.1.4 Contaminated Asphalt

Another location where concentrated thorium was thought to have been spilled is on an asphalted area between the wire department and the East Building (Sample locations 30, 31 and 32). Fixed alpha levels on the asphalt were about 4500 dpm/100 sq cm and gamma levels about 400 uR/hr at 1 cm. No U-238 or Ra-226 were detected in the samples. The surface of the asphalt was mostly free of ore dust.

5.1.5 Potential for Radionuclide Migration

Three pond, or swampy, areas exist on the site from which five sediment samples were collected. Samples P1 (parcel B, grid D24) and P2 (parcel B, grid G26) did not exhibit elevated levels of radionuclides. The presence of contaminated soil and waste piles uphill and adjacent to the pond suggests that there is very limited contaminant migration away from the piles. A similar situation exists at the filled area on the north portion of parcel C. While a large quantity of contaminated materials exist there, samples collected from run-off swales (sample 73, grid L2; sample 72, grid H4; sample 64, grid G10) and a downhill pond (sample P5, parcel C, grid F17) showed background levels of radionuclides.

Sediment samples P3 (grid L35) and P4 (grid P34,35) from the pond near the large oil tank on parcel C did should slightly elevated concentrations. Soil samples 84 (parcel C, grid K37) and 54 (parcel C, grid K38) from the run-off swale southwest of the pond, indicate that radionuclides were not being significantly transported from the site via surface water run-off.

5.1.6 Materials in Large Tanks

Several large tanks (5000 - 20,000 gallon cap.) emit gamma radiation levels of 30 to 100 uR/hr. They include tank numbers: 231, 232, 233, 1334 (empty), L138, 287, K4, K5, K6, K7, K8, and K9. Some are constructed of wood, others of steel. These readings indicate that contaminated liquid, contaminated sludge, or contaminated interior walls are present within the tank. Other tanks in the East Dice and West Dice Buildings may also emit elevated levels of gamma radiation, however, higher levels of gamma radiation from nearby piles of solid process materials may have masked radiation emitted from the tanks.

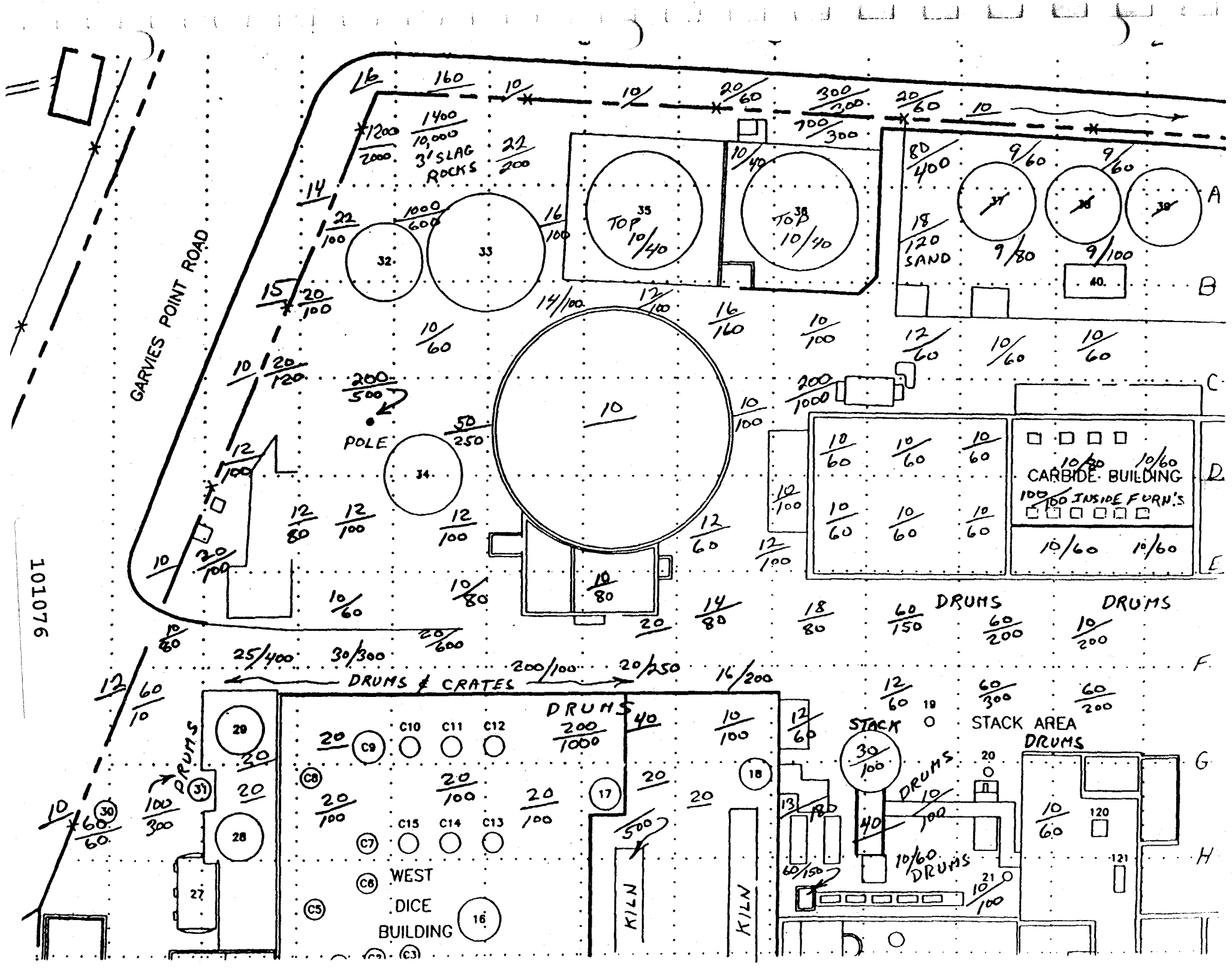
Samples of the liquid contents of many tanks were collected by Direct Environmental, Inc, in November, 1989. Gamma spectroscopic analyses show very low radionuclide concentrations (see Appendix D). The three outdoor, wooden tanks (231, 232 and 233 on parcel A, grid 24-I,J,K), reading 80-100 uR/hr, are filled with what appears to be clean rainwater. Thus, the walls themselves must be the source of the radiation. Tank # 1334 (parcel A, grid 24N), an empty steel tank with an open port, had slightly contaminated internal walls reading about 1000 cpm on the GM pancake probe and 1600 dpm/100 sq.cm. total alpha. Sludge samples from the tanks have not be studied at this time.

APPENDIX A

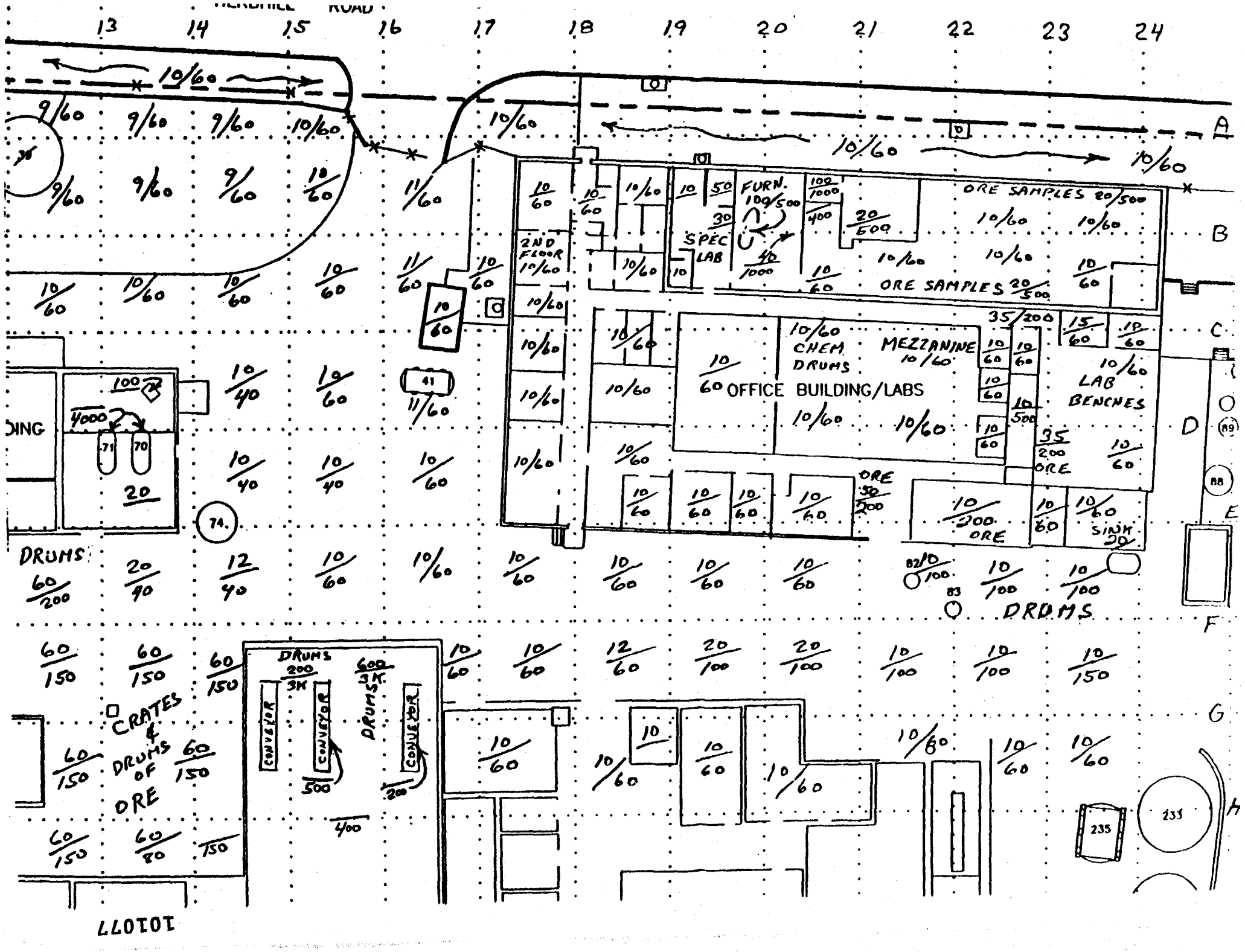
GAMMA RADIATION LEVELS AND GM READINGS

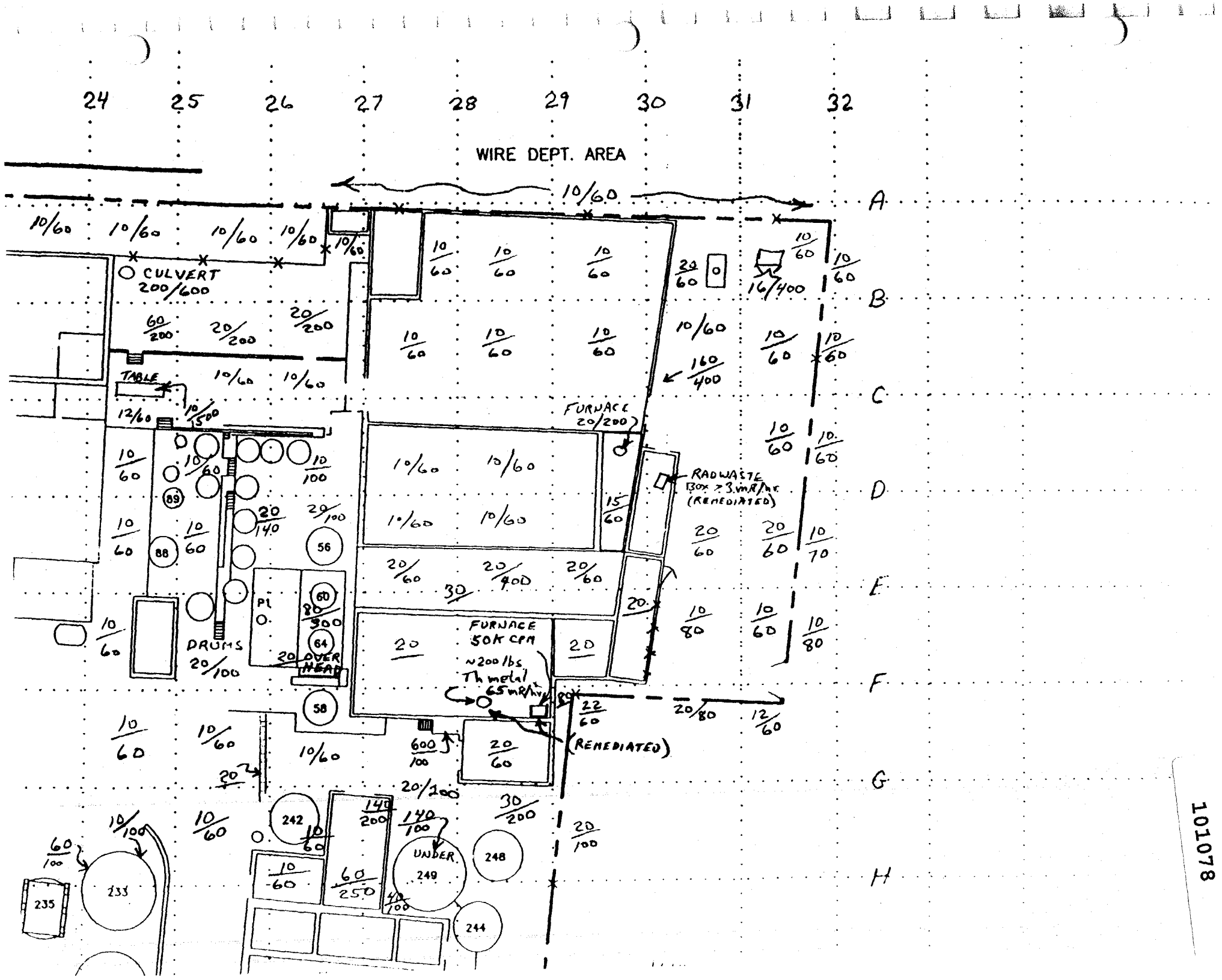
KEY:

uR/hr	<-----	microR meter reading
---		
cpm	<-----	GM pancake probe reading

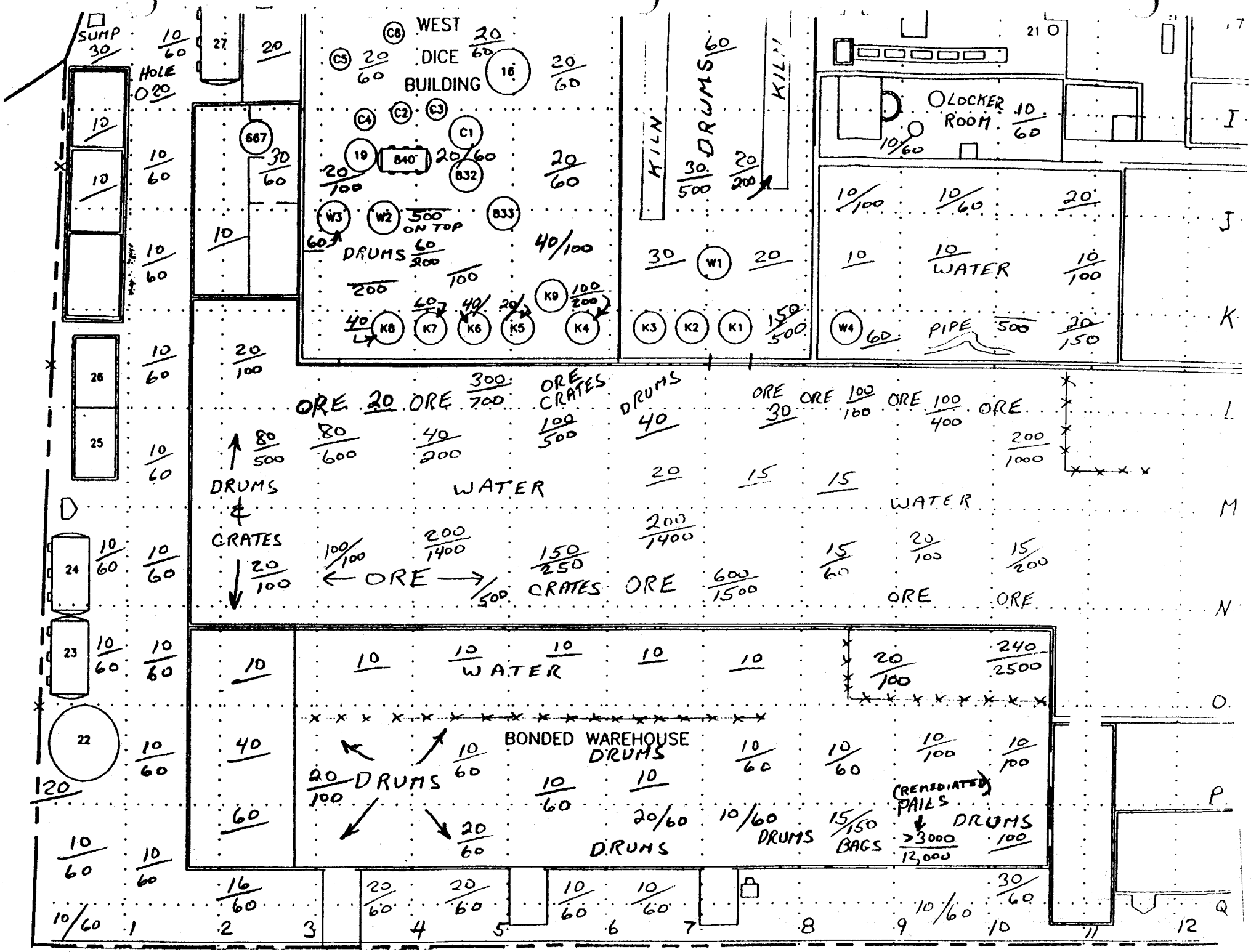

GARVIES POINT ROAD
3' SLAG ROCKS
TOP
TOP
SAND
POLE
CARBIDE BUILDING
INSIDE FURN'S
DRUMS
DRUMS
DRUMS & CRATES
DRUMS
DRUMS
STACK
STACK AREA
DRUMS
DRUMS
DRUMS
WEST
DICE
BUILDING
KILN
KILN
A
B
C
D
E
F
G
H

101076

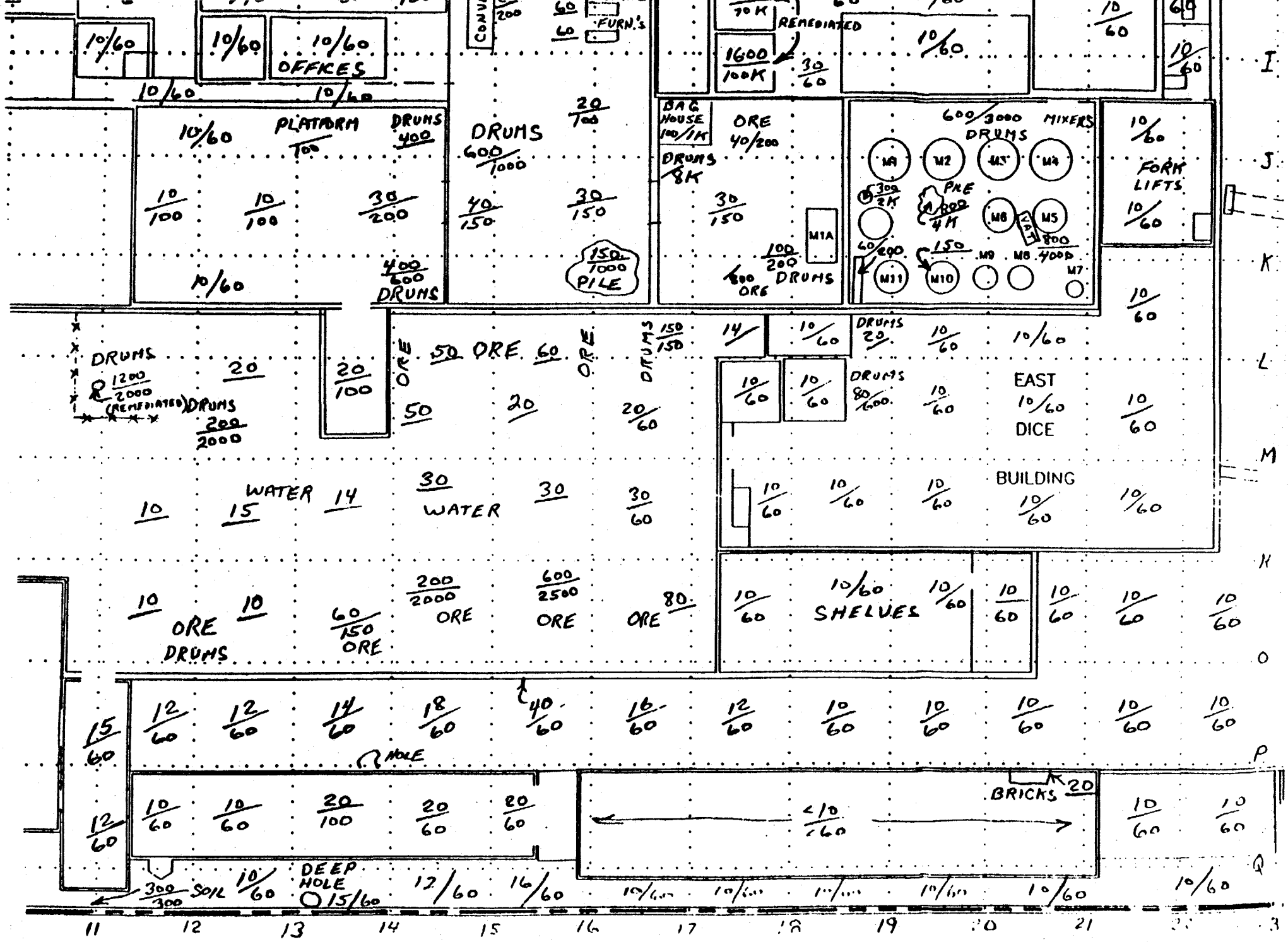

HERBRICE ROAD
13
14
15
16
17
18
19
20
21
22
23
24
A
B
C
D
E
F
G
H
OFFICE BUILDING/LABS
MEZZANINE
CHEM DRUMS
ORE SAMPLES
SPEC LAB
FURN.
2ND FLOOR
LAB BENCHES
SINK
ORE
DRUMS
CRATES & DRUMS OF ORE
CONVEYOR
DING
LLOIOI


24
25
26
27
28
29
30
31
32
A
B
C
D
E
F
G
H
WIRE DEPT. AREA
10/60
CULVERT
200/600
TABLE
FURNACE
20/200
RADWASTE
BOX > 3 mR/hr
(REMEDIATED)
DRUMS
20/100
OVER HEAD
FURNACE
50K CFM
~200 lbs
Th metal
65 mR/hr
(REMEDIATED)
UNDER
89
88
56
60
64
58
242
249
248
244
235
233

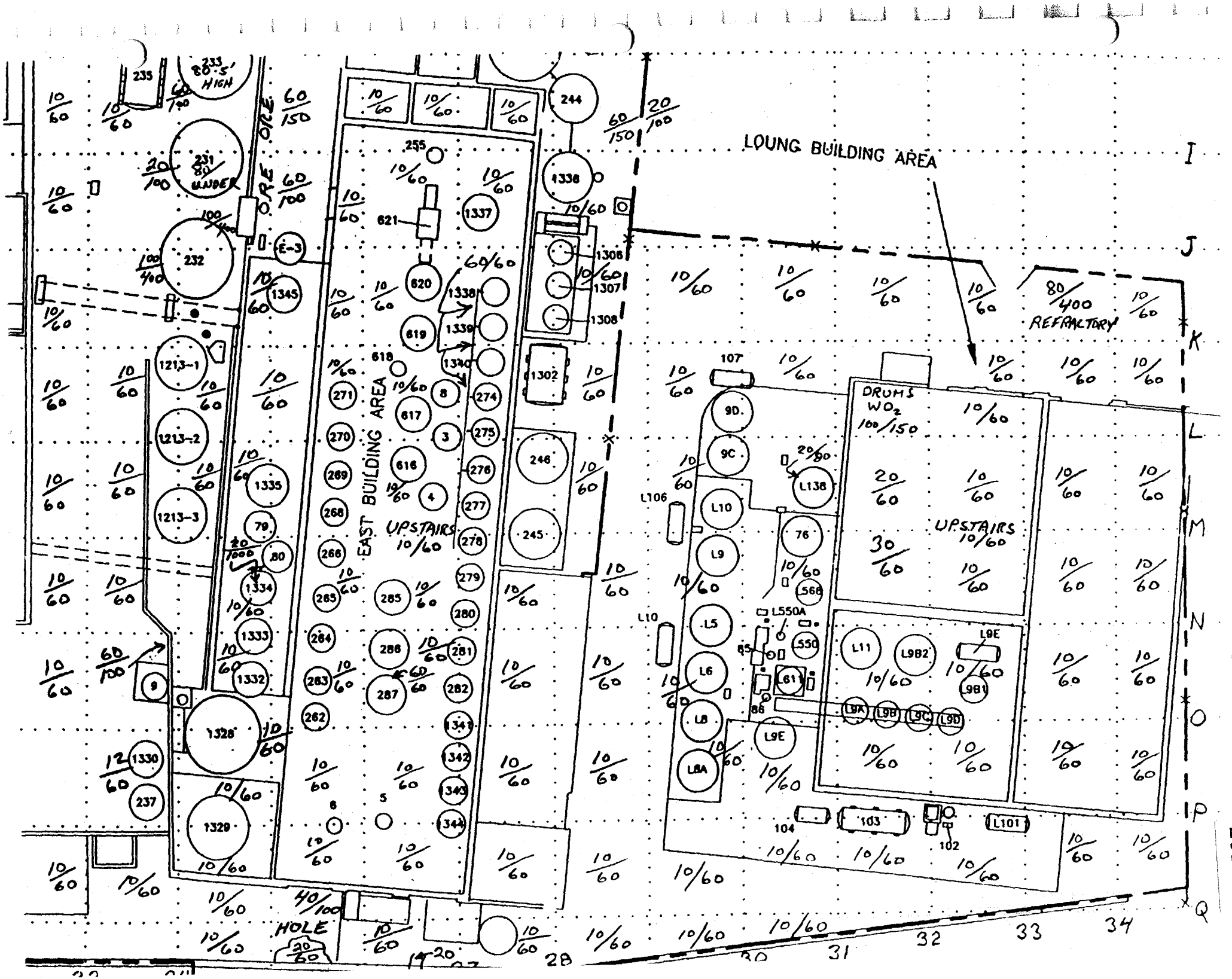
101078


SUMP
HOLE
WEST DICE BUILDING
KILN
DRUMS
KILN
LOCKER ROOM
WATER
PIPE
ORE
ORE CRATES
DRUMS & CRATES
WATER
ORE
CRATES
ORE
WATER
BONDED WAREHOUSE
DRUMS
DRUMS
DRUMS
DRUMS
(REMEDIATED) PAILS
DRUMS
BAGS
DRUMS

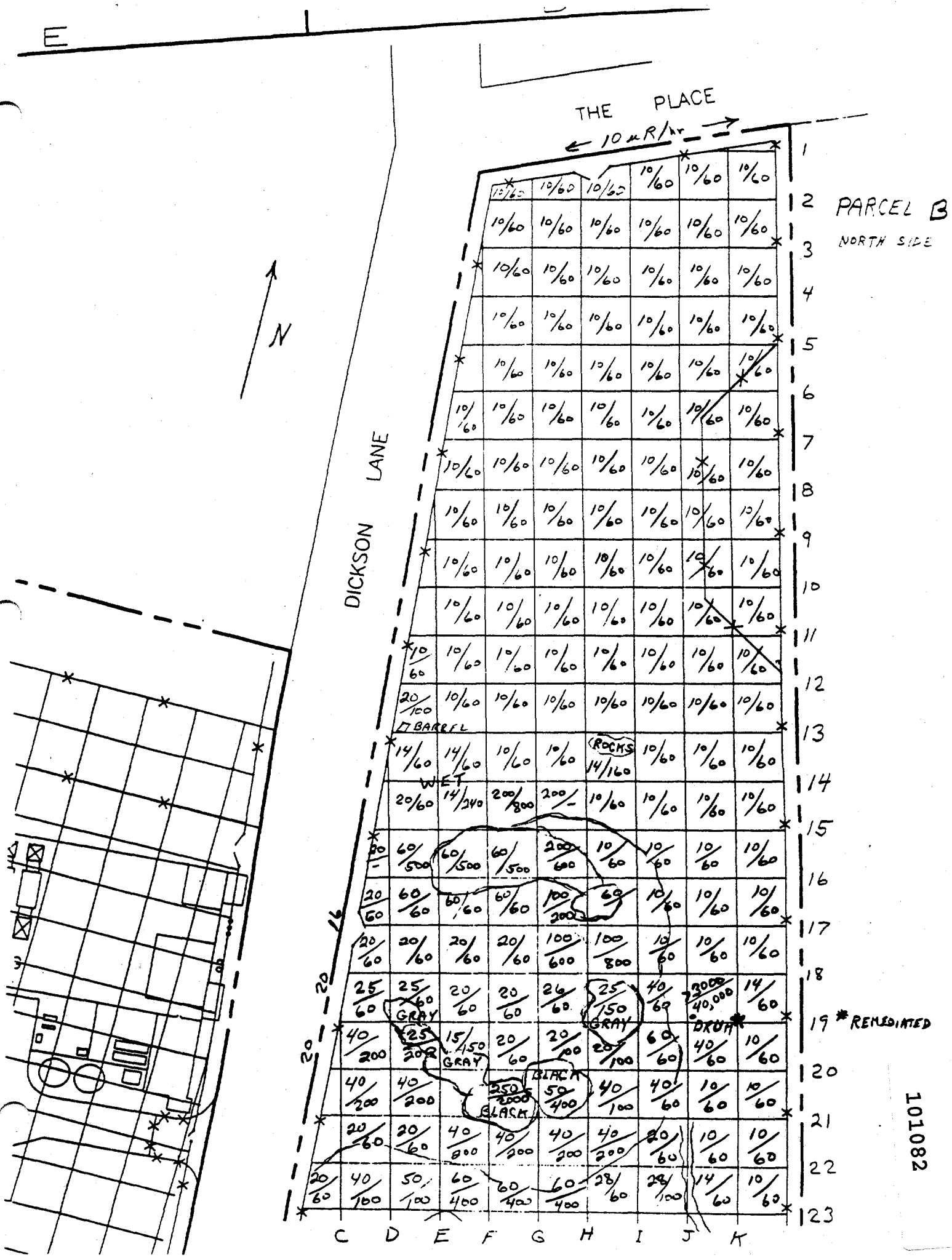
101079


OFFICES
PLATFORM
DRUMS
DRUMS
PILE
BAG HOUSE
ORE
DRUMS
REMEDIATED
MIXERS
FORK LIFTS
EAST
DICE
BUILDING
WATER
ORE
SHELVES
BRICKS
HOLE
DEEP HOLE
SOIL
I
J
K
L
M
N
O
P
Q
11
12
13
14
15
16
17
18
19
20
21

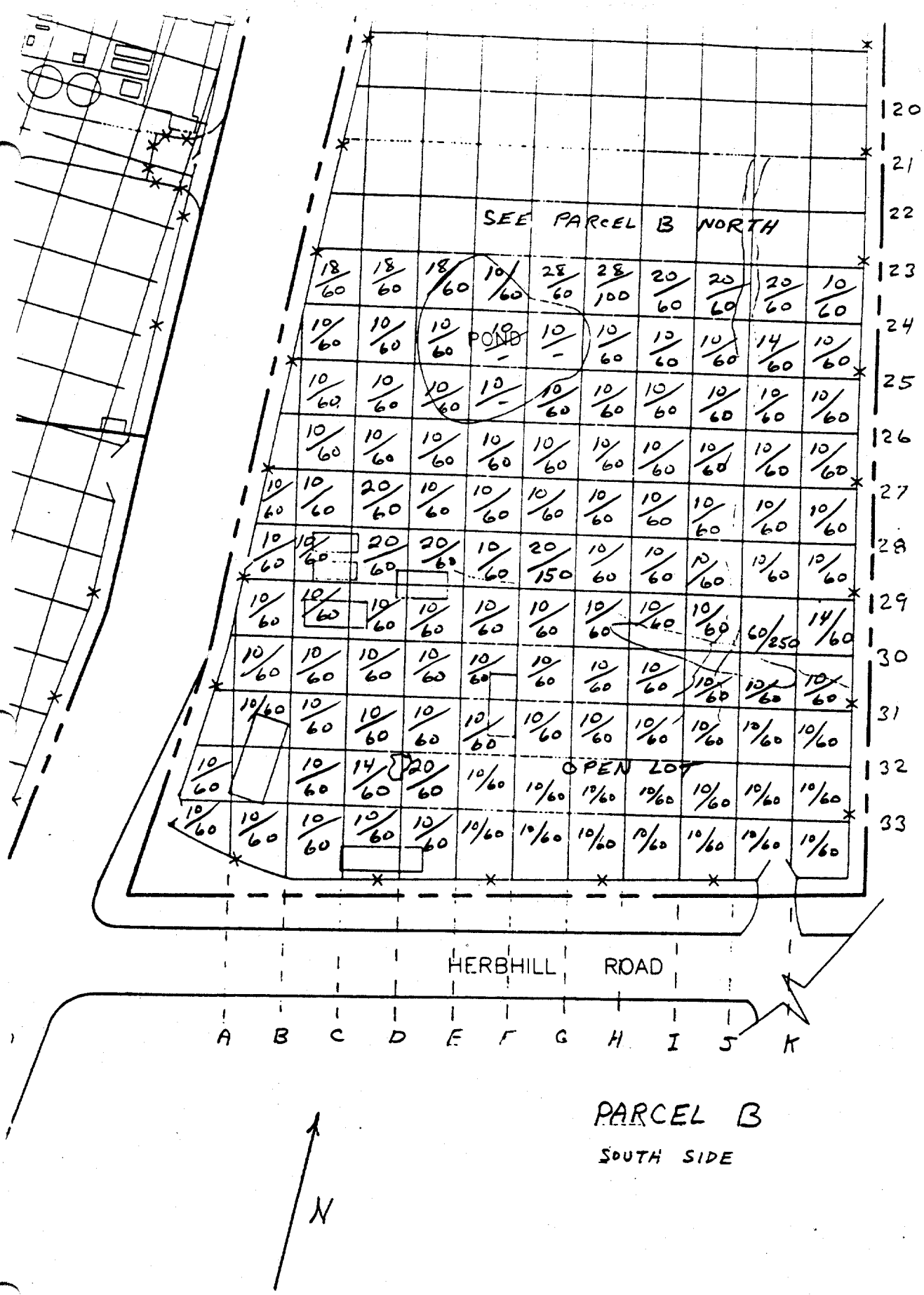
101080


LOUNG BUILDING AREA
EAST BUILDING AREA
UPSTAIRS
DRUMS
WO2
REFRACTORY
ORE
HOLE
UNDER
HIGH
I
J
K
L
M
N
O
P
Q
28
31
32
33
34

101081


E
THE PLACE
10 uR/hr
N
DICKSON LANE
PARCEL B
NORTH SIDE
BARREL
ROCKS
WET
GRAY
BLACK
DRUM
* REMEDIATED
C D E F G H I J K
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23

101082



PARCEL B

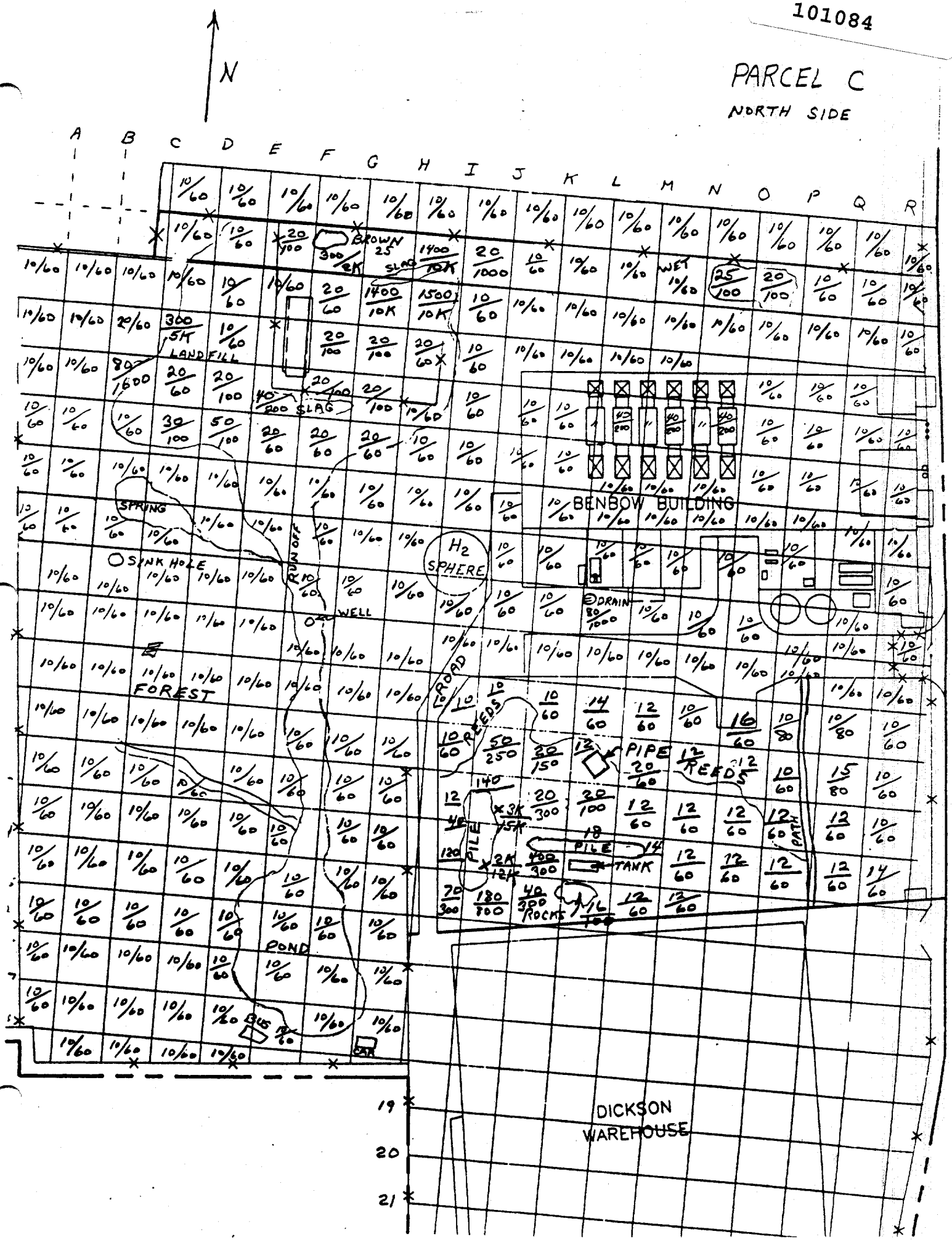
SOUTH SIDE

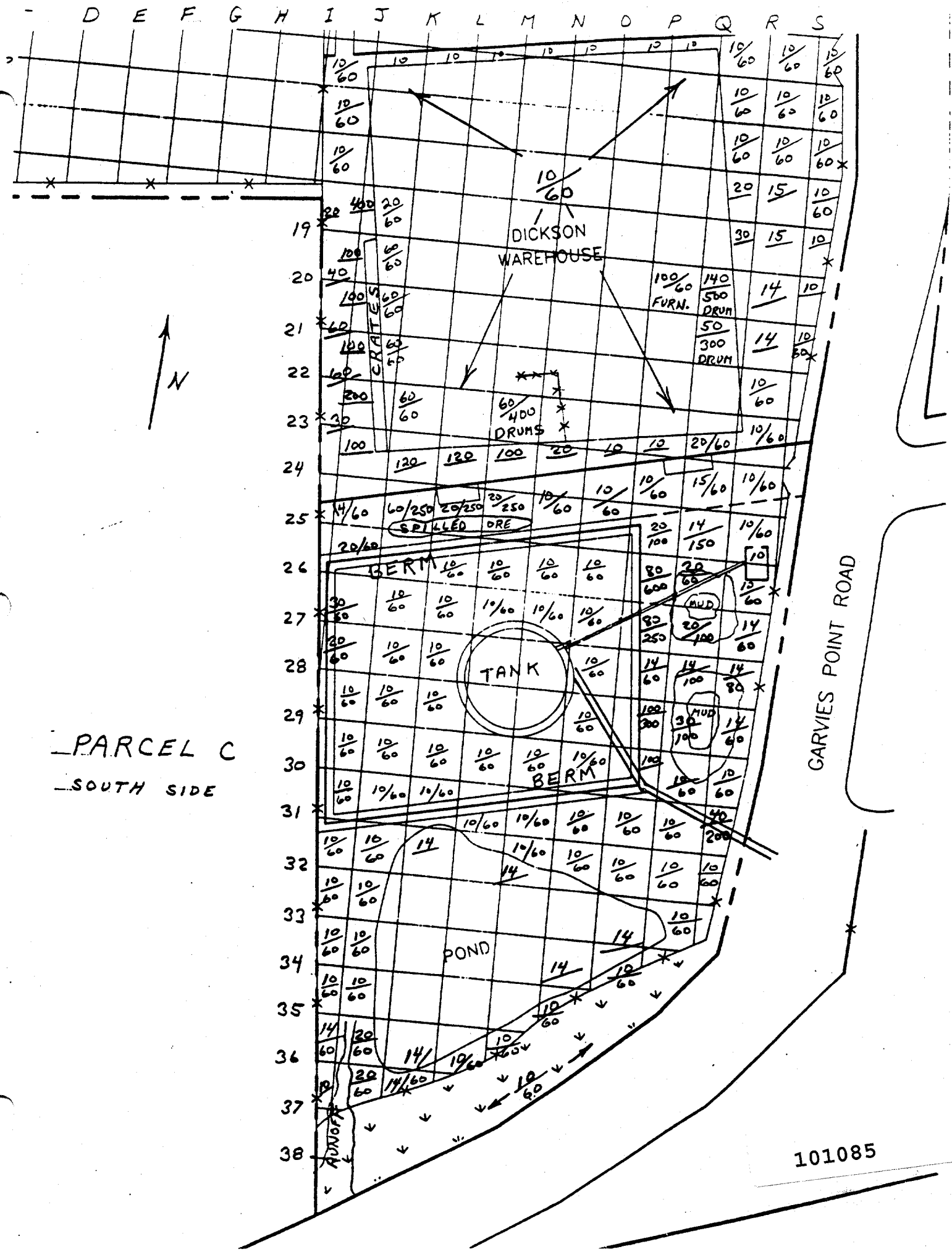
101083

101084

PARCEL C

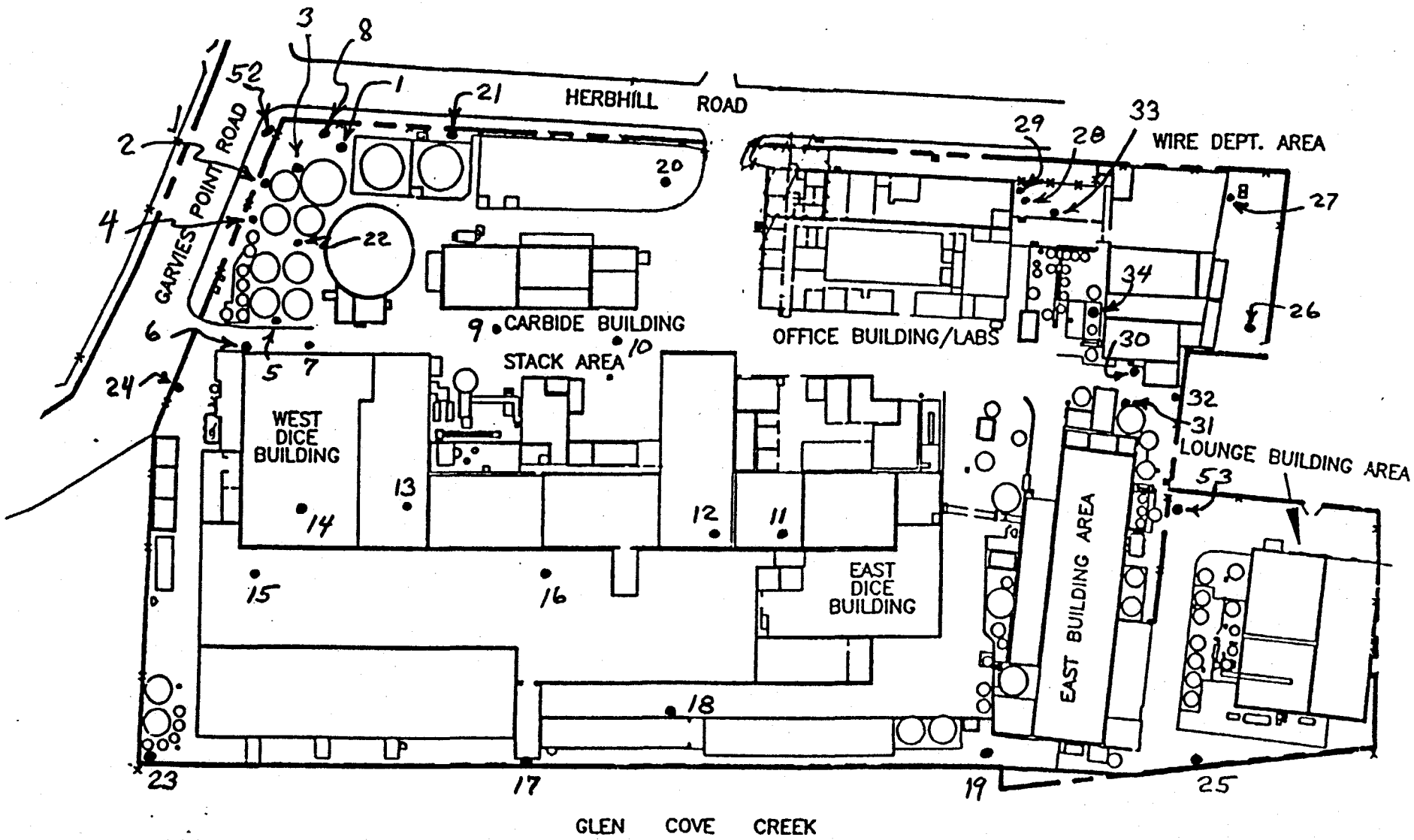
NORTH SIDE




D E F G H I J K L M N O P Q R S
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
N
DICKSON WAREHOUSE
CRATES
FURN.
500 DRUM
300 DRUM
400 DRUMS
SPILLED ORE
BERM
TANK
MUD
POND
RUNOFF
PARCEL C
SOUTH SIDE
GARVIES POINT ROAD
101085

APPENDIX B

SOIL AND PROCESS MATERIAL SAMPLE LOCATIONS


HERBHILL ROAD
GARVIES POINT ROAD
WIRE DEPT. AREA
CARBIDE BUILDING
STACK AREA
OFFICE BUILDING/LABS
WEST DICE BUILDING
EAST DICE BUILDING
EAST BUILDING AREA
LOUNGE BUILDING AREA
GLEN COVE CREEK
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
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26
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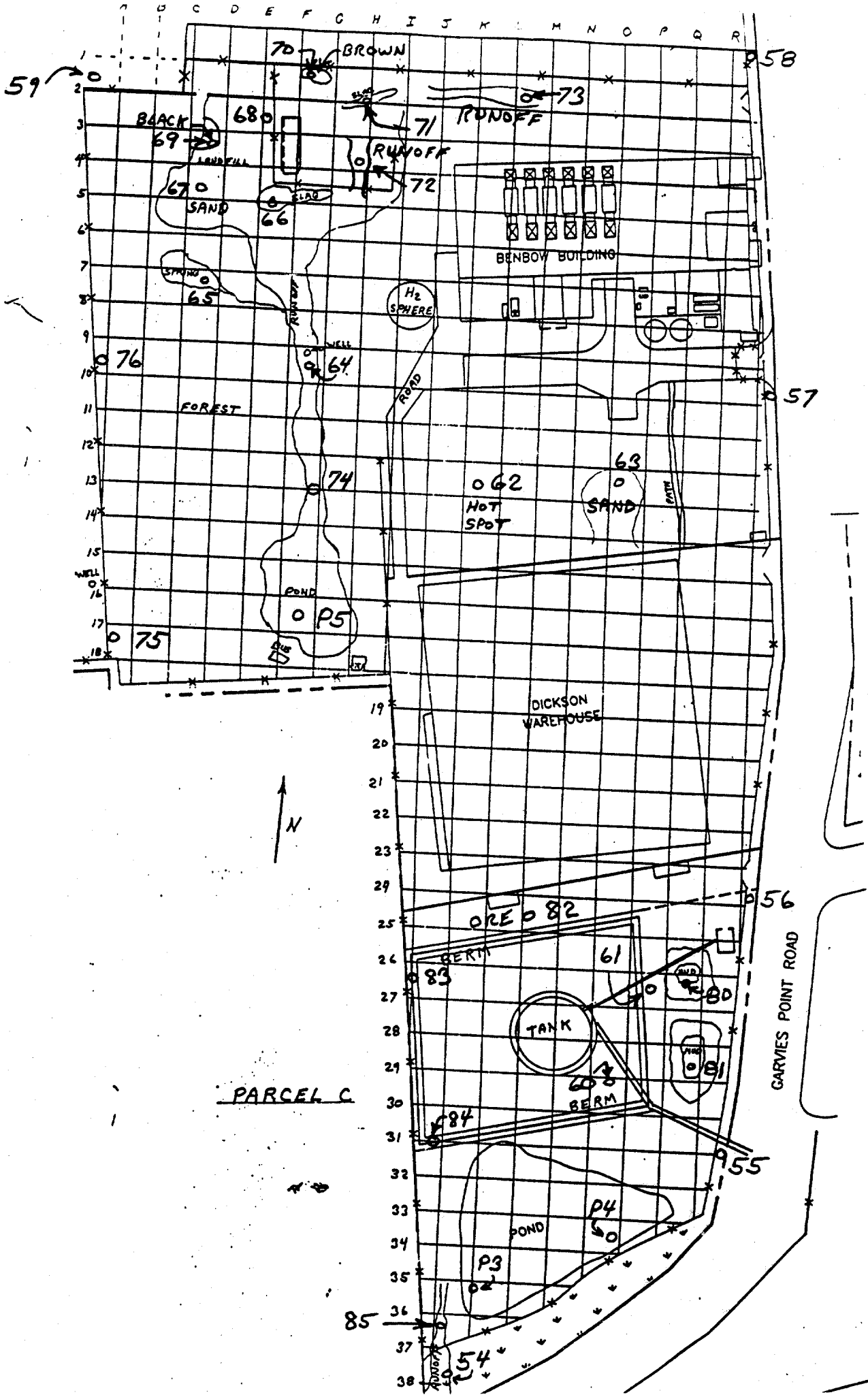
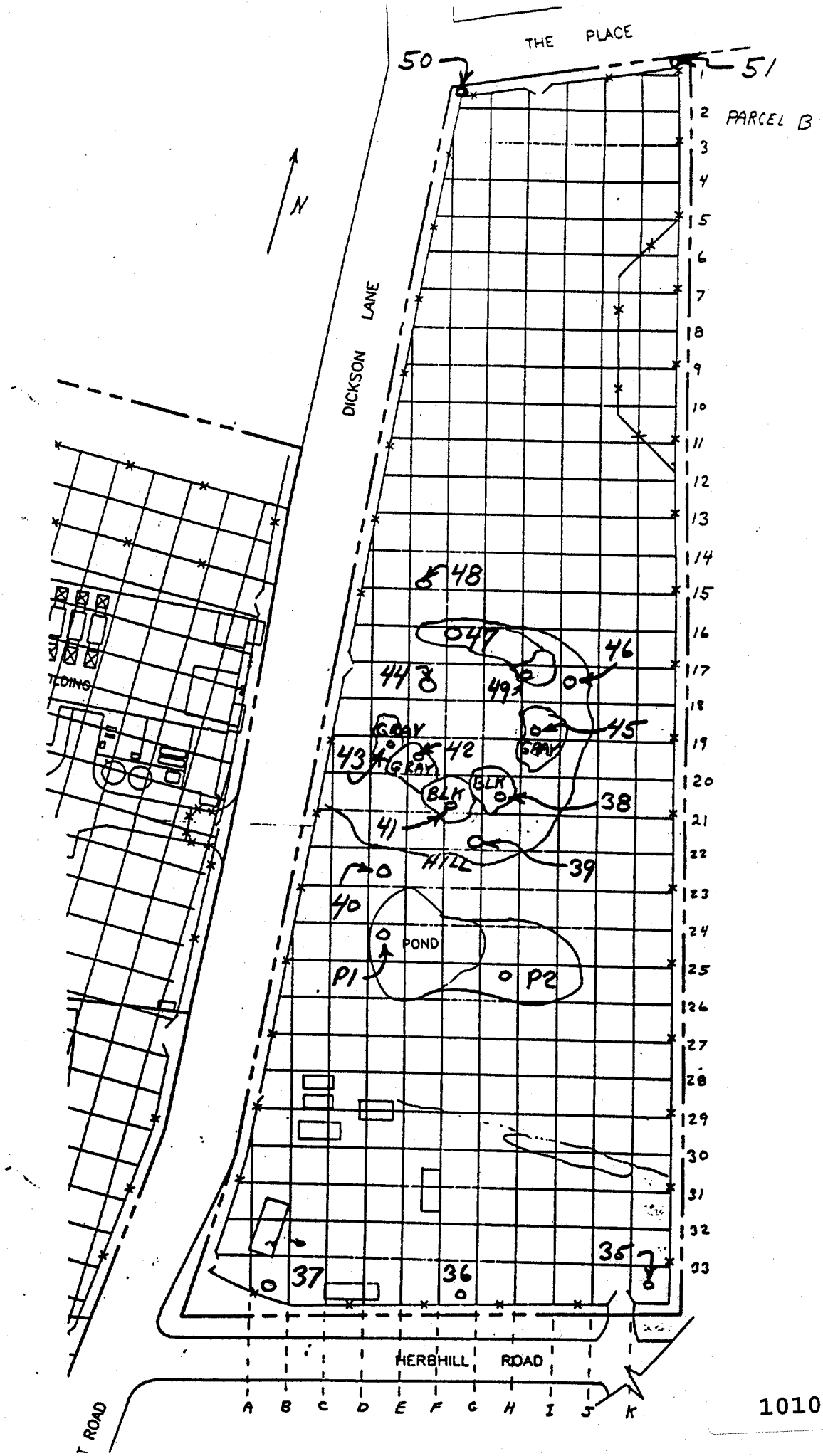
30
31
32
33
34
52
53

101087


BROWN
BLACK
LANDFILL
SAND
SLAG
RUNOFF
BENBOW BUILDING
H_2 SPHERE
SPRING
WELL
FOREST
ROAD
HOT SPOT
SAND
PATH
POND
DICKSON WAREHOUSE
N
ORE
BERM
TANK
PARCEL C
GARVIES POINT ROAD
58
59
70
73
71
68
69
72
67
66
65
76
64
57
74
62
63
75
P5
56
82
61
83
80
81
60
84
55
P4
P3
85
54

101088


THE PLACE
50
51
PARCEL B
N
DICKSON LANE
48
47
46
44
49
45
GRAY
43
42
GRAY
BLK
BLK
38
41
HILL
39
40
POND
P1
P2
37
36
35
HERBHILL ROAD
A B C D E F G H I J K
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33

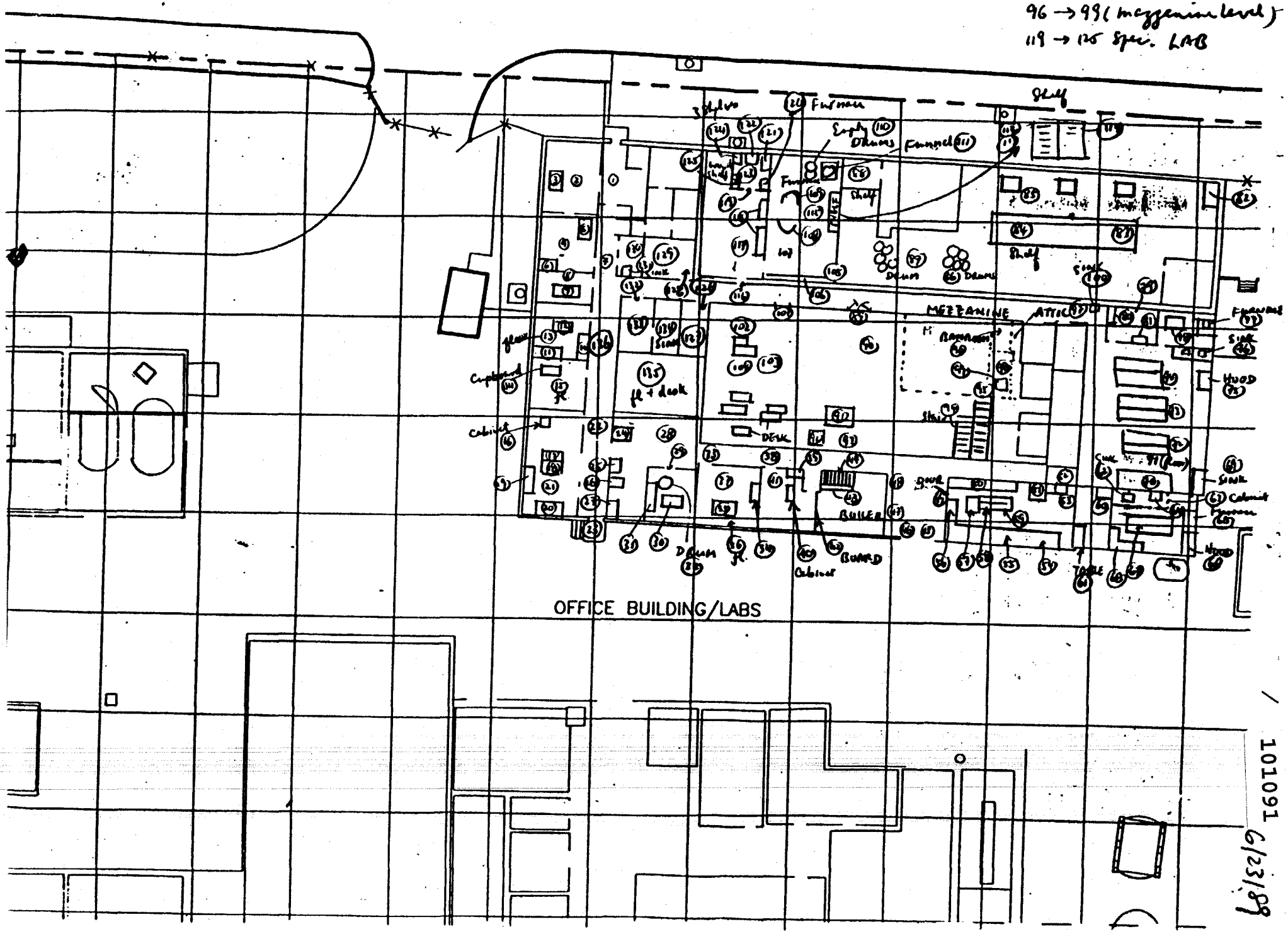
101089

APPENDIX C

WIPE TEST RESULTS

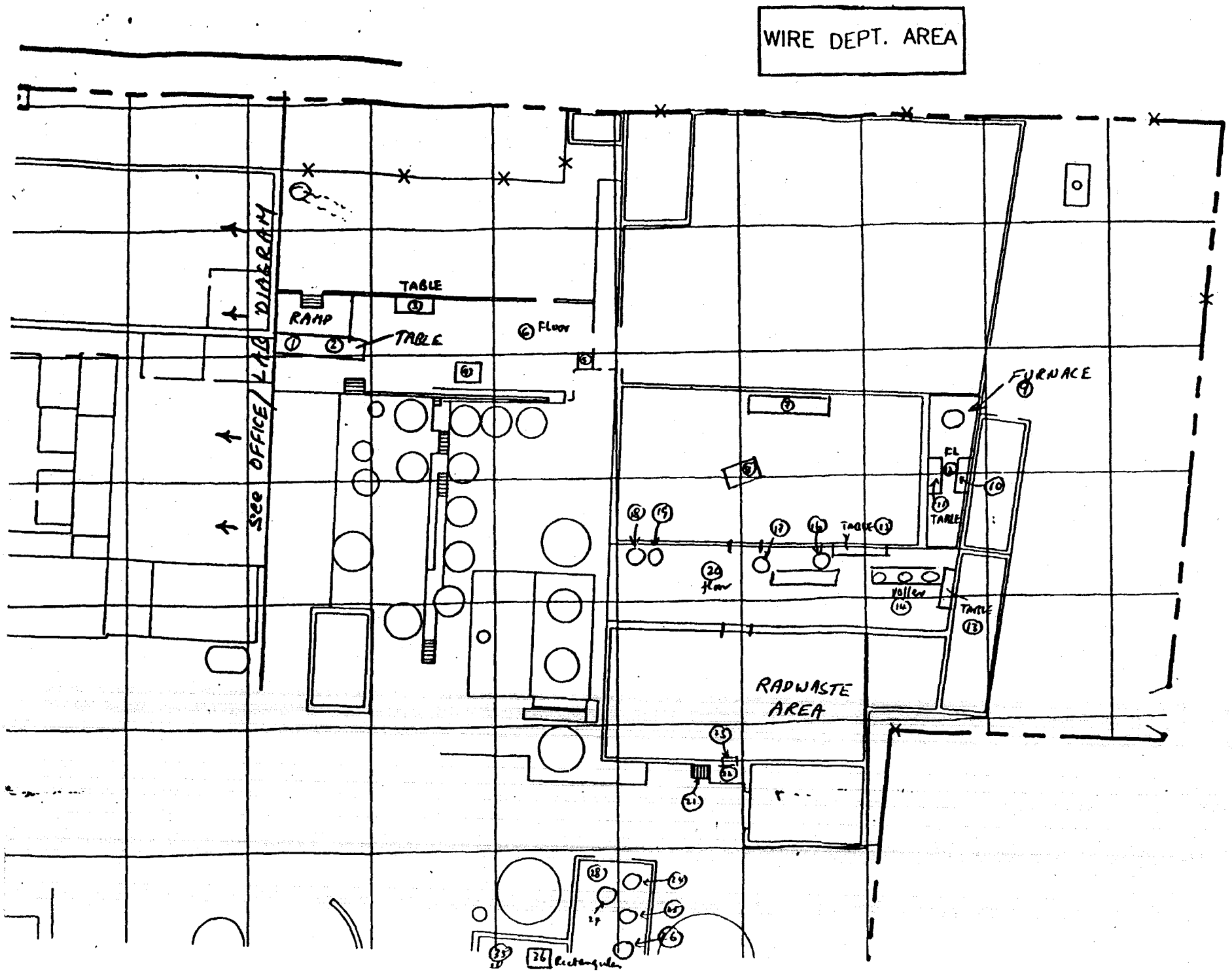
HERBHILL ROAD

96 → 99 (mezzanine level)
119 → 125 Spec. LAB



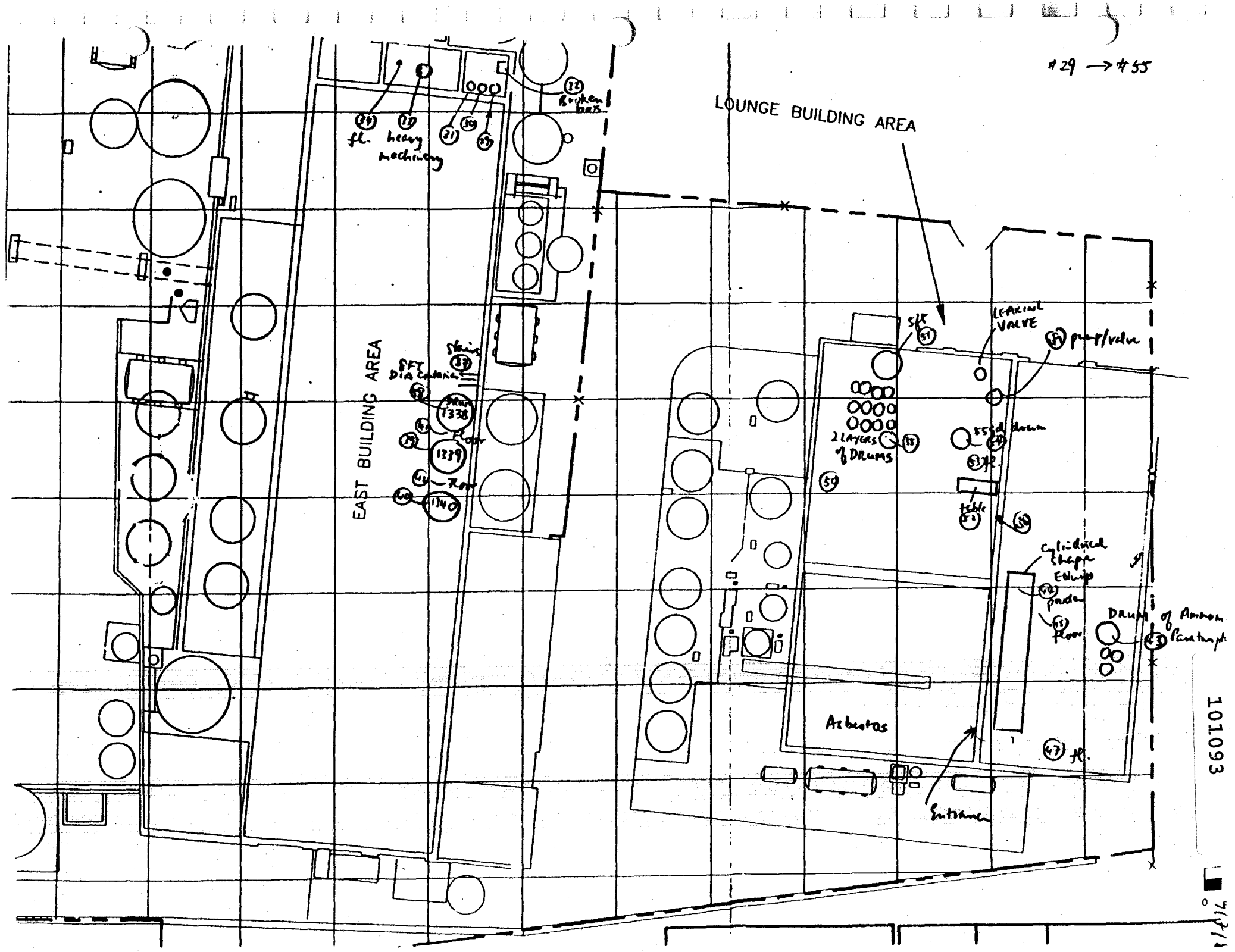
101091

6/23/89

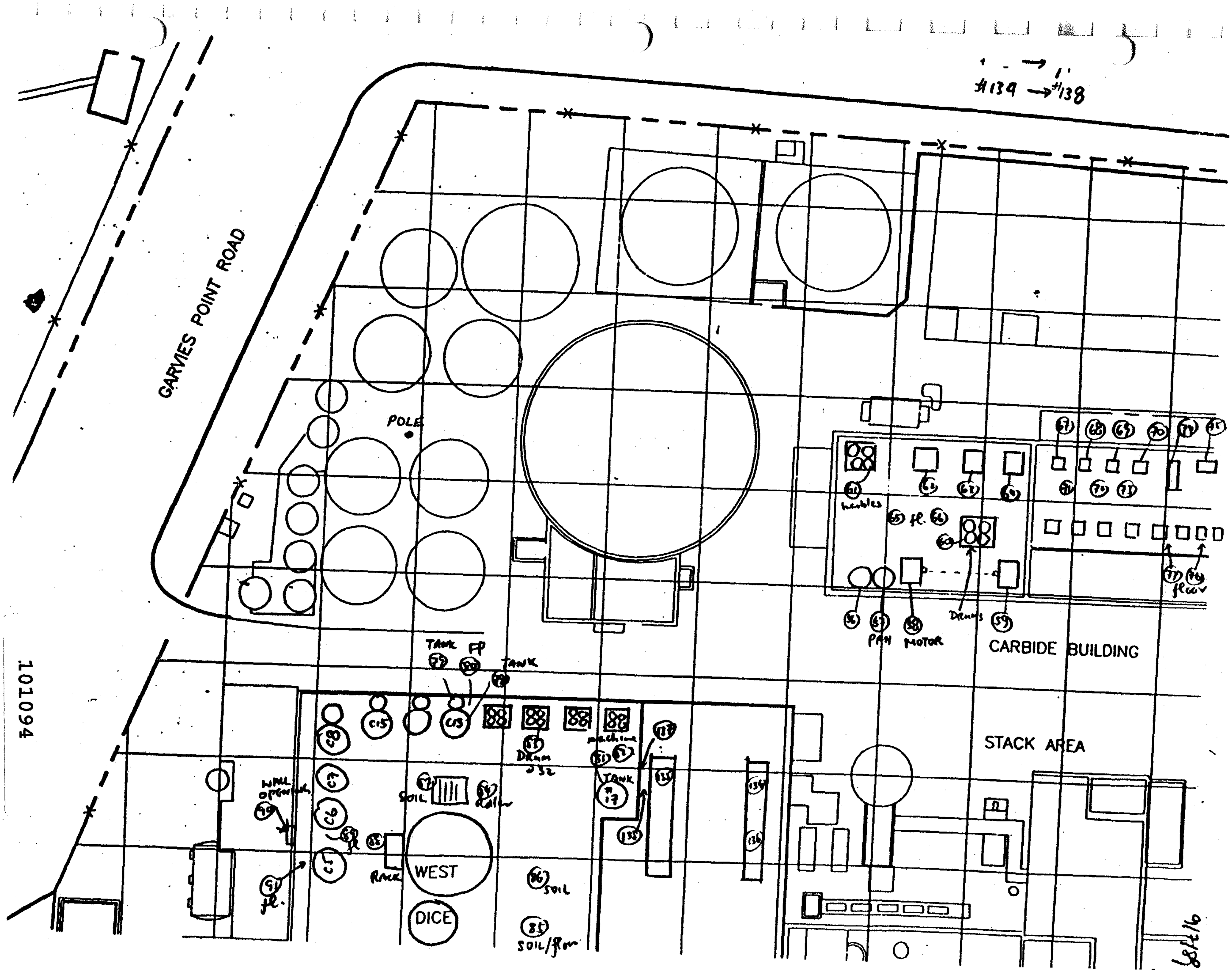

WIRE DEPT. AREA
SEE OFFICE/LAB DIAGRAM
RAMP
TABLE
TABLE
Floor
FURNACE
TABLE
TABLE
TABLE
Floor
Roller
TABLE
RADWASTE AREA
Rectangular

101092

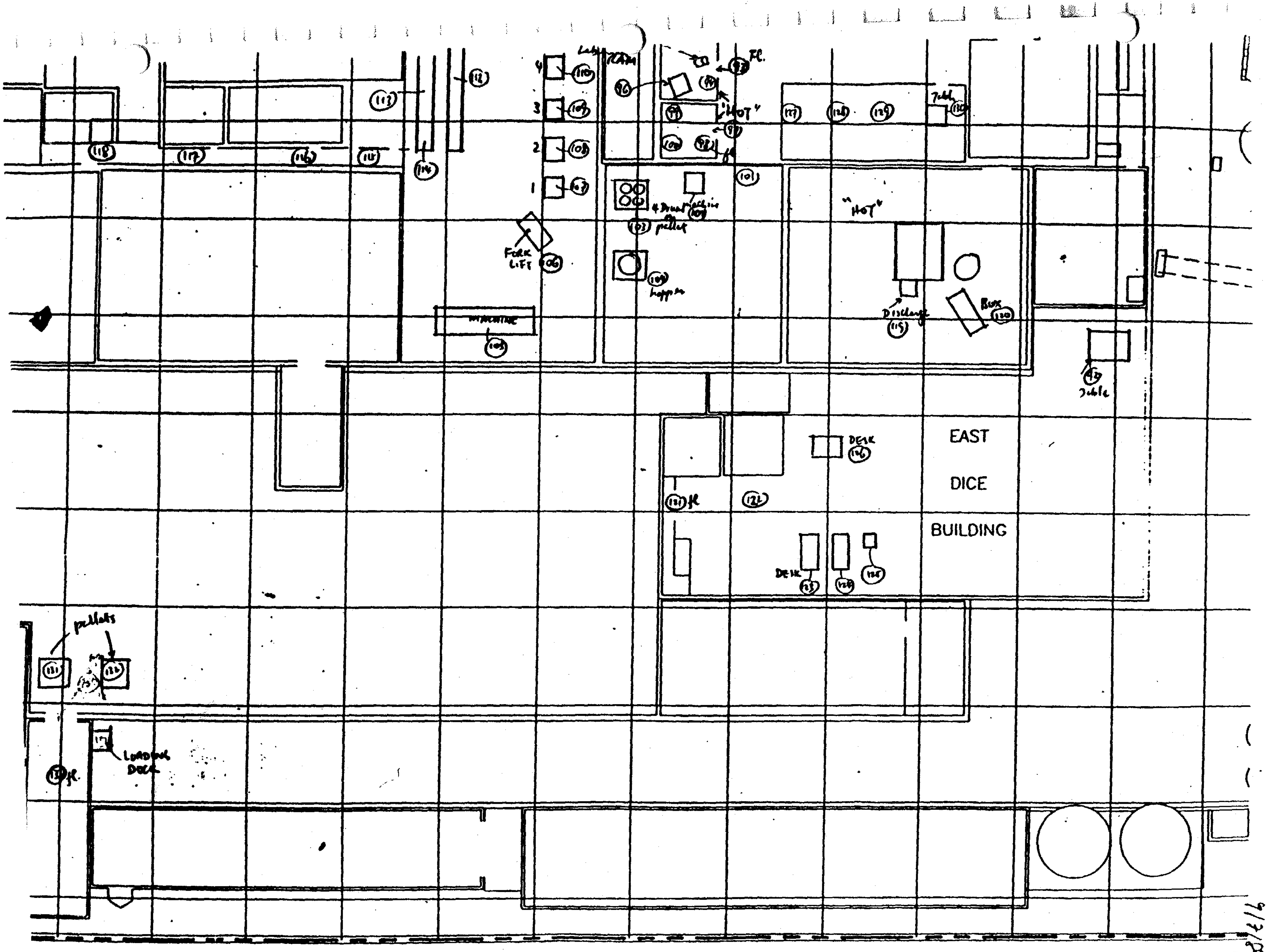
9/7/84


#29 → #55
LOUNGE BUILDING AREA
EAST BUILDING AREA
fl. heavy machinery
Broken box
Staing
5FT DIA Container
Drum 1338
Floor
1339
Floor
1340
5FT
LEAKING VALVE
pump/valve
2 LAYERS of DRUMS
55 gal drum
table
cylindrical shape Enclosure
powder
floor
DRUM of Ammon. Paratungst
Asbestos
Entrance

101093



#139 → #138
GARVIES POINT ROAD
POLE
CARBIDE BUILDING
STACK AREA
WEST
DICE
TANK
FP
TANK
PAN
MOTOR
SOIL
SOIL
SOIL/floor
RACK
WALL OPENING
TANK
machine
floor
101094


EAST
DICE
BUILDING
FORK LIFT
MACHINE
DESK
pellets
LOADING DOCK

101095

HEALTH PHYSICS SURVEY
SAMPLE ANALYSIS REPORT

COLLECTION DATE:9/07/89

CUSTOMER: FRED C. HART ASSOCIATES

TYPE OF SAMPLES: WIPE__X_ AIR__LEAK TEST__
ANALYZED FOR : ALPHA
STANDARD: AM-241
DETECTOR: GAS FLOW PROPORT. COUNTER
ANALYSIS DATE:9/28/89

SAMPLE NO.	LOCATION/DESCRIPTION	NET CPM	ACTIVITY
1	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
2	AS LABELLED IN DIAGRAM	1.0+/-3.5	1.0+/- 3
3	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
4	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 2
5	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
6	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
7	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 2
8	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
9	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
10	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 2
11	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 2
12	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 2
13	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
14	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
15	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
16	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
17	AS LABELLED IN DIAGRAM	1.0+/-3.5	1.0+/- 3
18	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
19	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
20	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
21	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
22	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
23	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
24	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 2
25	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 2
26	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
27	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
28	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
29	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
30	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1

101096

HEALTH PHYSICS SURVEY
SAMPLE ANALYSIS REPORT

COLLECTION DATE:9/07/89

CUSTOMER: FRED C. HART ASSOCIATES

TYPE OF SAMPLES: WIPE__x_ AIR__LEAK TEST__
ANALYZED FOR : ALPHA
STANDARD: AM-241
DETECTOR: GAS FLOW PROPORT. COUNTER
ANALYSIS DATE:9/26/89

SAMPLE NO.	LOCATION/DESCRIPTION	NET CPM	ACTIVITY
31	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
32	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
33	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
34	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 2
35	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
36	AS LABELLED IN DIAGRAM	1.0+/-3.5	1.0+/- 3
37	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
38	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
39	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 2
40	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
41	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
42	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
43	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 2
44	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
45	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
46	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
47	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
48	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
49	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 2
50	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
51	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 2
52	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
53	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
54	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
55	AS LABELLED IN DIAGRAM	3.0+/-4.5	2.9+/- 4
56	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
57	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
58	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
59	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
60	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
61	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 2

HEALTH PHYSICS SURVEY
SAMPLE ANALYSIS REPORT

COLLECTION DATE:9/07/89

CUSTOMER: FRED C. HART ASSOCIATES

TYPE OF SAMPLES: WIPE__x_ AIR__LEAK TEST__
ANALYZED FOR : ALPHA
STANDARD: AM-241
DETECTOR: GAS FLOW PROPORT. COUNTER
ANALYSIS DATE:9/28/89

SAMPLE NO.	LOCATION/DESCRIPTION	NET CPM	ACTIVITY
62	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
63	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
64	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
65	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
66	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 2
67	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
68	AS LABELLED IN DIAGRAM	1.0+/-3.5	1.0+/- 3
69	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
70	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
71	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
72	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
73	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
74	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
75	AS LABELLED IN DIAGRAM	1.0+/-3.5	1.0+/- 3
76	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
77	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
78	AS LABELLED IN DIAGRAM	5.0+/-5.3	4.9+/- 5
79	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
80	AS LABELLED IN DIAGRAM	3.0+/-4.5	2.9+/- 4
81	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 2
82	AS LABELLED IN DIAGRAM	154.0+/-%25.0	151.0+/- 24
83	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 2
84	AS LABELLED IN DIAGRAM	3.0+/-4.5	2.9+/- 4
85	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
86	AS LABELLED IN DIAGRAM	1.0+/-3.5	1.0+/- 3
87	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
88	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 2
89	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 2
90	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
91	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 2

101098

HEALTH PHYSICS SURVEY
SAMPLE ANALYSIS REPORT

COLLECTION DATE:9/07/89

CUSTOMER: FRED C. HART ASSOCIATES

TYPE OF SAMPLES: WIPE__x_ AIR__LEAK TEST__
ANALYZED FOR : ALPHA
STANDARD: AM-241
DETECTOR: GAS FLOW PROPORT. COUNTER
ANALYSIS DATE:9/28/89

SAMPLE NO.	LOCATION/DESCRIPTION	NET CPM	ACTIVITY
92	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
93	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
94	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 2
95	AS LABELLED IN DIAGRAM	%2543.0+/-%100.9	%2496.4+/- 98
96	AS LABELLED IN DIAGRAM	19.0+/-9.2	18.6+/- 8
97	AS LABELLED IN DIAGRAM	13.0+/-7.7	12.7+/- 7
98	AS LABELLED IN DIAGRAM	1.0+/-3.5	1.0+/- 3
99	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 2
100	AS LABELLED IN DIAGRAM	3.0+/-4.5	2.9+/- 4
101	AS LABELLED IN DIAGRAM	1.0+/-3.5	1.0+/- 3
102	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
103	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 2
104	AS LABELLED IN DIAGRAM	4.0+/-4.9	3.9+/- 4
105	AS LABELLED IN DIAGRAM	0.0+/-2.8	.0+/- 2
106	AS LABELLED IN DIAGRAM	1.0+/-3.5	1.0+/- 3
107	AS LABELLED IN DIAGRAM	5.0+/-5.3	4.9+/- 5
108	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
109	AS LABELLED IN DIAGRAM	2.0+/-4.0	2.0+/- 3
110	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
111	AS LABELLED IN DIAGRAM	3.0+/-4.5	2.9+/- 4
112	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
113	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
114	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 2
115	AS LABELLED IN DIAGRAM	1.0+/-3.5	1.0+/- 3
116	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 2
117	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 2
118	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
119	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
120	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
121	AS LABELLED IN DIAGRAM	5.0+/-5.3	4.9+/- 5

101099

HEALTH PHYSICS SURVEY
SAMPLE ANALYSIS REPORT

COLLECTION DATE:9/07/89

CUSTOMER: FRED C. HART ASSOCIATES

TYPE OF SAMPLES: WIPE__x_ AIR__LEAK TEST__
ANALYZED FOR : ALPHA
STANDARD: AM-241
DETECTOR: GAS FLOW PROPORT. COUNTER
ANALYSIS DATE:9/28/89

SAMPLE NO.	LOCATION/DESCRIPTION	NET CPM	ACTIVITY
122	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 2
123	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
124	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
125	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
126	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
127	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
128	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
129	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 2
130	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
131	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
132	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
133	AS LABELLED IN DIAGRAM	1.0+/-3.5	1.0+/- 3
134	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 2
135	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
136	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
137	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1
138	AS LABELLED IN DIAGRAM	0.0+/-2.0	0.0+/- 1

101100

HEALTH PHYSICS SURVEY
SAMPLE ANALYSIS REPORT

COLLECTION DATE:9/07/89

CUSTOMER: FRED C. HART ASSOCIATES

TYPE OF SAMPLES: WIPE__x_ AIR__LEAK TEST__
ANALYZED FOR : BETA
STANDARD: TC-99
DETECTOR: GAS FLOW PROPORT. COUNTER
ANALYSIS DATE:9/20/89

SAMPLE NO.	LOCATION/DESCRIPTION	NET CPM	ACTIVITY (PCI/100CM2)
1	AS LABELLED IN DIAGRAM	16.0+/-%10.6	45.1+/- 31
2	AS LABELLED IN DIAGRAM	11.0+/-9.6	33.1+/- 28
3	AS LABELLED IN DIAGRAM	0.0+/-6.9	0.0+/- 20
4	AS LABELLED IN DIAGRAM	0.0+/-5.7	0.0+/- 17
5	AS LABELLED IN DIAGRAM	0.0+/-6.9	0.0+/- 20
6	AS LABELLED IN DIAGRAM	0.0+/-5.7	0.0+/- 17
7	AS LABELLED IN DIAGRAM	0.0+/-6.3	0.0+/- 19
8	AS LABELLED IN DIAGRAM	0.0+/-6.0	0.0+/- 18
9	AS LABELLED IN DIAGRAM	0.0+/-6.0	0.0+/- 18
10	AS LABELLED IN DIAGRAM	0.0+/-6.6	0.0+/- 19
11	AS LABELLED IN DIAGRAM	0.0+/-5.7	0.0+/- 17
12	AS LABELLED IN DIAGRAM	0.0+/-6.0	0.0+/- 18
13	AS LABELLED IN DIAGRAM	0.0+/-5.7	0.0+/- 17
14	AS LABELLED IN DIAGRAM	4.0+/-8.0	12.0+/- 24
15	AS LABELLED IN DIAGRAM	0.0+/-6.6	0.0+/- 19
16	AS LABELLED IN DIAGRAM	0.0+/-4.9	0.0+/- 14
17	AS LABELLED IN DIAGRAM	0.0+/-5.7	0.0+/- 17
18	AS LABELLED IN DIAGRAM	0.0+/-5.3	0.0+/- 15
19	AS LABELLED IN DIAGRAM	0.0+/-6.9	0.0+/- 20
20	AS LABELLED IN DIAGRAM	0.0+/-6.6	0.0+/- 19
21	AS LABELLED IN DIAGRAM	2.0+/-7.5	6.0+/- 22
22	AS LABELLED IN DIAGRAM	0.0+/-5.3	0.0+/- 15
23	AS LABELLED IN DIAGRAM	0.0+/-5.7	0.0+/- 17
24	AS LABELLED IN DIAGRAM	0.0+/-4.9	0.0+/- 14
25	AS LABELLED IN DIAGRAM	1.0+/-7.2	3.0+/- 21
26	AS LABELLED IN DIAGRAM	2.0+/-7.5	6.0+/- 22
27	AS LABELLED IN DIAGRAM	0.0+/-5.3	0.0+/- 15
28	AS LABELLED IN DIAGRAM	0.0+/-5.3	0.0+/- 15
29	AS LABELLED IN DIAGRAM	0.0+/-6.6	0.0+/- 19
30	AS LABELLED IN DIAGRAM	0.0+/-6.6	0.0+/- 19

101101

HEALTH PHYSICS SURVEY
SAMPLE ANALYSIS REPORT

COLLECTION DATE:9/07/89

CUSTOMER: FRED C. HART ASSOCIATES

TYPE OF SAMPLES: WIPE__X__ AIR__LEAK TEST__
ANALYZED FOR : BETA
STANDARD: TC-99
DETECTOR: GAS FLOW PROPORT. COUNTER
ANALYSIS DATE:9/28/89

SAMPLE NO.	LOCATION/DESCRIPTION	NET CPM	ACTIVITY PCI/100CM2
31	AS LABELLED IN DIAGRAM	0.0+/-6.0	0.0+/- 18
32	AS LABELLED IN DIAGRAM	0.0+/-6.6	0.0+/- 19
33	AS LABELLED IN DIAGRAM	0.0+/-6.3	0.0+/- 19
34	AS LABELLED IN DIAGRAM	0.0+/-5.7	0.0+/- 17
35	AS LABELLED IN DIAGRAM	0.0+/-5.3	0.0+/- 15
36	AS LABELLED IN DIAGRAM	3.0+/-7.7	9.0+/- 23
37	AS LABELLED IN DIAGRAM	0.0+/-6.0	0.0+/- 18
38	AS LABELLED IN DIAGRAM	0.0+/-6.9	0.0+/- 20
39	AS LABELLED IN DIAGRAM	0.0+/-6.3	0.0+/- 19
40	AS LABELLED IN DIAGRAM	0.0+/-6.0	0.0+/- 18
41	AS LABELLED IN DIAGRAM	0.0+/-6.9	0.0+/- 20
42	AS LABELLED IN DIAGRAM	0.0+/-6.9	0.0+/- 20
43	AS LABELLED IN DIAGRAM	0.0+/-6.3	0.0+/- 19
44	AS LABELLED IN DIAGRAM	0.0+/-6.6	0.0+/- 19
45	AS LABELLED IN DIAGRAM	3.0+/-7.7	9.0+/- 23
46	AS LABELLED IN DIAGRAM	0.0+/-6.3	0.0+/- 19
47	AS LABELLED IN DIAGRAM	0.0+/-6.6	0.0+/- 19
48	AS LABELLED IN DIAGRAM	0.0+/-6.6	0.0+/- 19
49	AS LABELLED IN DIAGRAM	3.0+/-7.7	9.0+/- 23
50	AS LABELLED IN DIAGRAM	0.0+/-6.9	0.0+/- 20
51	AS LABELLED IN DIAGRAM	0.0+/-5.7	0.0+/- 17
52	AS LABELLED IN DIAGRAM	0.0+/-6.0	0.0+/- 18
53	AS LABELLED IN DIAGRAM	0.0+/-5.3	0.0+/- 15
54	AS LABELLED IN DIAGRAM	0.0+/-6.3	0.0+/- 19
55	AS LABELLED IN DIAGRAM	0.0+/-6.6	0.0+/- 19
56	AS LABELLED IN DIAGRAM	0.0+/-5.3	0.0+/- 15
57	AS LABELLED IN DIAGRAM	0.0+/-6.0	0.0+/- 18
58	AS LABELLED IN DIAGRAM	0.0+/-6.3	0.0+/- 19
59	AS LABELLED IN DIAGRAM	5.0+/-8.2	15.0+/- 24
60	AS LABELLED IN DIAGRAM	2.0+/-7.5	6.0+/- 22
61	AS LABELLED IN DIAGRAM	1.0+/-7.2	3.0+/- 21

101102

HEALTH PHYSICS SURVEY
SAMPLE ANALYSIS REPORT

COLLECTION DATE:9/07/89

CUSTOMER: FRED C. HART ASSOCIATES

TYPE OF SAMPLES: WIPE__x_ AIR__LEAK TEST__
ANALYZED FOR : BETA
STANDARD: TC-99
DETECTOR: GAS FLOW PROPORT. COUNTER
ANALYSIS DATE:9/28/89

SAMPLE NO.	LOCATION/DESCRIPTION	NET CPM	ACTIVITY(PCI/100CM)
62	AS LABELLED IN DIAGRAM	0.0+/-6.9	0.0+/- 20
63	AS LABELLED IN DIAGRAM	0.0+/-6.3	0.0+/- 19
64	AS LABELLED IN DIAGRAM	0.0+/-5.7	0.0+/- 17
65	AS LABELLED IN DIAGRAM	0.0+/-6.0	0.0+/- 19
66	AS LABELLED IN DIAGRAM	0.0+/-6.6	0.0+/- 19
67	AS LABELLED IN DIAGRAM	0.0+/-6.9	0.0+/- 20
68	AS LABELLED IN DIAGRAM	0.0+/-5.3	0.0+/- 15
69	AS LABELLED IN DIAGRAM	0.0+/-6.3	0.0+/- 19
70	AS LABELLED IN DIAGRAM	0.0+/-6.0	0.0+/- 18
71	AS LABELLED IN DIAGRAM	0.0+/-6.3	0.0+/- 19
72	AS LABELLED IN DIAGRAM	0.0+/-6.3	0.0+/- 19
73	AS LABELLED IN DIAGRAM	0.0+/-5.3	0.0+/- 15
74	AS LABELLED IN DIAGRAM	1.0+/-7.2	3.0+/- 21
75	AS LABELLED IN DIAGRAM	0.0+/-6.3	0.0+/- 19
76	AS LABELLED IN DIAGRAM	0.0+/-6.6	0.0+/- 19
77	AS LABELLED IN DIAGRAM	0.0+/-6.6	0.0+/- 19
78	AS LABELLED IN DIAGRAM	0.0+/-6.3	0.0+/- 19
79	AS LABELLED IN DIAGRAM	0.0+/-6.3	0.0+/- 19
80	AS LABELLED IN DIAGRAM	0.0+/-6.3	0.0+/- 19
81	AS LABELLED IN DIAGRAM	0.0+/-6.3	0.0+/- 19
82	AS LABELLED IN DIAGRAM	510.0+/-%45.7	%1533.5+/- 137
83	AS LABELLED IN DIAGRAM	9.0+/-9.2	27.1+/- 27
84	AS LABELLED IN DIAGRAM	3.0+/-7.7	9.0+/- 23
85	AS LABELLED IN DIAGRAM	0.0+/-6.9	0.0+/- 20
86	AS LABELLED IN DIAGRAM	0.0+/-6.3	0.0+/- 19
87	AS LABELLED IN DIAGRAM	0.0+/-6.6	0.0+/- 19
88	AS LABELLED IN DIAGRAM	0.0+/-6.3	0.0+/- 19
89	AS LABELLED IN DIAGRAM	2.0+/-7.5	6.0+/- 22
90	AS LABELLED IN DIAGRAM	0.0+/-6.0	0.0+/- 18
91	AS LABELLED IN DIAGRAM	92.0+/-%20.4	276.6+/- 61

HEALTH PHYSICS SURVEY
SAMPLE ANALYSIS REPORT

COLLECTION DATE:9/07/89

CUSTOMER: FRED C. HART ASSOCIATES

TYPE OF SAMPLES: WIPE__X_ AIR__LEAK TEST__
ANALYZED FOR : BETA
STANDARD: TC-99
DETECTOR: GAS FLOW PROPORT. COUNTER
ANALYSIS DATE:9/28/89

SAMPLE NO.	LOCATION/DESCRIPTION	NET CPM	ACTIVITY:PCI/100CM2
92	AS LABELLED IN DIAGRAM	1.0+/-7.2	3.0+/- 21
93	AS LABELLED IN DIAGRAM	0.0+/-5.3	0.0+/- 15
94	AS LABELLED IN DIAGRAM	1.0+/-7.2	3.0+/- 21
95	AS LABELLED IN DIAGRAM	%10530.0+/-%205.3	%31662.7+/- 617
96	AS LABELLED IN DIAGRAM	87.0+/-%19.9	261.6+/- 59
97	AS LABELLED IN DIAGRAM	42.0+/-%14.7	126.3+/- 44
98	AS LABELLED IN DIAGRAM	29.0+/-%12.8	87.2+/- 38
99	AS LABELLED IN DIAGRAM	18.0+/-%11.0	54.1+/- 32
100	AS LABELLED IN DIAGRAM	22.0+/-%11.7	66.2+/- 35
101	AS LABELLED IN DIAGRAM	14.0+/-%10.2	42.1+/- 30
102	AS LABELLED IN DIAGRAM	36.0+/-%13.9	108.2+/- 41
103	AS LABELLED IN DIAGRAM	45.0+/-%15.1	135.3+/- 45
104	AS LABELLED IN DIAGRAM	33.0+/-%13.4	99.2+/- 40
105	AS LABELLED IN DIAGRAM	28.0+/-%12.6	84.2+/- 38
106	AS LABELLED IN DIAGRAM	24.0+/-%12.0	72.2+/- 36
107	AS LABELLED IN DIAGRAM	25.0+/-%12.2	75.2+/- 36
108	AS LABELLED IN DIAGRAM	20.0+/-%11.3	60.1+/- 34
109	AS LABELLED IN DIAGRAM	21.0+/-%11.5	63.1+/- 34
110	AS LABELLED IN DIAGRAM	32.0+/-%13.3	96.2+/- 39
111	AS LABELLED IN DIAGRAM	27.0+/-%12.5	81.2+/- 37
112	AS LABELLED IN DIAGRAM	31.0+/-%13.1	93.2+/- 39
113	AS LABELLED IN DIAGRAM	30.0+/-%13.0	90.2+/- 38
114	AS LABELLED IN DIAGRAM	26.0+/-%12.3	78.2+/- 37
115	AS LABELLED IN DIAGRAM	21.0+/-%11.5	63.1+/- 34
116	AS LABELLED IN DIAGRAM	33.0+/-%13.4	99.2+/- 40
117	AS LABELLED IN DIAGRAM	22.0+/-%11.7	66.2+/- 35
118	AS LABELLED IN DIAGRAM	23.0+/-%11.8	69.2+/- 35
119	AS LABELLED IN DIAGRAM	24.0+/-%12.0	72.2+/- 36
120	AS LABELLED IN DIAGRAM	31.0+/-%13.1	93.2+/- 39
121	AS LABELLED IN DIAGRAM	17.0+/-%10.8	51.1+/- 32

HEALTH PHYSICS SURVEY
SAMPLE ANALYSIS REPORT

COLLECTION DATE:9/07/89

CUSTOMER: FRED C. HART ASSOCIATES

TYPE OF SAMPLE: WIPE[illegible] AIRBORNE [illegible]
ANALYZED FOR : BETA
STANDARD: TC-99
DETECTOR: GAS FLOW PROPORT. COUNTER
ANALYSIS DATE:9/26/[illegible]

SAMPLE NO	LOCATION/DESCRIPTION	NET CPM	ACTIVITY [illegible]
122	AS LABELLED IN DIAGRAM	16.0+/-%10.6	48.[illegible] +/- [illegible]
123	AS LABELLED IN DIAGRAM	8.0+/-8.9	24.[illegible] +/- [illegible]
124	AS LABELLED IN DIAGRAM	13.0+/-%10.0	39.[illegible] +/- 30
125	AS LABELLED IN DIAGRAM	17.0+/-%10.8	51.1[illegible] +/- 32
126	AS LABELLED IN DIAGRAM	12.0+/-9.8	36.1+/- 29
127	AS LABELLED IN DIAGRAM	19.0+/-%11.1	57.1+/- 33
128	AS LABELLED IN DIAGRAM	20.0+/-%11.3	60.[illegible] +/- 34
129	AS LABELLED IN DIAGRAM	27.0+/-%12.5	81.[illegible] +/- 37
130	AS LABELLED IN DIAGRAM	23.0+/-%11.8	69.2+/- 35
131	AS LABELLED IN DIAGRAM	8.0+/-6.9	24.1+/- [illegible]
132	AS LABELLED IN DIAGRAM	18.0+/-%11.0	54.1+/- 33
133	AS LABELLED IN DIAGRAM	22.0+/-%11.7	66.2+/- 35
134	AS LABELLED IN DIAGRAM	18.0+/-%11.0	54.1+/- 33
135	AS LABELLED IN DIAGRAM	16.0+/-%10.6	48.1+/- 31
136	AS LABELLED IN DIAGRAM	24.0+/-%12.0	72.2+/- 36
137	AS LABELLED IN DIAGRAM	23.0+/-%11.8	69.2+/- 35
138	AS LABELLED IN DIAGRAM	22.0+/-%11.7	66.2+/- 35

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HEALTH PHYSICS SURVEY
SAMPLE ANALYSIS REPORT

COLLECTION DATE:6/23/89

CUSTOMER: FRED C. HART ASSOCIATES

TYPE OF SAMPLES: WIPE__x_ AIR__LEAK TEST__
ANALYZED FOR : ALPHA
STANDARD: AM-241
DETECTOR: GAS FLOW PROPORT. COUNTER
ANALYSIS DATE:9/28/89

SAMPLE NO.	LOCATION/DESCRIPTION	NET CPM	ACTIVITY
31	AS LABELLED IN DIAGRAM	0.5+/-2.4	0.5+/- 1
32	AS LABELLED IN DIAGRAM	0.5+/-2.4	0.5+/- 2
33	AS LABELLED IN DIAGRAM	1.5+/-3.2	1.5+/- 3
34	AS LABELLED IN DIAGRAM	1.5+/-3.2	1.5+/- 3
35	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
36	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
37	AS LABELLED IN DIAGRAM	1.5+/-3.2	1.5+/- 3
38	AS LABELLED IN DIAGRAM	0.5+/-2.4	0.5+/- 2
39	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
40	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
41	AS LABELLED IN DIAGRAM	0.5+/-2.4	0.5+/- 2
42	AS LABELLED IN DIAGRAM	0.5+/-2.4	0.5+/- 2
43	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
44	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
45	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
46	AS LABELLED IN DIAGRAM	0.5+/-2.4	0.5+/- 2
47	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
48	AS LABELLED IN DIAGRAM	7.5+/-5.8	7.4+/- 5
49	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
50	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
51	AS LABELLED IN DIAGRAM	0.5+/-2.4	0.5+/- 2
52	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
53	AS LABELLED IN DIAGRAM	0.5+/-2.4	0.5+/- 2
54	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
55	AS LABELLED IN DIAGRAM	0.5+/-2.4	0.5+/- 2
56	AS LABELLED IN DIAGRAM	0.5+/-2.4	0.5+/- 2
57	AS LABELLED IN DIAGRAM	0.5+/-2.4	0.5+/- 2
58	AS LABELLED IN DIAGRAM	2.5+/-3.7	2.5+/- 3
59	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
60	AS LABELLED IN DIAGRAM	0.5+/-2.4	0.5+/- 2
61	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1

HEALTH PHYSICS SURVEY
SAMPLE ANALYSIS REPORT

COLLECTION DATE:6/23/89

CUSTOMER: FRED C. HART ASSOCIATES

TYPE OF SAMPLES: WIPE__x_ AIR__LEAK TEST__
ANALYZED FOR : ALPHA
STANDARD: AM-241
DETECTOR: GAS FLOW PROPORT. COUNTER
ANALYSIS DATE:9/28/89

SAMPLE NO.	LOCATION/DESCRIPTION	NET CPM	ACTIVITY
62	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
63	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
64	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
65	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
66	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
67	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
68	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
69	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
70	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
71	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
72	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
73	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
74	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
75	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
76	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
77	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
78	AS LABELLED IN DIAGRAM	1.5+/-3.2	1.5+/- 3
79	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
80	AS LABELLED IN DIAGRAM	0.5+/-2.4	0.5+/- 2
81	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
82	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
83	AS LABELLED IN DIAGRAM	0.5+/-2.4	0.5+/- 2
84	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
85	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
86	AS LABELLED IN DIAGRAM	0.5+/-2.4	0.5+/- 2
87	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
88	AS LABELLED IN DIAGRAM	0.5+/-2.4	0.5+/- 2
89	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
90	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
91	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1

HEALTH PHYSICS SURVEY
SAMPLE ANALYSIS REPORT

COLLECTION DATE:6/23/89

CUSTOMER: FRED C. HART ASSOCIATES

TYPE OF SAMPLES: WIPE__x_ AIR__LEAK TEST__
ANALYZED FOR : ALPHA
STANDARD: AM-241
DETECTOR: GAS FLOW PROPORT. COUNTER
ANALYSIS DATE:9/28/89

SAMPLE NO.	LOCATION/DESCRIPTION	NET CPM	ACTIVITY
92	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
93	AS LABELLED IN DIAGRAM	1.5+/-3.2	1.5+/- 3
94	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
95	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
96	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
97	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
98	AS LABELLED IN DIAGRAM	2.5+/-3.7	2.5+/- 3
99	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
100	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
101	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
102	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
103	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
104	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
105	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
106	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
107	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
108	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
109	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
110	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
111	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
112	AS LABELLED IN DIAGRAM	0.5+/-2.4	0.5+/- 2
113	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
114	AS LABELLED IN DIAGRAM	0.5+/-2.4	0.5+/- 2
115	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
116	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
117	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
118	AS LABELLED IN DIAGRAM	0.5+/-2.4	0.5+/- 2
119	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
120	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
121	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1

HEALTH PHYSICS SURVEY
SAMPLE ANALYSIS REPORT

COLLECTION DATE:6/23/89

CUSTOMER: FRED C. HART ASSOCIATES

TYPE OF SAMPLES: WIPE__x_ AIR__LEAK TEST__
ANALYZED FOR : ALPHA
STANDARD: AM-241
DETECTOR: GAS FLOW PROPORT. COUNTER
ANALYSIS DATE:9/23/89

SAMPLE NO.	LOCATION/DESCRIPTION	NET CPM	ACTIVITY
122	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
123	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
124	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
125	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
126	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
127	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
128	AS LABELLED IN DIAGRAM	0.5+/-2.4	0.5+/- 2
129	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
130	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
131	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
132	AS LABELLED IN DIAGRAM	0.5+/-2.4	0.5+/- 2
133	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
134	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
135	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
136	AS LABELLED IN DIAGRAM	0.5+/-2.4	0.5+/- 2

HEALTH PHYSICS SURVEY
SAMPLE ANALYSIS REPORT

COLLECTION DATE:6/23/89

CUSTOMER: FRED C. HART ASSOCIATES

TYPE OF SAMPLES: WIPE X AIR LEAK TEST
ANALYZED FOR : BETA
STANDARD: Tc-99
DETECTOR: GAS FLOW PROPORT. COUNTER
ANALYSIS DATE:9/28/89

SAMPLE NO.	LOCATION/DESCRIPTION	NET CPM	ACTIVITY
1	AS LABELLED IN DIAGRAM	2.0+/-4.9	18.1+/- 44
2	AS LABELLED IN DIAGRAM	3.0+/-5.3	27.2+/- 48
3	AS LABELLED IN DIAGRAM	0.0+/-3.5	0.0+/- 31
4	AS LABELLED IN DIAGRAM	0.0+/-3.5	0.0+/- 31
5	AS LABELLED IN DIAGRAM	0.0+/-3.5	0.0+/- 31
6	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
7	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
8	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
9	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
10	AS LABELLED IN DIAGRAM	0.0+/-4.0	0.0+/- 36
11	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
12	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
13	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
14	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
15	AS LABELLED IN DIAGRAM	0.0+/-3.5	0.0+/- 31
16	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
17	AS LABELLED IN DIAGRAM	0.0+/-3.5	0.0+/- 31
18	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
19	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
20	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
21	AS LABELLED IN DIAGRAM	0.0+/-3.5	0.0+/- 31
22	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
23	AS LABELLED IN DIAGRAM	0.0+/-3.5	0.0+/- 31
24	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
25	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
26	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
27	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
28	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
29	AS LABELLED IN DIAGRAM	0.0+/-3.5	0.0+/- 31
30	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25

HEALTH PHYSICS SURVEY
SAMPLE ANALYSIS REPORT

COLLECTION DATE: 6/23/89

CUSTOMER: FRED C. HART ASSOCIATES

TYPE OF SAMPLES: WIPE X AIR LEAK TEST
ANALYZED FOR : BETA
STANDARD: Tc-99
DETECTOR: GAS FLOW PROPORT. COUNTER
ANALYSIS DATE: 9/28/89

SAMPLE NO.	LOCATION/DESCRIPTION	NET CPM	ACTIVITY
31	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
32	AS LABELLED IN DIAGRAM	0.0+/-3.5	0.0+/- 31
33	AS LABELLED IN DIAGRAM	0.0+/-4.0	0.0+/- 36
34	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
35	AS LABELLED IN DIAGRAM	0.0+/-3.5	0.0+/- 31
36	AS LABELLED IN DIAGRAM	0.0+/-4.0	0.0+/- 36
37	AS LABELLED IN DIAGRAM	0.0+/-3.5	0.0+/- 31
38	AS LABELLED IN DIAGRAM	0.0+/-4.0	0.0+/- 36
39	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
40	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
41	AS LABELLED IN DIAGRAM	0.0+/-3.5	0.0+/- 31
42	AS LABELLED IN DIAGRAM	0.0+/-3.5	0.0+/- 31
43	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
44	AS LABELLED IN DIAGRAM	0.0+/-4.0	0.0+/- 36
45	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
46	AS LABELLED IN DIAGRAM	0.0+/-3.5	0.0+/- 31
47	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
48	AS LABELLED IN DIAGRAM	4.0+/-5.7	36.3+/- 51
49	AS LABELLED IN DIAGRAM	0.0+/-4.0	0.0+/- 36
50	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
51	AS LABELLED IN DIAGRAM	0.0+/-3.5	0.0+/- 31
52	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
53	AS LABELLED IN DIAGRAM	0.0+/-3.5	0.0+/- 31
54	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
55	AS LABELLED IN DIAGRAM	0.0+/-3.5	0.0+/- 31
56	AS LABELLED IN DIAGRAM	1.0+/-4.5	9.1+/- 40
57	AS LABELLED IN DIAGRAM	0.0+/-4.0	0.0+/- 36
58	AS LABELLED IN DIAGRAM	0.0+/-3.5	0.0+/- 31
59	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
60	AS LABELLED IN DIAGRAM	1.0+/-4.5	9.1+/- 40
61	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25

HEALTH PHYSICS SURVEY
SAMPLE ANALYSIS REPORT

COLLECTION DATE:6/23/89

CUSTOMER: FRED C. HART ASSOCIATES

TYPE OF SAMPLES: WIPE X AIR LEAK TEST
ANALYZED FOR : BETA
STANDARD: Tc-99
DETECTOR: GAS FLOW PROPORT. COUNTER
ANALYSIS DATE:9/26/89

SAMPLE NO.	LOCATION/DESCRIPTION	NET CPM	ACTIVITY
62	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
63	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
64	AS LABELLED IN DIAGRAM	0.0+/-4.0	0.0+/- 36
65	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
66	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
67	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
68	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
69	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
70	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
71	AS LABELLED IN DIAGRAM	0.0+/-3.5	0.0+/- 31
72	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
73	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
74	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
75	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
76	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
77	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
78	AS LABELLED IN DIAGRAM	4.0+/-5.7	36.3+/- 51
79	AS LABELLED IN DIAGRAM	23.0+/-%10.4	208.7+/- 94
80	AS LABELLED IN DIAGRAM	29.0+/-%11.5	263.2+/- 104
81	AS LABELLED IN DIAGRAM	23.0+/-%10.4	208.7+/- 94
82	AS LABELLED IN DIAGRAM	28.0+/-%11.3	254.1+/- 102
83	AS LABELLED IN DIAGRAM	21.0+/-%10.0	190.6+/- 90
84	AS LABELLED IN DIAGRAM	13.0+/-8.2	118.0+/- 74
85	AS LABELLED IN DIAGRAM	40.0+/-%13.3	363.0+/- 120
86	AS LABELLED IN DIAGRAM	23.0+/-%10.4	208.7+/- 94
87	AS LABELLED IN DIAGRAM	30.0+/-%11.7	272.2+/- 105
88	AS LABELLED IN DIAGRAM	5.0+/-6.0	45.4+/- 54
89	AS LABELLED IN DIAGRAM	22.0+/-%10.2	199.6+/- 92
90	AS LABELLED IN DIAGRAM	98.0+/-%20.2	889.3+/- 183
91	AS LABELLED IN DIAGRAM	12.0+/-8.0	108.9+/- 72

HEALTH PHYSICS SURVEY
SAMPLE ANALYSIS REPORT

COLLECTION DATE:6/23/89

CUSTOMER: FRED C. HART ASSOCIATES

TYPE OF SAMPLES: WIPE X AIR LEAK TEST
ANALYZED FOR : BETA
STANDARD: Tc-99
DETECTOR: GAS FLOW PROPORT. COUNTER
ANALYSIS DATE:9/26/89

SAMPLE NO.	LOCATION/DESCRIPTION	NET CPM	ACTIVITY
92	AS LABELLED IN DIAGRAM	23.0+/-%10.4	208.7+/- 94
93	AS LABELLED IN DIAGRAM	143.0+/-%24.2	%1297.7+/- 220
94	AS LABELLED IN DIAGRAM	15.0+/-8.7	136.1+/- 79
95	AS LABELLED IN DIAGRAM	0.0+/-4.0	0.0+/- 36
96	AS LABELLED IN DIAGRAM	4.0+/-5.7	36.3+/- 51
97	AS LABELLED IN DIAGRAM	2.0+/-4.9	18.1+/- 44
98	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
99	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
100	AS LABELLED IN DIAGRAM	0.0+/-4.0	0.0+/- 36
101	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
102	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
103	AS LABELLED IN DIAGRAM	0.0+/-3.5	0.0+/- 31
104	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
105	AS LABELLED IN DIAGRAM	0.0+/-3.5	0.0+/- 31
106	AS LABELLED IN DIAGRAM	0.0+/-4.0	0.0+/- 36
107	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
108	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
109	AS LABELLED IN DIAGRAM	0.0+/-4.0	0.0+/- 36
110	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
111	AS LABELLED IN DIAGRAM	2.0+/-4.9	18.1+/- 44
112	AS LABELLED IN DIAGRAM	0.0+/-3.5	0.0+/- 31
113	AS LABELLED IN DIAGRAM	2.0+/-4.9	18.1+/- 44
114	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
115	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
116	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
117	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
118	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
119	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
120	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
121	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25

HEALTH PHYSICS SURVEY
SAMPLE ANALYSIS REPORT

COLLECTION DATE:6/23/89

CUSTOMER: FRED C. HART ASSOCIATES

TYPE OF SAMPLES: WIPE X AIR LEAK TEST
ANALYZED FOR : BETA
STANDARD: Tc-99
DETECTOR: GAS FLOW PROPORT. COUNTER
ANALYSIS DATE:9/28/89

SAMPLE NO.	LOCATION/DESCRIPTION	NET CPM	ACTIVITY
122	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
123	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
124	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
125	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
126	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
127	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
128	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
129	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
130	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
131	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
132	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
133	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
134	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
135	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25
136	AS LABELLED IN DIAGRAM	0.0+/-2.8	0.0+/- 25

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HEALTH PHYSICS SURVEY
SAMPLE ANALYSIS REPORT

COLLECTION DATE:6/23/89

CUSTOMER: FRED C. HART ASSOCIATES

TYPE OF SAMPLES: WIPE__x_ AIR__LEAK TEST__
ANALYZED FOR : ALPHA
STANDARD: AM-241
DETECTOR: GAS FLOW PROPORT. COUNTER
ANALYSIS DATE:9/28/89

SAMPLE NO.	LOCATION/DESCRIPTION	NET CPM	ACTIVITY
1	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
2	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
3	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
4	AS LABELLED IN DIAGRAM	0.5+/-2.4	0.5+/- 2
5	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
6	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
7	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
8	AS LABELLED IN DIAGRAM	0.5+/-2.4	0.5+/- 2
9	AS LABELLED IN DIAGRAM	0.5+/-2.4	0.5+/- 2
10	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
11	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
12	AS LABELLED IN DIAGRAM	0.5+/-2.4	0.5+/- 2
13	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
14	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
15	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
16	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
17	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
18	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
19	AS LABELLED IN DIAGRAM	0.5+/-2.4	0.5+/- 2
20	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
21	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
22	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
23	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
24	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
25	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
26	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
27	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
28	AS LABELLED IN DIAGRAM	0.5+/-2.4	0.5+/- 2
29	AS LABELLED IN DIAGRAM	0.0+/-1.4	0.0+/- 1
30	AS LABELLED IN DIAGRAM	0.5+/-2.4	0.5+/- 2

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Page No. 1
09/29/89

GAMMA SPECTROSCOPY ANALYSIS
LI TUNGSTEN SAMPLES

SAMPLE #	WT (g)	TH-232+ DAUGHTERS (pCi/g)	U-238 + DAUGHTERS (pCi/g)	RA-226 (pCi/g)	SAMPLE DESCRIPTION
TANK	511.0	0.40 +- 0.11	<0.55	<0.25	SPILLED LIQUID FROM WOODEN TANK NE CORNER PARCEL A
R1	429.0	<0.41	<1.50	<0.33	CHEMICAL COMPOSITE R1
R2	459.0	<0.34	<0.94	0.18 +- 0.06	CHEMICAL COMPOSITE R2
R3	374.0	<0.37	<1.19	<0.48	CHEMICAL COMPOSITE R3
R4	393.0	0.51 +- 0.16	<0.69	<0.24	CHEMICAL COMPOSITE R4

APPENDIX D

RESULTS OF TANK CONTENTS ANALYSES

GAMMA SPECTROSCOPY ANALYSIS
LI TUNGSTEN TANK SAMPLES

SAMPLE #	WT (g)	TH-232 (pCi/g)	U-238 (pCi/g)	RA-226 (pCi/g)	SAMPLE DESCRIPTION
RN-2	421.0	<0.38 +- 0.00	<1.38 +- 0.00	0.33 +- 0.07	TANK CONTENTS - LIQUID
RA-1	419.0	<0.56 +- 0.00	<0.98 +- 0.00	<0.17 +- 0.00	TANK CONTENTS - LIQUID
RB-2	471.0	<0.33 +- 0.00	<1.74 +- 0.00	0.13 +- 0.06	TANK CONTENTS - LIQUID
RN-1	415.0	<0.41 +- 0.00	<0.91 +- 0.00	0.16 +- 0.06	TANK CONTENTS - LIQUID
RB-1	171.0	<0.82 +- 0.00	<2.35 +- 0.00	<0.77 +- 0.00	TANK CONTENTS - LIQUID
231	380.0	<0.40 +- 0.00	<1.00 +- 0.00	0.18 +- 0.08	TANK CONTENTS - LIQUID
232	468.0	<0.34 +- 0.00	<1.53 +- 0.00	<0.22 +- 0.00	TANK CONTENTS - LIQUID
233	533.0	<0.30 +- 0.00	<0.71 +- 0.00	<0.27 +- 0.00	TANK CONTENTS - LIQUID
287	141.0	<2.20 +- 0.00	<5.40 +- 0.00	1.26 +- 0.45	TANK CONTENTS - LIQUID
K-2	119.0	<2.70 +- 0.00	<6.75 +- 0.00	<3.20 +- 0.00	TANK CONTENTS - LIQUID
RN-7	149.0	<2.30 +- 0.00	<5.30 +- 0.00	0.96 +- 0.43	TANK CONTENTS - LIQUID
RN-6	385.0	<1.07 +- 0.00	<2.04 +- 0.00	0.45 +- 0.16	TANK CONTENTS - LIQUID
RN-5	382.0	<0.77 +- 0.00	<2.06 +- 0.00	0.39 +- 0.16	TANK CONTENTS - LIQUID
RN-4	364.0	<1.28 +- 0.00	<2.20 +- 0.00	0.50 +- 0.17	TANK CONTENTS - LIQUID
RN-3	385.0	<0.74 +- 0.00	<2.13 +- 0.00	<1.07 +- 0.00	TANK CONTENTS - LIQUID
K-1	232.0	<1.26 +- 0.00	<3.39 +- 0.00	1.40 +- 0.30	TANK CONTENTS - LIQUID
K-6	237.0	<1.35 +- 0.00	<3.46 +- 0.00	0.64 +- 0.24	TANK CONTENTS - LIQUID
K-8	216.0	<1.38 +- 0.00	<3.56 +- 0.00	<1.79 +- 0.00	TANK CONTENTS - LIQUID
K-3	265.0	<1.14 +- 0.00	<3.06 +- 0.00	0.51 +- 0.20	TANK CONTENTS - LIQUID
RB-3	467.0	<0.64 +- 0.00	<1.81 +- 0.00	0.43 +- 0.14	TANK CONTENTS - LIQUID
RB-4	468.0	<0.67 +- 0.00	<1.68 +- 0.00	<0.53 +- 0.00	TANK CONTENTS - LIQUID
RA-2	473.0	<0.71 +- 0.00	<1.98 +- 0.00	0.51 +- 0.12	TANK CONTENTS - LIQUID
K-9	220.0	1.24 +- 0.63	<3.41 +- 0.00	0.90 +- 0.30	TANK CONTENTS - LIQUID
K-4	146.0	<2.19 +- 0.00	<10.40 +- 0.00	1.57 +- 0.45	TANK CONTENTS - LIQUID

REFERENCE NO. 38

CHEMICAL QUALITY OF WATER FROM COMMUNITY SYSTEMS IN NEW YORK, NOVEMBER 1970 TO MAY 1975

Compiled by Robert H. Cartwright and James A. Ziarno

U.S. GEOLOGICAL SURVEY

Water Resources Investigations 80-77

Prepared in cooperation with the

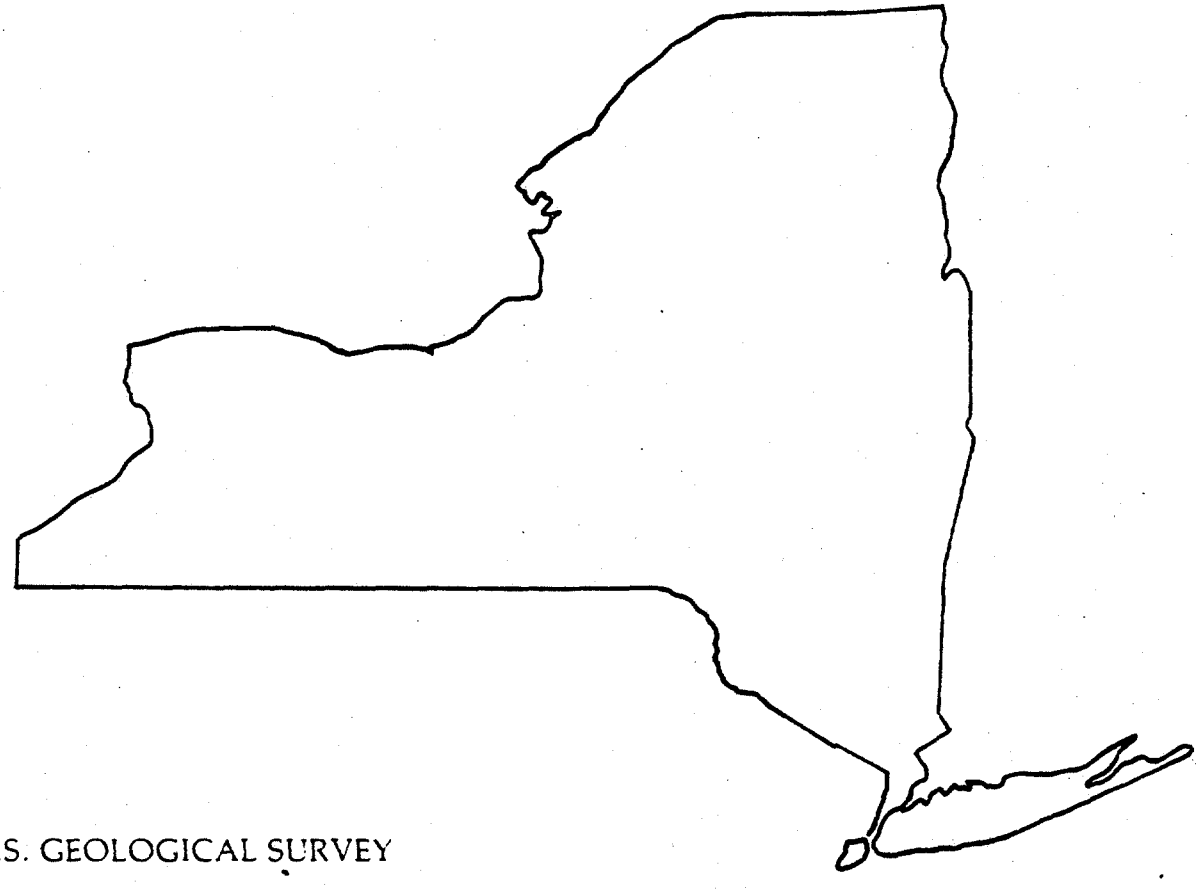
New York State Department of Health

Albany, New York

1980

101120

Chemical Quality of Water from Community Systems in New York, November 1970 to May 1975



U.S. GEOLOGICAL SURVEY

Water-Resources Investigations 80-77

Prepared in cooperation with

New York State Department of Health

101121

TABLE 2.--CHEMICAL ANALYSES OF WATER FROM COMMUNITY SYSTEMS IN NEW YORK, NOVEMBER 1970-MAY 1975
SECTION I. MAJOR AND MINOR CONSTITUENTS AND PHYSICAL PROPERTIES (CONTINUED)

NASSAU COUNTY

COLUMN(S) ON THIS PAGE	USGS-ASSIGNED LATITUDE-LONGITUDE NUMBER	SYSTEM (OR SITE) NAME AND RAW SOURCE OF WATER SAMPLED
A	404502073402400	GARDEN CITY PARK WD-WELL #5
B	405203073375300	GLEN COVE(C)-WELLS
C	404149073373100	HEMPSTEAD(V)-WELL N8264
D	404149073373101	HEMPSTEAD(V)-WELL N8264
E	404209073383200	HEMPSTEAD GARDEN WD-WELLS
F	404521073310200	HICKSVILLE WD-WELL N6193
G	404427073414900	JAMAICA WATER SUPPLY CO-WELL #16
H	404930073382000	JERICHO WD-WELL #1
I	404930073382001	JERICHO WD-WELL #1

SYSTEM(S) ON THIS PAGE..	A	B	C	D	E	F	G	H	I
TYPE OF WATER SAMPLED...	DISTRBN	DISTRBN	RAW	TREATED	DISTRBN	RAW	RAW	RAW	TREATED
DATE.....	08/24/71	09/12/73	04/02/74	06/02/74	09/11/73	06/05/74	08/24/71	08/24/71	08/24/71
ALUMINUM UG/L	20	60	100	220	120	24	6.0	4.0	3.0
ARSENIC UG/L	0	0	< 1	1	< 1	0	0	4	0
BARIUM UG/L	22	24	1.0	2.0	13	24	90	1.0	1.0
BERYLLIUM UG/L	< .80	--	< .20	< .30	--	< .70	< .90	< .10	< .20
BICARBONATE MG/L	24	28	3	17	20	3	33	18	33
BISMUTH UG/L	< 4.0	< 3.0	< .50	< .90	< 2.0	< 2.0	< 4.0	< .60	< .90
BORON UG/L	10	11	5.0	5.0	22	8.0	130	5.0	5.0
CADMIUM UG/L	0	0	0	0	0	0	0	0	0
CALCIUM MG/L	21	14	.60	1.5	10	7.0	36	3.0	3.0
CARBONATE MG/L	0	0	0	0	0	0	0	0	0
CHLORIDE MG/L	17	16	4.1	4.9	18	32	27	4.0	4.5
CHROMIUM UG/L	< 4	1	< 1	< 1	< 1	< 1	< 4	1	2
COBALT UG/L	< 2.0	< 3.0	2.0	2.0	6.0	3.0	< 2.0	< .30	< .40
COLIFORM COL/100 ML	--	--	--	--	--	--	--	--	--
COPPER UG/L	41	1000	18	19	150	740	43	21	16
CYANIDE MG/L	0	0	0	0	0	0	0	0	0
DISS SOLIDS SUM MG/L	149	184	20	33	106	76	181	30	43
FLUORIDE MG/L	0	.30	.40	.20	.30	.10	.10	.10	.10
GALLIUM UG/L	< .80	< 1.0	< .20	< .40	< 1.0	< 1.0	< .90	< .10	< .20
GERMANIUM UG/L	< 4.0	< 3.0	< .50	< .90	< 2.0	< 2.0	< 4.0	< .60	< .90
HARDNESS TOTAL MG/L	182	58	3	6	35	27	115	13	12
HARDNESS NONCARB MG/L	82	35	1	0	19	24	88	0	0
IRON UG/L	220	12	470	700	820	94	30	36	57
LEAD UG/L	2.0	--	2.0	2.0	< 2.0	< 2.0	< 3.0	3.0	1.0
LITHIUM UG/L	< 10	0	0	0	0	0	< 10	< 10	< 10
MAGNESIUM MG/L	12	5.7	.40	.50	2.5	2.2	6.2	1.3	1.2
MANGANESE UG/L	5.0	15	2.0	4.0	100	10	< 3.0	2.0	2.0
MBAS MG/L	.14	0	.01	.01	.02	.07	.12	.01	0
MERCURY UG/L	< .50	.60	< .50	< .50	2.7	< .50	< .50	< .50	< .50
MOLYBDENUM UG/L	< 2.0	< 1.0	< .20	< .40	< 1.0	< 1.0	< 3.0	< .30	< .40
NICKEL UG/L	3.0	4.0	3.0	5.0	10	9.0	< 4.0	2.0	2.0
NITRATE AS N MG/L	15	4.7	.02	.06	1.6	6.2	11	.10	.10
NITRITE AS N MG/L	.01	.01	0	0	.02	0	0	0	0
NITROGEN NH4 AS N MG/L	--	--	--	--	--	--	--	0	.07
NITROGEN NH4+ORG-N MG/L	.01	.05	.03	.02	.21	.02	.01	0	.17
PH UNITS	6.6	6.6	5.3	6.5	6.7	5.2	6.4	7.0	7.5
PHENOLS UG/L	0	--	--	--	--	--	0	0	0
PHOSPHORUS AS P MG/L	0	.06	1.2	.02	.56	.01	0	0	0
POTASSIUM MG/L	1.5	1.9	.60	.60	2.7	1.2	2.1	.50	.50
RUBIDIUM UG/L	--	--	--	--	--	--	--	--	--
SELENIUM UG/L	0	1	2	3	0	4	0	2	1
SILICA MG/L	11	15	6.0	6.1	9.8	7.2	10	7.3	7.1
SILVER UG/L	< .20	0	< .05	< .10	0	< .20	< .30	< .10	< .10
SODIUM MG/L	14	9.8	4.2	9.8	19	18	18	3.0	8.8
SPECIFIC COND UMHOS	303	192	39	59	182	177	347	39	65
STRONTIUM UG/L	120	90	2.0	4.0	65	40	360	18	23
SULFATE MG/L	46	23	.60	.50	32	.20	54	1.5	1.4
TIN UG/L	< 4.0	< 3.0	< .50	< 1.0	< 2.0	< 2.0	< 4.0	< .60	< .90
TITANIUM UG/L	< 2.0	< 2.0	3.0	5.0	< 2.0	2.0	< 2.0	< .30	< .40
VANADIUM UG/L	< 4.0	< 1.0	< .20	< .40	< 1.0	< 1.0	< 4.0	< .60	< .90
ZINC UG/L	< 250	20	40	150	10	30	< 200	< 40	< 65
ZIRCONIUM UG/L	< 8.0	< 4.0	< 1.0	< 2.0	< 3.0	< 5.0	< 9.0	< 2.0	< 2.0

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TABLE 2.--CHEMICAL ANALYSES OF WATER FROM COMMUNITY SYSTEMS IN NEW YORK, NOVEMBER 1970-MAY 1975
SECTION 1. MAJOR AND MINOR CONSTITUENTS AND PHYSICAL PROPERTIES (CONTINUED)

NASSAU COUNTY

COLUMN(S) ON THIS PAGE	USGS-ASSIGNED LATITUDE-LONGITUDE NUMBER	SYSTEM (OR SITE) NAME AND RAW SOURCE OF WATER SAMPLED
A	404650073291100	PLAINVIEW WD-WELL N6076
B	404650073291101	PLAINVIEW WD-WELL N6076
C	404838073415100	PLANDOME(V)-WELLS
D	405037073412800	PORT WASHINGTON(V)-WELLS
E	403929073391900	ROCKVILLE CENTRE(V)-WELL N5194
F	403929073391901	ROCKVILLE CENTRE(V)-WELL N5194
G	404712073372300	ROSLYN WD-WELLS
H	405100073430100	SANDS POINT(V)-WELL #2
I	404957073375000	SEA CLIFF(V)-WELLS

SYSTEM(S) ON THIS PAGE..	A	B	C	D	E	F	G	H	I
TYPE OF WATER SAMPLED...	RAW	TREATED	DISTRBN	DISTRBN	RAW	TREATED	DISTRBN	DISTRBN	DISTRBN
DATE.....	01/28/74	04/02/74	08/21/73	08/21/73	04/03/74	06/03/74	09/25/73	08/24/71	09/12/73
ALUMINUM UG/L	10	45	4.0	45	6.0	150	4.0	5.0	5.0
ARSENIC UG/L	< 1	0	0	0	1	0	< 1	0	0
BARIUM UG/L	26	19	22	13	< .70	1.0	4.0	40	20
BERYLLIUM UG/L	< .40	< .40	< 1.0	0	< .10	< .30	< .30	< .70	--
BICARBONATE MG/L	0	16	62	37	2	17	9	69	26
BISMUTH UG/L	< 2.0	< 2.0	< 3.0	< 2.0	< .40	< .80	< 1.0	< 3.0	< 2.0
BORON UG/L	6.0	5.0	8.0	9.0	9.0	7.0	6.0	20	40
CADMIUM UG/L	0	0	0	0	0	0	0	0	0
CALCIUM MG/L	6.0	7.8	14	11	.50	5.9	3.7	24	17
CARBONATE MG/L	0	0	0	0	0	2	0	0	0
CHLORIDE MG/L	12	8.4	7.5	8.4	3.7	3.4	5.9	16	12
CHROMIUM UG/L	< 1	< 1	< 2	< 1	< 1	< 1	< 1	< 3	1
COBALT UG/L	< 2.0	< 2.0	< 3.0	< 2.0	.70	.80	< 1.0	< 3.0	< 2.0
COLIFORM COL/100 ML	--	--	--	--	--	--	--	--	--
COPPER UG/L	35	47	42	75	12	2.0	840	10	85
CYANIDE MG/L	.01	0	.02	0	0	0	0	0	.01
DISS SOLIDS SUM MG/L	63	43	112	81	19	34	35	162	102
FLUORIDE MG/L	.10	.20	.18	.21	.10	.10	.40	.10	.20
GALLIUM UG/L	< .60	< .60	< 2.0	< 1.0	< .20	< .40	< .50	< .70	< 1.0
GERMANIUM UG/L	< 2.0	< 2.0	< 3.0	< 2.0	< .40	< .80	< 1.0	< 4.0	< 2.0
HARDNESS TOTAL MG/L	23	25	71	49	2	16	16	113	64
HARDNESS NONCARB MG/L	23	12	20	19	1	0	8	57	43
IRON UG/L	10	30	80	40	110	200	34	15	500
LEAD UG/L	1.0	< 2.0	< 3.0	< 3.0	6.0	< .80	6.0	< 4.0	4.0
LITHIUM UG/L	0	0	0	0	0	0	0	< 10	0
MAGNESIUM MG/L	2.0	1.4	8.7	5.2	.30	.40	1.6	13	5.3
MANGANESE UG/L	3.0	3.0	54	2.0	2.0	4.0	2.0	< 2.0	10
MBAS MG/L	0	.04	0	.01	0	.03	.01	.06	.01
MERCURY UG/L	.50	< .50	< .50	< .50	< .50	< .50	.60	< .50	1.0
MOLYBDENUM UG/L	< .60	< .60	< 2.0	< 1.0	.10	< .40	< .50	< 2.0	< 1.0
NICKEL UG/L	< 2.0	1.0	< 3.0	< 2.0	1.0	1.0	2.0	4.0	< 2.0
NITRATE AS N MG/L	6.3	3.8	1.4	3.1	0	0	2.0	5.0	4.6
NITRITE AS N MG/L	0	0	.01	.00	0	0	0	0	.00
NITROGEN NH4 AS N MG/L	0	--	--	--	--	--	--	--	--
NITROGEN NH4+ORG-N MG/L	.07	.04	.03	.03	0	0	.01	.03	.04
PH UNITS	5.4	6.6	6.8	6.6	4.9	5.3	6.1	7.0	6.4
PHENOLS UG/L	--	--	--	--	--	--	--	0	--
PHOSPHORUS AS P MG/L	0	.52	.01	.21	.01	.01	.01	0	.03
POTASSIUM MG/L	.60	.60	2.2	1.4	.60	.60	.70	2.2	2.5
RUBIDIUM UG/L	--	--	--	--	--	--	--	--	--
SELENIUM UG/L	2	2	2	2	0	3	0	3	1
SILICA MG/L	6.7	6.7	21	15	7.0	6.6	8.0	20	11
SILVER UG/L	< .20	< .20	0	0	< .04	< .08	< .20	< .20	0
SODIUM MG/L	8.4	6.2	6.8	6.9	3.0	3.2	5.0	10	8.2
SPECIFIC COND UMHOS	104	95	179	139	28	56	65	208	186
STRONTIUM UG/L	30	31	48	33	1.0	9.0	12	80	85
SULFATE MG/L	21	0	20	11	3.1	3.1	1.5	34	28
TIN UG/L	< 2.0	< 2.0	< 3.0	< 2.0	< .40	< .80	< 1.0	< 4.0	< 2.0
TITANIUM UG/L	< 1.0	2.0	< 3.0	< 2.0	.30	2.0	< .70	< 3.0	< 2.0
VANADIUM UG/L	< .50	< .60	< 2.0	< 1.0	< .20	< .40	< .50	< 3.0	< 1.0
ZINC UG/L	50	20	0	0	40	20	10	< 150	120
ZIRCONIUM UG/L	< 2.0	< 3.0	< 5.0	< 4.0	< .40	< 2.0	< 2.0	< 7.0	< 4.0

101123

REFERENCE NO. 39

HYDROGEOLOGIC CORRELATIONS FOR SELECTED WELLS ON LONG ISLAND, NEW YORK--

A data base with retrieval program

by H. T. Buxton, D. A. Smolensky, and P. K. Shernoff

U.S. GEOLOGICAL SURVEY

Water-Resources Investigations
Report 86-4318

Prepared in cooperation with the

NASSAU COUNTY DEPARTMENT OF PUBLIC WORKS
SUFFOLK COUNTY DEPARTMENT OF HEALTH SERVICES
SUFFOLK COUNTY WATER AUTHORITY
NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION

Syosset, New York

1989

101125

DEPARTMENT OF THE INTERIOR

MANUEL LUJAN, JR., Secretary

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PLATES
(in pocket)

Plates 1-3. Maps of Long Island showing location of wells in:

1. Kings, Queens, Nassau, and nearby Counties
2. Western Suffolk County
3. Eastern Suffolk County

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TABLES

Pa

Table 1. Hydrogeologic units of Long Island and their water-bearing properties. 4

2. FORTRAN computer program for selective retrieval of hydrogeologic data 1

CONVERSION FACTORS AND ABBREVIATIONS

For the convenience of readers who prefer metric (International System) units to the inch-pound units in this report, the following conversion factors may be used:

Multiply inch-pound units	by	To obtain metric units
	Length	
inch (in)	25.40	millimeter (mm)
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
	Flow	
gallon per minute (gal/min)	0.06308	liter per second (L/s)

National Geodetic Vertical Datum of 1929 (NGVD of 1929)

A geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada, formerly called "mean sea level."

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HYDROGEOLOGIC CORRELATIONS FOR SELECTED WELLS ON LONG ISLAND, NEW YORK--

A data base with retrieval program

By H. T. Buxton, D. A. Smolensky, and P. K. Shernoff

ABSTRACT

Accurate delineation of Long Island's internal hydrogeologic structure is integral to the understanding and management of the ground-water system. The irregular extent and surface configuration of Long Island's seven major hydrogeologic units give the ground-water system a complex internal structure. This report presents a computerized data base of hydrogeologic correlations for 3,146 wells on Long Island and adjacent parts of New York City. The data base includes the well-identification number, the latitude and longitude of the well location, the altitude of land surface at the well, the altitude of the bottom of the drilled hole, and the altitude of the upper surface of the major hydrogeologic units penetrated by the well. A computer program is included that allows retrievals of selected types of data for all or any local area of Long Island. These data retrievals are a valuable aid to the construction of hydrogeologic-surface maps.

INTRODUCTION

Long Island extends approximately 120 mi eastward from the East River and New York Harbor to Montauk Point (fig. 1). It contains the densely populated boroughs of New York City (Kings and Queens Counties) in the west, suburban Nassau and western Suffolk Counties in the central part, and areas of farmlands and pine barrens in the east.

Ground water is the sole source of freshwater supply for the 2.6 million inhabitants of Nassau and Suffolk Counties. About 500 Mgal/d was pumped from the Island's ground-water reservoir in 1981 for public supply, commercial, and agricultural needs. This demand is expected to increase in coming years, which will make proper resource management imperative.

Long Island's geologic history has consisted of alternating periods of erosion and deposition. The result is a sequence of aquifers and confining units of irregular extent and surface configuration that give the ground-water system a complex internal structure. This irregular internal geometry has a large influence on the patterns and rates of ground-water flow. Ground-water flow is retarded where the aquifers are separated by a confining unit but is unimpeded where the intervening confining unit has been eroded or where cut-and-fill deposition makes two aquifers laterally contiguous.

Knowledge of the internal hydrogeologic structure is necessary for efficient resource management, which includes (1) designing future water-development plans; (2) selecting sites for waste disposal; (3) locating and tracking the movement of contaminants within the ground-water system; and (4) mitigating other undesirable effects of man's influence on the system, such as streamflow depletion and saltwater intrusion.

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Purpose and Scope

This report presents a computerized data base of hydrogeologic-unit correlations for 3,146 wells on Long Island and adjacent parts of New York City. The data base (at end of report) gives the altitude at which the upper surface of each of seven major hydrogeologic units was penetrated and also includes the location, land-surface altitude, and depth of each well.

The following sections discuss the hydrogeologic units and the well data used to correlate surface altitudes for each unit; they also describe the format of the data base and explain each element. Also included is a description of a simple system of data retrieval that facilitates construction of hydrogeologic maps with a computer program.

A report by Smolensky and others (in press) presents a set of maps showing the configuration of the upper surface of these hydrogeologic units. The correlations presented herein were developed during construction of those maps and are consistent with their representation of the system geometry. The data-retrieval methods described in this report were used during map construction.

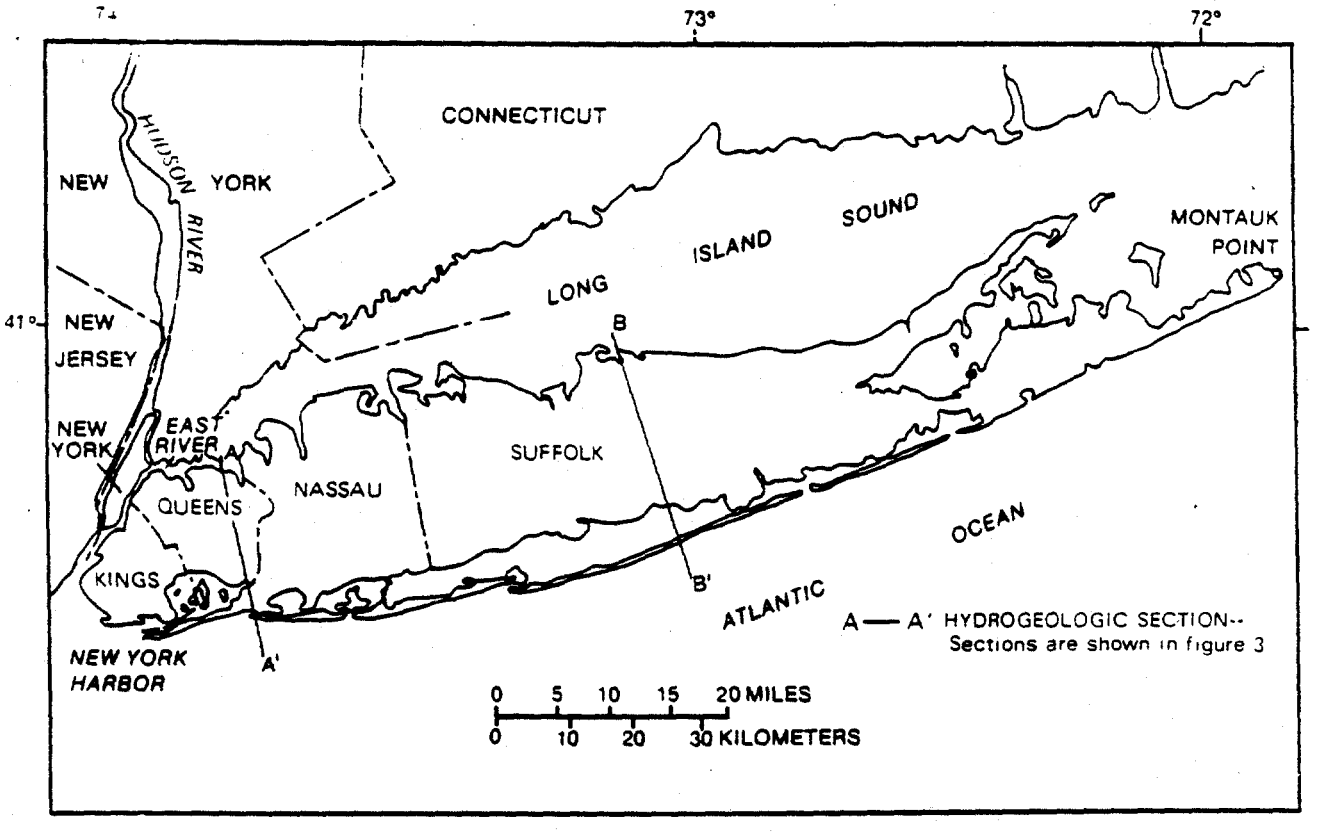

Figure 1.--Location of Long Island, N.Y., and of hydrogeologic sections depicted in figure 3.

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Previous Investigations

Some previous hydrogeologic investigations that were completed on a local scale were used as a starting point for this study. Krulikas (1981) and Jensen and Soren (1971) evaluated the hydrogeology of Suffolk County, Kilburn (1980) and Kilburn and Krulikas (1986) evaluated the hydrogeology of parts of Nassau County, and Buxton and others (1981) evaluated the hydrogeology of Kings and Queens Counties.

Acknowledgments

The authors greatly appreciate support provided by the New York State Department of Environmental Conservation, Nassau County Department of Public Works, Suffolk County Department of Health Services, Suffolk County Water Authority, and New York City Department of Environmental Protection.

HYDROGEOLOGIC FRAMEWORK

Long Island is underlain by unconsolidated deposits of clay, silt, sand, and gravel that overlie southward-dipping consolidated bedrock (fig. 2). The unconsolidated deposits are thinnest in northern Queens County (northwestern Long Island) and thicken to the south and east to a maximum thickness of 2,000 ft at the south shore. These deposits contain several distinct geologic units ranging in age from Late Cretaceous through Pleistocene, with some recent deposits near shores and along streams. These units are differentiated by age, method of deposition, and lithology in table 1.

In studies of ground-water availability and flow patterns, correlations that are based strictly on geologic factors may not adequately describe the internal structure of the hydrologic system; generally an interpretation in which the units are differentiated on the basis of water-transmitting properties is more useful. Thus, table 1 gives both the geologic units and the corresponding hydrogeologic units and shows their stratigraphic relationships. Eight major hydrogeologic units are indicated; these are, in order of deposition, consolidated bedrock, the Lloyd aquifer, the Raritan confining unit, the Magothy aquifer, the Monmouth greensand, the Jameco aquifer, the Gardiners Clay, and the upper glacial aquifer. The two hydrogeologic vertical sections shown in figure 3 depict the relative position of these units in western and eastern Long Island, respectively. The Jameco aquifer is present only in western Long Island (fig. 3A), and the Monmouth greensand is present only in eastern Long Island (fig. 3B). A map showing the extent and configuration of all units below the upper glacial aquifer is given in Smolensky and others (in press). Other local hydrogeologic units have been identified within the upper glacial deposits but are not discussed herein.

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Table 1.--Hydrogeologic units of Long Island and their water-bearing properties.

System	Series	Geologic unit	Hydro-geologic unit	Approximate maximum thickness (ft)	Character of deposits	Water-bearing properties
Quaternary	Holocene	Recent deposits: Salt marsh deposits, stream alluvium, shoreline deposits, and fill.	Recent deposits	50	Sand, gravel, clay, silt, organi mud, peat, loam, and shells. Colors are gray, brown, green, black, and yellow.	Beach deposits are highly permeable; marsh deposits poorly permeable. Locally hydraulically connected to underlying aquifers.
	Pleistocene	Upper Pleistocene deposits	Upper glacial aquifer	700	Till composed of clay, sand, gravel, and boulders, forms Harbor Hill and Ronkonkoma terminal moraines. Outwash deposits consist of quartzose sand, fine to very coarse, and gravel, pebble to boulder sized. Also contains lacustrine, marine, and reworked deposits. Local units are Port Washington aquifer and confining unit, "20 foot clay," and clay at Smithtown.	Till is poorly permeable. Outwash deposits are moderately to highly permeable. Glaciolacustrine and marine clay deposits are mostly poorly permeable but locally have thin, moderately permeable layers of sand and gravel. Average horizontal hydraulic conductivity is approximately 270 ft/d; conductivity of morainal material is approximately 50 percent of outwash deposits; anisotropy is approximately 10:1.
		unconformity?				
		Gardiners Clay	Gardiners Clay	150	Clay, silt, and few layers of sand. Colors are grayish green and brown. Contains marine shells and glauconite.	Poorly permeable; constitutes a confining layer for underlying aquifer. Some sand lenses may be permeable. Average vertical hydraulic conductivity is approximately 0.001 ft/d.
		unconformity?				
		Jameco Gravel	Jameco aquifer	200	Sand, fine to very coarse, and gravel to large-pebble size; few layers of clay and silt. Gravel is composed of crystalline and sedimentary rocks. Color is mostly brown.	Moderately to highly permeable. Confined by overlying Gardiners Clay. Average horizontal hydraulic conductivity is 200 to 300 ft/d; anisotropy is approximately 10:1.
		unconformity				

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Cretaceous	Upper Cretaceous	unconformity Monmouth Group unconformity		Monmouth Greensand	200	Interbedded marine deposits of clay, silt, and sand, dark-greenish gray, greenish-black, greenish, dark-gray, and black, containing much glauconite.	Poorly permeable; primarily a confining unit for underlying Magothy aquifer. Average vertical hydraulic conductivity is approximately 0.001 ft/d.
		Matawan Group-Magothy Formation, undifferentiated unconformity		Magothy aquifer	1,100	Sand, fine to medium, clayey in part; interbedded with lenses and layers of coarse sand and sandy and solid clay. Gravel is common in basal zone. Sand and gravel are quartzose. Lignite, pyrite, and iron oxide concretions are common. Colors are gray, white, red, brown, and yellow.	Most layers are poorly to moderately permeable; some are highly permeable locally. Water is unconfined in uppermost parts, elsewhere is confined. Constitutes principal aquifer for public supply. Average horizontal hydraulic conductivity is 50 ft/d; anisotropy is approximately 100:1.
		Raritan Formation	Unnamed clay member	Raritan confining unit	200	Clay, solid and silty; few lenses and layers of sand. Lignite and pyrite are common. Colors are gray, red, and white, commonly variegated.	Poorly to very poorly permeable; constitutes confining layer for underlying Lloyd aquifer. Average vertical hydraulic conductivity is approximately 0.001 ft/d.
			Lloyd Sand Member unconformity	Lloyd aquifer	500	Sand, fine to coarse, and gravel, commonly with clayey matrix; some lenses and layers of solid and silty clay; locally contains thin lignite layers. Sand and most of gravel are quartzose. Colors are yellow, gray, and white; clay is red locally.	Poorly to moderately permeable. Water is confined by overlying Raritan clay. Average horizontal hydraulic conductivity is 40 ft/d; anisotropy is approximately 10:1.
Precambrian and Paleozoic	- - -	Bedrock		Bedrock	- -	Crystalline metamorphic and igneous rocks; muscovite-biotite schist, gneiss, and granite. A soft, clayey zone of weathered bedrock locally is more than 70 ft thick.	Poorly permeable to virtually impermeable; constitutes lower boundary of ground-water reservoir. Some hard fresh water is contained in joints and fractures but is impractical to develop at most places.

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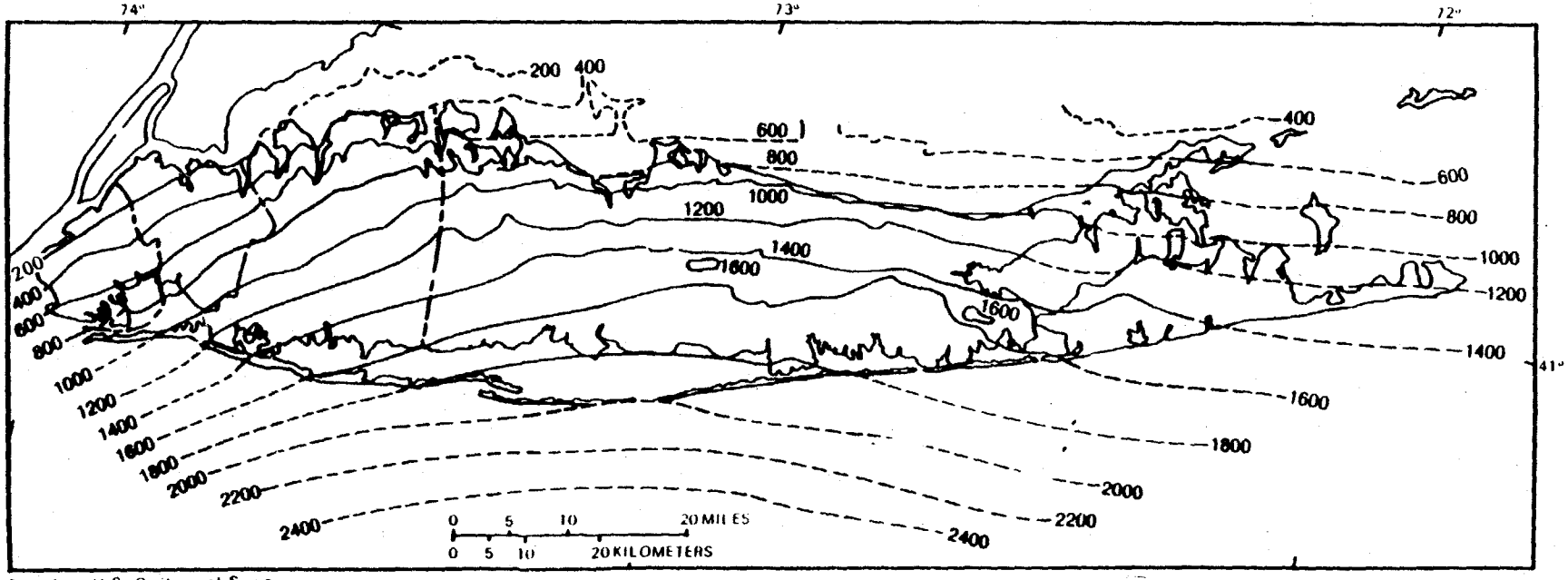

Base from U.S. Geological Survey
State base map, 1:500,000, 1974

EXPLANATION

1800 — — — LINE OF EQUAL THICKNESS OF UNCONSOLIDATED DEPOSITS--
Dashed where approximately located. Contour interval 200 feet

Figure 2.--Thickness of unconsolidated deposits on Long Island.

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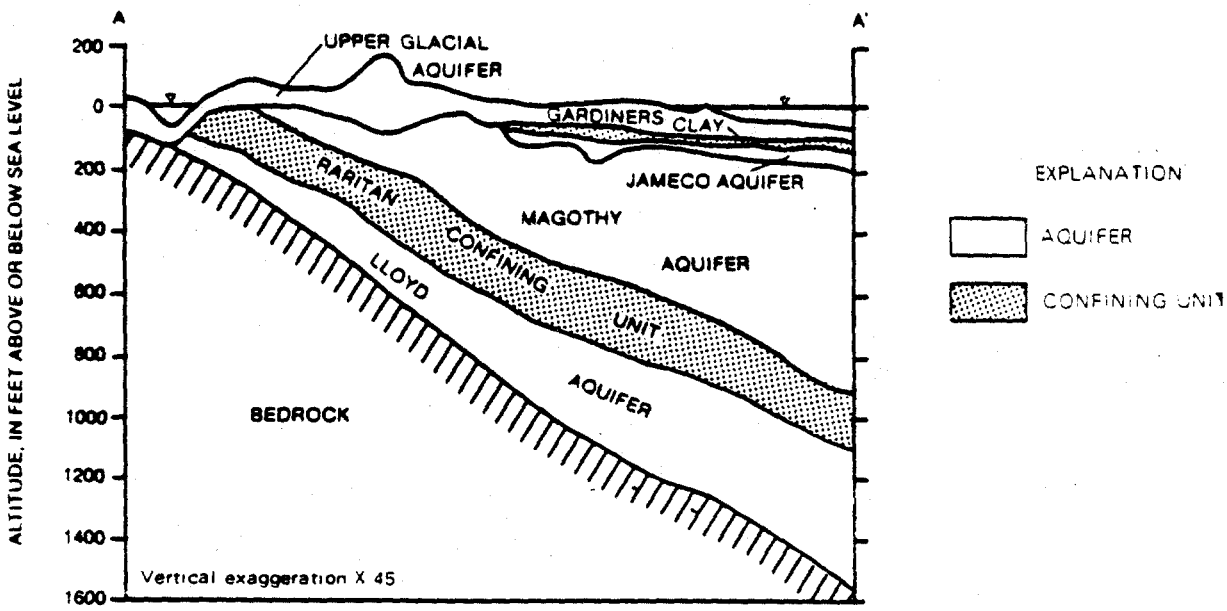

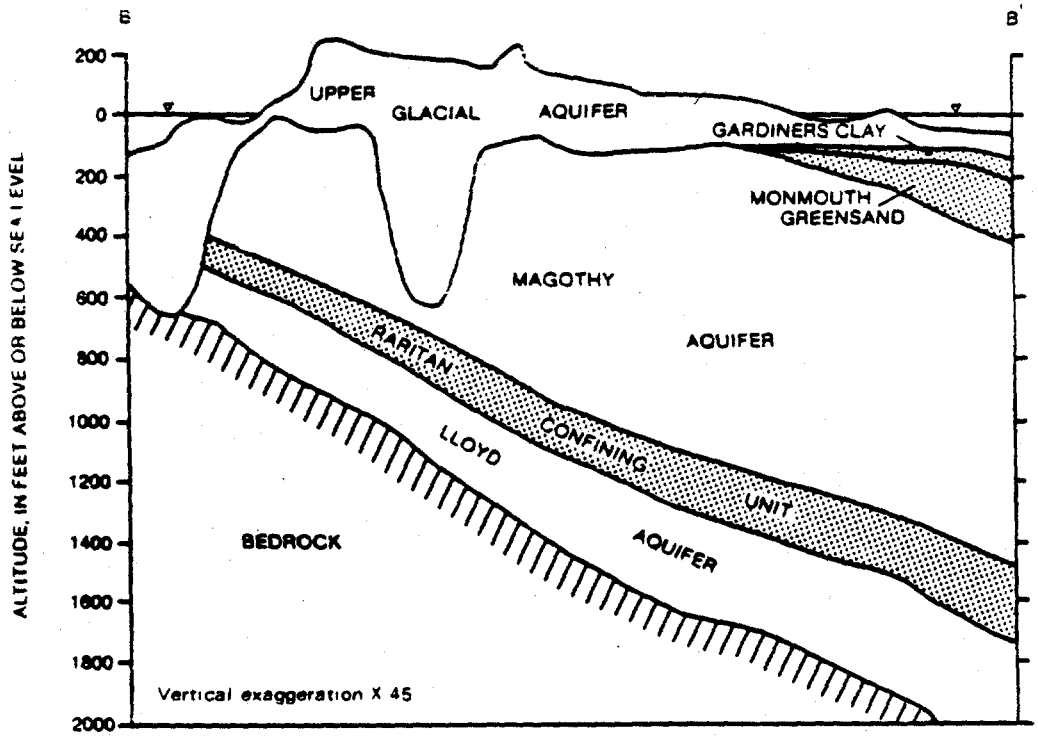

Figure 3.--Generalized vertical sections showing major hydrogeologic units: A. On western Long Island. B. On eastern Long Island. (Locations are shown in fig. 1.)

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CRITERIA FOR HYDROGEOLOGIC INTERPRETATION OF WELL DATA

Hydrogeologic well data included geophysical logs and drillers' and geologists' descriptions of cores and other drilling samples. Lithologic, mineralogic, and paleontologic evidence from these sources was used in conjunction with a conceptual sedimentation model of the succession of physical environments through Long Island's geologic past to define the altitude of the upper surface of each major hydrogeologic unit penetrated by a well. Offshore seismic-reflection data (Grim and others, 1970, and Deborah Hutchinson, U.S. Geological Survey, written commun., 1984) were also considered. The surface altitudes of a unit at all wells were correlated to form a surface consistent with Long Island's geologic history.

ELEMENTS OF DATA BASE

Hydrogeologic well data from 3.146 wells throughout Long Island are given in the data base at the end of this report. These include 1,559 wells in Suffolk County, 830 wells in Nassau County, 462 wells in Queens County, 264 wells in Kings County, and 30 wells in the adjacent parts of New York City. The locations of wells in Kings, Queens, and Nassau Counties and adjacent areas are shown on plate 1; those in western Suffolk County on plate 2; and those in eastern Suffolk County on plate 3. All elements of the data base are explained in the following sections.

Well Identification

The State of New York requires that Long Island wells that pump more than 45 gal/min have a permit from the New York State Department of Environmental Conservation (NYSDEC). In the permit process, the well owner files an installation report with basic well data with NYSDEC, who assigns a well number. Other wells that are installed as geologic test holes or for collection of other forms of hydrologic data are reported voluntarily and filed.

The prefix letter of the well indicates the county in which the well is located, as follows: K, Kings; Q, Queens; R, Richmond (Staten Island); B, Bronx; M, New York (Manhattan); N, Nassau; and S, Suffolk. Wells are assigned numbers chronologically as they are reported.

Well Location

Each well has been plotted on U.S. Geological Survey 24-minute topographic maps, and the latitude and longitude estimated to the nearest second. A 5-second latitude-longitude grid is included on plates 1 through 3 to facilitate well location.

Well Altitudes

The altitude of land surface and of the bottom of the borehole is given in feet above or below (-) sea level. Many boreholes are significantly deeper than the completed well, and commonly the hydrogeologic information from the backfilled part of the hole is of value in that it indicates the presence or absence of a hydrogeologic unit at that depth.

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Hydrogeologic Unit Penetrated and Altitude of Upper Surface

The altitude of the upper surface of any of the seven major hydrogeologic units penetrated by a well is given in feet above or below sea level. Altitudes facilitate correlation of these horizons among adjacent wells. In areas where the hydrogeologic unit is believed present but its exact surface altitude is difficult to identify, the term PRES (present) is entered. Where the unit is believed present but no drillers' log or other geologic information is available, the term NOREC (no record) is entered.

Adjacent Wells

Many wells are drilled in or near the same location; they may be clustered for site-specific projects or may be one of several grouped together in a well field. Only the most recent well at a location is labeled on plates 1 through 3; adjacent wells are included in the data base.

SELECTIVE DATA RETRIEVAL

Selective retrieval of information on individual hydrogeologic units is useful in defining the configuration and extent of a unit and its relationship to contiguous units. This section briefly describes a simple algorithm (and FORTRAN program, table 2) that retrieves selected information from the data base and prepares it in a form compatible with software available for plotting maps of Long Island (G. W. Hawkins, U.S. Geological Survey, written commun., 1984).

Program Documentation

A user can select pertinent information from nine fields in the data base. These nine fields along with a blank field are:

Field	Information
1	Well number
2	Altitude of hole bottom
3	Altitude of upper surface of Gardiners Clay
4	Altitude of upper surface of Jameco aquifer
5	Altitude of upper surface of Monmouth Greensand
6	Altitude of upper surface of Magothy aquifer
7	Altitude of upper surface of Raritan confining unit
8	Altitude of upper surface of Lloyd aquifer
9	Altitude of upper surface of consolidated bedrock
10	Blank field

The algorithm retrieves information from the selected field(s) and creates a file of labels. The file includes the latitude and longitude of the well for location, the symbol used for plotting the well on a map of Long Island, and the desired label to be plotted at each symbol (labels are selected from the above fields).

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Table 2.--FORTRAN computer program for s

```
      CHARACTER*6 NF(10),NA,NB,NC,NL
      CHARACTER*1 NS,TEXTIN,NN
      PRINT*,'*************************************************'
      PRINT*,'***  PROGRAM - HYDROGEOLOGY RETRIEVE(HGR.F77)  ***'
      PRINT*,'***  GENERATES A LABEL FILE (FOR MLIPLOT)      ***'
      PRINT*,'***  FROM THE HYDROGEOLOGY DATA BASE.          ***'
      PRINT*,'*************************************************'
      PRINT*,'***ENTER NAME OF HYDROGEOLOGY FILE'
      CALL IFILE(15)
      PRINT*,'***ENTER NAME OF LABEL CARDS FILE'
      CALL OFILE(4,16)
C
      PRINT*,'*******************************************************'
      NCHOP=INTIN(' ***ENTER 0 FOR ISLAND-WIDE RETRIEVAL, 1 FOR LOCAL')
      IF(NCHOP.EQ.0) GO TO 20
      LNLAT=INTIN(' ***ENTER LAT OF NORTHERN EXTENT OF LOCAL AREA***')
      LSLAT=INTIN(' ***ENTER LAT OF SOUTHERN EXTENT OF LOCAL AREA***')
      LELONG=INTIN(' ***ENTER LONG OF EASTERN EXTENT OF LOCAL AREA***')
      LWLONG=INTIN(' ***ENTER LONG OF WESTERN EXTENT OF LOCAL AREA***')
   20 CONTINUE
C
      PRINT*,'*************************************************'
      PRINT*,'***  THE DATA BASE HAS THE FOLLOWING          ***'
      PRINT*,'***  INFORMATION IN THE NOTED NUMBERED FIELDS. ***'
      PRINT*,'*************************************************'
      PRINT*,'*** - 1- WELL NUMBERS                          ***'
      PRINT*,'*** - 2- ALTITUDE OF HOLE BOTTOM               ***'
      PRINT*,'*** - 3- ALT. OF GARDINERS CLAY                ***'
      PRINT*,'*** - 4- ALT. OF JAMECO GRAVEL                 ***'
      PRINT*,'*** - 5- ALT. OF MONMOUTH GREENSAND            ***'
      PRINT*,'*** - 6- ALT. OF MAGOTHY AQUIFER               ***'
      PRINT*,'*** - 7- ALT. OF RARITAN CONFINING UNIT        ***'
      PRINT*,'*** - 8- ALT. OF LLOYD AQUIFER                 ***'
      PRINT*,'*** - 9- ALT. OF BEDROCK                       ***'
      PRINT*,'*** -10- BLANK FIELD(NO LABEL IN OPTIONS)      ***'
      PRINT*,'*************************************************'
      NN=TEXTIN('ENTER C TO CONTINUE')
      PRINT*,'*************************************************'
      PRINT*,'***     THREE OPTIONS ARE AVAILABLE            ***'
      PRINT*,'***     --------------------------             ***'
      PRINT*,'***  1- LABEL WITH FIELD A IF:                 ***'
      PRINT*,'***              FIELD B IS NOT BLANK.         ***'
      PRINT*,'***  2- LABEL WITH FIELD A IF:                 ***'
      PRINT*,'***              FIELD B IS BLANK              ***'
      PRINT*,'***  3- LABEL WITH FIELD A IF:                 ***'
      PRINT*,'***              FIELD B IS BLANK, AND         ***'
      PRINT*,'***              FIELD C IS NOT BLANK.         ***'
      NN=TEXTIN('ENTER C TO CONTINUE')
      PRINT*,'*************************************************'
      PRINT*,'*** '
      NOP=INTIN(' ***     ENTER OPTION( 1,2 OR 3)***')
```


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```
      PRINT*,'*** '
      NS=TEXTIN(' ***ENTER SYMBOL FOR WELL POINT ***')
      PRINT*,'***  '
C
       NF(10)='      '
      IA=INTIN(' ***ENTER FIELD FOR A ***')
      IB=INTIN(' ***ENTER FIELD FOR B ***')
       IF(NOP.NE.3) GO TO  15
      IC=INTIN(' ***ENTER FIELD FOR C ***')
C
   15 PRINT*,'*****************************************************'
      PRINT*,'***   YOU HAVE THE OPTION TO HAVE THE INFO IN  ***'
      PRINT*,'***   ONE OF THE FIELDS ADDED TO THE END OF    ***'
      PRINT*,'***   THE LABEL CARDS FOR REFERENCE.           ***'
      IL=INTIN(' ***      ENTER FIELD # FOR EXTRA LABEL***')
C
C  READ DATA FOR A WELL
C
   10 READ(15,8,END=99)NF(1),LAT,LONG,(NF(I),I=2,9)
    8 FORMAT(A6,3X,I6,1X,I6,7X,A6,3X,A6,1X,A6,
     /     1X,A6,1X,A6,1X,A6,1X,A6,1X,A6)
C
      IF(NCHOP.EQ.0)GO TO 25
      IF(LAT.GT.LNLAT.OR.LAT.LT.LSLAT) GO TO 10
      IF(LONG.GT.LWLONG.OR.LONG.LT.LELONG) GO TO 10
   25 CONTINUE
C
C   DEFINE FIELDS A,B,C AND L
C
      NA=NF(IA)
      NB=NF(IB)
      IF(NOP.NE.3) GO TO 140
      NC=NF(IC)
C
  140 CONTINUE
      NL=NF(IL)
C
      GO TO (50,60,70),NOP
   50 IF(NB.NE.'      ') GO TO 5
      GO TO 10
   60 IF(NB.EQ.'      ') GO TO 5
      GO TO 10
   70 IF(NB.EQ.'      '.AND.NC.NE.'      ') GO TO 5
      GO TO 10
C
    5 WRITE(16,9)NS,LAT,LONG,NA,NL
    9 FORMAT('L   0    ',A1,20X,I6,1X,I6,4X,A6,30X,A6)
      GO TO 10
   99 CONTINUE
      STOP
      END
```


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One of three options can be selected:

(1) Label with field A if field B is not blank,
(2) Label with field A if field B is blank,
(3) Label with field A if field B is blank, and field C is not blank,

where A, B, and C are defined to be one of the ten fields listed on page 9. Data can be retrieved on an islandwide scale or for a local area by defining limiting latitudes and longitudes.

Sample Retrievals

The options provided by this program enable the user to retrieve selected data and plot maps that are useful in defining hydrogeologic geometry, either on an islandwide or a local scale. Several examples of data retrievals are outlined below; an application to construct a hydrogeologic surface map is presented also.

Example 1.--Select option 1; designate field A equal to 1 (well number) and field B equal to 6 (altitude of the upper surface of the Magothy aquifer).

A file is prepared for use in plotting a map that shows the locations and well numbers of all wells that penetrate the Magothy aquifer. (If field A were designated equal to 6, the map would show the surface altitude of the Magothy aquifer at each well).

Example 2.--Select option 3; designate field A equal to 10, field B equal to 3, and field C equal to 6.

A file is prepared for use in plotting a map that identifies by a symbol each well that does not penetrate the Gardiners Clay but contacts the underlying Magothy aquifer. This indicates that the Gardiners Clay is absent at this site and provides a guide to defining the extent of that unit.

Example 3.--Select option 3; designate field A equal to 2, field B equal to 7, and field C equal to 6.

A file is prepared for use in plotting a map that shows the altitude of the bottom of all wells that penetrate the Magothy aquifer but not the underlying Raritan confining unit. The surface of the confining unit must be below this altitude.

An example of a hydrogeologic-unit map constructed with this data-retrieval system is shown in figure 4 (p. 14). This map shows the upper-surface configuration of the Raritan confining unit. All data on the map were retrieved from the data base through the discussed algorithm and are as follows:

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-- Upper surface altitude of the Raritan confining unit in wells where it is overlain by the Magothy aquifer, in feet. These values indicate the altitude of the unconformity between these units, a relatively flat surface.

-- Upper surface altitude of the Raritan confining unit in wells where the Magothy aquifer is absent. These values indicate the altitude of the Cretaceous surface where it has experienced severe post-Cretaceous erosion, especially during the Pleistocene.

-- Bottom altitude of wells that penetrate the Magothy aquifer but not the Raritan confining unit. These values indicate the highest possible surface altitude of the Raritan confining unit and are used to guide contours where wells are not deep enough to penetrate the unit.

-- Locations of wells that do not penetrate the Raritan confining unit but do contact older and stratigraphically deeper hydrogeologic units (the Lloyd aquifer or unconsolidated bedrock), indicating that the Raritan confining unit is absent at this location.

When combined, these data are a valuable aid to defining the surface configuration of a hydrogeologic unit; they also facilitate definition of the extent of a hydrogeologic unit and differentiation of the parts of the surface that were shaped by differing geologic events or environments. Use of this data-retrieval method is most advantageous in areas where typically layered strata have been affected by severe erosion.

SUMMARY

The hydrogeologic data base and method of selective retrieval presented in this report offer a method to obtain hydrogeologic data for any local area on Long Island and provide the data in a format suitable for construction of hydrogeologic maps. The data represent the upper surface altitudes of the hydrogeologic units penetrated in 3,146 wells on Long Island and surrounding parts of New York City. The surface altitude of each hydrogeologic unit at a well was inferred through inspection of lithologic, mineralogic, paleontologic, and geophysical data collected from the well and by correlation of surface altitudes in nearby wells. The resulting series of correlated surface altitudes were used to define the surface configuration of the hydrogeologic units on a set of maps by Smolensky and others (in press).

As additional hydrogeologic data become available, reevaluation of correlations with nearby wells and concurrent adjustment of the data would be advisable so that the data base will accurately represent the hydrogeologic structure of Long Island's ground-water reservoir.

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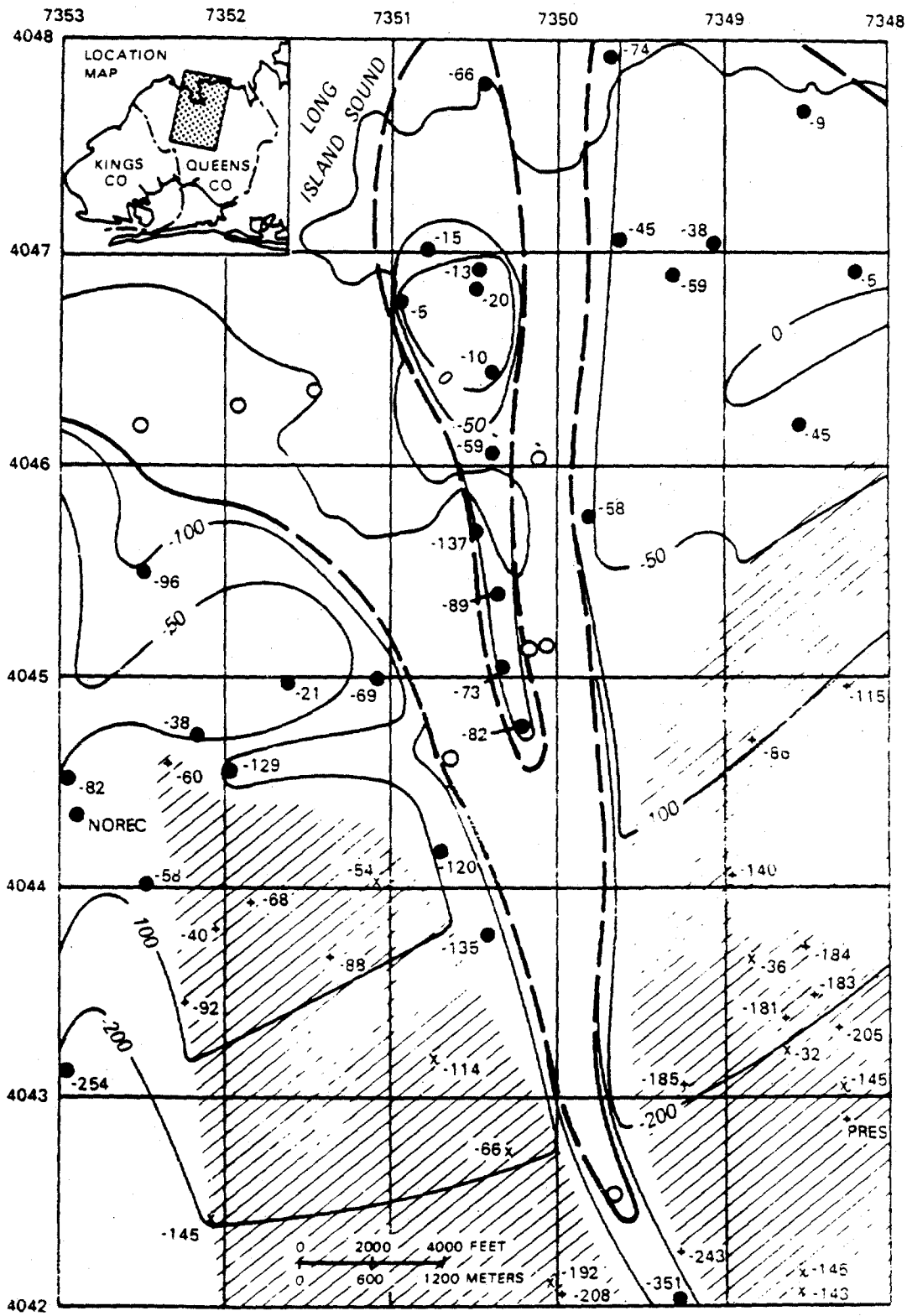

Figure 4.--Selected hydrogeologic data and estimated configuration of the upper surface of the Raritan confining unit in northern Queens County.

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EXPLANATION TO FIGURE 4

+-60	UPPER SURFACE ALTITUDE OF RARITAN CONFINING UNIT--where Magothy aquifer is overlying, in feet below NGVD of 1929.
●-38	UPPER SURFACE ALTITUDE OF RARITAN CONFINING UNIT--where Magothy aquifer was eroded away, in feet below NGVD of 1929.
x-114	ALTITUDE OF BOTTOM OF WELL THAT CONTACTS MAGOTHY AQUIFER BUT NOT RARITAN CONFINING UNIT--in feet below NGVD of 1929.
O	WELL THAT DOES NOT CONTACT RARITAN CONFINING UNIT BUT DOES CONTACT AN UNDERLYING UNIT.
+PRES	UNIT IS BELIEVED PRESENT BUT ITS SURFACE ALTITUDE IS UNDEFINED AT THIS WELL.
●NOREC	NO BOREHOLE INFORMATION IS AVAILABLE IN THE INTERVAL WHERE THIS UNIT IS BELIEVED PRESENT.
———	EXTENT OF RARITAN CONFINING UNIT.
—50—	LINE OF EQUAL UPPER SURFACE ALTITUDE--contour interval 50 and 100 feet. Datum is NGVD of 1929.
▨	AREA WHERE RARITAN CONFINING UNIT IS UNCONFORMABLY OVERLAIN BY MAGOTHY AQUIFER.
4044, 7351	DEGREES AND MINUTES OF LATITUDE AND LONGITUDE, RESPECTIVELY.

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DATA BASE

Upper Surface Altitudes of Major Hydrogeologic Units at 3,146 Wells on Long Island, New York

(Locations are shown on plates 1, 2, 3)

NOTES

Well identification

Prefix letter (column 1) indicates county in which well is located:

K = Kings	B = Bronx
Q = Queens	M = New York (Manhattan)
S = Suffolk	N = Nassau
R = Richmond (Staten Island)	

Hydrogeologic unit penetrated

The term PRES (present) is entered for wells where the hydrogeologic unit is believed present but its surface altitude is difficult to identify. Where the unit is believed present but no drillers' log or other geologic information is available, the term NOREC (no record) is entered.

Other abbreviations

Mon. greensand = Monmouth greensand
Rarit. conf. unit = Raritan confining unit

Remarks

Veatch 65 - indicates well number used in Veatch (1906).
NR -10 to -30 - indicates no hydrogeologic records are available from 10 to 30 feet below sea level.

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Q 3034	404237	734554	60	-228			-85						
Q 3056	404054	734403	40	-429			-86	-425			Q3083		
Q 3062	404059	734508	25	-405			-44	-401					
Q 3083	404056	734406	40	-323			-49						
Q 3109	403933	734829	22	-427	-109	-202	-234	-376					
Q 3110	403845	734757	10	-461	-104	-186	-346	-431					
Q 3111	403850	734648	14	-486	-112	-198	-295	-447					
Q 3112	403939	734728	11	-418	-99	-145	-293	-381					
Q 3156	404050	734755	35	-278	-80	-159		-278					
Q 3157	404107	734805	28	-259	-102	-173	-244	-257					
Q BWS2	404424	735610	25	-29						-29			
Q BWS3	404338	735414	29	-158				-86		-158			
Q BWS4	404446	735406	49	-127				FRES		-127			
Q BWS5	404612	735233	23	-159						-159			
Q BWS7	404429	734632	61	-535			-32	-151	-302	-482			
Q BWS9	404233	734940	115	-537					-388	-498			
QBWS10	404612	734611	61	-411			-21	-99	-274	-381			
QBWS12	404442	734850	16	-406			-52	-86	-276	-332			
QBWS13	404308	735257	102	-296	-148			-254		-294			
QBWS14	404303	734914	85	-490			-55	-185	-330	-450			
QBWS15	404612	734834	97	-299				-45	-185	-258			
QBWS16	404530	735231	60	-172				-96		-172			
QBWS17	404431	735258	38	-242	-67			-82		-222			
QBWS18	404227	735106	77	-429			-66	168	-366	-429			
QBWS19	404655	734813	65	-297				-5	-137	-225			
N 2	4039300734017		19	-63			-48					20FT	-31
N 3	403931	734234	5	-460	-61		-107						
N 6	403953	734316	10	-328			-52						
N 7	404043	734131	20	-950			-40	-519	-759				
N 10	404229	734246	51	-351			-79	-351					
N 11	404224	734238	50	-390			-30	-358			N9151		
N 15	4044270734149		116	9			9				N1958		
N 16	4044160734015		89	-356			3	-343					
N 17	4044350734020		104	-366			-21				N6918		
N 19	4046150734112		121	1			23						
N 20	4046050734232		210	-6			65						
N 22	4046420734405		16	-134			-57				N9110		
N 23	404642	734405	18	-449			-54	-178	-280	-416	N9110		
N 24	404735	734242	12	-448				-171	-261	-416	N9308		
N 29	4048300734148		29	-180			-173						

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UPPER SURFACE ALTITUDE OF MAJOR HYDROGEOLOGIC UNITS AT 3,146 WELLS ON LONG ISLAND, NEW YORK

WELL IDENT-ICATION NUMBER	LAT-LONG	ALTITUDE OF WELL, IN FEET ABOVE OR BELOW SEA LEVEL		HYDROGEOLOGIC UNIT PENETRATED AND ALTITUDE OF UNIT SURFACE, IN FEET ABOVE OR BELOW SEA LEVEL							LOCATED NEAR WELL	REMARKS
		TOP	BOTTOM	GARD-INERS CLAY	JAMECO GRAVEL	MON GREEN SAND	MAGOTHY AQUIFER	RARIT CONF UNIT	LLOYD AQUIFER	BED-ROCK		
N 31	4048000734429	9	-363						PRES	-355		
N 33	4050110734150	20	-352							-345		
N 36	4051110734302	46	-234							-199	N37	
N 37	4051130734302	52	-88							-166		
N 38	4051320734141	85	-337							-330		
N 41	4035360733936	6	-1251				-134	-861	-1038		N7776	
N 42	4035370733939	6	-1197				-124	-822	-1038		N7776	
N 43	4035310734012	6	-1279				-85	-791	-946		N6450	
N 44	4035310734023	6	-1276				PRES	-786	-959		N6450	
N 45	4035360733943	6	-1127				-126	-814	-1009		N7776	
N 46	4035340733527	8	-1258	-42			-92	-854	-1065		N6850	
N 47	4037170733916	6	-176	-52	-95		-130					
N 48	4039240733917	17	-506				-39				N50	
N 50	4039230733916	16	-507				-90					
N 52	4039290733826	27	-523	PRES			-90				N9792	20 FT -22
N 54	4039320733749	28	-73				-36					
N 57	4039130733717	11	-139				-25					20FT -19
N 62	4039050733615	10	-190				-47					20FT -21
N 67	4039220733535	24	-1028				PRES	PRES	PRES		N69	
N 68	4039220733532	25	-527				-60				N69	
N 69	4039220733537	21	-484				-31					
N 72	4041040733741	44	-572				-17					
N 73	4040560733553	30	-686				-10					
N 82	4043080733707	61	-481				-12					
N 83	404306 733713	1	-1004				2	-527	-702		N7298	
N 87	4043240733755	1	-793				10	-488	-646			
N 93	4043520733831	75	-7				-7					
N 97	4044480733812	114	-261				11				N98	
N 98	4044460733813	114	-255				11					
N 101	4045210733534	108	-291				45					

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N	102	4045340733743	176	78				81					
N	105	4046520733727	164	-353				10				N7613	
N	107	4047330733524	212	-294				153					
N	109	4049250733817	48	-481					-272	-374		N570	
N	110	4049310733821	56	-463					-298	-335			
N	118	4052440733509	65	-412						-337	-411		
N	119	4052440733523	80	-492						-411	-492		
N	120	4052410733526	80	-478						-363	-478		
N	122	405352 733704	5	-470						PRES	-467		
N	123	4053530733645	25	-279						-205			
N	128	4035580733027	6	-1028	PRES		PRES	PRES	PRES			N8414	
N	129	4036240733014	10	-946	PRES		PRES	PRES	PRES				
N	130	4037520733010	5	-83	-50								
N	131	4039490733417	11	-519				-68				N7796	
N	133	4039530733420	21	-508				-66					
N	134	4039500733415	16	-512				-56				N7796	
N	135	4040020733423	20	-130				-10					
N	136	4040450733418	25	-97				-33					20FT -12
N	137	4039530733050	10	-80				-32					
N	138	4040560733107	25	-100				-17					
N	140	4042300733134	55	-101				0					
N	141	4041420733435	28	-81				-12					
N	152	4046280733418	141	-343				73					
N	167	4051480733417	55	-68				34				N613	
N	173	4053370733448	38	-360						-322			
N	181	4040300732908	24	-988				-89	-796				20FT -28
N	184	4040250732802	10	-151				-90					20FT -38
N	185	4043000732733	45	-227				-25					
N	190	4044500732654	146	-554				96					
N	198	4049170732929	240	-885				40	-390	-576			
N	199	4049220732924	235	-376				20					
N	216	4049550734524	30	-482							-200		
N	248	403946 734252	14	-176				-41					
N	263	4045320734229	171	-584				26	-254	-489		N1332	
N	268	4046050734018	172	56				92					
N	273	4047070734353	58	-35				-25					
N	314	4051430734336	60	-190							-190		
N	319	4035130733957	10	-376				-80					
N	320	4036230733925	5	-378	-70	-108		-124					
N	373	4046250733506	149	-31				74					

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UPPER SURFACE ALTITUDE OF MAJOR HYDROGEOLOGIC UNITS AT 3,146 WELLS ON LONG ISLAND, NEW YORK

WELL IDENT-ICATION NUMBER	LAT-LONG	ALTITUDE OF WELL, IN FEET ABOVE OR BELOW SEA LEVEL: TOP	BOTTOM	HYDROGEOLOGIC UNIT PENETRATED AND ALTITUDE OF UNIT SURFACE, IN FEET ABOVE OR BELOW SEA LEVEL: GARD-INERS CLAY	JAMECO GRAVEL	MON GREEN SAND	MAGOTHY AQUIFER	RARIT CONF UNIT	LLOYD AQUIFER	BED-ROCK	LOCATED NEAR WELL	REMARKS
N 374	404643073360 4	205	102				168					
N 375	404653073362 0	182	32				162					
N 377	404722073362 9	200	-143				173					
N 381	404756073364 1	300	1				200					
N 384	404659073383 7	132	-118				32					
N 417	405403 733644	18	-228						-197			
N 418	405202 733638	10	-215				PRES	PRES	-215			
N 420	405401 733616	10	-332						-260			
N 440	404003073310 3	8	-72	-40			-60					20FT -20
N 502	405346073311 3	8	-362					-152	-308			
N 504	405422073303 6	19	-279					-131	-276			
N 506	405445073313 5	8	-310						-292			
N 558	404644073440 0	44	-138				-36				N4388	
N 559	403713 734333	20	-109	-64			-109					20FT -26,-41
N 570	404919073293 1	237	-369				-27	-369				
N 576	404605073313 4	144	-265				54					
N 578	404455073390 9	110	-305				-20					
N 599	404856073412 3	76	-378				-104	-164	-278		N8790	
N 613	405148073341 7	55	-85				33					
N 629	404141073414 3	55	-16				14					
N 637	403821073345 0	5	-182				-47					20FT -37
N 638	404811073360 4	295	-265				138					
N 650	404533073393 6	108	-242				48				N651	
N 651	404534073393 3	105	-243				17					
N 661	405151073381 6	60	-343					-140	-212		N8048	
N 662	404940073392 7	11	-353					-274	-335			
N 687	404743 734444	8	-362						-272	-312		
N 693	404226073424 2	90	-17				-6					
N 695	405147073374 9	47	-247					-153	-225			
N 842	405032073391 2	8	-433					-313	-336	-433	N906	

N	906	405034 0733912	9	-410				PRES	PPES	-427		
N	914	403932 734243	10	-104	-60		-88					
N	941	4041470734001	55	-12			-8					
N 1038		4041140733648	60	-55			-15					
N 1122		4046450734033	179	40			75					
N 1123		4045390734004	125	32			66					
N 1155		4048000733712	261	31			73					
N 1175		4049020733539	177	19			97					
N 1176		4047360733531	195	-3			163				N7549	
N 1177		4046480733513	183	37			156					
N 1190		4051320733407	128	29			35					
N 1210		4050230733155	187	44			90					
N 1212		4048400733119	227	42			104					
N 1227		4050550732950	172	38			132					
N 1228		4049540732939	224	35			38					
N 1229		4048460732910	251	50			93					
N 1244		4049100732708	249	-13			184					
N 1245		4048200732659	260	58			192					
N 1246		4047030732642	186	62			97					
N 1291		4049480734128	105	-296					-235			
N 1293		4047070733732	162	18			22					
N 1298		404655 734445	15	-370			-70	-132	-243	-325		
N 1300		4045490734021	165	-210			54					
N 1326		4047220734352	96	-99			12				N5576	
N 1328		4047130734105	177	-593			55	-234	-356	-586		
N 1332		4045300734230	162	-48			43					
N 1335		4037440734230	25	-117	-56		-110					20FT -15
N 1346		403850 734238	5	-143	-50		-142					
N 1420		4043520733820	74	-800			-6	-458	-620			
N 1476		4050570733251	130	47			101					
N 1477		4051250733047	216	22			30					
N 1481		4046080733029	149	72			78					
N 1486		4053250732933	5	-495					-475			
N 1499		4037590733920	6	-239			-61					
N 1601		4049480734126	108	-290					-256		N3888	
N 1585		4042240734041	65	-23			-13					
N 1602		4040250733932	30	-563			-52					
N 1603		4041120733935	32	-507			-26				N3520	
N 1618		404631 734215	83	-502			-52	-184	-324	-502	N5110	
N 1651		4052310733633	162	-308					-259			

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UPPER SURFACE ALTITUDE OF MAJOR HYDROGEOLOGIC UNITS AT 3,148 WELLS ON LONG ISLAND, NEW YORK

WELL IDENT-ICATION NUMBER	LAT-LONG	ALTITUDE OF WELL, IN FEET ABOVE OR BELOW SEA LEVEL		HYDROGEOLOGIC UNIT PENETRATED AND ALTITUDE OF UNIT SURFACE, IN FEET ABOVE OR BELOW SEA LEVEL							LOCATED NEAR WELL	REMARKS
		TOP	BOTTOM	GARD-INERS CLAY	JAMECO GRAVEL	MON GREEN SAND	MAGOTHY AQUIFER	RARIT CONF UNIT	LLOYD AQUIFER	BED-ROCK		
N 1658	404480732949	115	-185				67					
N 1667	404524073532	108	-129				33				N7785	
N 1686	404723073349	95	-255				30	-125			N5576	
N 1687	404723 734349	95	-130				FRFS	113			N5576	
N 1715	404908073409	101	-419				118	-165	-264	-397	N2030	
N 1716	404911073411	101	-412				-115	-158	-254	-408		
N 1742	403918073304	20	-252				-37					
N 1744	403922073417	20	-57				-50					20FT -36
N 1771	404743073434	212	-158				-149					
N 1793	404338 733307	91	-209				38					
N 1802	404512073421	132	-618				9	-284	-427	-616		
N 1804	404528 734149	119	-137				1				N8373	
N 1805	405427073112	15	-337					-142	-290			
N 1818	404532 734209	141	-94				21					
N 1819	404514073415	117	-167				9					
N 1825	404756073373	200	-167				82					
N 1835	404519 734210	122	-148				1					
N 1841	404515073415	118	-141				8				N4207	
N 1869	403847073330	10	-122				-42					20FT -33
N 1877	404810073391	20	-535				26	-240	-405		N2571	
N 1917	405138073382	15	-292					-150	-200		N4440	
N 1922	404523073294	125	-66				63					
N 1926	404841 734533	51	-235						-160	-235		
N 1927	403521073381	10	-1461	-89			-121	-859	-1051	-1461	N8233	20FT -20
N 1939	405314073315	5	-374					-169	-332			
N 1940	405300073325	20	-460					-190	-350		N9595	
N 1958	404426 734148	116	-641				16	-296	491	-639		
N 2002	404938073385	18	-454				-15	-229	-342			
N 2006	404110073400	45	-18				-14					
N 2017	405311073320	10	-385					-159	-325			

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N 2025	405630733114	23	-378					-192	-372				
N 2028	404731073400 7	254	-356				59	-237					
N 2030	404907073410 9	102	-263				-113	-161	-256				
N 2035	404737073411 7	141	-4				74						
N 2052	404829073395 3	159	-249				-34	-208			N5228		
N 2064	403939073291 2	5	-66				-59						
N 2087	405145073382 0	50	-295					-163	-278		N6549		
N 2088	405209073284 4	159	-446				-174	-242	-439				
N 2092	404829073395 1	158	-121				-35				N5228		
N 2113	405309073313 7	10	-439					-190	-350				
N 2132	405337073301 5	10	-459						-396				
N 2169	404648073421 5	58	-182				-61	-182					
N 2201	404518073342 7	115	-487				65	[illegible]			N8497		
N 2203	403806 734412	5	-177	-70	-142		-158						
N 2214	404826 734504	47	-245						-173	-243			
N 2225	403920073255 5	5	-169	-49		-70	-89						
N 2236	404519073342 7	115	-455				65	-445			N8497		
N 2241	405325073315 1	18	-358						-341				
N 2269	404916073411 8	110	-155				-125						
N 2349	404205073323 5	55	-51				-5						
N 2359	403906073282 9	5	-58	-44			-49					20FT	-34
N 2400	404710073380 4	166	-321				61	-311					
N 2422	404441073365 1	93	-17				68				N7186		
N 2424	404935073384 9	16	-445				-40	-218	-353				
N 2487	404546073390 2	135	-299				-20						
N 2527	404443073365 1	94	-24				69				N7186		
N 2528	405001073343 2	92	-251				-195	-204					
N 2560	405445073310 5	15	-402					-140	-302				
N 2566	404543073404 7	173	38				38						
N 2670	404811073391 6	51	1				32				N2571		
N 2671	404811073391 4	42	-25				6						
N 2572	403731073383 5	5	-95	-48			-92						
N 2574	403951073361 5	20	-524				-42				N8196	20FT	-16
N 2578	404033 734312	25	-478				-57	-434			N5145		
N 2580	404323073314 5	75	-1				0						
N 2597	403532 734034	6	-1246	-103	-117		-137	-786	-945				
N 2602	404516073343 4	114	-744				-39	-476	-635				
N 2747	404446073365 0	92	-325				11				N2748		
N 2748	404445073365 1	94	-457				60	-453					
N 2749	404751 734405	56	-389					194	-250	-342	N4266		

N 3603	4042480734021	75	-458				31	427			
N 3605	4041530734102	48	-537				-44	-478			20FT -17
N 3618	4043400733047	88	-332				12				
N 3636	4042090733735	50	-306				-13				
N 3649	4044460733704	107	-197				23			N3700	
N 3668	4041500733729	55	-511				-30				
N 3672	4044590734021	105	-376				-15	-342			
N 3685	4042240733742	55	-95				-1				
N 3700	4044480733705	106	33				38				
N 3704	4041300733831	55	-145				-39				20FT -30
N 3705	403824 734159	24	-166	-49	-136		-150				20FT -16,-49
N 3719	4041120734041	33	-553				PRES	-487		N3720	
N 3720	4041120734041	35	-551				-63	-485			
N 3721	4040440733548	40	-61				-8				
N 3732	4046440733839	140	-310				26				
N 3733	4046280733831	141	-314				32				
N 3734	403711 734443	12	-130				-130				20FT -16
N 3741	4039130734020	20	-102				-59				20FT -32
N 3742	4048420734044	140	-125				-125				
N 3752	4048230733805	211	-52				2			N5708	
N 3758	4044350733718	110	10				19				
N 3781	4040300734145	19	-561				-16	-520			
N 3801	4047260734355	85	-100				56			N3851	
N 3838	4047590733115	195	32				100				
N 3851	404727 734355	82	-105				17				
N 3857	4043530732910	91	-601				39			N8941	
N 3860	4047450733059	183	-262				123			N3874	
N 3861	403751 734401	5	-616	-59	-133		-203	-545			20FT -23
N 3862	403621 734418	8	-787	-111	-123		-156	-646			20FT -36
N 3863	4035170734307	11	-206	-79	-115		-149			N6701	20FT -30
N 3864	403827 734250	4	-632	-65	-133		-206	-576		N6581	20FT -19,-37
N 3865	4037350733748	4	-846				-56	-736			20FT -28
N 3866	403816 734142	6	-446	-88	-130		-180				20FT -22,-33
N 3867	403912 734320	6	-543	-51	-78		-144	-513			20FT -30,-51
N 3874	4047450733059	183	-152				108				
N 3876	4043520732911	90	-316				36			N8941	
N 3877	4046280733237	152	-403				-5			N3953	
N 3878	4046240733233	150	-456				12	-435			
N 3881	4043200734025	80	-414				-20				
N 3888	4049480734128	108	-294						-260		

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UPPER SURFACE ALTITUDE OF MAJOR HYDROGEOLOGIC UNITS AT 3,146 WELLS ON LONG ISLAND, NEW YORK

WELL IDENT-ICATION NUMBER	LAT-LONG	ALTITUDE OF WELL, IN FEET ABOVE OR BELOW SEA LEVEL		HYDROGEOLOGIC UNIT PENETRATED AND ALTITUDE OF UNIT SURFACE, IN FEET ABOVE OR BELOW SEA LEVEL							LOCATED NEAR WELL	REMARKS
		TOP	BOTTOM	GARD-INERS CLAY	JAMECO GRAVEL	MON GREEN SAND	MAGOTHY AQUIFER	RARIT CONF UNIT	LLOYD AQUIFER	BED-ROCK		
N 3892	4052330733724	145	-300					-171	-234		N5261	
N 3894	4040590733417	30	-385				-27					20FT -10
N 3895	4041190733231	40	-463				-51				N8976	
N 3905	404544 734151	134	-636				41	-254	-431	-611	N4243	
N 3926	4037250734304	14	-101	65								20FT -19
N 3937	4039570734017	25	-652				-29	-592				
N 3953	4046280733237	152	-362				23					
N 3982	4053150733342	20	-399					-149	-311			
N 4077	404324 734139	85	-453				PRES	-351				
N 4095	4046380732807	150	-377				76					
N 4097	4046310732939	158	-312				112				N6580	
N 4120	4040430734104	35	-423				-40					20FT -25
N 4128	4047330734146	137	-43				16					
N 4133	4048090733034	192	-253				-2					
N 4149	4039050733242	5	-873				-44	-764				20FT -33
N 4150	4038430733407	7	-819				-44	-745				20FT -29
N 4173	404526 734159	130	-130				12					
N 4208	4045240733632	108	-254				47					
N 4207	4045170734154	120	-125				18					
N 4215	4046330733759	132	28				36					
N 4223	4048550734034	192	-318				-148	-194	-311			
N 4243	404541 734152	132	-128				41					
N 4245	4047460733211	222	-349				72					
N 4246	4048020733128	200	-258				40					
N 4255	4047050733724	215	-275				19					
N 4268	404752 734403	57	-419					-155	-233	-348		
N 4327	4046210733923	127	-303				36	-303				
N 4332	4047560733940	189	-21				113					
N 4334	4042110733832	85	-96				-13					
N 4376	4054450733112	58	-309					-110	-242			

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N 4382	404522 0733437	114	-108					54					
N 4383	404527 0733354	124	-12					82				N9062	
N 4388	404646 0734403	28	-117					-26					
N 4390	404514 0734121	124	-177					9				N7445	
N 4400	405154 0732958	36	-364					-177	-266				
N 4401	404153 0732622	37	-684					-57				N9173	
N 4405	403515 734305	9	-1108	-84	-120			-141	-709	-865		N6701	20FT -35,
N 4411	403920 0734049	17	-551					-58					
N 4425	404259 0733715	60	-315					0					
N 4432	405143 0733821	28	-324						-120	-272		N6549	
N 4440	405135 0733829	16	-300						-119	-234			
N 4461	404051 0732948	25	-617	PRES				-58				N8837	
N 4462	405010 0733849	69	-202						PRES				
N 4512	404058 0734108	35	-487					-28	-470				
N 4623	404722 0733948	257	-246					67	-244				
N 4633	404721 0733322	176	-132					19					
N 4714	403802 734444		-228		-150								VEATCH 272
N 4766	404206 0733452	61	-847					4	-575	-755			
N 4772	404437 0733743	109	-129					30					
N 4859	405010 0734142	30	-369								-353		
N 4875	403749 0734236	25	-123	-57				-112					20FT -15
N 5007	404552 0733420	119	-140					99				N7353	
N 5058	404848 0733407	238	-17					170					
N 5071	405213 0733655	143	-99					48					
N 5074	404700 0734350	81	-39					-39					
N 5076	404238 734203	71	-392					-31	-392				
N 5079	403742 0734052	15	-138	-97				-122					
N 5099	404647 734235	189	-245					-50	-199				
N 5110	404629 734213	82	-324					-63	-188				
N 5121	403958 0734103	26	-521					-62				N8251	
N 5129	403606 0733030	9	-1094	-52		PRES		-90	-990				
N 5135	404732 0734304	135	-29					99					
N 5145	404031 0734310	30	-474					-57					
N 5149	404556 0733045	147	-45					39					
N 5153	403942 0733644	25	-330					-25					
N 5187	404041 0733438	35	-579					-18					
N 5188	405350 0733124	22	-353						-178	-338			
N 5193	403929 0733821	27	-528	PRES				PRES				N9792	
N 5194	403923 0733922	16	-504					PRES					
N 5201	404925 0733817	48	-461						-292	-376			

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N 5696	403945 0733415	20	-545		-35					
N 5705	404538 0732652	145	-368		95					
N 5708	404824 0733806	211	-32		-3					
N 5710	404559 0734155	179	-211		59					
N 5731	403944 734319	15	-87		-58				20FT	-34,-48
N 5762	405129 0733615	145	-165		-19	-135				
N 5768	403521 0733739	5	-845	-68	-127					
N 5777	403940 0732930	5	-78		-62				20FT	-30
N 5851	404714 0733420	218	41		90					
N 5852	404808 0733746	235	-282		50	-265				
N 5876	404858 0734115	100	-195		-118	-168				
N 5883	404820 0733814	208	-7		6					
N 5884	404756 734258	68	-160		36	-95				
N 5901	404731 0733105	179	31		103					
N 5906	403833 0733555	10	-101		-42				20FT	-28
N 5947	404646 0733908	129	-375		80	-282				
N 5994	405211 0733718	130	-110		25	-102				
N 6034	404743 0734022	210	-97		-17					
N 6035	404745 0734012	198	-98		81			N6395		
N 6046	404417 0733551	101	-255		39					
N 6062	403913 0732920	6	-82	-48	-58					
N 6073	404511 0734128	120	14		14					
N 6076	404650 0732911	158	-536		86	-512		N6077		
N 6077	404649 0732910	158	-534		86	-515				
N 6092	404912 0732751	241	-398		191					
N 6093	404908 0732751	240	-366		141					
N 6119	404609 0733929	123	-58		41					
N 6148	404216 0732733	50	-516		-40					
N 6149	404212 0732621	47	-670		-48				20FT	-23
N 6150	404245 0732903	59	-645		-20					
N 6190	404707 0733053	177	-465		-41	-456		N6191		
N 6191	404707 0733049	180	-496		-1	-482				
N 6192	404516 0733100	127	-530		25			N9180		
N 6193	404517 0733105	130	-607		26	-574		N9180		
N 6202	404549 0733305	132	-132		37					
N 6205	404425 0733813	107	-161		4			N7849		
N 6224	405439 0733048	30	-322			-115	-278	N9464		
N 6282	405125 0734207	102	-340						-318	
N 6289	405122 0733517	162	-223			-220				
N 6312	405436 0733120	38	-302				-258	N6578		

UPPER SURFACE ALTITUDE OF MAJOR HYDROGEOLOGIC UNITS AT 3,146 WELLS ON LONG ISLAND, NEW YORK

WELL IDENT-ICATION NUMBER	LAT-LONG	ALTITUDE OF WELL, IN FEET ABOVE OR BELOW SEA LEVEL		HYDROGEOLOGIC UNIT PENETRATED AND ALTITUDE OF UNIT SURFACE, IN FEET ABOVE OR BELOW SEA LEVEL							LOCATED NEAR WELL	REMARKS
		TOP	BOTTOM	GARD-INERS CLAY	JAMECO GRAVEL	MON GREEN SAND	MAGOTHY AQUIFER	RARIT CONF UNIT	LLOYD AQUIFER	BED-ROCK		
N 6315	404626073362 6	104	-251				41					
N 6334	404464073410 4	128	-80				24					
N 6354	403712073300 8	10	-104	-57		-68	-94					
N 6355	403644073330 5	5	-125	-52			-65					
N 6376	404633073270 6	200	-47				72					
N 6383	404123073285 2	31	-653				-31				N6442	
N 6394	404746073401 0	190	-27				116				N6395	
N 6395	404747073401 0	190	-18				115					
N 6416	405133073381 8	15	-280					-150	-236			
N 6435	405328073312 6	58	-380					-154	-307			
N 6437	404209073382 1	65	-226				-14					
N 6442	404123073285 3	31	-581				-42					
N 6444	405031073353 5	170	-87				80					
N 6450	403533073401 1	10	-1321				-97	-815	-950			
N 6455	403942073424 5	15	-69				-46					
N 6467	403810 734331	4	-694	-55	-132		-191	-571				20FT -21,-36
N 6468	403840 734330	5	-699	-52	-134		-230	-530				20FT -29,-33
N 6469	403810 734313	6	-597	-66	-131		-150	-569				20FT -7,-26
N 6510	403642 734333	10	-453	-88	-155		-154				N6610	
N 6549	405144073382 4	32	-409					-177	-223	-404		
N 6578	405433073312 2	20	-311					-156	-260			
N 6580	404630073293 7	160	-542				100	-524				
N 6581	403827 734250	8	-612	-61	-131		-207	-579				
N 6610	403641 734331	9	-235	-79	-100		-121					20FT -24,-40
N 6623	403907073353 2	20	-118				-52					
N 6631	404344073284 1	87	-500				23				N8004	
N 6636	404319073265 6	60	-140				-30					
N 6644	404410073271 0	90	-148				14					
N 6651	404754073315 7	225	-395				62	-385				
N 6655	404534073324 4	122	-114				57				N8880	

N 6657	4036310732552	5	-406	-53		-84	-179					20FT	-46
N 6660	4039180733639	15	-73				-25					20FT	-22
N 6675	4053330733032	7	-453						-431				
N 6691	4046460733657	145	42				42						
N 6701	403517 734306	11	-846	-77	-133		-149	-716					
N 6706	403713 734159	6	-737	-68	-125		-155	-628				20FT	-19,-33
N 6721	4046570733819	148	29				30						
N 6741	4047510733045	180	-243				67						
N 6757	4038550733248	5	-66	-46			-51					20FT	-21
N 6791	4037280733930	5	-73	-50									
N 6806	4050260733616	154	-169				69						
N 6813	4039360734309	10	-228				-69						
N 6817	4039300733817	28	-550	-36			-64				N9792		
N 6819	4045370733335	130	-132				34						
N 6834	4040390732836	25	-678				-48				N6866	20FT	-28
N 6842	4044420733610	104	-54				40						
N 6848	4044450733328	110	-2				2						
N 6850	4035330733532	7	-1043	-46			-87	-908					
N 6865	4044330734025	87	-214				11				N6918		
N 6866	4040390732835	26	-600				PRES						
N 6873	4053310733114	30	-360					-176	-339				
N 6893	4040490733543	40	-524				-15						
N 6904	4043390733040	91	-602				18				N7076		
N 6907	4046360733641	138	4				55				N7936		
N 6915	4044010732832	90	-496				36				N6916		
N 6916	4043580732831	91	-522				48						
N 6918	4044330734027	87	-216				2						
N 6925	404750 734446	11	-274					-159	-190				
N 6928	4038050733953	6	-852	?			-85	-685	-841		N7889		
N 6945	4045470734011	154	-360				81	-343					
N 6956	4045570732705	170	-484				38				N8595		
N 6965	4037570734039	5	-132	-86	-103							20FT	-29
N 6972	4047060734400	78	-48				-26						
N 6992	4040510732721	24	-87	-44			-69					20FT	-35
N 6996	4045280733040	132	12				21						
N 7022	4042000733500	60	-4				-4						
N 7030	4046370733305	160	-378				-3						
N 7045	4047290733423	241	90				91						
N 7047	4051530733326	223	-41				83						
N 7053	4046280734058	209	-77				72						
N 7076	4043390733040	91	-583				20						
N 7087	4047060734337	98	-105				-13						
N 7104	4048320733722	158	-314				68	-272					
N 7114	4037530733726	[illegible]	[illegible]										

UPPER SURFACE ALTITUDE OF MAJOR HYDROGEOLOGIC UNITS AT 3,146 WELLS ON LONG ISLAND, NEW YORK

WELL IDENT-IFICATION NUMBER	LAT-LONG	ALTITUDE OF WELL, IN FEET ABOVE OR BELOW SEA LEVEL		HYDROGEOLOGIC UNIT PENETRATED AND ALTITUDE OF UNIT SURFACE, IN FEET ABOVE OR BELOW SEA LEVEL							LOCATED NEAR WELL	REMARKS
		TOP	BOTTOM	GARD-INERS CLAY	JAMECO GRAVEL	MON GREEN SAND	MAGOTHY AQUIFER	RARIT CONF UNIT	LLOYD AQUIFER	BED-ROCK		
N 7117	4042220734047	60	-431				-26					
N 7124	4043610732647	70	-85				-22					
N 7126	4046520734007	193	-636				113	-275	-429	-628	N7892	
N 7133	4037490734116	9	141	-88			-126					
N 7152	4054330733446	14	-395					-239	-266	-369		
N 7160	4041560733448	60	-639				-3	-582				
N 7161	4038560733925	10	-690				-66	-680				
N 7186	4044410733650	92	-230				58					
N 7298	4043030733714	61	-526				-4					
N 7334	4045140734121	120	-362				15	-340			N7445	
N 7336	4046510733647	144	21				41					
N 7353	4045520733416	120	-295				60					
N 7377	4043130732750	65	-701				-14					
N 7399	4046520734226	126	-74				-64				N8456	
N 7407	4040020733332	24	-624				PRES				N8253	
N 7414	4040540732613	22	-597				-63					
N 7419	4049050732852	243	-82				78					
N 7420	4048030732806	283	18				153					
N 7430	4040100734252	20	-530				-57					
N 7433	4040050733429	25	-70				-21					
N 7438	4044260732743	127	-523				82					
N 7439	4052590733850	22	-190						-179			
N 7445	404515 734122	120	-333				18	PRES				
N 7446	4048480733443	222	-276				85					
N 7450	4048550733601	176	42				71					
N 7469	4039220733904	20	-258				-56					
N 7482	4041080734329	35	-425				-48					
N 7486	4054120733112	25	-335					-174	-314			
N 7487	4042120734239	50	-78				-44					
N 7500	4044180733454	90	-384				52					

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N 7503	4043380732708	60	-605		-20				N7516
N 7510	4054440733131	19	-310			-208	-265		
N 7512	4045360734103	123	-257		28				
N 7513	4046520733727	154	-321		4				
N 7516	4043370732705	63	-526		PRES				
N 7518	4045330732937	133	-327		72				
N 7521	4039480733928	13	-559	-47	-65				
N 7522	4040010733913	25	-612		-55	-588			
N 7523	4043090733026	76	-608		16				
N 7524	4044250733805	106	-174		33				N7849
N 7525	4054050733112	32	-385			-158	-358		
N 7526	4047040732803	210	-484		90				
N 7529	4041550733802	45	-27		-17				
N 7546	4054180733240	11	-353			-310	-332		
N 7547	4054300733528	9	-313			-261	-291		
N 7548	4040070734250	20	-487		-61				
N 7549	4047380733531	198	-306		155				
N 7551	4046560733946	162	-443		79	-248	-418		
N 7552	4046490733944	143	-455		101	-254			
N 7553	4046520733946	153	-305		111	-261			
N 7554	4047050733949	190	-310		99	-253			
N 7560	4045070734202	150	-92		38				N8267
N 7562	4046340733112	160	-523		-18	-494			N8249
N 7570	4054240733400	125	-397			-251	-286		N7620
N 7581	4046400733814	123	30		31				
N 7593	4050450732830	253	-220		66				
N 7613	404814 734518	38	-197				-147		
N 7614	4051450733815	32	-381			-148	-229		
N 7620	4054240733400	125	-355			-251	-281		
N 7644	4054210733052	19	-301			-158	-277		
N 7651	4046110734010	162	-411		28	-284			N7666
N 7663	4039510732724	6	-171	-44	-54				
N 7666	4046110734010	162	-363		28	-84			
N 7719	4054420733429	20	-380					-340	
N 7720	4042370734007	70	-493		-38				
N 7731	4046120734006	167	18		78				
N 7732	4045170733339	121	13		73				
N 7764	4042210733537	60	-186		-5				
N 7770	404827 734454	43	-267				-178		
N 7772	4050120733102	258	-310		-76				N7773

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UPPER SURFACE ALTITUDE OF MAJOR HYDROGEOLOGIC UNITS AT 3,146 WELLS ON LONG ISLAND, NEW YORK

WELL IDENT-ICATION NUMBER	LAT-LONG	ALTITUDE OF WELL, IN FEET ABOVE OR BELOW SEA LEVEL		HYDROGEOLOGIC UNIT PENETRATED AND ALTITUDE OF UNIT SURFACE, IN FEET ABOVE OR BELOW SEA LEVEL							LOCATED NEAR WELL	REMARKS
		TOP	BOTTOM	GARD-INERS CLAY	JAMECO GRAVEL	MON GREEN SAND	MAGOTHY AQUIFER	RARIT CONF UNIT	LLOYD AQUIFER	BED-ROCK		
N 7773	4050100733059	230	-335				-136					
N 7776	4035370733940	5	-1233				-123	-817	-980			
N 7781	4047510733220	217	-333				91					
N 7782	4051420733714	95	-133				24	-133				
N 7785	4045260733534	108	-298				54					
N 7795	4040230733709	40	-720				-23	-665				
N 7796	4039490733417	11	-689				-51					
N 7830	4051110733258	118	-79				83					
N 7849	4044230733806	106	-145				23					
N 7852	4044110732616	75	-540				-23					
N 7854	4040350734035	35	-637				-18	-587				
N 7855	4040400734036	37	-568				-18					
N 7857	4050590733841	195	-432					-171	-275	-432		
N 7858	4048110733321	218	-157				33					
N 7873	4048110733633	253	-282				135					
N 7884	4038030733953	7	-736	-40			-54	-685			N7889	
N 7885	4038030733954	7	-725	-47			-54				N7889	
N 7886	4038030733954	7	-595	-41			-54				N7889	
N 7887	4038030733954	7	-538	-43			-58				N7889	
N 7889	4038020733954	7	-595	-45			-55					
N 7892	4046510734009	200	-255				101	-252				
N 7936	4046360733641	138	-5				70					
N 7957	4044190733531	96	-527				32	-488				
N 7980	4047160733711	161	6				60					
N 8004	4043450732840	85	-663				30	-654				
N 8007	4045430733549	120	-458				64	-450				
N 8008	4039130733211	10	-383	-42			-51					
N 8010	4047390733921	225	-228				131	-224				
N 8031	4040390733115	25	-498				-39					20FT -30
N 8037	4043590733146	97	-587				1				N8321	

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N 8038	404545073426 5	210	-85		104							
N 8043	4047540732831	222	-499		132	-484						
N 8048	4051520733819	60	-310			-184	-240					
N 8095	4049140733924	35	-365			-250	-331		N8608			
N 8096	4049170733924	27	-383			-258	-347		N8608			
N 8109	4038440734233	5	-148	-52	-147						20FT	-28
N 8123	4050490733035	263	-63		41							
N 8162	4039040733134	10	-144	-42	-51						20FT	-35
N 8163	4046050734001	156	5		81							
N 8171	4038560733338	10	-373		-40							
N 8181	4046160733545	141	-99		12							
N 8188	4037180733343	12	-150	-58	-63						20FT	-33
N 8195	4039340734107	20	-683		-52	-585					20FT	-31
N 8196	4039520733616	24	-682		-30	-636						
N 8211	4045280734129	120	-105		29				N8568			
N 8214	4041560732620	37	-663		-30				N9173			
N 8216	4040000733710	30	-635		-11							
N 8217	4040040733710	36	-669		-17	-646						
N 8221	404922 734500	75	-215				-155					
N 8233	4035180733820	8	-1223	PRES	-146	-893	-1042					
N 8248	4045250733825	120	-398		15	-398						
N 8249	4046320733111	163	-332		-27							
N 8250	4041090733716	50	-643		-20	-551						
N 8251	4039590734104	25	-660		-49	-530					20FT	-35
N 8253	4040030733334	25	-675		-40						20FT	-23
N 8255	4046560734224	105	-195		-59	-185			N8456			
N 8267	4045050734205	125	-160		30							
N 8277	4044190733830	103	-258		7							
N 8319	4039490734325	15	-165		-35							
N 8321	4044000733147	97	-577		PRES							
N 8326	4051160733729	53	-454				-304		N8327			
N 8327	4051130733728	53	-309				-304					
N 8342	404642 734405	18	-425		-81	-179	-277	-421	N9110			
N 8343	4052160733723	138	-282		-4	-96	-239		N8394			
N 8344	4039310734310	10	-50	-48								
N 8354	4035220733700	5	-1270	-61	-87	-866	-1095					
N 8355	4048290733159	258	-337		136							
N 8358	4045300734144	119	-336		23	-252			N8373			
N 8363	4042170732904	58	-544		-30				N8665			
N 8369	4046320733011	160	-35		71							

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UPPER SURFACE ALTITUDE OF MAJOR HYDROGEOLOGIC UNITS AT 3,146 WELLS ON LONG ISLAND, NEW YORK

WELL IDENT-ICATION NUMBER	LAT-LONG	ALTITUDE OF WELL, IN FEET ABOVE OR BELOW SEA LEVEL		HYDROGEOLOGIC UNIT PENETRATED AND ALTITUDE OF UNIT SURFACE, IN FEET ABOVE OR BELOW SEA LEVEL							LOCATED NEAR WELL	REMARKS
		TOP	BOTTOM	GARD-INERS CLAY	JAMECO GRAVEL	MON GREEN SAND	MAGOTHY AQUIFER	RARIT CONF UNIT	LLOYD AQUIFER	BED-ROCK		
N 8372	4045290734146	119	-229				6				N8373	
N 8373	4045290734146	119	-231				16					
N 8375	404654 734223	110	-454				-66	174	-325		N8456	
N 8390	4040520734216	45	-38				-26					
N 8394	4052170733721	138	-455				11	-105	-251	-444		
N 8409	4044200733939	96	-309				-8					
N 8413	4047500734253	39	-96				-24	-96				
N 8414	4035580733027	7	-1073	-56		-85	-113	-993				
N 8415	4042280732933	58	-660				-32				.338	
N 8423	4043150733436	76	-16				58					
N 8431	4046540734357	68	-28				-26					
N 8432	4048570733521	165	-85				102					
N 8455	4049400734446	55	-224							-205		
N 8456	404656 734226	105	-519				-73	-182	-342	-510		
N 8457	4044560733607	105	-335				35					
N 8466	4038030734142	11	-463	-69			-129					20FT -20
N 8472	4045310733332	126	-70				36					
N 8477	4047520733953	188	-565				112	-252	-398	-550		
N 8480	4042290732934	58	-661				-32				N9338	
N 8481	4037570733817	8	-72				-47					
N 8482	4038420733808	16	-66				-52					20FT -17
N 8487	4041260733052	35	-35				-17					
N 8497	4045190733429	115	-489				66	-445				
N 8499	4045380734127	140	-130				23					
N 8514	4039000732929	5	-245	-45			-61					
N 8516	4045310734126	130	-125				38				N8568	
N 8520	4040510732603	21	-913				-64	-906			N8603	
N 8543	4045280733514	106	-54				66					
N 8557	4035220734108	9	-1286	-71			-127	-772	-971			
N 8558	4046310733832	142	-373				7	-351				

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N 8564	4046380734124	148	-172		42				
N 8565	4045310734126	130	-130		35			N8568	
N 8566	4045310734126	130	-120		36			N8568	
N 8567	4045310734126	130	-120		38			N8568	
N 8568	4045310734126	130	-111		34				
N 8569	4047480733955	195	-550		125	-241	-393		
N 8576	4044530733834	112	-439		-2				
N 8583	4048150732946	194	17		115			N9696	
N 8595	4045540732703	182	-439		52				
N 8601	4045050733454	104	-236		52				
N 8603	4040510732803	22	-871		PRES				
N 8608	4049170733924	27	-397			-273	-347		
N 8624	4050110733948	15	-362			-331	-340		
N 8642	4047270733456	243	-167		57				
N 8657	4039250733547	23	-617		-21				
N 8658	4048190733433	325	-345		246	-313			
N 8664	4042170732904	56	-525		-30			N8665	
N 8665	4042170732902	57	-553		-43				
N 8668	4045410732650	141	-352		96				
N 8672	4041330733119	35	-728		-15				
N 8678	4046000734124	183	-412		100	-271			
N 8681	4049530733302	200	-170		78				
N 8690	4051340733843	25	-322			-165	-220	N8709	
N 8709	4051320733845	22	-290			-151	-218		
N 8713	4049200733733	168	-244		-22	-235			
N 8761	4048420734044	140	-134		-131				
N 8767	4045320732849	124	-521		63			N8768	
N 8768	4045330732848	124	-559		61				
N 8776	4054230733353	98	-361			-250	-294		
N 8790	4048560734123	76	-367		-98	-161	-266		
N 8799	4045390733742	111	-119		21				
N 8801	4045270734222	147	-133		41			N8803	
N 8803	4045250734225	146	-132		40				
N 8805	4053230733131	83	-394			-158	-327		
N 8807	4045430733246	118	-32		25				
N 8818	4042110734056	55	-447		-29	-437			
N 8821	404533 734154	133	-107		18			N8840	
N 8829	4042160733710	60	-8		-2				
N 8830	4041480733747	40	-52		-24				
N 8837	4040520732946	20	-661	-45	-64				20FT -32

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UPPER SURFACE ALTITUDE OF MAJOR HYDROGEOLOGIC UNITS AT 3,146 WELLS ON LONG ISLAND, NEW YORK

WELL IDENT-ICATION NUMBER	LAT-LONG	ALTITUDE OF WELL, IN FEET ABOVE OR BELOW SEA LEVEL		HYDROGEOLOGIC UNIT PENETRATED AND ALTITUDE OF UNIT SURFACE, IN FEET ABOVE OR BELOW SEA LEVEL								
		TOP	BOTTOM	GARD-INERS CLAY	JAMECO GRAVEL	MON GREEN SAND	MAGOTHY AQUIFER	RARIT CONF UNIT	LLOYD AQUIFER	BED-ROCK	LOCATED NEAR WELL	REMARKS
N 8840	404532 734151	122	-118				22					
N 8842	404438073295 3	111	-643				8					
N 8858	403559073434 1	10	-94	-88								20FT -29
N 8873	403915073270 8	7	-200	-54			74					
N 8880	404534073324 4	122	-125				52					
N 8881	404024073374 2	40	-31				-5					
N 8885	404740073360 8	196	-102				106					
N 8896	404036073430 9	30	-67				-58					
N 8898	404941073384 5	18	-205				-134	-200				
N 8935	403945073425 8	15	-351				-52					
N 8941	404353073291 0	91	-720				19	-682				
N 8956	404508073333 6	115	-477				20					
N 8962	405421073364 8	6	-422						-368	-422		
N 8964	404635 734356	47	-188				-143	-173				
N 8976	404119073323 1	38	-735				-48	-664				
N 8988	403928073384 1	26	-84	-38			-65					
N 8994	405153073420 6	21	-287							-286		
N 8995	405357073310 9	41	-364					-140	-346			
N 9019	404853073395 9	46	-365				-156	-223	-328			
N 9024	404444073371 2	94	24				40				N9027	
N 9025	404444073371 2	94	32				32				N9027	
N 9026	404445073371 2	94	24				31				N9027	
N 9027	404445073371 2	94	34				36					
N 9062	404527073335 4	124	-19				79					
N 9066	405204073363 4	143	-508				5	-121	-282	-461	N9211	
N 9084	404357 733317	96	-47				16				N9202	
N 9085	404416 733308	102	8				44				N9206	
N 9110	404640 734410	15	-371				-90	-174	-281			
N 9151	404224 734238	50	-386				-24	-383				
N 9170	404754073303 9	184	-369				40					

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N 9173	404154073262 0	38	-846		-34	-814				20FT	-34
N 9178	404205073350 0	62	-584		-5	-583					
N 9180	404517073310 2	130	-570		40	-565					
N 9182	404407 733315	101	-96		28				N9204		
N 9193	404404 733304	100	-96		40						
N 9196	404404 733253	99	-108		36				N9367		
N 9202	404357 733316	98	-3		25						
N 9203	404402 733315	100	-1		14						
N 9204	404407 733314	101	0		39						
N 9205	404412 733313	103	2		18				N9360		
N 9206	404415 733307	104	-33		39						
N 9210	405202073363 3	142	-133		2	-114			N9211		
N 9211	405205073363 4	142	-127		0	-126					
N 9212	404453 733246	117	-713		47	-501					
N 9219	404353 733318	96	0		28						
N 9223	404346 733320	93	-8		28						
N 9234	404430073331 0	105	-100		41						
N 9247	404345 733243	93	-3		33						
N 9252	404331 733247	89	-107		30						
N 9308	404735 734240	12	-431			-144	-243	-419			
N 9318	404153073361 2	55	-407		-2						
N 9334	405128073370 5	143	-488		8	-152	-294	-481			
N 9338	404228073293 5	58	-588		-22						
N 9380	404410 733312	102	-104		32						
N 9387	404401 733248	101	-5		35						
N 9463	404601073316 0	141	-497		-64	-489					
N 9464	405439073304 5	22	-308			-165	-288				
N 9488	404628073311 2	161	-477		-111	-477					
N 9489	404912073323 5	225	27		130						
N 9514	404131073311 4	30	-650		-45						
N 9520	405144073313 5	90	-486				-447				
N 9521	404411073361 0	90	-540		20	-469					
N 9523	403927073411 1	20	-118		-77						
N 9532	403948073421 8	10	-130	-70	-88						
N 9533	403752073412 3	10	-135	-94	-125						
N 9534	403927073391 5	20	-65		-44						
N 9535	403731073381 7	5	-100	-46	-53					20FT	-31
N 9536	403747073371 8	5	-75		-60					20FT	-25
N 9537	403938073371 1	28	-40		-32						
N 9538	403925073360 5	10	-135		-34					20FT	-18

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UPPER SURFACE ALTITUDE OF MAJOR HYDROGEOLOGIC UNITS AT 3,146 WELLS ON LONG ISLAND, NEW YORK

WELL IDENT-ICATION NUMBER	LAT-LONG	ALTITUDE OF WELL, IN FEET ABOVE OR BELOW SEA LEVEL		HYDROGEOLOGIC UNIT PENETRATED AND ALTITUDE OF UNIT SURFACE, IN FEET ABOVE OR BELOW SEA LEVEL								
		TOP	BOTTOM	GARD-INERS CLAY	JAMECO GRAVEL	MON GREEN SAND	MAGOTHY AQUIFER	RARIT CONF UNIT	LLOYD AQUIFER	BED-ROCK	LOCATED NEAR WELL	REMARKS
N 9539	403742073363 5	6	-54				-46					20FT -30
N 9541	404138073343 9	28	-77				-12					
N 9550	403930073340 9	15	-110				-75					20FT -25
N 9551	403808073334 3	10	-85				-52					20FT -38
N 9552	404011073305 7	15	-80	-49			-57					20FT -35
N 9553	403828073303 2	5	-80	-39			-61					
N 9554	404105073274 2	20	-80	-42			-52					20FT -30
N 9556	404030073293 3	20	-135				-45					20FT -35
N 9565	404124073291 5	40	-60				-48					
N 9567	403846073402 9	25	-115	-43			-63					
N 9576	404051073263 3	15	-60	-45			-58					
N 9577	404159073270 7	25	-55				-45					20FT -27
N 9579	404218073401 9	55	-130				-25					
N 9591	404524073282 6	121	-579				83	-568				
N 9593	405410073312 0	5	-365					-135	-295			
N 9595	405300073325 0	20	-447					-137	-306			
N 9683	403956073351 7	25	-40				-25					
N 9684	404001073330 6	20	-50				-40					20FT -25
N 9685	403959073313 2	15	-65				-49					20FT -25
N 9696	404815073294 6	194	106				124					
N 9697	404713073273 0	180	51				104					
N 9699	405124073292 6	67	20				33					
N 9708	405426073311 9	12	-375					-143	-300			
N 9792	403930073382 9	31	-531	-37			-102					20FT -23
N 9809	404838073404 2	115	-488					PRES	PRES	-485		
N 9846	404412 733510	85	-530				47	-510				
N 9965	404413073370 7	92	37				46					
N 9977		173	-43				-43					
N 9978		173	-73				-41					
N10019	404407 733704	87	-213				27					

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REFERENCE NO. 40

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Radionuclide Concentrations in Surface Sediments and Core Sediments from Glen Cove Creek and Hempstead Harbor, New York

prepared by:

Paul Linsalata, Ph.D. and Norman Cohen, Ph.D.

October 28, 1989

for:

Hart Environmental Management Corp.

530 Fifth Ave., N.Y., N.Y.

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I. Sampling

From a boat on loan from the Hempstead marina, the surface two to four inches of bottom sediment was collected over an area of approximately 60 square inches from several locations in Glen Cove Creek and Hempstead Harbor on June 20, 1989. Since the constituency and compactness of the bottom sediments in the creek were not amenable to sediment core collection using a 10 kg gravity core, a petite Ponar dredge sampler was used. The sampler was dropped and raised from the bottom several times at each location to acquire one to two kg (wet weight) of surface sediment from which an aliquot (of about one kg) was removed after mixing by hand. Four dredge samples were collected along the creek (actually a tidal canal) midline at high tide (overlying water depths of approximately 7 to 15 feet) at the locations shown in Figure 1. Sample numbers 1-4 correspond to specific locations in the creek i.e., towards the eastern creek boundary (approaching Mill Pond) (sample #1); towards the western end of the creek (near the 24" no. 3 outfall pipe) (sample #2); and two intermediate locations which were near outfall pipe no. 4 (sample #3), and near outfall pipe no. 1 (sample #4).

In addition to these four samples which bracket the area of all relevant Li Tungsten discharge pipes to the creek, three additional dredge samples were taken. These locations are the tidal marsh opposite the marina on the north side of the creek (sample #7, in three feet of water), and two from locations in the southerly portion of Hempstead Harbor (samples #5 and #6, Fig. 2). Two core samples of about eight inches in length were taken adjacent to one another in approximately the middle of Hempstead Harbor directly opposite the entrance to Glen Cove Creek (Fig. 2).

II. Sample Preparation and Radionuclide Analysis

Sample dredge material (N = 7) was oven-dryed (90 °C) and sieved to < 1.4 mm to remove shells, pebbles, twigs, etc. The fraction > 1.4 mm was discarded and that material passing the sieve, blended and weighed prior to analysis. An aliquot of the dry blended sediment from each sample was placed in individual Al cans and hermetically sealed. After an appropriate waiting period (generally exceeding two weeks to insure radioactive equilibrium between ^{222}Rn and ^{226}Ra), the samples were assayed for gamma-emitting radionuclides (^{40}K, ^{7}Be, ^{137}Cs, ^{226}Ra-daughters, ^{228}Th-daughters

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and ^{228}Ra-daughters) using an intrinsic Ge detector. The detector is calibrated with a certified NIST (formerly NBS) standard reference source prepared in the same counting geometry (300 ml capacity Al cans) used for the samples. All reported data include background subtraction, decay correction to the date of sample collection, and the propagated uncertainties associated with sample and background count rates and detector efficiencies (expressed to ± 1SD). Quality assurance and quality control is maintained at our laboratory by semiannual participation in a Department of Energy Quality Assurance Program, by recalibrating on a monthly basis, by daily check source corrections for electronic drift, and by weekly analysis of ambient detector background.

A second aliquot of each of the dryed sediments from sample numbers 1-4 and #7 (≈ 2 grams each) was removed and assayed radiochemically for ^{234}U and ^{238}U. For these analyses, the sample matrix is completely dissolved (utilizing a lithium borate fusion technique) prior to the additions of known quantities of ^{232}U which serve an internal chemical yield monitor. Following radiochemical seperation and purification of uranium, determination of uranium isotopes is by alpha spectrometry, which is based on counting thin sample preparations with a silicon detector under vacuum. One reagent blank for uranium isotopes was also processed with the five samples. As with results reported for gamma-emitting radionuclides, net concentrations, in pCi/g-dry sediment (1 pCi = 2.22 dpm = 0.037 Bq) are reported along with ± 1SD propagated uncertainties. Detection limits for each of the reported radionuclides are < 0.1 pCi/g-dry sediment.

III. Results

A. Physical characteristics of sediment samples

Some physical characteristics associated with the dredge samples are given in Table 1. Of interest, are the very course sand compositions which characterize samples 3 and 4 taken adjacent to the Li Tungsten property (and adjacent to a sand/gravel loading barge moored on the south bulkhead of the creek). The organic matter content of the creek samples are shown to be fairly high (7-13% based on weight loss on ignition), which may or may not reflect organic loading from a sewage treatment plant also located on the southern bank of the creek. The samples from the creek are black in

color, malodorous (H_2S and CH_4) and strewn with debris such as leaf litter, glass fragments, etc. The surface sediments in the creek are unconsolidated and appeared to be composed of sands or fine sands with an apparent absence of fine silt or clay-sized particles.

B. Radionuclide concentrations in dredge samples

B.1 Natural series radionuclides

The concentrations of various natural series radionuclides in surface sediments taken from the creek in the immediate vicinity of the Li Tungsten plant and at points increasingly distant from the plant, indicate normal, nonenhanced concentrations of these radionuclides. That is, the measured concentrations appear to be within normal fluctuations associated with both the ambient background levels in U. S. surface soils (NCRP-45, 1975), and with the few published data for natural series radionuclides in nearby marine sediments (Table 5).

For example, assuming radioactive equilibrium in surface soils for the uranium and thorium series (see attachment A for a description of the radionuclides comprising each of these series), the NCRP soil data indicates average concentrations for Th-series radionuclides (eg., ^{228}Ra and ^{228}Th) of 1.0 pCi/g, and 0.6 pCi/g for U-series radionuclides (eg., ^{238}U, ^{234}U and ^{226}Ra). The data presented in Table 2 for ^{228}Ra, ^{228}Th and ^{226}Ra, and in Table 4 (^{238}U and ^{234}U) are quite similar to what one might expect to observe in inland surface sediments composed of eroded soils. Additionally, published data for ^{228}Th concentrations in surface sediments of Long Island Sound and Narragansett Bay (Table 5) essentially encompass the range of ^{228}Th values reported in Table 2, i.e., from 0.7 to 1.15 pCi/g-dry for Glen Cove Creek sediments. Strict comparisons among the data reported in the literature (Table 5) with those given in this report cannot be made because of differences in methodology as well as physicochemical properties of the sediments analyzed.

An interesting observation apparent in the data of Table 2 is that although all of the levels of the natural series radionuclides measured do not indicate enhancement, slightly higher concentrations are seen in those sediments taken from the creek (i.e., samples 1-4, excluding the marsh which is technically within the creek boundaries but represents a different environment). This may be related to differences in the sediment

accumulation rates typical of the creek (discussed below) and the Harbor, and/or to differences in sediment composition. For example, the data given in Table 1 for LOI percentages (reflecting % organic matter) are linearly correlated with concentrations of ^{228}Th, ^{228}Ra and ^{226}Ra. Thus, for example, concentrations of ^{228}Th can be expressed as a function of % LOI by the linear equation:

$$[^{228}Th \text{ in pCi/g}] = 0.27 + 0.067(\% \text{ LOI}), \text{ with } R = 0.96.$$

This relationship implies that the variation in ^{228}Th concentrations found among different sediment samples can be explained for the most part by fluctuations in the organic matter content of the sediments. Elements such as thorium (as well as many other heavy metals) have been widely reported to have a strong binding affinity (or partition coefficient) to naturally occurring organic molecules such as humic and fulvic acids which, along with other compounds, often exist as surficial coatings on particles. Thus, the slightly higher natural series radionuclide concentrations associated with the creek samples (nos. 1-4), and sample #6 from Hempstead Harbor (which had characteristics resembling those taken in the creek), may be related to the sediments organic matter content.

The isotopic uranium data (Table 4) from Glen Cove Creek (sample nos. 1-4) indicate ^{238}U to range between 0.75 and 0.84 pCi/g-dry, and in equilibrium with concentrations of ^{234}U. These data are only slightly greater than those reported for U. S. soils on average (0.6 pCi/g), and those given in Table 5 (0.4 to 0.6 pCi/g) from other marine surface sediments in nearby waters. Strict comparisons cannot be made with existing data for reasons previously stated.

B.2 Other radionuclides in surface dredge sediments

Concentrations of ^{7}Be (a cosmogenic radionuclide with a high propensity for sorption onto suspended particulate matter) and ^{137}Cs (a nuclear weapons fallout fission product which has been globally distributed from atmospheric testing and is also "particle reactive") are included to gain insight into those regions of the sediment bed sampled which may be conducive to particle and associated radionuclide accumulation. That high ^{7}Be and more typical ^{137}Cs concentrations (based on comparisons with other near-shore marine and estuarine sediment environments) were determined within the creek surface sediments compared with those taken at other

locations (eg. samples 1-4 vs. 5-7 in Table 2), may indicate that the creek is accumulating sediments at a relatively rapid rate. The implication here is that if sediments are accumulating at a rate of approximately one to two inches per year, for example, then the dredge sample would only have captured that material deposited within the last two to four years at the maximum sampling depth of four inches.

Very crude estimates of the sediment accumulation rate can be made based on the depths of the water column recorded during sample collection , and the depth to which the Army Core of Engineers (ACOE) last dredged the creek i.e., 1965. Given that the ACOE dredged the creek to 15 feet below mean low water in 1965 (J. Perazzo, personal communication), then sediment has been accumulating to the current water column depths over a 24 year interval. Given that our depths (crudely obtained using a calibrated line attached to the dredge) were taken at high water, and assuming a four foot tidal rise, the corresponding high water depth of the water column from the 1965 measurement is increased to 19 feet. Thus obtaining the difference in depths from this value and those recorded in Table 1 for samples 1-4 (which are along the creek midline) and deviding by 24 years, one obtains average sediment accumulation rates of 2-3 inches/y for samples 2, 3 and 4 and approximately 6 inches/y for sample 1, taken towards the eastern boundary of the creek. These estimates are very crude since sounding equipment was not used and complete sounding grids not obtained, thus their accuracy is probably no better than a factor of two.

The sediment accumulation estimates combined with the ^{137}Cs and ^{7}Be data carries the further implication that although surface sediments do not indicate "technologically enhanced" levels of those natural series radionuclides which have been measured, the sediments sampled are probably of very recent origin and hence, the radionuclide data may not be representative of concentrations at greater depths, i.e., for older sediments.

B.3 Core sample results

The two core samples which were collected adjacent to one another in the middle of Hempstead Harbor were frozen upon return to the laboratory then cut into one inch increments. Incremental depth sections were combined from the two cores to provide a reasonable sample mass for gamma spectral analysis. All other processing and

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counting procedures were carried out as previously described for dredge samples. The results (Table 3) do not indicate any "technologically enhanced" concentrations of the natural series emitters for which data are included (i.e., for ^{228}Th, ^{228}Ra and ^{226}Ra). Concentrations of natural series radionuclides at this location are similar to those of surface dredge samples taken at different locations within Hempstead Harbor (samples 5 and 6, Table 2). The notable absence of ^{7}Be and ^{137}Cs within this core indicates that this region is not conducive to sediment accumulation and that these sediments are not of recent origen.

IV. Conclusions

Based on data presented in this report we conclude that:

1. Surface sediments taken within Glen Cove Creek in the immediate vicinity of the Li Tungsten facility outfall pipes do not indicate the presence of enhanced levels of ^{238}U, ^{234}U, ^{228}Th, ^{228}Ra or ^{226}Ra radionuclides.
2. Because the sediments assayed were collected from the surface two to four inches, and because there are indications of relatively rapid rates of sediment accumulation, the data presented cannot be used to address questions relating to natural series radionuclide accumulations at depths greater than those sampled.
3. Although the data are limited, there is no indication of enhanced levels of those natural series radionuclides assayed in surface sediment or core samples taken from the various sampling locations within Hempstead Harbor.

101175

References

1. Li et. al. 1977. Earth and Planetary Sci. Let. 37.
2. Thomson et. al. 1975. Estuarine Research. Vol 1. (L. E. Cronin, ed.).
3. Aller and Cochran. 1976. Earth and Planetary Sci. Let. 29.
4. Benninger et. al. 1979. Earth and Planetary Sci. Let. 43.
5. Santschi et. al. 1980. Earth and Planetary Sci. Let. 51.
6. National Council on Radiation Protection and Measurements. 1975. NCRP Report 45. (Washington, D.C.).

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Table 1

Dredge Sample Characteristics**

Sample No.	Location Samples within canal	Weight % < 1.4 mm	Water Depth (ft)*	LOI (%)^
1	canal-eastern end toward Mill Pond	90.3	7	13.2
2	canal-western end -near 24" outfall pipe no.3	98.1	13	6.6
3	canal-outfall pipe no.4	45.8	15	8
4	canal-outfall pipe no.1	42.8	14	9.2
	Samples outside canal			
5	Hemp. Harbor-SE of Buoy M (see map)	98.5	9	0.6
6	Hemp. Harbor (see map)	88.3	22	8.8
7	marsh opposite marina	96.2	3	1.8

**Surface two to four inches collected with a petite ponar dredge at approximately the canal midpoint for samples 1-4.
*Water depths approximate for high tide.
^LOI is percent weight loss on ignition (400 C for 15 hours).

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Table 2

Gamma Emitting Radionuclides in Hempstead Harbor/Glen Cove Creek Surface Sediments

Sample No.	Location (see Fig. 1) Samples within creek-	Concentration - pCi/g-dry (± %SD) Ra-228	Th-228	Ra-226	K-40	Be-7	Cs-137
	immediate outfall vicinity						
1	creek-eastern end toward Mill Pond	0.96 (7.4)	1.15 (3.6)	0.70 (5.0)	10.7 (3.8)	9.5 (3.4)	0.35 (4.8)
2	creek-western end -near 24" outfall pipe no.3	0.57 (6.4)	0.72 (3.8)	0.52 (6.4)	8.0 (3.8)	1.69 (5.8)	0.15 (7.0)
3	creek-outfall pipe no.4	0.78 (5.6)	0.86 (3.7)	0.63 (4.8)	9.4 (3.6)	4.75 (4.1)	0.27 (4.8)
4	creek-outfall pipe no.1	0.82 (5.4)	0.93 (4.9)	0.57 (6.5)	9.4 (3.7)	3.61 (4.1)	0.25 (5.4)
	Mean concentra.(±SD)	0.78 ± 0.16	0.92 ± 0.18	0.61 ± 0.08			
	Samples beyond immediate outfall pipe vicinity						
5	Hemp. Harbor (see Fig.2)	0.18 (12.7)	0.21 (10.9)	0.17 (9.0)	5.6 (4.1)	0.13 (62.5)	0.01 (100)
6	Hemp. Harbor (see Fig.2)	0.68 (5.2)	0.75 (4.7)	0.48 (5.9)	11.2 (3.3)	0.09 (65.6)	0.10 (8.8)
7	marsh opposite marina	0.44 (7.4)	0.51 (4.1)	0.38 (5.6)	6.4 (4.0)	0.68 (12.0)	0.05 (100)
	Mean concentra. (±SD)	0.43 ± 0.25	0.49 ± 0.27	0.34 ± 0.16			

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Table 3

Gamma Emitting Radionuclides in Hempstead Harbor Core Sample^

Depth Increment (inches)	Concentration - pCi/g-dry (± %SD)					
	Ra-228	Th-228	Ra-226*	K-40	Be-7	Cs-137
0 - 1	0.60 (22)	0.53 (12)	0.13 (33)	10.5 (13)	0.02 (100)	0.071 (34)
1 - 2	0.48 (19)	0.46 (13)	0.19 (16)	10.1 (6)	0.28 (60)	0.05 (39)
2 - 3	0.87 (14)	0.57 (9)	0.22 (29)	13.0 (7)	-0.03 (100)	0.005 (100)
3 - 4	0.75 (16)	0.77 (10)	0.25 (18)	14.7 (10)	-0.13 (100)	0.002 (100)
4 - 5	0.68 (16)	0.83 (10)	0.27 (23)	13.7 (10)	0.30 (93)	0.01 (100)
5 - 6	0.72 (14)	0.99 (11)	0.43 (13)**	16.0 (9)	-0.10 (100)	0.026 (100)
6 - 7	0.85 (15)	1.01 (10)	0.41 (13)**	14.7 (10)	-0.13 (100)	0.015 (100)
7-8.75	0.70 (13)	0.80 (11)	0.30 (15)	14.7 (9)	0.19 (100)	-0.003 (100)

^See map for location of core sample.
*Since most samples were counted within three days of canning, Ra-226 results are probably underestimated due to nonequilibrium.
**These samples had reached equilibrium between radon and Ra-226 prior to counting.

Table 4

Isotopic Uranium Concentrations in Glen Cove Creek
Surficial Dredge Sediments

Sample No.	Concentration (pCi/g-dry ± SD) U-238	U-234	234U/238U	U (µg/g-dry)
1	0.84 ± 0.04	0.81 ± 0.04	0.97 ± 0.06	2.53 ± 0.11
2	0.75 ± 0.03	0.74 ± 0.03	0.99 ± 0.06	2.24 ± 0.09
3	0.82 ± 0.03	0.71 ± 0.03	0.88 ± 0.05	2.45 ± 0.10
4	0.84 ± 0.02	0.88 ± 0.02	1.04 ± 0.04	2.53 ± 0.07
7	0.46 ± 0.01	0.48 ± 0.01	1.05 ± 0.04	1.37 ± 0.04

*Determination by alpha spectrometry following complete sample dissolution (lithium borate fusion) and uranium purification.

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Table 5

Measurements of Natural Series Radionuclides in L. I. Sound and Other Marine Sediments^

Location	Water depth (m)	sediment depth (cm)	Concentration (pCi/g-dry, unless noted) Th-232	Th-228	Ra-228	U-238	Th-230	Ra-226	U234/U238
N. Y. Harbor (ref.1)	not given	surface					0.54	0.1	
L. I. Sound-off New Haven	28	0-2						0.14*	
CT (ref.2)	20	0-7.6	0.89*	0.66-1.05*		0.41*	0.70*	0.28*	
L. I. Sound-off New Haven CT (ref.3)	not given	0-7	1.04-1.08*			0.5*			@ 1 0
L. I. Sound-off New Haven CT (ref.4)	not given	0-6						0.75	
Narragansett Bay (ref. 5)	10	0-5	0.88	0.61-0.75		0.59	0.62	0.35	@ 1 03
N. Y. Bight-mud hole (ref. 5)	69-87	0-5	0.76-0.87	0.69-0.77		0.46	0.52-0.60	0.23	0.94 1 07

^Missing entries were omitted from the original publications.
*Concentrations based on sediment ash weights (organic C typically 6-8%).
References:
1. Li et al., 1977; 2. Thomson et al., 1975; 3. Aller and Cochran, 1976;
4. Benninger et al., 1979; 5. Santschi et al., 1980.

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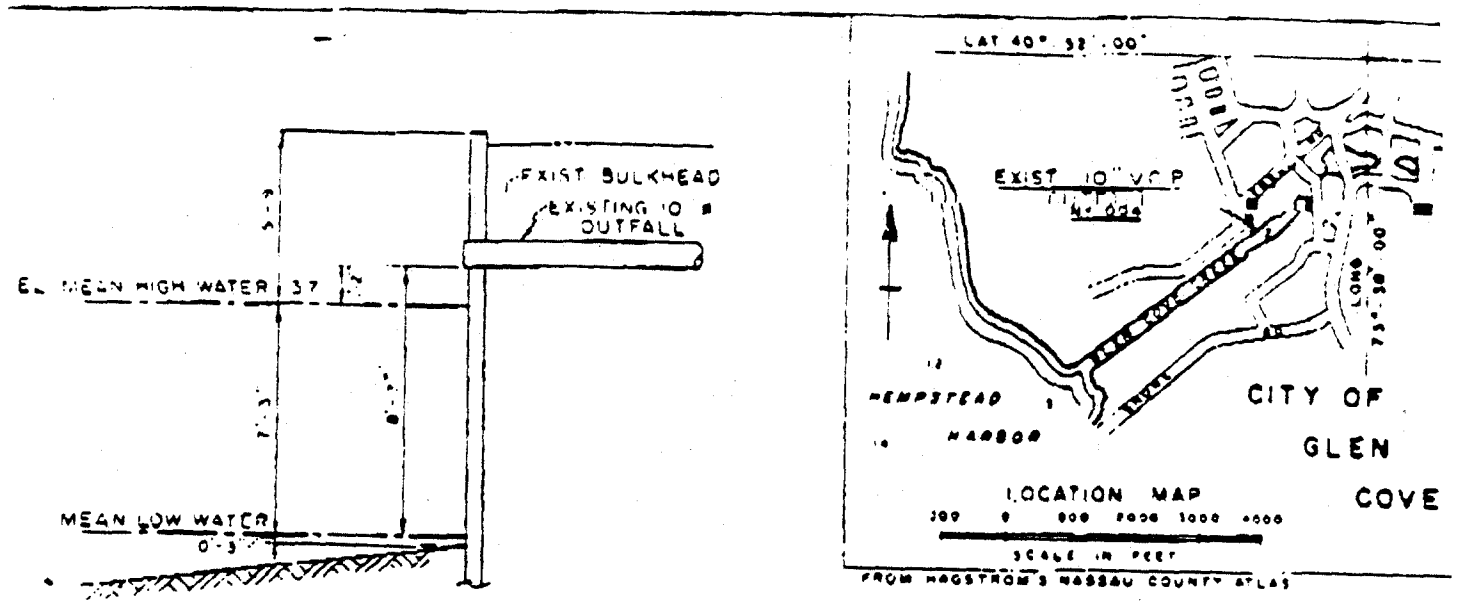
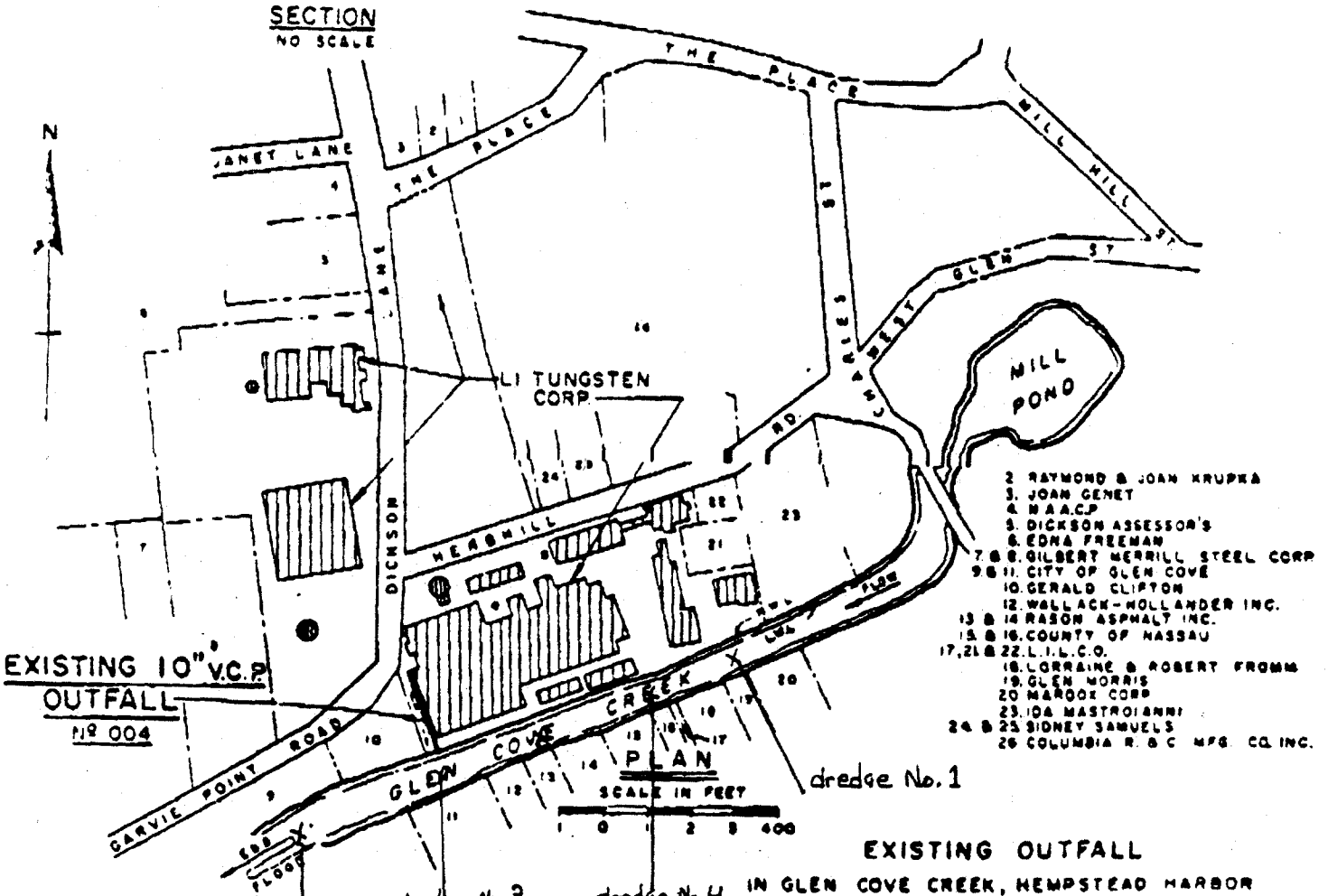
Locations of Dredge Samples from Glen Cove Creek





HOLZMACHER, McLENDON & MURRELL, P.C
CONSULTING ENGINEERS
MELVILLE, N.Y.

EXISTING OUTFALL
IN GLEN COVE CREEK, HEMPSTEAD HARBOR
AT CITY OF GLEN COVE, T/O OYSTER BAY
NASSAU COUNTY, N.Y

APPLICATION BY LI TUNGSTEN CORP.
DATE: JULY 28, 1972

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FIGURE 2

Location of Dredge Samples 5-7, and Core Sample from Hempstead Harbor

101183

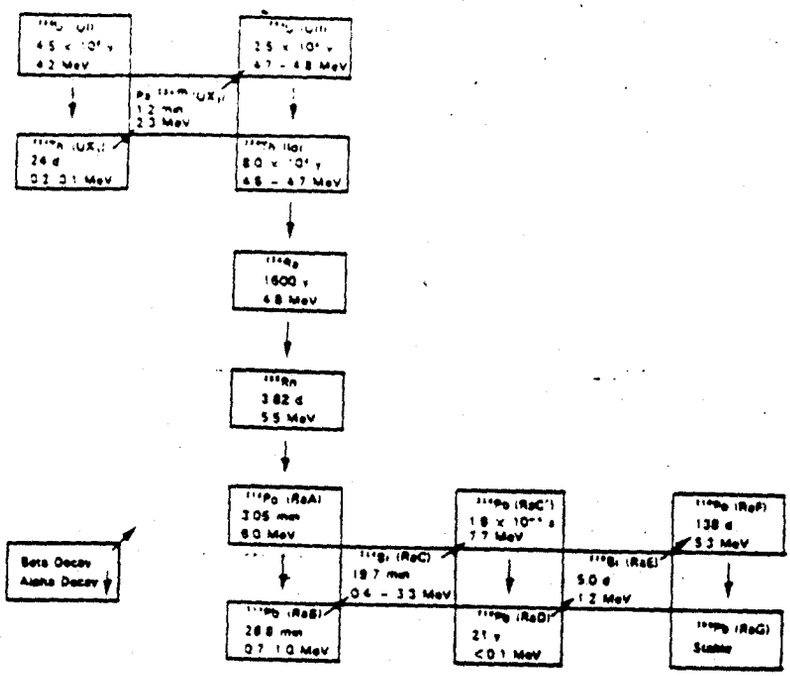

Fig. 1. Principal decay scheme of the uranium series.

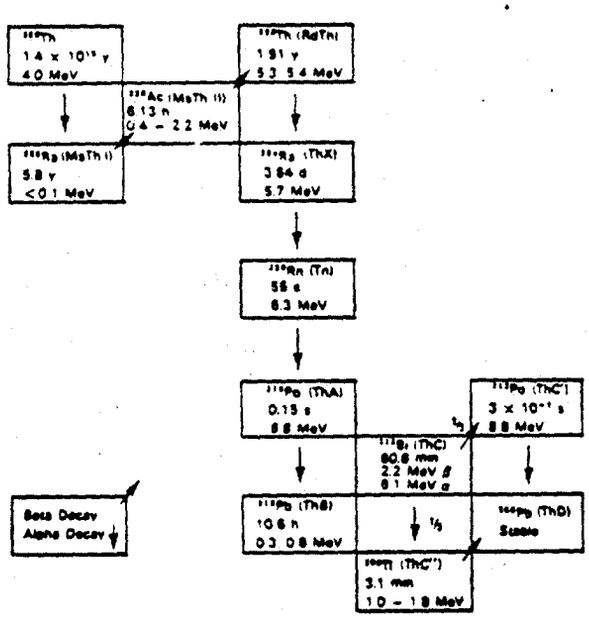

Fig. 3. Principal decay scheme of the thorium series. [The half-life for Ra is taken from Mays, *et al.* (1962).]

101184

REFERENCE NO. 41

TOTAL ANALYTICAL SERVICES FOR A SAFE ENVIRONMENT

nytest environmental inc

(Composite Tank Samples (See Status Report #20)

Project No.: 89-16154

Log in No: 3200

P.O. No.: Pending

Date: December 30, 1989

ANALYTICAL DATA REPORT PACKAGE
FOR

Direct Environmental Inc.

66-b Otis Street

West Babylon, NY 11704

Attn: Brent Thompson
Ref: LI Tungsten

SAMPLE IDENTIFICATION	LABORATORY NUMBER	TYPE OF SAMPLE	DATE AND TIME OF SAMPLE COLLECTION

SEE NEXT PAGE

REPORT PREPARED BY:
MARLIN McCRIDKARD
INORGANIC LAB MANAGER

WE CERTIFY THAT THIS REPORT IS A TRUE REPORT OF RESULTS OBTAINED FROM OUR TESTS OF THIS MATERIAL.

RESPECTFULLY SUBMITTED,
NYTEST ENVIRONMENTAL INC.

Remo Gigante

REMO GIGANTE

DOUGLAS SHEELEY
LABORATORY DIRECTOR

bf

Report on sample(s) furnished by client applies to sample(s). Report on sample(s) obtained by us applies only to lot sampled. Information contained herein is not to be used for reproduction except by special permission. Sample(s) will be retained for thirty days maximum after date of report unless specifically requested otherwise by client. In the event that there are portions or parts of sample(s) remaining after Nytest has completed the required tests, Nytest shall have the option of returning such sample(s) to the client at the client's expense.

box 1518 □ 60 seaview blvd., port washington, ny 11050 □ (516) 625-5500

Project No.: 89-16154

SAMPLE IDENTIFICATION	LABORATORY NUMBER	TYPE OF SAMPLE	DATE AND TIME OF SAMPLE COLLECTION
TA-1	3200001	WATER	12/3/89
TA-2	3200002	WATER	12/3/89
TN-1	3200003	WATER	12/3/89
TN-2	3200004	WATER	12/3/89
TN-3	3200005	WATER	12/3/89
TN-4	3200006	WATER	12/3/89
TN-5	3200007	WATER	12/3/89
TN-6	3200008	WATER	12/3/89
TN-7	3200009	WATER	12/3/89
TB-1	3200010	WATER	12/3/89
TB-2	3200011	WATER	12/3/89
TB-3	3200012	WATER	12/3/89
TB-4	3200013	WATER	12/3/89
TB-5	3200014	WATER	12/3/89

Table of Contents

Project No.:89-16154

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VII. Organic Data Reporting Qualifiers	NA
VIII. Sample Results	7 - 22
IX. Quality Assurance Summary (Including Initial and Continuing Calibration Time and Date)	23

CHAIN OF CUSTODY / FIELD DATA SHEET

Direct Environmental, Inc.
290 Sanford St., East Orange, N.J. 07018
201/677-1800 ■ FAX: 201/675-5919

CLIENT: DIRECT ENV./ HART ENV.

CLIENT/PROJECT SITE: L.I. TUNGSTEN

PAGE: 1 OF: 1

CLIENT CONTACT: B. THOMPSON

PROJECT JOB NO:

SAMPLE DESCRIPTION/LOCATION		TYPE GRB	TYPE COMP	MATRIX TYPE	DATE SAMPLED	TIME	PRESERVATIVE	NUMBER OF CONTAINERS	COLLECTED BY:	ANALYSIS REQUESTED
TA-1	ACIDIC		X	LIQ				1	DEI	E.P. TOX METALS, pH, sp. gr.
TA-2			X	"				1	"	chlorine, Flourine,
TN-1			X	"				1	"	sulfate
TN-2			X	"				1	"	
TN-3			X	"				1	"	EP TOX METALS,
TN-4	NEUTRAL		X	"				1	"	
TN-5			X	"				1	"	
TN-6			X	"				1	"	
TN-7			X	"				1	"	
TB-1			X	"				1	"	
TB-2			X	"				1	"	
TB-3	BASIC		X	"				1	"	EP TOX METALS, pH,
TB-4			X	"				1	"	sulfide.
TB-5			X	"				1	"	

REMARKS: TANK COMPOSITE SAMPLES

SHIPPED BY:
UPS: CLIENT VEHICLE
FEDX: LAB VEHICLE
OTHER: DEI VEHICLE

RELINQUISHED BY:	RECEIVED BY:	DATE:	TIME:	REASON:	RELINQUISHED TO LABORATORY BY:	ACCEPTED FOR LAB BY	DATE	TIME
TS B Thompson	Y. McGuire	12/3	1250	transfer	Y. McGuire	Ken Prendes	12/4	2:12

LABORATORY COMMENTS:

00001

101189

Project No [illegible]

Client Name: DIRECT ENVIRONMENTAL, INC.

Date Received: 12/4/89
Sample ID: AS PER CHAIN OF CUSTODY

Organics Extraction:

1. Acids _____
2. Base/Neutrals _____
3. Pesticides/PCBs _____
4. Dioxin _____

Analysis:

1. Volatiles _____
2. Acids _____
3. Base/Neutrals _____
4. Pesticides/PCBs _____
5. Dioxin _____

Section Supervisor
Review & Approval _____

Inorganics:

1. Metals 12/27/89
2. Cyanides _____
3. Phenols _____

Other Analysis:

_____

_____

_____

Section Supervisor
Review & Approval _____

Quality Control Supervisor
Review & Approval _____

If fractions are re-extracted and re-analyzed include dates for both.

101190

nytest environmental

NON-CONFORMANCE SUMMARY
CASE NARRATIVE

LOGIN NO.: 3200

Samples were analyzed as per required protocols, no problems were encountered.

AQUEOUS SAMPLE PREPARATION [See reference 1 and 2]

	METHOD
BNA, Pesticides / PCB's Extraction (2)	3510
AA/ICP Sample Preparation (1)	200.7
Furnace Sample Preparation (1)	200.0
Mercury Sample Preparation (1)	245.1
Hexavalent Chromium Sample Preparation (1)	218.5

NON-AQUEOUS EXTRACTIONS [See reference 2]

SOIL AND SEDIMENT SAMPLES:

BNA, Pesticides / PCB's Extraction	3550
AA/ICP Sample Preparation	3050
Furnace Sample Preparation	3050
Mercury Sample Preparation	7471

SLUDGE / PETROLEUM BASED SAMPLES: [See reference 2]

AA/ICP Sample Preparation	3050
Furnace Sample Preparation	3020 / 3030 / 3050
Mercury Sample Preparation	7471

ICP (INDUCTIVELY COUPLED PLASMA):

	REFERENCE 1a/REFERENCE 2a
ALUMINUM	200.7/6010
ANTIMONY	200.7/6010
BARIUM	200.7/6010
BERYLLIUM	200.7/6010
CADMIUM	200.7/6010
CALCIUM	200.7/6010
CHROMIUM	200.7/6010
COBALT	200.7/6010
COPPER	200.7/6010
IRON	200.7/6010
LEAD	200.7/6010
MAGNESIUM	200.7/6010
MANGANESE	200.7/6010
MOLYBDENUM	200.7/6010
NICKEL	200.7/6010
POTASSIUM	200.7/6010
SILVER	200.7/6010
SODIUM	200.7/6010
TIN	200.7/6010
TITANIUM	200.7/6010
VANADIUM	200.7/6010
ZINC	200.7/6010

FURNACE AA:	REFERENCE 1 / REFERENCE 2
ANTIMONY	204.1 / 7041
ARSENIC	206.2 / 7060
LEAD	239.2 / 7421
SELENIUM	270.2 / 7740
THALLIUM	279.2 / 7841
TIN	282.2
VANADIUM	286.2 / 7911
MERCURY	245.1 / 7470

AQUEOUS METHODOLOGIES: [See reference 3]

Organochlorine Pesticides and PCB's by Gas Chromatography	608
Herbicides by Gas Chromatography	362
Purgeable Organics by GC/MS	624
Base/Neutral, Acids by GC/MS	625
2,3,7,8 - TCDD by GC/MS	613 / 625

NON - AQUEOUS METHODOLOGIES: [See reference 2]

Gas Chromatography / Mass Spectrometry for:

Purgeable Organics	8240
Base / Neutral and Acid Extractables	8270

Organochlorine Pesticides and PCB's by Gas Chromatography	8080

MISCELLANEOUS ANALYSIS: [See reference 2]

Extraction Procedure Toxicity	1310
Ignitability	1010
Corrosivity	1110
Reactivity	CHAPTER 8.3

Toxicity Characteristic Leaching Procedure (TCLP) [Reference 5]

ADDITIONAL INORGANIC PARAMETERS

PARAMETER	REFERENCE 1	REFERENCE 2
BROMIDE	320.1	
COLOR	110.2	
CONDUCTANCE	120.1	
CONDUCTANCE		9050
ODOR	140.1	
pH	150.1	
pH		9040
TDS	160.2	
TSS	160.2	
TS	160.3	
HARDNESS	130.1	
TEMPERATURE	170.1	
TURBIDITY	180.1	
ACIDITY	305.1	
ALKALINITY	310.1	
AMMONIA	350.2,.3	
CHLORIDE	325.3	
CHLORIDE		9252
RESIDUAL CHLORINE	330.2	
COD	410.3,405.1	
CYANIDE	335.3	
OIL AND GREASE	413.1,.2	
OIL AND GREASE		9070
FLUORIDE	340.2	
TKN	351.2	
NO2/NO3	353.2	
D.O.	360.2	
PETROLEUM-HYDROCARBONS (see reference 4)	418.1	
PHENOL	420.2	
PHOSPHORUS	365.1	
SILICA	370.1	
SULFATE	375.4,.2	
SULFIDE	376.1	
SURFACTANTS	425.1	
TOC	415.1	

REFERENCES:

(1) - 600 / 4-79-002 Methods for Chemical Analysis of Water and Waste
(1a) - 600 / 4-79-002 Methods for Chemical Analysis of Water and Waste As modified by the EPA CLP Statement of Work 787
(2) - SW 846 Test Methods for Evaluating Solid Waste
(2a) - SW 846 Test Methods for Evaluating Solid Waste As modified by the EPA CLP Statement of Work 787
(3) - 40 CFR Part 136, VOL. 49, No. 209 Test Parameters for the Analysis of Pollutants
(4) - as modified by NJDEP - BISE (for non aqueous samples)
(5) Federal Register Vol 51 No. 216 Friday 11/7/86 p.40643 - 40652

REPORT OF ANALYSIS

Project No.:89-16154

We find as follows:

Sample Identification		Parameter(s)					
		Chlorine (PPM)	pH	Fluoride (PPM)	Sulfur (PPM)	Specific Gravity (gm/cm^3)	Sulfate (PPM)
3200001	TA-1	< 0.2	1.4	320	-	1.0042	223
3200002	TA-2	< 0.2	2.5	7.4	-	1.0009	69
3200003	TN-1	-	-	-	-	-	-
3200004	TN-2	-	-	-	-	-	-
3200005	TN-3	-	-	-	-	-	-
3200006	TN-4	-	-	-	-	-	-
3200007	TN-5	-	-	-	-	-	-
3200008	TN-6	-	-	-	-	-	-
3200009	TN-7	-	-	-	-	-	-
3200010	TB-1	-	12.4	-	< 1	-	-
3200011	TB-2	-	13.0	-	< 1	-	-
3200012	TB-3	-	11.5	-	< 1	-	-
3200013	TB-4	-	9.4	-	< 1	-	-
3200014	TB-5	-	11.1	-	< 1	-	-
METHOD BLANK*		< 0.2	7.00	< 0.02	< 1	ND	< 1
DATE ANALYZED:		12/5/89	12/26/89	12/28/89	12/4/89	12/8/89	12/18/89

ND = Not Detected

* = Results ar on a as received basis.

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Project No: 89-16154

Sample Identification and Results

Sample No: TA-1
Lab Sample ID No.:3200001

Results	Max. Allowable Levels	Found
E P Toxicity (PPM)		
Arsenic	5.0	< .5
Barium	100.0	<10.0
Cadmium	1.0	< .1
Chromium	5.0	1.7
Lead	5.0	1.8
Mercury	0.2	< .02
Selenium	1.0	< .1
Silver	5.0	< .5

ND = None Detected
< = Less than

Project No: 89-16154

Sample Identification and Results

Sample No: TA-2
Lab Sample ID No.:3200002

Results	Max. Allowable Levels	Found
E P Toxicity (PPM)		
Arsenic	5.0	< .5
Barium	100.0	<10.0
Cadmium	1.0	< .1
Chromium	5.0	< .5
Lead	5.0	< .5
Mercury	0.2	< .02
Selenium	1.0	< .1
Silver	5.0	< .5

ND = None Detected
< = Less than

Project No: 89-16154

Sample Identification and Results

Sample No: TN-1
Lab Sample ID No.:3200003

Results	Max. Allowable Levels	Found
E P Toxicity (PPM)		
Arsenic	5.0	< .5
Barium	100.0	<10.0
Cadmium	1.0	< .1
Chromium	5.0	< .5
Lead	5.0	< .5
Mercury	0.2	< .02
Selenium	1.0	< .1
Silver	5.0	< .5

ND = None Detected
< = Less than

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Sample Identification and Results

Sample No: TN-2
Lab Sample ID No.:3200004

Results	Max. Allowable Levels	Found
E P Toxicity (PPM)		
Arsenic	5.0	1.8
Barium	100.0	<10.0
Cadmium	1.0	< .1
Chromium	5.0	< .5
Lead	5.0	< .5
Mercury	0.2	< .02
Selenium	1.0	< .1
Silver	5.0	< .5

ND = None Detected
< = Less than

Sample Identification and Results

Sample No: TN-3
Lab Sample ID No.:3200005

Results	Max. Allowable Levels	Found
E P Toxicity (PPM)		
Arsenic	5.0	< .5
Barium	100.0	<10.0
Cadmium	1.0	< .1
Chromium	5.0	< .5
Lead	5.0	< .5
Mercury	0.2	< .02
Selenium	1.0	< .1
Silver	5.0	< .5

ND = None Detected
< = Less than

Project No: 89-15154

Sample Identification and Results

Sample No: TN-4
Lab Sample ID No.:3200006

Results	Max. Allowable Levels	Found
E P Toxicity (PPM)		
Arsenic	5.0	< .5
Barium	100.0	<10.0
Cadmium	1.0	< .1
Chromium	5.0	< .5
Lead	5.0	< .5
Mercury	0.2	< .02
Selenium	1.0	< .1
Silver	5.0	< .5

ND = None Detected
< = Less than

Project No: 89-16154

Sample Identification and Results

Sample No: TN-5
Lab Sample ID No.:3200007

Results	Max. Allowable Levels	Found
E P Toxicity (PPM)		
Arsenic	5.0	< .5
Barium	100.0	<10.0
Cadmium	1.0	< .1
Chromium	5.0	< .5
Lead	5.0	< .5
Mercury	0.2	< .02
Selenium	1.0	< .1
Silver	5.0	< .5

ND = None Detected
< = Less than

Project No: 89-15154

Sample Identification and Results

Sample No: TN-6
Lab Sample ID No.:3200008

Results	Max. Allowable Levels	Found
E P Toxicity (PPM)		
Arsenic	5.0	< .5
Barium	100.0	<10.0
Cadmium	1.0	< .1
Chromium	5.0	< .5
Lead	5.0	< .5
Mercury	0.2	< .02
Selenium	1.0	< .1
Silver	5.0	< .5

ND = None Detected
< = Less than

Project No: 89-15154

Sample Identification and Results

Sample No: TN-7
Lab Sample ID No.:3200009

Results	Max. Allowable Levels	Found
E P Toxicity (PPM)		
Arsenic	5.0	< .5
Barium	100.0	<10.0
Cadmium	1.0	< .1
Chromium	5.0	< .5
Lead	5.0	< .5
Mercury	0.2	< .02
Selenium	1.0	< .1
Silver	5.0	< .5

ND = None Detected
< = Less than

Project No: 89-16154

Sample Identification and Results

Sample No: TB-1
Lab Sample ID No.:3200010

Results	Max. Allowable Levels	Found
E P Toxicity (PPM)		
Arsenic	5.0	< .5
Barium	100.0	<10.0
Cadmium	1.0	< .1
Chromium	5.0	0.72
Lead	5.0	< .5
Mercury	0.2	< .02
Selenium	1.0	< .1
Silver	5.0	< .5

ND = None Detected
< = Less than

Project No: 89-15154

Sample Identification and Results

Sample No: TB-1
Lab Sample ID No.:3200010

Results	Max. Allowable Levels	Found
E P Toxicity (PPM)		
Arsenic	5.0	< .5
Barium	100.0	<10.0
Cadmium	1.0	< .1
Chromium	5.0	0.72
Lead	5.0	< .5
Mercury	0.2	< .02
Selenium	1.0	< .1
Silver	5.0	< .5

ND = None Detected
< = Less than

101206

Project No: 39-16154

Sample Identification and Results

Sample No: TB-2
Lab Sample ID No.:3200011

Results	Max. Allowable Levels	Found
E P Toxicity (PPM)		
Arsenic	5.0	< .5
Barium	100.0	<10.0
Cadmium	1.0	0.19
Chromium	5.0	7.8
Lead	5.0	< .5
Mercury	0.2	< .02
Selenium	1.0	< .1
Silver	5.0	< .5

ND = None Detected
< = Less than

REFERENCE NO. 45

101208

EPA ID NO.	SITE NAME STREET CITY COUNTY CODE AND NAME	STATE ZIP CONG DIST.	NFA. FLAG	OPRBLE UNIT	EVENT TYPE	ACTUAL START DATE	ACTUAL COMPL DATE	CURRENT EVENT LEAD
NYD099331118	LEWISTON LF			00	DS1		04/01/80	EPA (FUND)
	BTW PATROL/HAROLD PLETCHER RDS				PA1		10/01/83	EPA (FUND)
	LEWISTON	NY 14092			PA2		06/08/87	STATE(FUND)
	063 NIAGARA				SI1	02/01/85	02/28/85	STATE(FUND)
NYD982531915	LEY CREEK PCB DREDGINGS			00	DS1		04/19/88	EPA (FUND)
	FACTORY AVE.							
	SALINA	NY 13209						
	067 ONONDAGA							
NYD986882660	LI TUNGSTON			00	RV1	07/21/89		RESP. PARTY
	GARVIES POINT RD.				DS1		04/15/89	EPA (FUND)
	GLEN COVE	NY 11542			PA1		09/27/89	EPA (FUND)
	059 NASSAU							
NYD053169694	LIBERTY HEAT TREATING CO. INC.		NFA	00	DS1		06/13/89	EPA (FUND)
	100-15 94TH AVENUE				PA1	03/31/89	06/30/89	EPA (FUND)
	OZONE PARK	NY 11416						
	081 QUEENS							
NYD000337295	LIBERTY IND FINISHING			00	DS1		04/10/80	EPA (FUND)
	55 MOTOR PARKWAY				PA1		09/01/84	STATE(FUND)
	FARMINGDALE	NY 11735			NP1		10/01/84	EPA (FUND)
	059 NASSAU				NF1		06/01/86	EPA (FUND)
					SI1	07/01/85	08/31/85	STATE(FUND)
				01	CO1	04/17/85		OTHER
YD002240075	LIBRARY BUREAU		NFA	00	DS1		06/01/81	EPA (FUND)
	801 PARK AVE				PA1		09/22/87	EPA (FUND)
	HERKIMER	NY 13350						
	043 HERKIMER							
YD006866008	LILCO HICKSVILLE OP. CENTER		NFA	00	DS1		02/28/89	EPA (FUND)
	175 E OLD COUNTRY ROAD				PA1	02/28/89	03/31/89	EPA (FUND)
	HICKVILLE	NY 11801						
	059 NASSAU							
YD982271462	LINCOLN AVENUE			00	RV1	07/10/87	02/25/88	EPA (FUND)
	LINCOLN AV. BETWEEN CHURCH ST							
	BOHEMIA, TOWN OF ISLIP	NY 11716						
	103 SUFFOLK							

101209

REGION: 02

EPA ID	SITE/ALIAS NAME STREET CITY COUNTY NAME	STATE COUNTY	ZIP CODE	ALIAS SEQ. #	NAME SOURCE	FED FAC
NYD982531915 (CONTINUED)	LEY CREEK PCB DREDGINGS			01		
	ONONDAGA	NY				
NYD986882660	LI TUNGSTON GARVIES POINT RD. GLEN COVE	NY	11542			D
	NASSAU	059				
	LI TUNGSTON			01		
	NASSAU	NY				
NYD053169694	LIBERTY HEAT TREATING CO. INC. 100-15 94TH AVENUE OZONE PARK	NY	11416			D
	QUEENS	081				
	LIBERTY HEAT TREATING CO. INC.			01		
	QUEENS	NY				
NYD000337295	LIBERTY IND FINISHING 55 MOTOR PARKWAY FARMINGDALE	NY	11735		STS	N
	NASSAU	059				
	LIBERTY IND FINISHING			01		
	NASSAU	NY				
NYD002240075	LIBRARY BUREAU 801 PARK AVE HERKIMER	NY	13350		NOTIS	N
	HERKIMER	043				
NYD006866008	LILCO HICKSVILLE OP. CENTER 175 E OLD COUNTRY ROAD HICKVILLE	NY	11801			D
	NASSAU	059				

101210

REFERENCE NO. 46

Project No: 89-15154

Sample Identification and Results

Sample No: TB-3
Lab Sample ID No.:3200012

Results	Max. Allowable Levels	Found
E P Toxicity (PPM)		
Arsenic	5.0	< .5
Barium	100.0	<10.0
Cadmium	1.0	< .1
Chromium	5.0	2.5
Lead	5.0	< .5
Mercury	0.2	< .02
Selenium	1.0	< .1
Silver	5.0	< .5

ND = None Detected
< = Less than

Project No: 89-16154

Sample Identification and Results

Sample No: TB-4
Lab Sample ID No.:3200013

Results	Max. Allowable Levels	Found
E P Toxicity (PPM)		
Arsenic	5.0	< .5
Barium	100.0	<10.0
Cadmium	1.0	0.28
Chromium	5.0	11.9
Lead	5.0	< .5
Mercury	0.2	< .02
Selenium	1.0	< .1
Silver	5.0	< .5

ND = None Detected
< = Less than

Project No: 89-16154

Sample Identification and Results

Sample No: TB-5
Lab Sample ID No.:3200014

Results	Max. Allowable Levels	Found
E P Toxicity (PPM)		
Arsenic	5.0	< .5
Barium	100.0	<10.0
Cadmium	1.0	< .1
Chromium	5.0	2.1
Lead	5.0	< .5
Mercury	0.2	< .02
Selenium	1.0	< .1
Silver	5.0	< .5

ND = None Detected
< = Less than

REFERENCE NO. 42

101215

United States
Environmental Protection Agency
Region 2: New Jersey, New York
Puerto Rico, Virgin Islands
26 Federal Plaza, NY, NY 10278

FACTS

JANUARY 23, 1990

EPA SUPERFUND ACTION AT LI TUNGSTEN IN GLEN COVE, NEW YORK

SITE BACKGROUND

The Li Tungsten Property was operated from the 1940's to approximately 1985 by the Wah Chang Trading Company and its wholly-owned subsidiary the Li Tungsten Corporation. The operation involved the processing of ore and scrap tungsten to formulate metal tungsten powder and tungsten carbide powder. The site was acquired by the Glen Cove Development Corporation (GCDC) in 1984 and leased to the Li Tungsten Corp. The market for tungsten was apparently depressed and operations at the site had slowed by this time. The Li Tungsten operation went bankrupt in 1985. GCDC is a New York State general partnership jointly owned by Old Court Holdings Corp., Inc. and Old Court Joint Ventures, Inc., both of which in turn are wholly-owned subsidiaries of Old Court Savings and Loan, Inc., located in Maryland.

On April 14, 1989 the U.S. Environmental Protection Agency (EPA) received a request from the New York State Department of Environmental Conservation (DEC) to use its Superfund authority to respond to threats posed by hazardous materials at the former Li Tungsten Property on Garvey's Point Road in Glen Cove, Long Island. Superfund is the federal program which addresses hazardous waste sites across the country.

EPA's preliminary assessment of site conditions, which began on April 16th, revealed a large quantity of slag, or material emitting low-level beta-gamma radiation. Large quantities of laboratory reagents, various hazardous materials in drums and tanks, asbestos, transformers, as well as gas cylinders containing ccmpressed liquids and gases were found in several buildings on the property. Air monitoring, however, showed no dangerous levels of organic compounds either on site or off site.

As a result of the conditions identified at the site, EPA issued an Administrative Order on Consent to the current owners of the property, GCDC, to stabalize all potential threats to the public and the environment.

The following information presented in this fact sheet relates to progress in characterizing and removing materials from the site as specified in the USEPA Administrative Order on consent. This information corresponds to site activities which have been completed since the last public meeting held on September 26, 1989.

-more-

Site Security - 24 hour guard services have been maintained at the site. A series of maintenance checks and repairs to the fence have been made to discourage access to the site property.

Radioactive Materials - Twelve (12) 55-gallon drums were filled with materials which exhibited radioactivity levels greater than 2 millirems per hour (mR/hr). In addition, a furnace chamber exhibiting similar radiation levels was crated for shipment. The 12 drums and furnace chambers were removed from the site for disposal.

Laboratory Chemicals and Drums - Approximately 255 drums containing oils, grease mixed organics and solids, PCB oils, aqueous solutions and decontamination solids have been characterized. Arrangements for disposal of this material have been made and removal from the site (providing weather conditions permit pumping of this material) will occur over the next 3 weeks.

Tanks - To date, 226 tanks have been inspected at the site. There were no liquids or gases in 133 of these tanks. All remaining tanks have either been characterized or will be characterized over the next 3 weeks. The various liquid volumes which have been tested indicate that generally acidic, basic or neutral (rainwater) solutions are present in the tanks.

Creek Sediments Surface sediment samples from Glen Cove Creek as well as a sediment core from Hempstead Harbor underwent analysis for radionuclides. These samples did not indicate any elevated levels of radionuclides above the expected, natural background levels.

Transformers - As of January 15, 1990, thirty (30) transformers/switches have been identified on the site. The liquids in these structures have been tested and characterized. The transformers/switches have been drained and the liquid contents drummed for removal off-site. The carcasses of PCB transformers will also be removed from the site over the next 3 weeks.

Cylinders - All pressurized gas cylinders (other than fire extinguishers), with the exception of one, have been removed from the site.

-more-

The remaining cylinder will undergo characterization in order to determine appropriate handling.

The site work described above was accompanied by air monitoring to ensure these actions did not cause any change in air conditions beyond the site boundary. The results of monitoring indicate that on-site activities have not caused any change in off-site conditions.

The remaining field work to be conducted at the site, which is anticipated to be completed within the next 3 week period, will be devoted to removing the drummed material from the site for appropriate disposal. The contents of some drummed material will have to adequately thaw so that it can be pumped into trucks prior to removal.

Once the removal of the materials specified in the USEPA Administrative Order is completed, a final report will be prepared for EPA approval.

###

REFERENCE NO. 43

101219

HART

HART ENVIRONMENTAL MANAGEMENT CORPORATION
470 PARK AVENUE SOUTH
NEW YORK, N.Y. 10016

Office: (212) 447-1480
Fax: (212) 447-1495

FAX TRANSMITTAL

Date: March 26, 1990

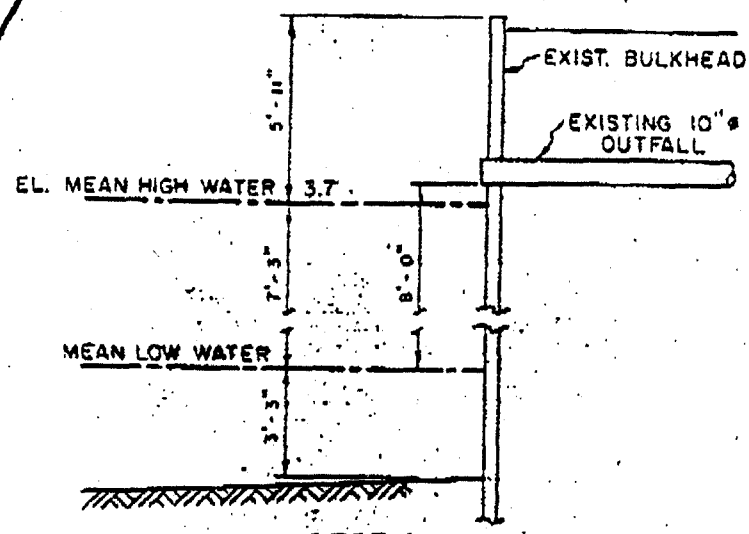
Number of Pages: 6 **(including this page)**

To: Steve Okulewicz (201) 225-5490

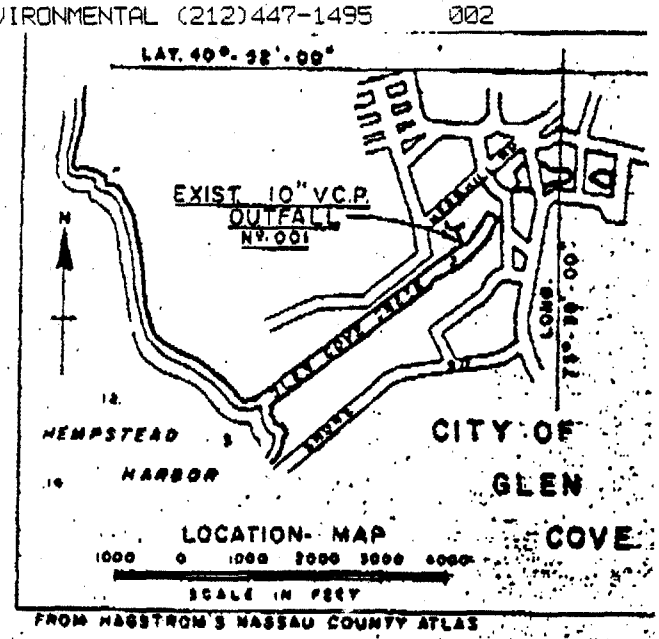
From: Jim Perazzo

RE: Li Tungsten, Glen Cove, NY
Report outfall locations - from former SPDES permit
(They may not all exist today)

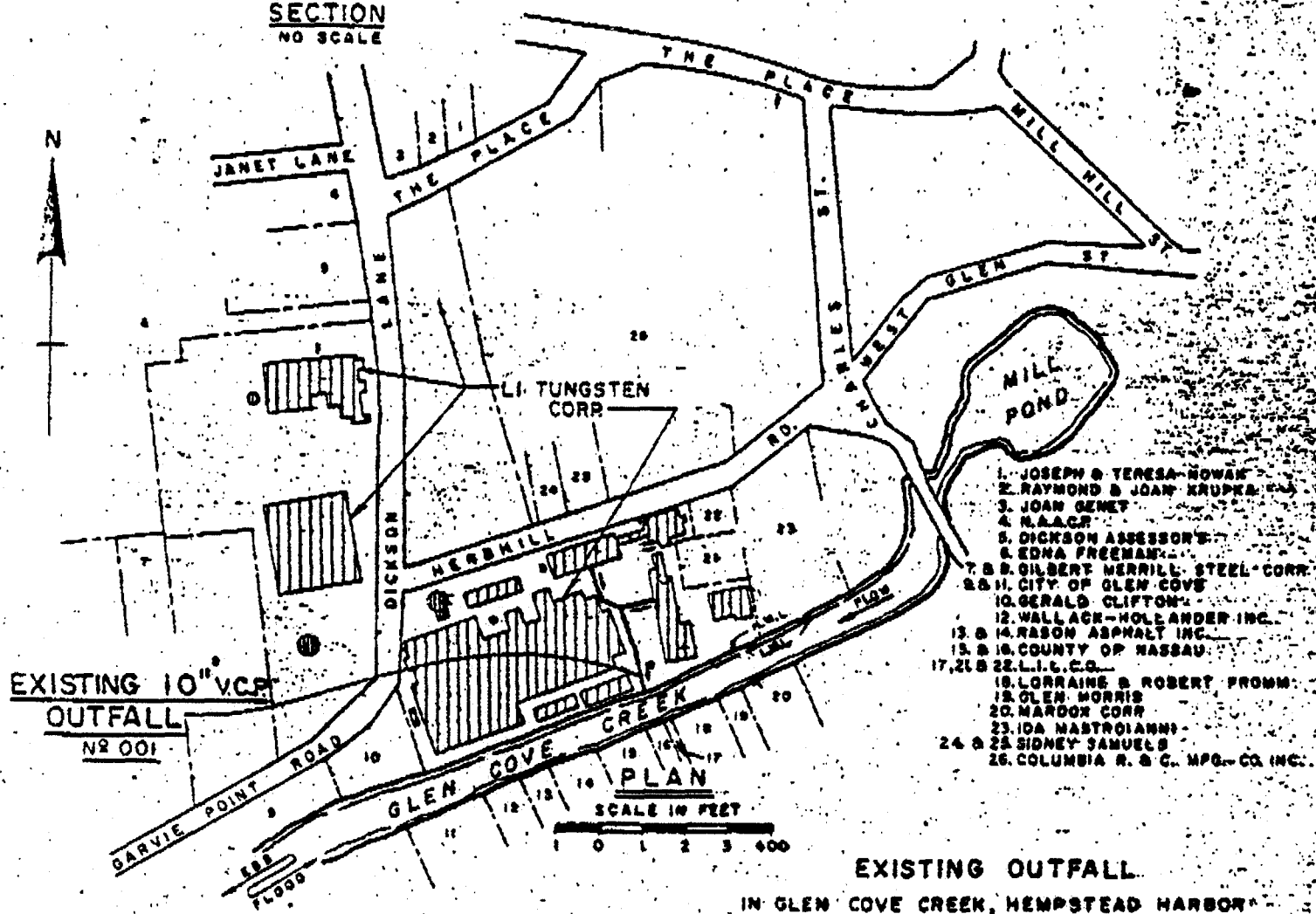
101220



SECTION
NO SCALE



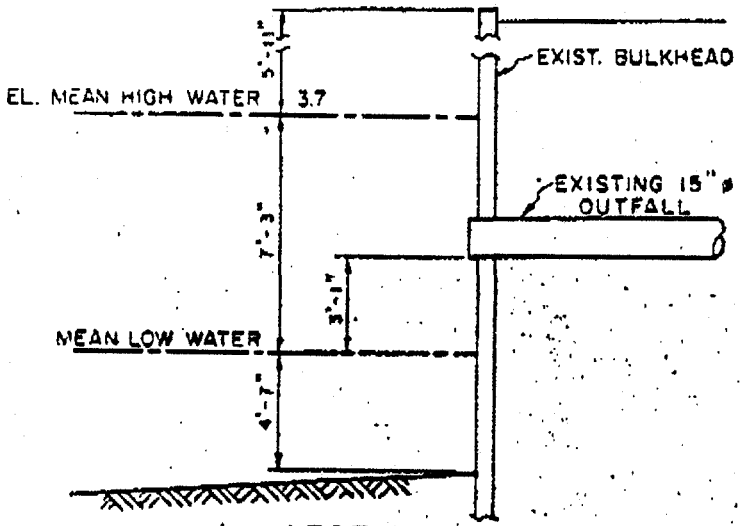
FROM HAGSTROM'S NASSAU COUNTY ATLAS



HOLZMACHER, McLENDON & MURRELL, P.C.
CONSULTING ENGINEERS
MELVILLE, N.Y.

EXISTING OUTFALL
IN GLEN COVE CREEK, HEMPSTEAD HARBOR
AT CITY OF GLEN COVE, T/O OYSTER BAY
NASSAU COUNTY, N.Y.

APPLICATION BY LI TUNGSTEN CORP.
DATE: JULY 28, 1972



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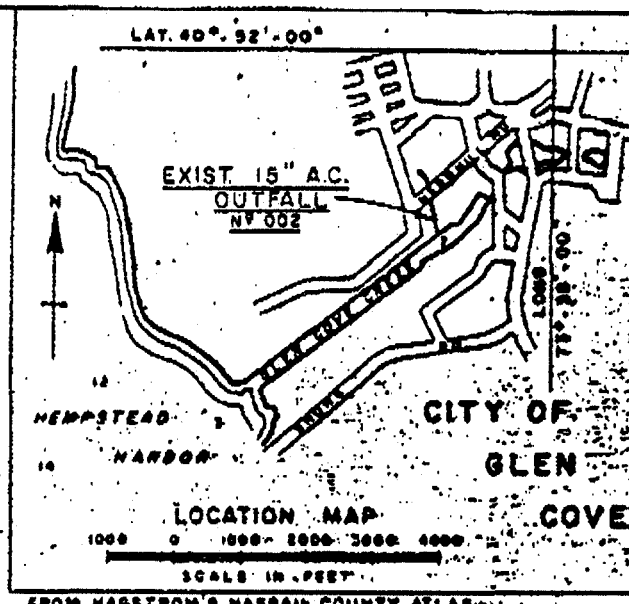
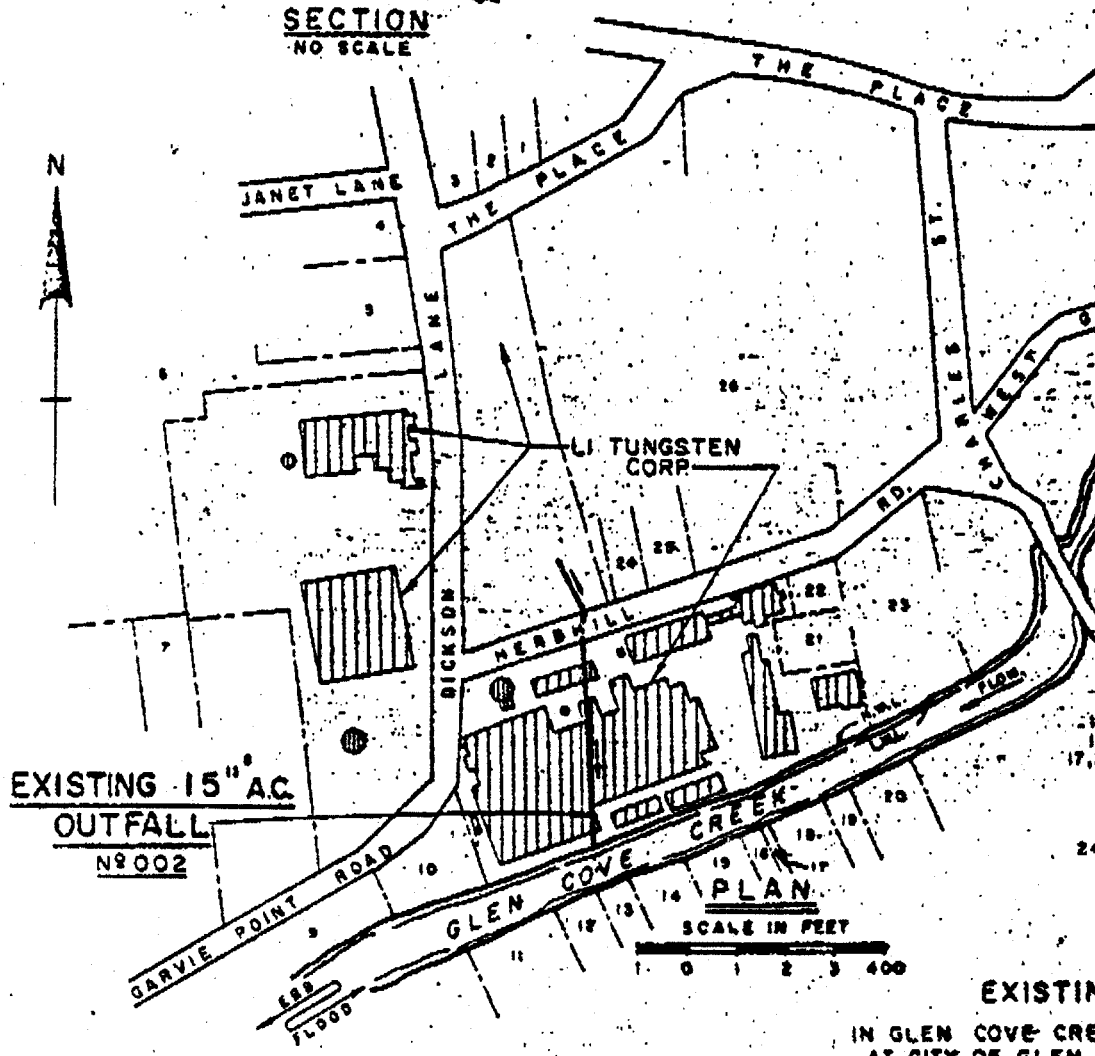


FROM HAGSTROM'S NASSAU COUNTY ATLAS



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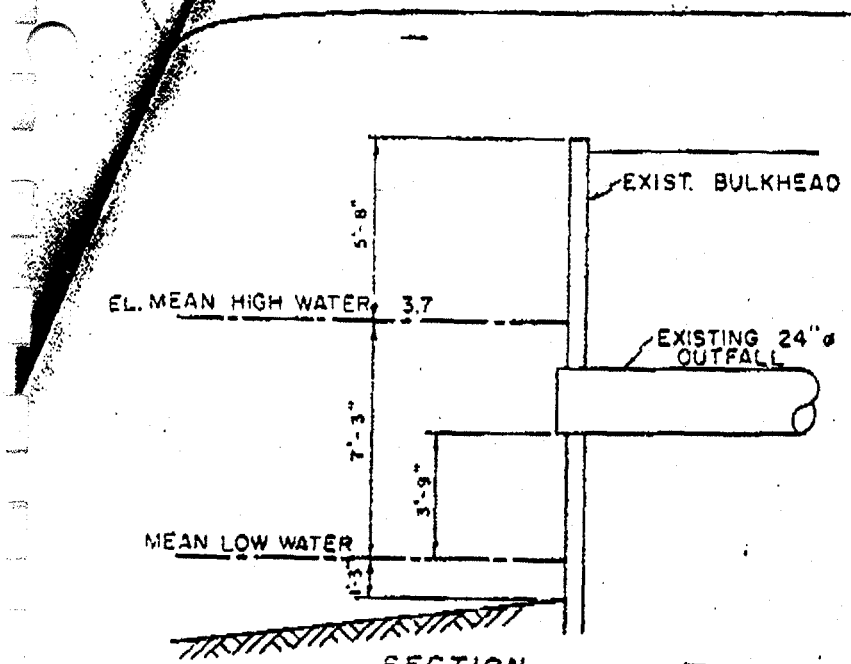

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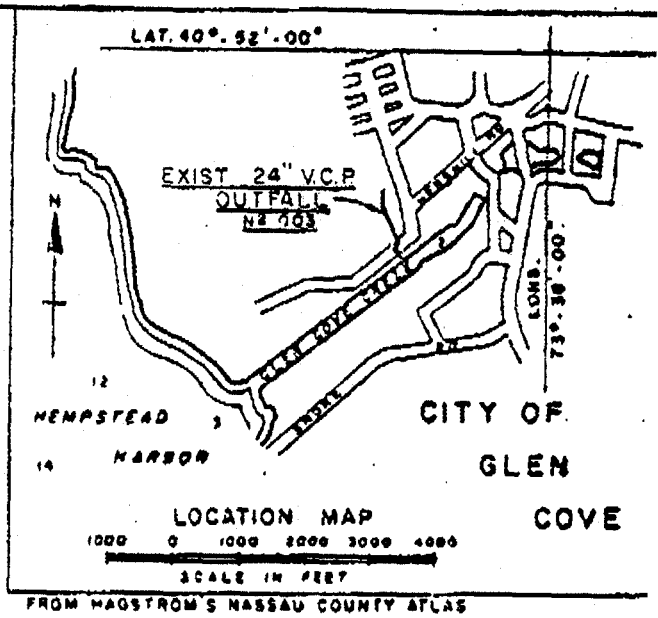
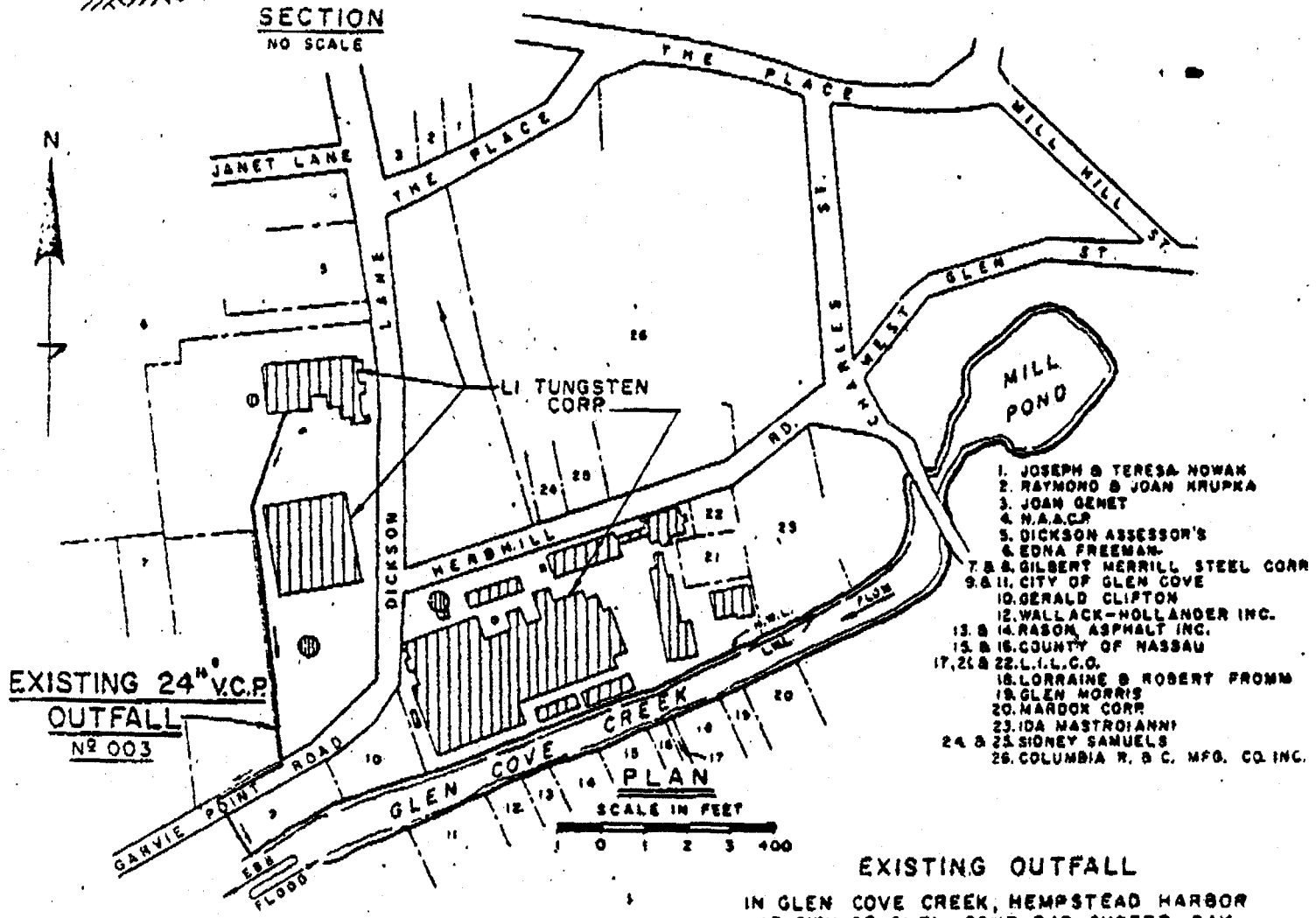


FROM HAGSTROM'S NASSAU COUNTY ATLAS



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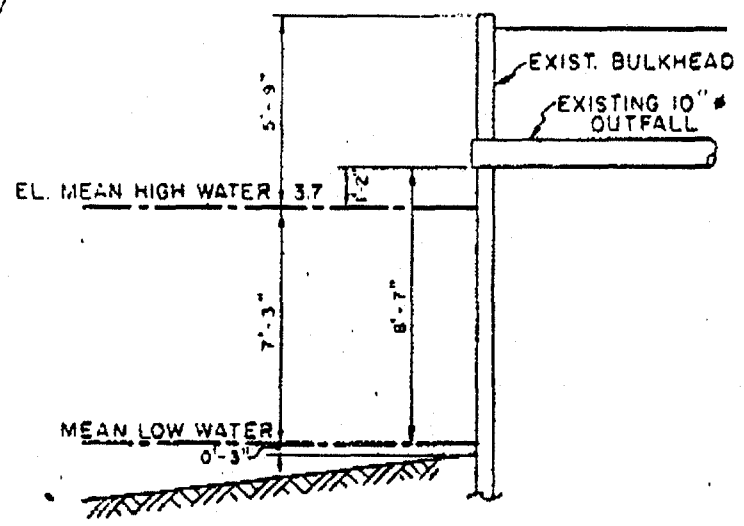
APPLICATION BY LI TUNGSTEN CORP.
DATE: JULY 28, 1972



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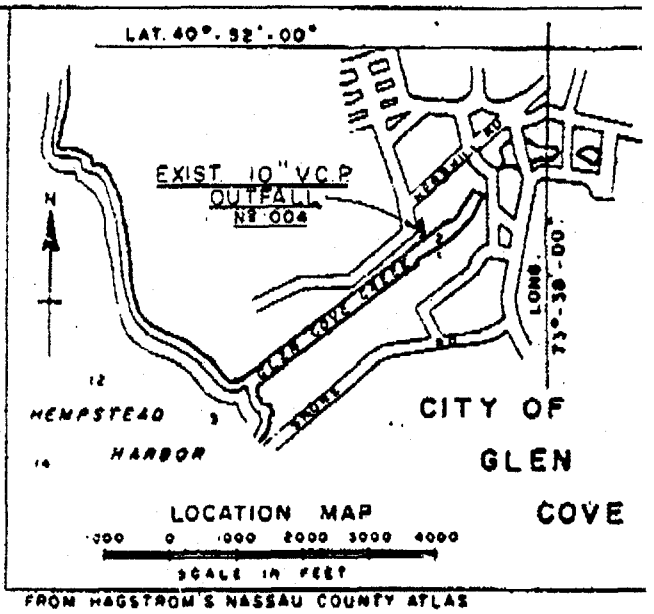

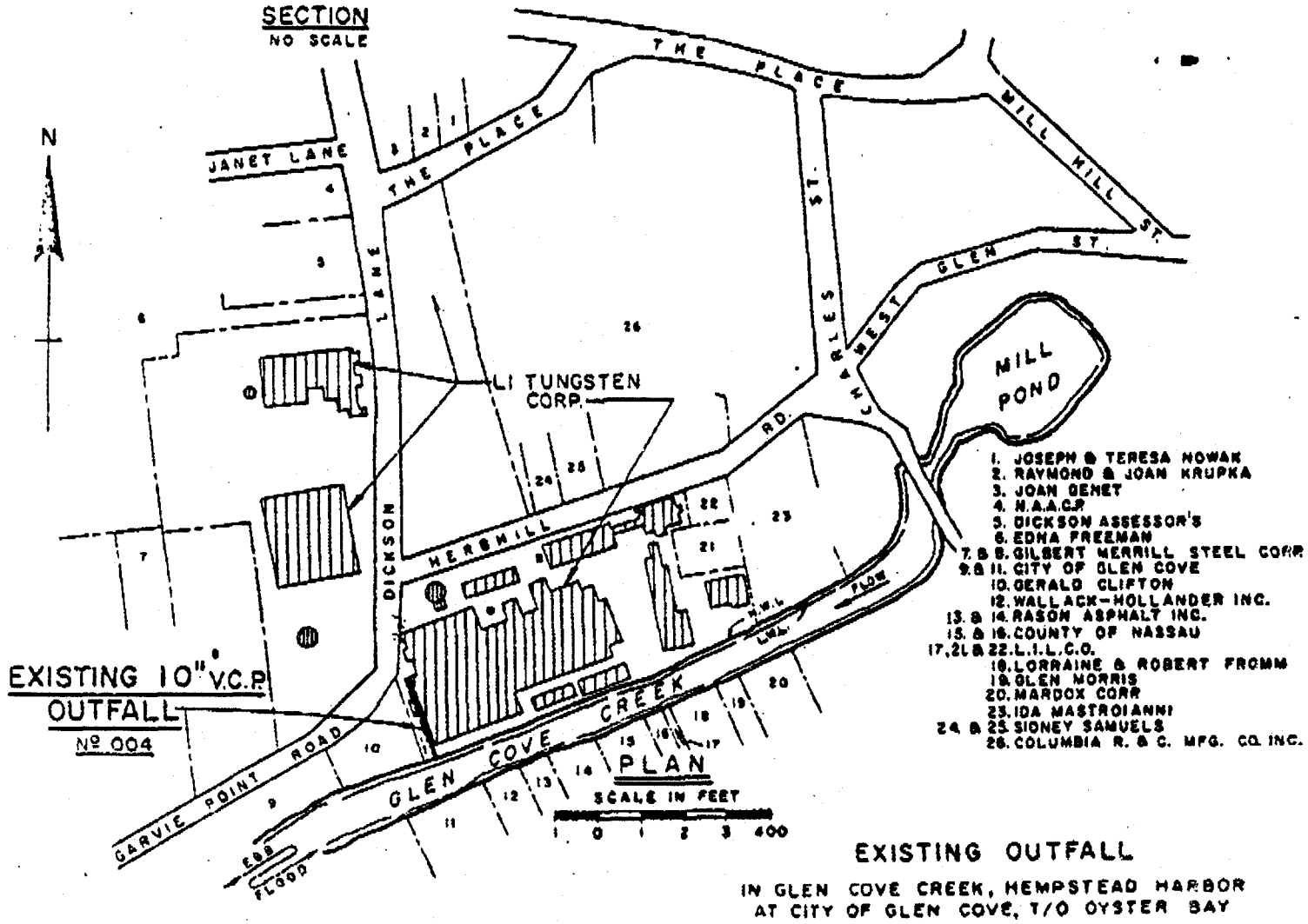

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MELVILLE, N.Y.

EXISTING OUTFALL
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AT CITY OF GLEN COVE, T/O OYSTER BAY
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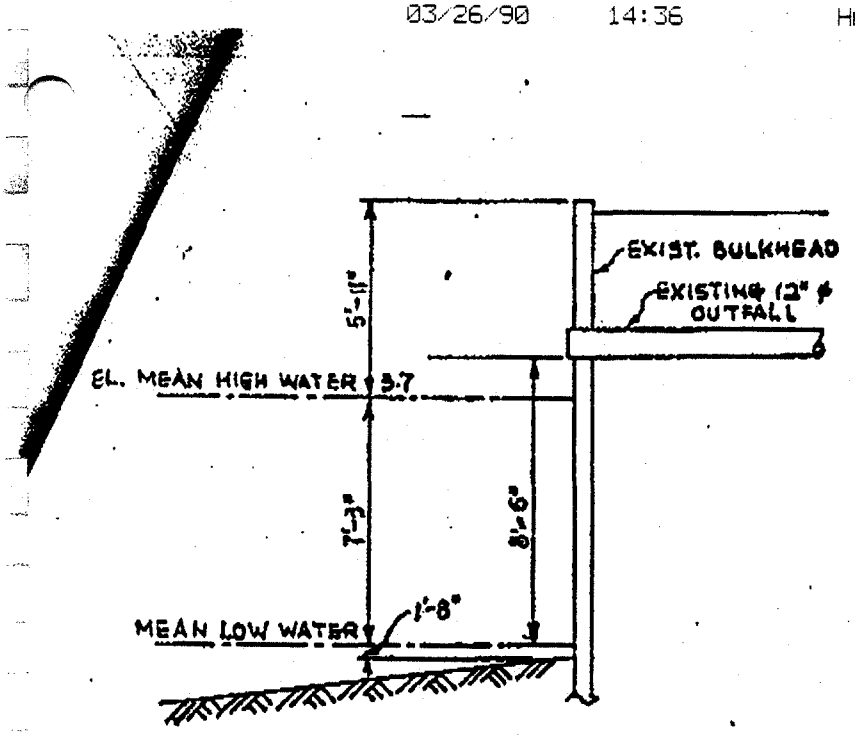
APPLICATION BY LI TUNGSTEN CORP.
DATE: JULY 28, 1972



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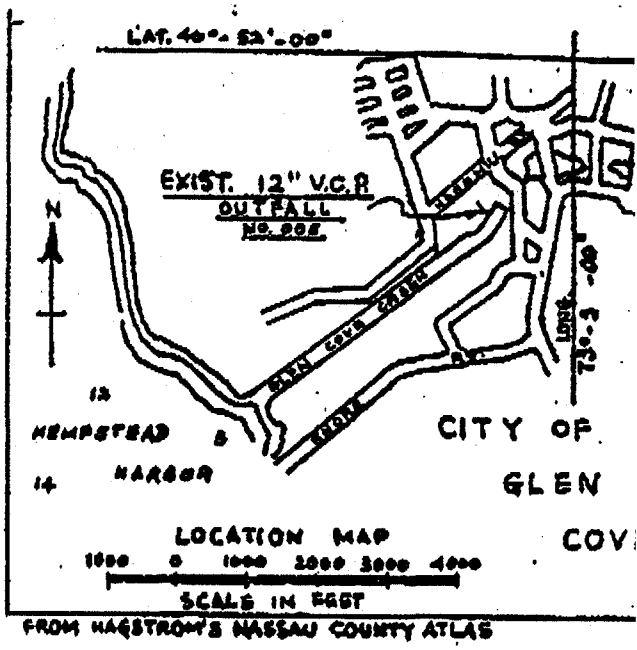
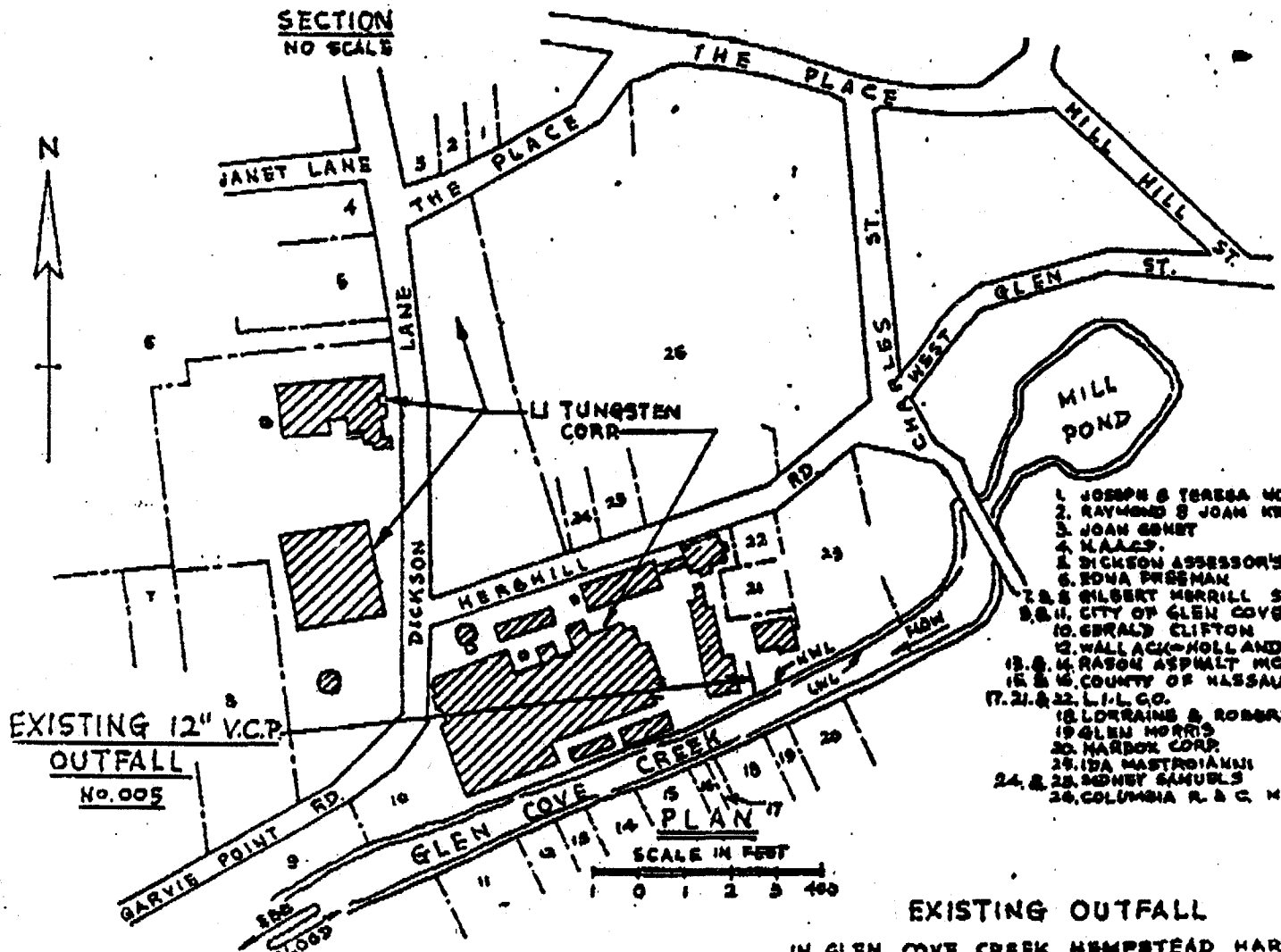


FROM HAGSTROM'S NASSAU COUNTY ATLAS



EXISTING OUTFALL

IN GLEN COVE CREEK, HEMPSTEAD HARBOR
AT CITY OF GLEN COVE, T/O OYSTER BAY
NASSAU COUNTY, N. Y.

APPLICATION BY LI TUNGSTEN CORP.
DATE: NOV. 17, 1975.

101225

REFERENCE NO. 44

101226

NUS CORPORATION AND SUBSIDIARIES — **TELECON NOTE**

CONTROL NO.:	DATE:	TIME:
02-9003-01	3/26/90	1430

DISTRIBUTION:

TO FILE: Li TUNGSTEN

BETWEEN:	OF:	PHONE:
JIM PERAZZO	FRED HART ASSOC.	(312) 4471480

AND: STEVEN OKULEWICZ (NUS)

DISCUSSION:

I ASKED JIM PERAZZO IF A TANK INVENTORY WAS AVAILABLE FOR THE Li TUNGSTEN SITE. HE SAID A REPORT WAS IN FINAL DRAFT AND WOULD BE SENT TO CHARLIE FITZSIMMONS OF EPA-EDISON ON 3/30/90. THIS REPORT WOULD CONTAIN INFORMATION CONCERNING THE CONTENTS OF ALL TANKS, THEIR VOLUME, THEIR FORMER CONTENTS, A RADIATION SURVEY OF EACH TANK, THEIR FIELD CHARACTERIZATION OF PRESENT CONTENTS AND A LISTING OF THE NUMBER AND KIND OF DRUMS/BARRELS REMOVED FROM THE SITE. I ASKED HIM ABOUT THE LOCATIONS OF UNDERGROUND TANKS AND THE 3 OUTFALLS. HE SAID THERE WERE SEVERAL UNDERGROUND FUEL OIL TANKS, AN EMPTY GASOLINE TANK BY THE MAIN ENTRANCE GUARD HOUSE AND SEVERAL TANKS WITHIN THE EAST BUILDING. THESE LATTER TANKS ARE PARTIALLY IN-GROUND. THERE ARE 5 OUTFALLS ON THE Li TUNGSTEN SITE AND JIM SAID HE WOULD FAX A MAP OF THEIR LOCATION TO NUS.

ACTION ITEMS:

101227

NUS 067 REVISED 0685

REFERENCE NO. 47

NEW YORK

Congressional District Identification—Continued

Table 1. MUNICIPALITIES—Continued

Municipality	County	Congressional district
[illegible] VILLAGE	NASSAU	3
[illegible] VILLAGE	CATTARAUGUS	34
[illegible] VILLAGE	MONROE	30
[illegible] VILLAGE	NASSAU	4
[illegible] VILLAGE	ONONDAGA	27
[illegible] VILLAGE	NASSAU	3
[illegible] VILLAGE	ST. LAWRENCE	26
[illegible] VILLAGE	GENESEE	30
[illegible] VILLAGE	ONONDAGA	27
[illegible] VILLAGE	ESSEX	26
[illegible] VILLAGE	ULSTER	28
[illegible] VILLAGE	CATTARAUGUS	34
[illegible] VILLAGE	JEFFERSON	26
[illegible] CITY	CHEMUNG	34
[illegible] VILLAGE	CHEMUNG	34
[illegible] VILLAGE	WESTCHESTER	22
[illegible] VILLAGE	BROOME	28
[illegible] VILLAGE	SCHOHARIE	25
[illegible] VILLAGE	JEFFERSON	26
[illegible]	ONONDAGA	27
[illegible] VILLAGE	CAYUGA	29
[illegible] VILLAGE	MONROE	30
[illegible] VILLAGE	CHAUTAUQUA	34
[illegible] VILLAGE	NASSAU	4
[illegible] VILLAGE	ERIE	31
[illegible] VILLAGE	ONONDAGA	27
[illegible] VILLAGE	ALLEGANY	34
[illegible] VILLAGE	DUTCHESS	21
[illegible] VILLAGE	DELAWARE	25
[illegible] VILLAGE	NASSAU	1,5
[illegible]	ORANGE	22
[illegible] VILLAGE	NASSAU	3
[illegible] VILLAGE	MONTGOMERY	25
[illegible] VILLAGE	CHAUTAUQUA	34
[illegible] VILLAGE	WASHINGTON	24
[illegible] VILLAGE	WASHINGTON	24
[illegible] VILLAGE	MONTGOMERY	25
[illegible] VILLAGE	MONTGOMERY	25
[illegible] VILLAGE	HERKIMER	26
[illegible] VILLAGE	DELAWARE	25
FRANKLINVILLE VILLAGE	CATTARAUGUS	34
[illegible] VILLAGE	CHAUTAUQUA	34
[illegible] VILLAGE	NASSAU	4,5
[illegible] VILLAGE	TOMPKINS	25
[illegible] CITY	OSWEGO	29
[illegible] VILLAGE	MONTGOMERY	25
[illegible] VILLAGE	WYOMING	31
[illegible] VILLAGE	SARATOGA	24
[illegible] CITY VILLAGE	NASSAU	5
[illegible] VILLAGE	LIVINGSTON	31
[illegible] CITY	ONTARIO	31
	SENECA	29
[illegible] VILLAGE	OTSEGO	25
[illegible] CITY	NASSAU	3
[illegible] VILLAGE	JEFFERSON	26
[illegible] CITY	WARREN	24
[illegible] CITY	FULTON	26
[illegible] VILLAGE	ORANGE	22
[illegible] VILLAGE	ST. LAWRENCE	26
[illegible] VILLAGE	CATTARAUGUS	31
	ERIE	31
[illegible] VILLAGE	ROCKLAND	22
[illegible] VILLAGE	WASHINGTON	24
[illegible] VILLAGE	NASSAU	8
[illegible] ESTATES VILLAGE	NASSAU	8
[illegible] VILLAGE	NASSAU	3
[illegible] VILLAGE	CHENANGO	25
[illegible] VILLAGE	ALBANY	23
[illegible] VILLAGE	SUFFOLK	1
[illegible] VILLAGE	WASHINGTON	24
[illegible] VILLAGE	ORANGE	22
[illegible] VILLAGE	TOMPKINS	25
[illegible] VILLAGE	MONTGOMERY	25
[illegible]	ERIE	31
[illegible] VILLAGE	MADISON	27
[illegible] VILLAGE	ST. LAWRENCE	26
[illegible] VILLAGE	STEUBEN	34
[illegible] VILLAGE	DELAWARE	28
[illegible] VILLAGE	OSWEGO	29
[illegible] VILLAGE	ORANGE	22
HARRISON VILLAGE	WESTCHESTER	20
HARRISVILLE VILLAGE	LEWIS	26
HASTINGS-ON-HUDSON VILLAGE	WESTCHESTER	22
HAVERSTRAW VILLAGE	ROCKLAND	22
HEAD OF THE HARBOR VILLAGE	SUFFOLK	1
HEMPSTEAD VILLAGE	NASSAU	5
HERKIMER VILLAGE	HERKIMER	26
HERMON VILLAGE	ST. LAWRENCE	26
HERKINGS VILLAGE	JEFFERSON	26
HEUVELTON VILLAGE	ST. LAWRENCE	26
HEWLETT BAY PARK VILLAGE	NASSAU	5
HEWLETT HARBOR VILLAGE	NASSAU	5
HEWLETT NECK VILLAGE	NASSAU	5
HIGHLAND FALLS VILLAGE	ORANGE	21
HILLBURN VILLAGE	ROCKLAND	22
HILTON VILLAGE	MONROE	30
HOBART VILLAGE	DELAWARE	25
HOLCOMB VILLAGE	ONTARIO	30
HOLLAND PATENT VILLAGE	ONEIDA	25
HOLLEY VILLAGE	ORLEANS	32
HOMER VILLAGE	CORTLAND	25
HONEOYE FALLS VILLAGE	MONROE	30
HOOSICK FALLS VILLAGE	RENSSELAER	24
HORNELL CITY	STEUBEN	34
HORSEHEADS VILLAGE	CHEMUNG	34
HUDSON CITY	COLUMBIA	24
HUDSON FALLS VILLAGE	WASHINGTON	24
HUNTER VILLAGE	GREENE	24
HUNTINGTON BAY VILLAGE	SUFFOLK	3
ILION VILLAGE	HERKIMER	26
INTERLAKEN VILLAGE	SENECA	29
IRVINGTON VILLAGE	WESTCHESTER	22
ISLAND PARK VILLAGE	NASSAU	4
ITHACA CITY	TOMPKINS	28
JAMESTOWN CITY	CHAUTAUQUA	34
JEFFERSONVILLE VILLAGE	SULLIVAN	28
JOHNSON CITY VILLAGE	BROOME	28
JOHNSTOWN CITY	FULTON	26
JORDAN VILLAGE	ONONDAGA	27
KEESEVILLE VILLAGE	CLINTON	26
	ESSEX	26
KENMORE VILLAGE	ERIE	32
KENSINGTON VILLAGE	NASSAU	8
KINDERHOOK VILLAGE	COLUMBIA	24
KINGS POINT VILLAGE	NASSAU	8
KINGSTON CITY	ULSTER	28
KIRYAS JOEL VILLAGE	ORANGE	22
LACKAWANNA CITY	ERIE	33
LACONA VILLAGE	OSWEGO	29
LAKE GEORGE VILLAGE	WARREN	24
LAKE GROVE VILLAGE	SUFFOLK	1
LAKE PLACID VILLAGE	ESSEX	26
LAKE SUCCESS VILLAGE	NASSAU	3
LAKEWOOD VILLAGE	CHAUTAUQUA	34
LANCASTER VILLAGE	ERIE	33
LANSING VILLAGE	TOMPKINS	25
LARCHMONT VILLAGE	WESTCHESTER	20
LATTINGTOWN VILLAGE	NASSAU	3
LAUREL HOLLOW VILLAGE	NASSAU	3
LAURENS VILLAGE	OTSEGO	25
LAWRENCE VILLAGE	NASSAU	5
LEICESTER VILLAGE	LIVINGSTON	31
LE ROY VILLAGE	GENESEE	30
LEWISTON VILLAGE	NIAGARA	32
LIBERTY VILLAGE	SULLIVAN	28
LIMA VILLAGE	LIVINGSTON	30
LIMESTONE VILLAGE	CATTARAUGUS	34
LINDENHURST VILLAGE	SUFFOLK	2
LISLE VILLAGE	BROOME	28
LITTLE FALLS CITY	HERKIMER	26
LITTLE VALLEY VILLAGE	CATTARAUGUS	34
LIVERPOOL VILLAGE	ONONDAGA	27
LIVONIA VILLAGE	LIVINGSTON	31
LLOYD HARBOR VILLAGE	SUFFOLK	3
LOCKPORT CITY	NIAGARA	32
LODI VILLAGE	SENECA	29
LONG BEACH CITY	NASSAU	5
LOWVILLE VILLAGE	LEWIS	26
LYNBROOK VILLAGE	NASSAU	5
LYNDONVILLE VILLAGE	ORLEANS	32

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REFERENCE NO. 48

NUS CORPORATION AND SUBSIDIARIES — **TELECON NOTE**

CONTROL NO:	DATE:	TIME:
	2/28/90	1020

DISTRIBUTION:
Li Tungsten SI file

BETWEEN:	OF:	PHONE:
Charlie Fitzsimmons	U.S. EPA Edison	(201) 321-6608

AND: Joann Wagner

DISCUSSION:
I asked Mr. Fitzsimmons when removal of the tanks was scheduled to begin, as Amy Brochu wants FIT to sample the contents for TCL analyses prior to removal. He said that they will be removing the tank contents in 2 to 3 weeks - they are still removing the drums from the property, which he expects to have completed by the end of next week. The tank contents have been tested by the PRP for compatibility and will be transferred to tanker trucks for overland transportation to and disposal at an approved TSD facility. Authorization for this TSD acquisition is a lengthy process; therefore, even after the tank contents are removed and transferred to the transportation vehicles, the materials may be on site for several months. It is estimated that 290,000 gallons of material, mostly corrosive

ACTION ITEMS:
in nature, will be removed. The week after next would be a good time for us to go out there, as all his people should be gone by then. He would like to be kept informed of our sampling schedule - he said that not all the tanks have product in them and that he could assist us in determining which drums to collect samples from.

Joann L Wagner
2/28/90

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