

GW - 40

INSPECTIONS & DATA

RECEIVED DEC 26 1990

Laboratory Report for

Sample Manager
Geoscience Consultants, Ltd.
500 Copper N.W., Suite 200
Albuquerque, NM 87102

December 18, 1990

By

Canonie Environmental
212 Frank West Circle, Suite A
Stockton, CA 95206
(209) 983-1340

85-052-10056

Canonie Environmental

Canonie Environmental Case Narrative

Client: GEOSCIENCE CONSULTANTS, LTD
LP #: 10056

Project #:L89073

Volatiles Case Narrative

Calibration was verified for all samples analyzed.

Surrogate recoveries were within acceptable limits for all samples.

The method blank associated with this group of samples was free from target analyte interferences at, or above, the reporting limits.

Spike recoveries were within acceptable limits.

Client: GEOSCIENCE CONSULTANTS, LTD
 Sample ID: 9012061034
 Matrix: LIQUID
 Lab ID: 856273-SA-C
 Project #: L89073. LP #: 10056
 Starting Depth: 0.00

Date Sampled: 12/06/1990
 Date Received: 12/07/1990
 QC Batch #: V121290AB1
 Date Analyzed: 12/12/1990
 Date Reported: 12/18/1990
 Ending Depth: 0.00

Test Description: Volatile Halocarbons

Analyte	Result*	Reporting		Units	Method
		Limit			
Bromodichloromethane	ND	0.50		ug/L	EPA 601
Bromoform	ND	0.50		ug/L	
Bromomethane	ND	0.50		ug/L	
Carbon tetrachloride	ND	0.50		ug/L	
Chlorobenzene	ND	0.50		ug/L	
Chloroethane	ND	0.50		ug/L	
2-Chloroethylvinyl ether	ND	0.50		ug/L	
Chloroform	ND	0.50		ug/L	
Chloromethane	ND	0.50		ug/L	
Dibromochloromethane	ND	0.50		ug/L	
1,2-Dichlorobenzene	ND	0.50		ug/L	
1,3-Dichlorobenzene	ND	0.50		ug/L	
1,4-Dichlorobenzene	ND	0.50		ug/L	
Dichlorodifluoromethane	ND	0.50		ug/L	
1,1-Dichloroethane	ND	0.50		ug/L	
1,2-Dichloroethane	ND	0.50		ug/L	
1,1-Dichloroethene	ND	0.50		ug/L	
t-1,2-Dichloroethene	ND	0.50		ug/L	
Dichloromethane	ND	0.50		ug/L	
1,2-Dichloropropane	ND	0.50		ug/L	
c-1,3-Dichloropropene	ND	0.50		ug/L	
t-1,3-Dichloropropene	ND	0.50		ug/L	
1,1,2,2-Tetrachloroethane	ND	0.50		ug/L	
Tetrachloroethene	ND	0.50		ug/L	
1,1,1-Trichloroethane	ND	0.50		ug/L	
1,1,2-Trichloroethane	ND	0.50		ug/L	
Trichloroethene	ND	0.50		ug/L	
Trichlorofluoromethane	ND	0.50		ug/L	
Vinyl chloride	ND	0.50		ug/L	
cis-1,2-Dichloroethene	ND	0.50		ug/L	

Acetone, 1,1,1,2,2,2-Hexachloroethane

Tested By : AMB/PJ
 Validated By: BMR

* ND indicates a compound was not detected at a concentration level greater than the reporting limit.

Canonie Environmental

Client: GEOSCIENCE CONSULTANTS, LTD
Sample ID: 9012061034
Matrix: LIQUID
Lab ID: 856273-SA-C
Project #: L89073. LP #: 10056
Starting Depth: 0.00

Date Sampled: 12/06/1990
Date Received: 12/07/1990
QC Batch #: V121290AB1
Date Analyzed: 12/12/1990
Date Reported: 12/18/1990
Ending Depth: 0.00

Test Description: Volatile Aromatics

Analyte	Result*	Reporting		Units	Method
		Limit			
Benzene	ND	0.50		ug/L	EPA 602
Chlorobenzene	ND	0.50		ug/L	
1,2-Dichlorobenzene	ND	0.50		ug/L	
1,3-Dichlorobenzene	ND	0.50		ug/L	
1,4-Dichlorobenzene	ND	0.50		ug/L	
Ethylbenzene	ND	0.50		ug/L	
Toluene	ND	0.50		ug/L	
Xylene	ND	0.50		ug/L	

Tested By : AMB/PJ
Validated By: BMR

* ND indicates a compound was not detected at a concentration level greater than the reporting limit.

Canonie Environmental

Client: GEOSCIENCE CONSULTANTS, LTD
 Sample ID: 9012061210
 Matrix: LIQUID
 Lab ID: 856274-SA-C
 Project #: L89073. LP #: 10056
 Starting Depth: 0.00

Date Sampled: 12/06/1990
 Date Received: 12/07/1990
 QC Batch #: V121290AB1
 Date Analyzed: 12/12/1990
 Date Reported: 12/18/1990
 Ending Depth: 0.00

Test Description: Volatile Halocarbons

Analyte	Result*	Reporting Limit	Units	Method
Bromodichloromethane	ND	5.0	ug/L	EPA 601
Bromoform	ND	5.0	ug/L	
Bromomethane	ND	5.0	ug/L	
Carbon tetrachloride	ND	5.0	ug/L	
Chlorobenzene	ND	5.0	ug/L	
Chloroethane	ND	5.0	ug/L	
2-Chloroethylvinyl ether	ND	5.0	ug/L	
Chloroform	ND	5.0	ug/L	
Chloromethane	ND	5.0	ug/L	
Dibromochloromethane	ND	5.0	ug/L	
1,2-Dichlorobenzene	ND	5.0	ug/L	
1,3-Dichlorobenzene	ND	5.0	ug/L	
1,4-Dichlorobenzene	ND	5.0	ug/L	
Dichlorodifluoromethane	ND	5.0	ug/L	
1,1-Dichloroethane	ND	5.0	ug/L	
1,2-Dichloroethane	ND	5.0	ug/L	
1,1-Dichloroethene	ND	5.0	ug/L	
t-1,2-Dichloroethene	ND	5.0	ug/L	
Dichloromethane	5.4	5.0	ug/L	
1,2-Dichloropropane	ND	5.0	ug/L	
c-1,3-Dichloropropene	ND	5.0	ug/L	
t-1,3-Dichloropropene	ND	5.0	ug/L	
1,1,2,2-Tetrachloroethane	ND	5.0	ug/L	
Tetrachloroethene	15.	5.0	ug/L	
1,1,1-Trichloroethane	ND	5.0	ug/L	
1,1,2-Trichloroethane	ND	5.0	ug/L	
Trichloroethene	11.	5.0	ug/L	
Trichlorofluoromethane	ND	5.0	ug/L	
Vinyl chloride	ND	5.0	ug/L	
cis-1,2-Dichloroethene	140.	5.0	ug/L	

Tested By : AMB/PJ
 Validated By: BMR

* ND indicates a compound was not detected at a concentration level greater than the reporting limit.

Canonie Environmental

Final Report

Page: 4

Client: GEOSCIENCE CONSULTANTS, LTD
Sample ID: 9012061210
Matrix: LIQUID
Lab ID: 856274-SA-C
Project #: L89073. LP #: 10056
Starting Depth: 0.00

Date Sampled: 12/06/1990
Date Received: 12/07/1990
QC Batch # : V121290AB1
Date Analyzed: 12/12/1990
Date Reported: 12/18/1990
Ending Depth: 0.00

Test Description: Volatile Aromatics

Analyte	Result*	Reporting Limit	Units	Method
Benzene	ND	5.0	ug/L	EPA 602
Chlorobenzene	ND	5.0	ug/L	
1,2-Dichlorobenzene	ND	5.0	ug/L	
1,3-Dichlorobenzene	ND	5.0	ug/L	
1,4-Dichlorobenzene	ND	5.0	ug/L	
Ethylbenzene	ND	5.0	ug/L	
Toluene	ND	5.0	ug/L	
Xylene	ND	5.0	ug/L	

Tested By : AMB/PJ
Validated By: BMR

* ND indicates a compound was not detected at a concentration level greater than the reporting limit.

Canonie Environmental

Client: GEOSCIENCE CONSULTANTS, LTD
 Sample ID: 9012061350
 Matrix: LIQUID
 Lab ID: 856275-SA-C
 Project #: L89073. LP #: 10056
 Starting Depth: 0.00

Date Sampled: 12/06/1990
 Date Received: 12/07/1990
 QC Batch #: V121290AB1
 Date Analyzed: 12/12/1990
 Date Reported: 12/18/1990
 Ending Depth: 0.00

Test Description: Volatile Halocarbons

Analyte	Result*	Reporting		Units	Method
		Limit			
=====					
Bromodichloromethane	ND	5.0		ug/L	EPA 601
Bromoform	ND	5.0		ug/L	
Bromomethane	ND	5.0		ug/L	
Carbon tetrachloride	ND	5.0		ug/L	
Chlorobenzene	ND	5.0		ug/L	
Chloroethane	ND	5.0		ug/L	
2-Chloroethylvinyl ether	ND	5.0		ug/L	
Chloroform	ND	5.0		ug/L	
Chloromethane	ND	5.0		ug/L	
Dibromochloromethane	ND	5.0		ug/L	
1,2-Dichlorobenzene	ND	5.0		ug/L	
1,3-Dichlorobenzene	ND	5.0		ug/L	
1,4-Dichlorobenzene	ND	5.0		ug/L	
Dichlorodifluoromethane	ND	5.0		ug/L	
1,1-Dichloroethane	ND	5.0		ug/L	
1,2-Dichloroethane	ND	5.0		ug/L	
1,1-Dichloroethene	ND	5.0		ug/L	
t-1,2-Dichloroethene	ND	5.0		ug/L	
Dichloromethane	5.8	5.0		ug/L	
1,2-Dichloropropane	ND	5.0		ug/L	
c-1,3-Dichloropropene	ND	5.0		ug/L	
t-1,3-Dichloropropene	ND	5.0		ug/L	
1,1,2,2-Tetrachloroethane	ND	5.0		ug/L	
Tetrachloroethene	15.	5.0		ug/L	
1,1,1-Trichloroethane	ND	5.0		ug/L	
1,1,2-Trichloroethane	ND	5.0		ug/L	
Trichloroethene	9.1	5.0		ug/L	
Trichlorofluoromethane	ND	5.0		ug/L	
Vinyl chloride	ND	5.0		ug/L	
cis-1,2-Dichloroethene	120.	5.0		ug/L	

Tested By : AMB/PJ
 Validated By: BMR

* ND indicates a compound was not detected at a concentration level greater than the reporting limit.

Canonie Environmental

Client: GEOSCIENCE CONSULTANTS, LTD
Sample ID: 9012061350
Matrix: LIQUID
Lab ID: 856275-SA-C
Project #: L89073. LP #: 10056
Starting Depth: 0.00

Date Sampled: 12/06/1990
Date Received: 12/07/1990
QC Batch #: V121290AB1
Date Analyzed: 12/12/1990
Date Reported: 12/18/1990
Ending Depth: 0.00

Test Description: Volatile Aromatics

Analyte	Result*	Reporting		Units	Method
		Limit			
Benzene	ND	5.0		ug/L	EPA 602
Chlorobenzene	ND	5.0		ug/L	
1,2-Dichlorobenzene	ND	5.0		ug/L	
1,3-Dichlorobenzene	ND	5.0		ug/L	
1,4-Dichlorobenzene	ND	5.0		ug/L	
Ethylbenzene	ND	5.0		ug/L	
Toluene	ND	5.0		ug/L	
Xylene	ND	5.0		ug/L	

Tested By : AMB/PJ
Validated By: BMR

* ND indicates a compound was not detected at a concentration level greater than the reporting limit.

CanonieEnvironmental

Client: GEOSCIENCE CONSULTANTS, LTD
 Sample ID: 9012061440
 Matrix: LIQUID
 Lab ID: 856276-SA-C
 Project #: L89073. LP #: 10056
 Starting Depth: 0.00

Date Sampled: 12/06/1990
 Date Received: 12/07/1990
 QC Batch #: V121290AB1
 Date Analyzed: 12/12/1990
 Date Reported: 12/18/1990
 Ending Depth: 0.00

Test Description: Volatile Halocarbons

Analyte	Result*	Reporting Limit	Units	Method
Bromodichloromethane	ND	5.0	ug/L	EPA 601
Bromoform	ND	5.0	ug/L	
Bromomethane	ND	5.0	ug/L	
Carbon tetrachloride	ND	5.0	ug/L	
Chlorobenzene	ND	5.0	ug/L	
Chloroethane	ND	5.0	ug/L	
2-Chloroethylvinyl ether	ND	5.0	ug/L	
Chloroform	ND	5.0	ug/L	
Chloromethane	ND	5.0	ug/L	
Dibromochloromethane	ND	5.0	ug/L	
1,2-Dichlorobenzene	ND	5.0	ug/L	
1,3-Dichlorobenzene	ND	5.0	ug/L	
1,4-Dichlorobenzene	ND	5.0	ug/L	
Dichlorodifluoromethane	ND	5.0	ug/L	
1,1-Dichloroethane	ND	5.0	ug/L	
1,2-Dichloroethane	ND	5.0	ug/L	
1,1-Dichloroethene	ND	5.0	ug/L	
t-1,2-Dichloroethene	ND	5.0	ug/L	
Dichloromethane	ND	5.0	ug/L	
1,2-Dichloropropane	ND	5.0	ug/L	
c-1,3-Dichloropropene	ND	5.0	ug/L	
t-1,3-Dichloropropene	ND	5.0	ug/L	
1,1,2,2-Tetrachloroethane	ND	5.0	ug/L	
Tetrachloroethene	16.	5.0	ug/L	
1,1,1-Trichloroethane	ND	5.0	ug/L	
1,1,2-Trichloroethane	ND	5.0	ug/L	
Trichloroethene	6.8	5.0	ug/L	
Trichlorofluoromethane	ND	5.0	ug/L	
Vinyl chloride	ND	5.0	ug/L	
cis-1,2-Dichloroethene	160.	5.0	ug/L	

Tested By : AMB/PJ
 Validated By: BMR

* ND indicates a compound was not detected at a concentration level greater than the reporting limit.

Canonie Environmental

Client: GEOSCIENCE CONSULTANTS, LTD
Sample ID: 9012061440
Matrix: LIQUID
Lab ID: 856276-SA-C
Project #: L89073. LP #: 10056
Starting Depth: 0.00

Date Sampled: 12/06/1990
Date Received: 12/07/1990
QC Batch # : V121290AB1
Date Analyzed: 12/12/1990
Date Reported: 12/18/1990
Ending Depth: 0.00

Test Description: Volatile Aromatics

Analyte	Result*	Reporting		Units	Method
		Limit			
Benzene	ND	5.0		ug/L	EPA 602
Chlorobenzene	ND	5.0		ug/L	
1,2-Dichlorobenzene	ND	5.0		ug/L	
1,3-Dichlorobenzene	ND	5.0		ug/L	
1,4-Dichlorobenzene	ND	5.0		ug/L	
Ethylbenzene	ND	5.0		ug/L	
Toluene	ND	5.0		ug/L	
Xylene	ND	5.0		ug/L	

Tested By : AMB/PJ
Validated By: BMR

* ND indicates a compound was not detected at a concentration level greater than the reporting limit.

Canonie Environmental



Geoscience Consultants, Ltd.

Albuquerque
500 Copper N.W.
Suite 200
Albuquerque, NM 87102
(505) 842-0001

Silver Spring
1109 Spring St.
Suite 706
Silver Spring, MD 20910
(301) 587-2088

Newport Beach
1400 Quail Street
Suite 140
Newport Beach, CA 92660
(714) 724-0536

Las Cruces
P.O. Drawer MM
Las Cruces, NM 88004
(505) 524-5364

No 2-33

Chain of Custody

DATE 12/6/90 PAGE 1 OF 1

LAB NAME Canonie Environmental

ADDRESS 212 Frank West Circle

Stockton CA

TELEPHONE 209 783-1340

SAMPLERS (SIGNATURE)

D. M.

SAMPLE NUMBER MATRIX LOCATION

9012061034	H ₂ O	GBR 50
9012061210	H ₂ O	GBR 48r
9012061350	H ₂ O	GBR 49
9012061440	H ₂ O	GBR 32

ANALYSIS REQUEST

BASE/NEU/ACID CMPDS.	GC/MS/ 625/8270	VOLATILE CMPDS.	GC/MS/ 624/8240	PESTICIDES/PCB	608/8080	POLYNUCLEAR	AROMATIC 610/8310	PHENOLS, SUB PHENOLS	604/8040	HALOGENATED	VOLATILES 601/8010	AROMATIC VOLATILES	602/8020	TOTAL ORGANIC	CARBON 415/9060	TOTAL ORGANIC	HALIDES 9020	PETROLEUM	HYDROCARBONS 418.1	TPH	MODIFIED 8015	PRIORITY POLLUTANT	CAM METALS (18)	TTL/CSTLC	EP TOX	SDWA-INORGANICS	PRIMARY/SECONDARY	HAZARDOUS WASTE	PROFILE
											✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

9012061034	H ₂ O	GBR 50	4
9012061210	H ₂ O	GBR 48r	4
9012061350	H ₂ O	GBR 49	4
9012061440	H ₂ O	GBR 32	4

PROJECT INFORMATION	SAMPLE RECEIPT	
PROJECT: <u>Grant</u>	TOTAL NO. OF CONTAINERS	
PROJECT DIRECTOR <u>W. NEE</u>	CHAIN OF CUSTODY SEALS	
CHARGE CODE NO. <u>456-003</u>	REC'D GOOD CONDITION/COLD	
SHIPPING <u>8836694782</u>	CONFORMS TO RECORD	
VIA: <u>Fed X</u>	LAB NO.	
SPECIAL INSTRUCTIONS/COMMENTS: <u>receipt Temp 20C</u>		
RELINQUISHED BY 1. <u>David NEE</u> 1506 12/6/90		
RELINQUISHED BY 2. <u>gcl</u>		
RECEIVED BY 1. <u>gcl</u>		
RECEIVED BY 2. <u>gcl</u>		
RECEIVED BY 3. <u>gcl</u>		

RECEIVED DEC 2 6 1990

DISTRIBUTION: WHITE, CANARY - LABORATORY - PINK - GEOSCIENCE CONSULTANTS, LTD.



2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: GBR
ID: Effluent
SITE: Stripper
LAB NO: F5401

DATE REPORTED: 11/13/90
DATE RECEIVED: 11/05/90
DATE COLLECTED: 11/05/90

Lab pH (s.u.).....	7.93
Lab conductivity, umhos/cm.....	4920
Lab resistivity, ohm-m.....	2.03
Total dissolved solids (180), mg/l..	3460
Total dissolved solids (calc), mg/l.	3280
Total alkalinity as CaCO ₃ , mg/l.....	54.7
Total acidity as CaCO ₃ , mg/l.....	0
Total hardness as CaCO ₃ , mg/l.....	1200
Sodium absorption ratio.....	7.79

	mg/l	meq/l
Bicarbonate as HCO ₃	66.5	1.09
Carbonate as CO ₃	0	0
Chloride.....	736	20.8
Sulfate.....	1430	29.8
Calcium.....	414	20.6
Magnesium.....	42	3.45
Potassium.....	3.15	0.08
Sodium.....	621	27
Major cations.....		51.2
Major anions.....		51.7
Cation/anion difference.....		0.46 %



C. Neal Schaeffer
Lab Director



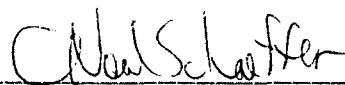
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: GBR
ID: Influent
SITE: Stripper
LAB NO: F5402

DATE REPORTED: 11/13/90
DATE RECEIVED: 11/05/90
DATE COLLECTED: 11/05/90

Lab pH (s.u.).....	6.66
Lab conductivity, umhos/cm.....	4880
Lab resistivity, ohm-m.....	2.05
Total dissolved solids (180), mg/l..	3430
Total dissolved solids (calc), mg/l.	3300
Total alkalinity as CaCO ₃ , mg/l.....	75.2
Total acidity as CaCO ₃ , mg/l.....	0
Total hardness as CaCO ₃ , mg/l.....	1180
Sodium absorption ratio.....	7.84

	mg/l	meq/l
Bicarbonate as HCO ₃	91.5	1.5
Carbonate as CO ₃	0	0
Chloride.....	736	20.8
Sulfate.....	1440	30
Calcium.....	430	21.4
Magnesium.....	27.4	2.25
Potassium.....	3.21	0.08
Sodium.....	620	27
Major cations.....		50.8
Major anions.....		52.3
Cation/anion difference.....		1.5 %



C. Neal Schaeffer
Lab Director



2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: Effluent
SITE: Stripper
LAB NO: F5509

DATE REPORTED: 12/11/90
DATE RECEIVED: 12/03/90
DATE COLLECTED: 12/03/90

Lab pH (s.u.).....	7.91
Lab conductivity, umhos/cm.....	4830
Lab resistivity, ohm-m.....	2.07
Total dissolved solids (180), mg/l..	3430
Total dissolved solids (calc), mg/l.	3250
Total alkalinity as CaCO ₃ , mg/l.....	61.6
Total hardness as CaCO ₃ , mg/l.....	1210
Sodium absorption ratio.....	7.82

	mg/l	meq/l
Bicarbonate as HCO ₃	75	1.23
Carbonate as CO ₃	0	0
Chloride.....	725	20.4
Sulfate.....	1460	30.3
Calcium.....	281	14
Magnesium.....	125	10.3
Potassium.....	3.15	0.08
Sodium.....	627	27.3
Major cations.....		51.6
Major anions.....		52
Cation/anion difference.....		0.37 %

Mary Stepp

Mary Stepp
Lab Director



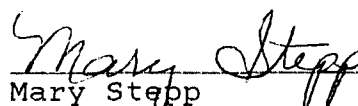
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: Giant Refinery
ID: Influent
SITE: Stripper
LAB NO: F5510

DATE REPORTED: 12/11/90
DATE RECEIVED: 12/03/90
DATE COLLECTED: 12/03/90

Lab pH (s.u.).....	6.58
Lab conductivity, umhos/cm.....	4870
Lab resistivity, ohm-m.....	2.05
Total dissolved solids (180), mg/l..	3420
Total dissolved solids (calc), mg/l.	3240
Total alkalinity as CaCO ₃ , mg/l.....	58.1
Total hardness as CaCO ₃ , mg/l.....	1280
Sodium absorption ratio.....	7.52

	mg/l	meq/l
Bicarbonate as HCO ₃	70.8	1.16
Carbonate as CO ₃	0	0
Chloride.....	735	20.7
Sulfate.....	1460	30.4
Calcium.....	205	10.2
Magnesium.....	186	15.3
Potassium.....	2.9	0.07
Sodium.....	618	26.9
Major cations.....		52.4
Major anions.....		52.3
Cation/anion difference.....		0.16 %



Mary Stepp
Lab Director

Analytical Report
01/04/91

Giant Refining Company

Giant Refining Company
606 E. Highway 64
Farmington, NM 87401

Tim Kinney

Customer Work Identification REFINING
Purchase Order Number RFE-9834

Contents:

- 1 Analytical Data Summary
- 2 Sample History
- 3 Comments Summary
- 4 Notes and Definitions

Radian Analytical Services
10395 Old Placerville Road
Sacramento, CA 95827

916-362-5332

Client Services Coordinator: RRMAY

Certified by: Marilyn Melton

Giant Refining Company
 Radian Work Order: S0-12-012

Method: Halocarbons by SW8010 (1)

List: Table 3 analyte list

Sample ID:	901203905	901203920	REAGENT BLANK
	STRIPPER EFF	STRIPPER INF	
Factor:	1	1	1
Results in:	ug/L	ug/L	ug/L
	01A	02A	06A
Matrix:	water	water	water

	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit
Bromodichloromethane	ND	0.10	ND	0.10	ND	0.10
Bromoform	ND	0.50	ND	0.50	ND	0.50
Bromomethane	ND	1.2	ND	1.2	ND	1.2
Carbon tetrachloride	ND	0.12	ND	0.12	ND	0.12
Chlorobenzene	ND	0.25	ND	0.25	ND	0.25
Chloroethane	ND	0.52	ND	0.52	ND	0.52
2-Chloroethylvinylether	ND	0.50	ND	0.50	ND	0.50
Chloroform	ND	0.10	ND	0.10	ND	0.10
Chloromethane	ND	0.30	0.42 Xa	0.30	ND	0.30
Dibromochloromethane	ND	0.20	ND	0.20	ND	0.20
1,2-Dichlorobenzene	ND	0.50	ND	0.50	ND	0.50
1,3-Dichlorobenzene	ND	0.32	ND	0.32	ND	0.32
1,4-Dichlorobenzene	ND	0.24	ND	0.24	ND	0.24
1,1-Dichloroethane	ND	0.50	ND	0.50	ND	0.50
1,2-Dichloroethane	ND	0.10	ND	0.10	ND	0.10
1,1-Dichloroethene	ND	0.20	ND	0.20	ND	0.20
cis-1,2-Dichloroethene	ND	0.20	ND	0.20	ND	0.20
trans-1,2-Dichloroethene	ND	0.20	ND	0.20	ND	0.20
1,2-Dichloropropane	ND	0.10	ND	0.10	ND	0.10
cis-1,3-Dichloropropene	ND	0.20	ND	0.20	ND	0.20
trans-1,3-Dichloropropene	ND	0.34	ND	0.34	ND	0.34
Methylene chloride	ND	0.40	ND	0.40	ND	0.40
1,1,2,2-Tetrachloroethane	ND	0.15	ND	0.15	ND	0.15
Tetrachloroethene	ND	0.10	0.15 Ca	0.10	ND	0.10
1,1,1-Trichloroethane	ND	0.20	ND	0.20	ND	0.20
1,1,2-Trichloroethane	ND	0.20	ND	0.20	ND	0.20
Trichloroethene	ND	0.20	ND	0.20	ND	0.20
Trichlorofluoromethane	ND	0.20	ND	0.20	ND	0.20
Vinyl chloride	ND	0.20	ND	0.20	ND	0.20

ND Not detected at specified detection limit

a Est. result less than 5 times detection limit

X See definition in report narrative

C Confirmed on second column or by GC/MS

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

Giant Refining Company
 Radian Work Order: S0-12-012

Method: Halocarbons by SW8010 (1)

List: Table 3 analyte list

Sample ID:	901203905 STRIPPER EFF	901203920 STRIPPER INF	REAGENT BLANK
Factor:	1	1	1
Results in:	ug/L	ug/L	ug/L
	01A	02A	06A
Matrix:	water	water	water

	Result Det. Limit	Result Det. Limit	Result Det. Limit
Surrogate Recovery(%)			
1-Bromo-4-fluorobenzene	90	110	112
Control Limits: 40 to 140			

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

Giant Refining Company
 Radian Work Order: S0-12-012

Method: Aromatics by SW8020 (1)

List: Complete analyte list

Sample ID:	901203905	901203920	REAGENT BLANK
	STRIPPER EFF	STRIPPER INF	
Factor:	1	1	1
Results in:	ug/L	ug/L	ug/L
	03A	04A	05A
Matrix:	water	water	water

	Result	Det. Limit	Result	Det. Limit	Result	Det. Limit
Benzene	ND	0.20	1.2 C	0.20	ND	0.20
Chlorobenzene	ND	0.20	ND	0.20	ND	0.20
1,2-Dichlorobenzene	ND	0.40	1.3 C@	0.40	ND	0.40
1,3-Dichlorobenzene	ND	0.40	ND	0.40	ND	0.40
1,4-Dichlorobenzene	ND	0.30	ND	0.30	ND	0.30
Ethylbenzene	ND	0.20	ND	0.20	ND	0.20
Toluene	ND	0.20	ND	0.20	ND	0.20
Xylenes (total)	ND	0.20	1.0 C	0.20	ND	0.20
Surrogate Recovery(%)						
1-Bromo-4-fluorobenzene	83		88		88	
Control Limits: 40 to 140						

ND Not detected at specified detection limit

C Confirmed on second column or by GC/MS

@ Est. result less than 5 times detection limit

(1) For a detailed description of flags and technical terms in this report refer to Appendix A in this report.

Giant Refining Company
 Radian Work Order: S0-12-012

Sample Identifications and Dates

Sample ID	901203905	901203920	901203905	901203920	REAGENT BLANK	REAGENT BLANK
	STRIPPER E	STRIPPER INF	STRIPPER EFF	STRIPPER INF		
Date Sampled	12/03/90	12/03/90	12/03/90	12/03/90	12/03/90	12/03/90
Date Received	12/04/90	12/04/90	12/04/90	12/04/90	12/04/90	12/04/90
Matrix	water	water	water	water	water	water
	01	02	03	04	05	06
Halocarbons by SW8010						
Prepared						
Analyzed	12/13/90	12/13/90				12/13/90
Analyst	KB	KB				KB
File ID	K12137	K12138				K12132
Blank ID	K12132	K12132				
Instrument	5	5				5
Report as	received	received				received
Aromatics by SW8020						
Prepared						
Analyzed			12/13/90	12/13/90	12/13/90	
Analyst			KB	KB	KB	
File ID			L12137	L12138	L12132	
Blank ID			L12132	L12132		
Instrument			5	5	5	
Report as			received	received	received	

Appendix A

Comments, Notes and Definitions

Giant Refining Company
Radian Work Order: S0-12-012

The X flag means that the presence of this analyte was not confirmed after analysis on a second column.

Giant Refining Company
Radian Work Order: S0-12-012

Q ALL METHODS EXCEPT CLP

The results which are less than five times the method specified detection limit.

EXPLANATION

Uncertainty of the analysis will increase as the method detection limit is approached. These results should be considered approximate.

C ORGANIC CLP

pesticides require that single component results > 10ng/uL in the final extract be confirmed by GC/MS.

OTHER ORGANIC METHODS

This analysis has been confirmed on a second column or by GC/MS.

EXPLANATION

Most methods of analysis by gas chromatography recommend reanalysis on a second column of dissimilar phase to resolve compounds of interest from interferences that may occur and for analyte confirmation.

ND ALL METHODS EXCEPT CLP

This flag is used to denote analytes which are not detected at or above the specified detection limit.

EXPLANATION

The value to the right of the < symbol is the method specified detection limit for the analyte.

X ALL METHODS EXCEPT INORGANIC CLP

This is a general purpose flag for those situations not covered by the standard flags. The specific definition of this flag is described in the Comments Summary and/or in the case narrative.

Giant Refining Company
Radian Work Order: S0-12-012

TERMS USED IN THIS REPORT:

Analyte - A chemical for which a sample is to be analyzed. The analysis will meet EPA method and QC specifications.

Compound - See Analyte.

Detection Limit - The method specified detection limit, which is the lower limit of quantitation specified by EPA for a method. Radian staff regularly assess their laboratories' method detection limits to verify that they meet or are lower than those specified by EPA. Detection limits which are higher than method limits are based on experimental values at the 99% confidence level. The detection limits for EPA CLP (Contract Laboratory Program) methods are CRQLs (contract required quantitation limits) for organics and CRDLs (contract required detection limits) for inorganics. Note, the detection limit may vary from that specified by EPA based on sample size, dilution or cleanup. (Refer to Factor, below)

EPA Method - The EPA specified method used to perform an analysis. EPA has specified standard methods for analysis of environmental samples. Radian will perform its analyses and accompanying QC tests in conformance with EPA methods unless otherwise specified.

Factor - Default method detection limits are based on analysis of clean water samples. A factor is required to calculate sample specific detection limits based on alternate matrices (soil or water), reporting units, use of cleanup procedures, or dilution of extracts/digestates. For example, extraction or digestion of 10 grams of soil in contrast to 1 liter of water will result in a factor of 100.

Matrix - The sample material. Generally, it will be soil, water, air, oil, or solid waste.

Radian Work Order - The unique Radian identification code assigned to the samples reported in the analytical summary.

Units - ug/L	micrograms per liter (parts per billion); liquids/water
ug/kg	micrograms per kilogram (parts per billion); soils/solids
ug/M3	micrograms per cubic meter; air samples
mg/L	milligrams per liter (parts per million); liquids/water
mg/kg	milligrams per kilogram (parts per million); soils/solids
%	percent; usually used for percent recovery of QC standards
uS/cm	conductance unit; microSiemens/centimeter
mL/hr	milliliters per hour; rate of settlement of matter in water
NTU	turbidity unit; nephelometric turbidity unit
CU	color unit; equal to 1 mg/L of chloroplatinate salt



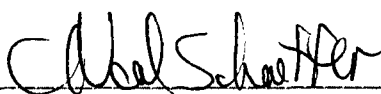
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

Client: Giant Refinery

Date reported: 10/30/90
Date received: 10/29/90
Date collected: 10/29/90

Analysis requested: electrical conductivity, umhos/cm.

Lab #:	Sample site:	Sample ID:	Result:
F5362	GBR #6	N/A	4066 umhos/cm
F5363	GBR #20	N/A	3281 umhos/cm
F5364	GBR #41	N/A	6280 umhos/cm
F5365	GRW-3	N/A	4218 umhos/cm


C. Neal Schaeffer
Senior Chemist



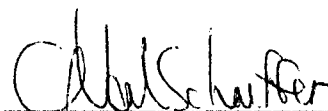
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: GBR
ID: 1405
SITE: GB4-41
LAB NO: F5398

DATE REPORTED: 11/14/90
DATE RECEIVED: 11/05/90
DATE COLLECTED: 11/02/90

Lab pH (s.u.).....	6.97
Lab conductivity, umhos/cm.....	6840
Lab resistivity, ohm-m.....	1.46
Total dissolved solids (180), mg/l..	5050
Total dissolved solids (calc), mg/l.	4830
Total alkalinity as CaCO ₃ , mg/l.....	428
Total acidity as CaCO ₃ , mg/l.....	0
Total hardness as CaCO ₃ , mg/l.....	1730
Sodium absorption ratio.....	10.1

	mg/l	meq/l
Bicarbonate as HCO ₃	522	8.55
Carbonate as CO ₃	0	0
Chloride.....	812	22.9
Sulfate.....	2180	45.4
Calcium.....	482	24
Magnesium.....	128	10.5
Potassium.....	2.3	0.06
Sodium.....	966	42
Major cations.....		76.6
Major anions.....		76.9
Cation/anion difference.....		0.18 %


C. Neal Schaeffer
Lab Director



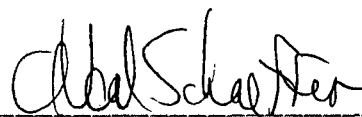
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

Client: Giant Refinery

Date reported: 10/30/90
Date received: 10/29/90
Date collected: 10/29/90

Analysis requested:

Lab #:	Sample site:	Sample ID:	Result:
F5362	GBR #6	N/A	4066 mg/l
F5363	GBR #20	N/A	3281 mg/l
F5364	GBR #41	N/A	6280 mg/l
F5365	GRW-3	N/A	4218 mg/l



C. Neal Schaeffer
Senior Chemist



Inter-Mountain
Laboratories, Inc.

Client: Giant Refinery

2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

Date reported: 10/23/90
Date received: 10/15/90
Date collected: 10/15/90

Analysis requested: Conductivity

Lab #:	Sample site:	Sample ID:	Result:
F5284	RW-3	9010151010	4197 umhos/cm
F5285	GBR-41	9010151109	4710 umhos/cm
F5286	GBR-20	9010151119	3226 umhos/cm
F5287	GBR-6	9010151355	4085 umhos/cm

C. Neal Schaeffer
Senior Chemist



InterMountain
Laboratories, Inc.

2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: GBR
ID: N/A
SITE: GBR-41
LAB NO: F5236

DATE REPORTED: 10/23/90
DATE RECEIVED: 10/09/90
DATE COLLECTED: 10/09/90

Lab pH (s.u.).....	7.80
Lab conductivity, umhos/cm.....	4620
Lab resistivity, ohm-m.....	2.16
Total dissolved solids (180), mg/l..	3240
Total dissolved solids (calc), mg/l.	3130
Total alkalinity as CaCO ₃ , mg/l.....	770
Total acidity as CaCO ₃ , mg/l.....	0
Total hardness as CaCO ₃ , mg/l.....	1200
Sodium absorption ratio.....	8.4

	mg/l	meq/l
Bicarbonate as HCO ₃	939	15.4
Carbonate as CO ₃	0	0
Chloride.....	467	13.2
Sulfate.....	1090	22.8
Calcium.....	365	18.2
Magnesium.....	71.3	5.86
Potassium.....	4.56	0.12
Sodium.....	670	29.2
Major cations.....		53.4
Major anions.....		51.4
Cation/anion difference.....		1.91 %

C. Neal Schaeffer
Lab Director



Inter-Mountain
Laboratories, Inc.

2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: GBR
ID: N/A
SITE: GBR-20
LAB NO: F5237

DATE REPORTED: 10/23/90
DATE RECEIVED: 10/09/90
DATE COLLECTED: 10/09/90

Lab pH (s.u.).....	8.43
Lab conductivity, umhos/cm.....	3120
Lab resistivity, ohm-m.....	3.21
Total dissolved solids (180), mg/l..	1820
Total dissolved solids (calc), mg/l.	1760
Total alkalinity as CaCO ₃ , mg/l.....	1000
Total acidity as CaCO ₃ , mg/l.....	0
Total hardness as CaCO ₃ , mg/l.....	106
Sodium absorption ratio.....	29.4

	mg/l	meq/l
Bicarbonate as HCO ₃	1070	17.6
Carbonate as CO ₃	71.7	2.39
Chloride.....	352	9.94
Sulfate.....	67.5	1.41
Calcium.....	36.1	1.8
Magnesium.....	3.95	0.32
Potassium.....	2.8	0.07
Sodium.....	698	30.3
Major cations.....		32.5
Major anions.....		31.4
Cation/anion difference.....		1.86 %


C. Neal Schaeffer
Lab Director



Inter-Mountain
Laboratories, Inc.

2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: GBR
ID: N/A
SITE: GBR-6
LAB NO: F5235

DATE REPORTED: 10/23/90
DATE RECEIVED: 10/09/90
DATE COLLECTED: 10/09/90

Lab pH (s.u.).....	7.95
Lab conductivity, umhos/cm.....	4030
Lab resistivity, ohm-m.....	2.48
Total dissolved solids (180), mg/l..	2700
Total dissolved solids (calc), mg/l.	2640
Total alkalinity as CaCO ₃ , mg/l.....	958
Total acidity as CaCO ₃ , mg/l.....	0
Total hardness as CaCO ₃ , mg/l.....	1180
Sodium absorption ratio.....	6.43

	mg/l	meq/l
Bicarbonate as HCO ₃	1170	19.2
Carbonate as CO ₃	0	0
Chloride.....	387	10.9
Sulfate.....	728	15.2
Calcium.....	373	18.6
Magnesium.....	61.5	5.06
Potassium.....	3.21	0.08
Sodium.....	509	22.1
Major cations.....		45.9
Major anions.....		45.2
Cation/anion difference.....		0.75 %

C. Neal Schaeffer
Lab Director

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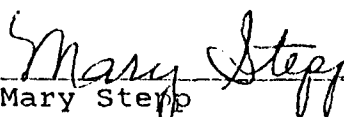
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: GCL
ID: 9012061210
SITE: GBR-48R
LAB NO: F5527

DATE REPORTED: 12/14/90
DATE RECEIVED: 12/06/90
DATE COLLECTED: 12/06/90

Lab pH (s.u.).....	7.18
Lab conductivity, umhos/cm.....	7080
Lab resistivity, ohm-m.....	1.41
Total dissolved solids (180), mg/l..	5070
Total dissolved solids (calc), mg/l.	4960
Total alkalinity as CaCO ₃ , mg/l.....	407
Total hardness as CaCO ₃ , mg/l.....	1800
Sodium absorption ratio.....	10.2

	mg/l	meq/l
Bicarbonate as HCO ₃	497	8.14
Carbonate as CO ₃	0	0
Chloride.....	1070	30.1
Sulfate.....	1980	41.3
Calcium.....	594	29.7
Magnesium.....	76.4	6.28
Potassium.....	4.9	0.13
Sodium.....	996	43.3
Major cations.....		79.4
Major anions.....		79.5
Cation/anion difference.....		0.08 %



Mary Stepp
Lab Director



2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: GCL
ID: 9012061350
SITE: GBR-49
LAB NO: F5528

DATE REPORTED: 12/14/90
DATE RECEIVED: 12/06/90
DATE COLLECTED: 12/06/90

Lab pH (s.u.).....	7.15
Lab conductivity, umhos/cm.....	4630
Lab resistivity, ohm-m.....	2.16
Total dissolved solids (180), mg/l..	3350
Total dissolved solids (calc), mg/l.	3310
Total alkalinity as CaCO ₃ , mg/l.....	257
Total hardness as CaCO ₃ , mg/l.....	1020
Sodium absorption ratio.....	9.14

	mg/l	meq/l
Bicarbonate as HCO ₃	313	5.13
Carbonate as CO ₃	0	0
Chloride.....	431	12.2
Sulfate.....	1650	34.3
Calcium.....	386	19.2
Magnesium.....	15.1	1.24
Potassium.....	2.97	0.08
Sodium.....	672	29.2
Major cations.....		49.8
Major anions.....		51.6
Cation/anion difference.....		1.77 %

Mary Stepp

Mary Stepp
Lab Director

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2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: GCL
ID: 9012061034
SITE: GBR-50
LAB NO: F5529

DATE REPORTED: 12/14/90
DATE RECEIVED: 12/06/90
DATE COLLECTED: 12/06/90

Lab pH (s.u.).....	7.68
Lab conductivity, umhos/cm.....	3480
Lab resistivity, ohm-m.....	2.87
Total dissolved solids (180), mg/l..	2760
Total dissolved solids (calc), mg/l.	2690
Total alkalinity as CaCO ₃ , mg/l.....	161
Total hardness as CaCO ₃ , mg/l.....	1050
Sodium absorption ratio.....	5.87

	mg/l	meq/l
Bicarbonate as HCO ₃	196	3.21
Carbonate as CO ₃	0	0
Chloride.....	76.1	2.15
Sulfate.....	1740	36.2
Calcium.....	217	10.8
Magnesium.....	123	10.1
Potassium.....	2.94	0.08
Sodium.....	436	19
Major cations.....		40
Major anions.....		41.5
Cation/anion difference.....		1.9 %



Mary Stepp
Lab Director

RECEIVED DEC 28 1990



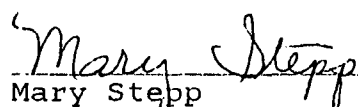
2506 West Main Street
Farmington, New Mexico 87401
Tel. (505) 326-4737

CLIENT: GCL
ID: 9012061440
SITE: GBR-32
LAB NO: F5530

DATE REPORTED: 12/14/90
DATE RECEIVED: 12/06/90
DATE COLLECTED: 12/06/90

Lab pH (s.u.).....	7.61
Lab conductivity, umhos/cm.....	4540
Lab resistivity, ohm-m.....	2.2
Total dissolved solids (180), mg/l..	3300
Total dissolved solids (calc), mg/l.	3230
Total alkalinity as CaCO ₃ , mg/l.....	335
Total hardness as CaCO ₃ , mg/l.....	1010
Sodium absorption ratio.....	9.19

	mg/l	meq/l
Bicarbonate as HCO ₃	409	6.7
Carbonate as CO ₃	0	0
Chloride.....	330	9.31
Sulfate.....	1660	34.6
Calcium.....	293	14.6
Magnesium.....	68.7	5.65
Potassium.....	3.15	0.08
Sodium.....	673	29.3
Major cations.....		49.6
Major anions.....		50.6
Cation/anion difference.....		0.97 %



Mary Stepp
Lab Director

PURGEABLE VOLATILE ORGANIC CONCENTRATIONS (pbb)
IN GROUND WATER, GIANT BLOOMFIELD REFINERY

MONITOR WELL GBR-8

<u>SAMPLER</u>	GIANT	GIANT	GIANT	GIANT
<u>ANALYTE</u>	<u>3/15/89</u>	<u>6/12/89</u>	<u>9/12/89</u>	<u>12/12/89</u>
BENZENE	5184.0	4400.0	2200.0	2000.0
BROMODICHLOROMETHANE	ND	ND	ND	ND
BROMOFORM	ND	ND	ND	ND
BROMOMETHANE	ND	ND	ND	ND
CARBON TETRACHLORIDE	ND	ND	ND	ND
CHLOROBENZENE	ND	ND	ND	ND
CHLOROETHANE	ND	ND	ND	1.3
CHLOROFORM	ND	ND	ND	ND
CHLOROMETHANE	ND	ND	ND	ND
DIBROMOCHLOROMETHANE	ND	ND	ND	ND
1,2-DICHLOROBENZENE	ND	ND	ND	0.84
1,3-DICHLOROBENZENE	ND	ND	ND	ND
1,4-DICHLOROBENZENE	ND	ND	ND	ND
DICHLORODIFLUOROMETHANE	ND	ND	ND	ND
1,1-DICHLOROETHANE	3.2	ND	ND	5.3
1,2-DICHLOROETHANE	5.7	ND	ND	4.7
1,1-DICHLOROETHENE	ND	ND	ND	ND
CIS-1,2-DICHLOROETHENE	ND	ND	ND	ND
TRANS-1,2-DICHLOROETHENE	ND	ND	ND	20.0
DICHLOROMETHANE	ND	ND	ND	ND
1,2-DICHLOROPROPANE	ND	ND	ND	ND
ETHYLBENZENE	1341.0	2130.0	1400.0	560.0
METHYLENE CHLORIDE	10.7	ND	ND	ND
1,1,2,2-TETRACHLOROETHANE	ND	ND	ND	ND
TETRACHLOROETHENE	ND	ND	ND	ND
TOLUENE	172.0	560.0	180.0	ND
1,1,1-TRICHLOROETHANE	ND	ND	ND	ND
1,1,2-TRICHLOROETHANE	ND	ND	ND	ND
TRICHLOROETHENE	1.4	ND	ND	2.3
TRICHLOROFLUOROMETHANE	ND	ND	ND	ND
VINYL CHLORIDE	ND	ND	ND	ND
TOTAL XYLENES	2664.0	7010.0	4400.0	2200.0

TR - TRACE
ND - NOT DETECTED
NA - NOT ANALYZED
* - DUPLICATE ANALYSIS

PURGEABLE VOLATILE ORGANIC CONCENTRATIONS (pbb)
IN GROUND WATER, GIANT BLOOMFIELD REFINERY

MONITOR WELL GBR-8

<u>SAMPLER</u>	GIANT	GIANT	GIANT	GIANT	GIANT
<u>ANALYTE</u>	<u>10/17/86</u>	<u>10/6/87</u>	<u>11/11/87</u>	<u>12/7/88</u>	<u>1/20/89</u>
BENZENE	2670.0	7750.0	6500.0	570.0	10000.0
BROMODICHLOROMETHANE	NA	ND	ND	ND	ND
BROMOFORM	NA	ND	ND	ND	ND
BROMOMETHANE	NA	ND	ND	ND	ND
CARBON TETRACHLORIDE	NA	ND	ND	ND	ND
CHLOROBENZENE	NA	ND	ND	ND	ND
CHLOROETHANE	NA	ND	ND	ND	ND
CHLOROFORM	NA	ND	12.0	ND	ND
CHLOROMETHANE	NA	ND	ND	ND	ND
DIBROMOCHLOROMETHANE	NA	ND	ND	ND	ND
1,2-DICHLOROBENZENE	NA	ND	ND	ND	ND
1,3-DICHLOROBENZENE	NA	ND	ND	ND	ND
1,4-DICHLOROBENZENE	NA	ND	ND	ND	ND
DICHLORODIFLUOROMETHANE	NA	ND	ND	ND	ND
1,1-DICHLOROETHANE	NA	ND	ND	ND	ND
1,2-DICHLOROETHANE	NA	ND	32.0	ND	ND
1,1-DICHLOROETHENE	NA	ND	ND	ND	ND
CIS-1,2-DICHLOROETHENE	NA	ND	ND	ND	ND
TRANS-1,2-DICHLOROETHENE	NA	ND	16.0	ND	ND
DICHLOROMETHANE	NA	ND	ND	ND	ND
1,2-DICHLOROPROPANE	NA	ND	ND	ND	ND
ETHYLBENZENE	1890.0	1320.0	1200.0	1800.0	1000.0
METHYLENE CHLORIDE	NA	ND	ND	ND	ND
1,1,2,2-TETRACHLOROETHANE	NA	ND	ND	ND	ND
TETRACHLOROETHENE	NA	ND	ND	ND	ND
TOLUENE	1460.0	1160.0	820.0	470.0	940.0
1,1,1-TRICHLOROETHANE	NA	ND	ND	ND	ND
1,1,2-TRICHLOROETHANE	NA	ND	ND	ND	ND
TRICHLOROETHENE	NA	ND	ND	ND	ND
TRICHLOROFLUOROMETHANE	NA	ND	ND	ND	ND
VINYL CHLORIDE	NA	ND	ND	ND	ND
TOTAL XYLENES	6980.0	5600.0	3600.0	9000.0	3700.0

TR - TRACE
ND - NOT DETECTED
NA - NOT ANALYZED
* - DUPLICATE ANALYSIS

PURGEABLE VOLATILE ORGANIC CONCENTRATIONS (pbb)
IN GROUND WATER, GIANT BLOOMFIELD REFINERY

MONITOR WELL GBR-9

<u>SAMPLER</u>	<u>EID</u>
<u>ANALYTE</u>	<u>8/25/88</u>
BENZENE	1.3
BROMODICHLOROMETHANE	ND
BROMOFORM	ND
BROMOMETHANE	ND
CARBON TETRACHLORIDE	ND
CHLOROBENZENE	ND
CHLOROETHANE	ND
CHLOROFORM	ND
CHLOROMETHANE	ND
DIBROMOCHLOROMETHANE	ND
1,2-DICHLOROBENZENE	ND
1,3-DICHLOROBENZENE	ND
1,4-DICHLOROBENZENE	ND
DICHLORODIFLUOROMETHANE	ND
1,1-DICHLOROETHANE	3.4
1,2-DICHLOROETHANE	3.5
1,1-DICHLOROETHENE	1.5
CIS-1,2-DICHLOROETHENE	2.3
TRANS-1,2-DICHLOROETHENE	ND
DICHLOROMETHANE	1.2
1,2-DICHLOROPROPANE	ND
ETHYLBENZENE	ND
METHYLENE CHLORIDE	ND
1,1,2,2-TETRACHLOROETHANE	ND
TETRACHLOROETHENE	0.7
TOLUENE	ND
1,1,1-TRICHLOROETHANE	1.3
1,1,2-TRICHLOROETHANE	ND
TRICHLOROETHENE	3.5
TRICHLOROFLUOROMETHANE	0.5
VINYL CHLORIDE	ND
TOTAL XYLENES	ND

TR - TRACE
ND - NOT DETECTED
NA - NOT ANALYZED
* - DUPLICATE ANALYSIS

PURGEABLE VOLATILE ORGANIC CONCENTRATIONS (pbb)
IN GROUND WATER, GIANT BLOOMFIELD REFINERY

MONITOR WELL GBR-9

<u>SAMPLER</u>	<u>GIANT</u>	<u>OCD</u>	<u>GIANT</u>	<u>GIANT</u>	<u>GIANT</u>
<u>ANALYTE</u>	<u>10/17/86</u>	<u>11/21/86</u>	<u>9/10/87</u>	<u>10/7/87</u>	<u>8/25/88</u>
BENZENE	0.041	49.0	60.9	29.3	ND
BROMODICHLOROMETHANE	NA	ND	ND	ND	ND
BROMOFORM	NA	ND	ND	ND	ND
BROMOMETHANE	NA	ND	ND	ND	ND
CARBON TETRACHLORIDE	NA	ND	ND	ND	ND
CHLOROBENZENE	NA	ND	ND	ND	ND
CHLOROETHANE	NA	ND	ND	ND	ND
CHLOROFORM	NA	ND	ND	ND	ND
CHLOROMETHANE	NA	ND	ND	ND	ND
DIBROMOCHLOROMETHANE	NA	ND	ND	ND	ND
1,2-DICHLOROBENZENE	NA	ND	ND	ND	ND
1,3-DICHLOROBENZENE	NA	ND	ND	ND	ND
1,4-DICHLOROBENZENE	NA	TR	ND	ND	ND
DICHLORODIFLUOROMETHANE	NA	ND	ND	ND	ND
1,1-DICHLOROETHANE	NA	4.0	8.0	9.4	3.3
1,2-DICHLOROETHANE	NA	6.0	23.3	28.6	5.1
1,1-DICHLOROETHENE	NA	ND	0.4	0.6	0.6
CIS-1,2-DICHLOROETHENE	NA	TR	ND	ND	ND
TRANS-1,2-DICHLOROETHENE	NA	ND	1.3	1.8	ND
TOTAL 1,2-DICHLOROETHENE					2.3
DICHLOROMETHANE	NA	ND	ND	ND	ND
1,2-DICHLOROPROPANE	NA	ND	ND	ND	ND
ETHYLBENZENE	0.054	ND	9.5	6.4	ND
METHYLENE CHLORIDE	NA	ND	ND	ND	ND
1,1,2,2-TETRACHLOROETHANE	NA	ND	ND	ND	ND
TETRACHLOROETHENE	NA	TR	ND	ND	0.9
TOLUENE	0.066	ND	4.0	5.1	ND
1,1,1-TRICHLOROETHANE	NA	TR	0.7	0.3	1.3
1,1,2-TRICHLOROETHANE	NA	ND	ND	ND	ND
TRICHLOROETHENE	NA	TR	2.6	4.1	2.5
TRICHLOROFLUOROMETHANE	NA	ND	ND	ND	ND
VINYL CHLORIDE	NA	ND	ND	ND	ND
TOTAL XYLENES	0.138	2.0	53.6	44.1	ND

TR - TRACE
 ND - NOT DETECTED
 NA - NOT ANALYZED
 * - DUPLICATE ANALYSIS

PURGEABLE VOLATILE ORGANIC CONCENTRATIONS (pbb)
IN GROUND WATER, GIANT BLOOMFIELD REFINERY

MONITOR WELL GBR-11

<u>SAMPLER</u>	<u>GIANT</u>	<u>OCD</u>	<u>OCD</u>
<u>ANALYTE</u>	<u>5/29/86</u>	<u>6/5/86</u>	<u>11/20/86</u>
BENZENE	9025.0	4600.0	6500.0
BROMODICHLOROMETHANE	NA	ND	ND
BROMOFORM	NA	ND	ND
BROMOMETHANE	NA	ND	ND
CARBON TETRACHLORIDE	NA	ND	ND
CHLOROBENZENE	NA	ND	ND
CHLOROETHANE	NA	ND	ND
CHLOROFORM	NA	ND	ND
CHLOROMETHANE	NA	ND	ND
DIBROMOCHLOROMETHANE	NA	ND	ND
1,2-DICHLOROBENZENE	NA	ND	ND
1,3-DICHLOROBENZENE	NA	ND	ND
1,4-DICHLOROBENZENE	NA	ND	ND
DICHLORODIFLUOROMETHANE	NA	ND	ND
1,1-DICHLOROETHANE	NA	ND	ND
1,2-DICHLOROETHANE	NA	140.0	ND
1,1-DICHLOROETHENE	NA	ND	ND
CIS-1,2-DICHLOROETHENE	NA	ND	ND
TRANS-1,2-DICHLOROETHENE	NA	ND	ND
DICHLOROMETHANE	NA	ND	ND
1,2-DICHLOROPROPANE	NA	ND	ND
ETHYLBENZENE	NA	960.0	680.0
METHYLENE CHLORIDE	NA	ND	ND
1,1,2,2-TETRACHLOROETHANE	NA	ND	ND
TETRACHLOROETHENE	NA	ND	TR
TOLUENE	3088.0	3100.0	2800.0
1,1,1-TRICHLOROETHANE	NA	ND	ND
1,1,2-TRICHLOROETHANE	NA	ND	ND
TRICHLOROETHENE	NA	ND	TR
TRICHLOROFLUOROMETHANE	NA	ND	ND
VINYL CHLORIDE	NA	ND	ND
TOTAL XYLENES	6981.0	4200.0	1780.0

TR - TRACE
 ND - NOT DETECTED
 NA - NOT ANALYZED
 * - DUPLICATE ANALYSIS

PURGEABLE VOLATILE ORGANIC CONCENTRATIONS (pbb)
IN GROUND WATER, GIANT BLOOMFIELD REFINERY

MONITOR WELL GBR-13

<u>SAMPLER</u>	GIANT	GIANT	GIANT
<u>ANALYTE</u>	<u>6/12/89</u>	<u>9/12/89</u>	<u>12/12/89</u>
BENZENE	1600.0	1700.0	710.0
BROMODICHLOROMETHANE	ND	ND	ND
BROMOFORM	ND	ND	ND
BROMOMETHANE	ND	ND	ND
CARBON TETRACHLORIDE	ND	ND	ND
CHLOROBENZENE	ND	ND	ND
CHLOROETHANE	ND	ND	ND
CHLOROFORM	ND	ND	ND
CHLOROMETHANE	ND	ND	ND
DIBROMOCHLOROMETHANE	ND	ND	ND
1,2-DICHLOROBENZENE	ND	ND	ND
1,3-DICHLOROBENZENE	ND	ND	ND
1,4-DICHLOROBENZENE	ND	ND	ND
DICHLORODIFLUOROMETHANE	ND	ND	ND
1,1-DICHLOROETHANE	ND	ND	4.9
1,2-DICHLOROETHANE	ND	57.0	7.4
1,1-DICHLOROETHENE	ND	ND	ND
CIS-1,2-DICHLOROETHENE	ND	ND	ND
TRANS-1,2-DICHLOROETHENE	ND	ND	25.0
DICHLOROMETHANE	ND	ND	ND
1,2-DICHLOROPROPANE	ND	ND	ND
ETHYLBENZENE	620.0	540.0	820.0
METHYLENE CHLORIDE	ND	ND	1.3
1,1,2,2-TETRACHLOROETHANE	ND	ND	ND
TETRACHLOROETHENE	ND	ND	ND
TOLUENE	840.0	200.0	130.0
1,1,1-TRICHLOROETHANE	ND	ND	0.9
1,1,2-TRICHLOROETHANE	ND	ND	ND
TRICHLOROETHENE	ND	13.0	4.0
TRICHLOROFUOROMETHANE	ND	ND	ND
VINYL CHLORIDE	ND	ND	ND
TOTAL XYLENES	2060.0	1900.0	3100.0

TR - TRACE
 ND - NOT DETECTED
 NA - NOT ANALYZED
 * - DUPLICATE ANALYSIS

PURGEABLE VOLATILE ORGANIC CONCENTRATIONS (pbb)
IN GROUND WATER, GIANT BLOOMFIELD REFINERY

MONITOR WELL GBR-13

<u>SAMPLER</u>	GIANT	GIANT	GIANT	GIANT	GIANT
<u>ANALYTE</u>	<u>9/10/87</u>	<u>10/7/87</u>	<u>11/11/87</u>	<u>12/7/88</u>	<u>3/16/89</u>
BENZENE	2470.0	1130.0	4500.0	390.0	309.0
BROMODICHLOROMETHANE	ND	ND	ND	ND	ND
BROMOFORM	ND	ND	ND	ND	ND
BROMOMETHANE	ND	ND	ND	ND	ND
CARBON TETRACHLORIDE	ND	ND	ND	ND	ND
CHLOROBENZENE	ND	ND	ND	ND	ND
CHLOROETHANE	ND	ND	ND	ND	ND
CHLOROFORM	ND	ND	17.0	ND	ND
CHLOROMETHANE	ND	ND	ND	ND	ND
DIBROMOCHLOROMETHANE	ND	ND	ND	ND	ND
1,2-DICHLOROBENZENE	ND	ND	ND	ND	ND
1,3-DICHLOROBENZENE	ND	ND	ND	ND	ND
1,4-DICHLOROBENZENE	ND	ND	ND	ND	ND
DICHLORODIFLUOROMETHANE	ND	ND	ND	ND	ND
1,1-DICHLOROETHANE	58.9	60.0	ND	5.2	4.3
1,2-DICHLOROETHANE	41.8	34.0	35.0	9.0	4.4
1,1-DICHLOROETHENE	ND	ND	ND	ND	ND
CIS-1,2-DICHLOROETHENE	ND	ND	ND	ND	ND
TRANS-1,2-DICHLOROETHENE	44.7	55.0	29.0	14.0	ND
DICHLOROMETHANE	ND	ND	ND	ND	ND
1,2-DICHLOROPROPANE	ND	ND	ND	ND	ND
ETHYLBENZENE	797.0	495.0	1700.0	330.0	166.0
METHYLENE CHLORIDE	ND	ND	ND	1.6	30.8
1,1,2,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND
TETRACHLOROETHENE	ND	ND	ND	ND	ND
TOLUENE	1240.0	288.0	3000.0	78.0	24.3
1,1,1-TRICHLOROETHANE	11.7	ND	ND	1.8	ND
1,1,2-TRICHLOROETHANE	ND	ND	ND	ND	ND
TRICHLOROETHENE	ND	15.0	ND	4.8	3.6
TRICHLOROFLUOROMETHANE	ND	ND	ND	0.6	ND
VINYL CHLORIDE	ND	ND	ND	ND	ND
TOTAL XYLENES	3790.0	1715.0	5200.0	1530.0	132.9

TR - TRACE
ND - NOT DETECTED
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* - DUPLICATE ANALYSIS

PURGEABLE VOLATILE ORGANIC CONCENTRATIONS (pbb)
IN GROUND WATER, GIANT BLOOMFIELD REFINERY

MONITOR WELL GBR-13

<u>SAMPLER</u>	GIANT	GIANT	OCD	OCD	EID
<u>ANALYTE</u>	<u>4/15/85</u>	<u>5/9/86</u>	<u>6/5/86</u>	<u>11/20/86</u>	<u>8/5/87</u>
BENZENE	0.042	129.0	1300.0	2900.0	1050.0
BROMODICHLOROMETHANE	NA	NA	ND	ND	ND
BROMOFORM	NA	NA	ND	ND	ND
BROMOMETHANE	NA	NA	ND	ND	ND
CARBON TETRACHLORIDE	NA	NA	ND	ND	ND
CHLOROBENZENE	NA	NA	ND	ND	ND
CHLOROETHANE	NA	NA	ND	ND	ND
CHLOROFORM	NA	NA	ND	ND	ND
CHLOROMETHANE	NA	NA	ND	ND	ND
DIBROMOCHLOROMETHANE	NA	NA	ND	ND	ND
1,2-DICHLOROBENZENE	NA	NA	ND	ND	ND
1,3-DICHLOROBENZENE	NA	NA	ND	ND	ND
1,4-DICHLOROBENZENE	NA	NA	ND	ND	ND
DICHLORODIFLUOROMETHANE	NA	NA	ND	ND	ND
1,1-DICHLOROETHANE	NA	NA	25.0	44.0	TR
1,2-DICHLOROETHANE	NA	NA	58.0	32.0	TR
1,1-DICHLOROETHENE	NA	NA	ND	ND	ND
CIS-1,2-DICHLOROETHENE	NA	NA	ND	23.0	25.0
TRANS-1,2-DICHLOROETHENE	NA	NA	ND	ND	ND
TOTAL 1,2 DICHLOROETHENE			10.0		
DICHLOROMETHANE	NA	NA	25.0	ND	ND
1,2-DICHLOROPROPANE	NA	NA	ND	ND	ND
ETHYLBENZENE	0.011	3.0	130.0	520.0	275
METHYLENE CHLORIDE	NA	NA	ND	ND	ND
1,1,2,2-TETRACHLOROETHANE	NA	NA	ND	ND	ND
TETRACHLOROETHENE	NA	NA	TR	19.0	ND
TOLUENE	0.025	32.0	12.0	1800.0	390.0
1,1,1-TRICHLOROETHANE	NA	NA	23.0	16.0	TR
1,1,2-TRICHLOROETHANE	NA	NA	ND	ND	ND
TRICHLOROETHENE	NA	NA	TR	12.0	TR
TRICHLOROFLUOROMETHANE	NA	NA	ND	ND	ND
VINYL CHLORIDE	NA	NA	ND	ND	ND
TOTAL XYLENES	0.099	105.0	731.0	2870.0	1125.0

TR - TRACE
 ND - NOT DETECTED
 NA - NOT ANALYZED
 * - DUPLICATE ANALYSIS

PURGEABLE VOLATILE ORGANIC CONCENTRATIONS (pbb)
IN GROUND WATER, GIANT BLOOMFIELD REFINERY

MONITOR WELL GBR-17

<u>SAMPLER</u>	GIANT	GIANT	GIANT	GIANT
<u>ANALYTE</u>	<u>6/14/89</u>	<u>9/13/89</u>	<u>12/12/89</u>	<u>4/3/90</u>
BENZENE	ND	ND	ND	ND
BROMODICHLOROMETHANE	ND	ND	ND	ND
BROMOFORM	ND	ND	ND	ND
BROMOMETHANE	ND	ND	ND	ND
CARBON TETRACHLORIDE	ND	ND	ND	ND
CHLOROBENZENE	ND	ND	ND	ND
CHLOROETHANE	ND	ND	ND	ND
CHLOROFORM	ND	ND	ND	ND
CHLOROMETHANE	ND	ND	ND	ND
DIBROMOCHLOROMETHANE	ND	ND	ND	ND
1,2-DICHLOROBENZENE	ND	ND	ND	ND
1,3-DICHLOROBENZENE	ND	ND	ND	ND
1,4-DICHLOROBENZENE	ND	ND	ND	ND
DICHLORODIFLUOROMETHANE	ND	ND	ND	ND
1,1-DICHLOROETHANE	ND	0.89	ND	ND
1,2-DICHLOROETHANE	ND	ND	ND	ND
1,1-DICHLOROETHENE	ND	ND	ND	ND
CIS-1,2-DICHLOROETHENE	ND	ND	ND	ND
TRANS-1,2-DICHLOROETHENE	ND	ND	ND	ND
DICHLOROMETHANE	ND	ND	ND	ND
1,2-DICHLOROPROPANE	ND	ND	ND	ND
ETHYLBENZENE	ND	ND	ND	ND
METHYLENE CHLORIDE	ND	ND	ND	ND
1,1,2,2-TETRACHLOROETHANE	ND	ND	ND	ND
TETRACHLOROETHENE	ND	0.21	0.13	0.37
TOLUENE	ND	ND	ND	ND
1,1,1-TRICHLOROETHANE	1.4	0.96	1.0	1.7
1,1,2-TRICHLOROETHANE	ND	ND	ND	ND
TRICHLOROETHENE	ND	ND	ND	ND
TRICHLOROFLUOROMETHANE	ND	3.0	ND	ND
VINYL CHLORIDE	ND	ND	ND	ND
TOTAL XYLENES	ND	ND	ND	ND

TR - TRACE
ND - NOT DETECTED
NA - NOT ANALYZED
* - DUPLICATE ANALYSIS

PURGEABLE VOLATILE ORGANIC CONCENTRATIONS (pbb)
IN GROUND WATER, GIANT BLOOMFIELD REFINERY

MONITOR WELL GBR-17

<u>SAMPLER</u>	GIANT	EID	GIANT	GIANT	GIANT
<u>ANALYTE</u>	<u>8/24/88</u>	<u>8/24/88</u>	<u>9/1/88</u>	<u>12/7/89</u>	<u>3/14/89</u>
BENZENE	ND	ND	ND	ND	ND
BROMODICHLOROMETHANE	ND	ND	ND	ND	ND
BROMOFORM	ND	ND	ND	ND	ND
BROMOMETHANE	ND	ND	ND	ND	ND
CARBON TETRACHLORIDE	ND	ND	ND	ND	ND
CHLOROBENZENE	ND	ND	ND	ND	ND
CHLOROETHANE	ND	ND	ND	ND	ND
CHLOROFORM	ND	TR	ND	ND	ND
CHLOROMETHANE	ND	ND	ND	ND	ND
DIBROMOCHLOROMETHANE	ND	ND	ND	ND	ND
1,2-DICHLOROBENZENE	ND	ND	ND	ND	ND
1,3-DICHLOROBENZENE	ND	ND	ND	ND	ND
1,4-DICHLOROBENZENE	ND	ND	ND	ND	ND
DICHLORODIFLUOROMETHANE	ND	ND	ND	ND	ND
1,1-DICHLOROETHANE	ND	TR	ND	0.8	ND
1,2-DICHLOROETHANE	ND	ND	ND	ND	ND
1,1-DICHLOROETHENE	ND	ND	ND	ND	ND
CIS-1,2-DICHLOROETHENE	ND	ND	ND	ND	ND
TRANS-1,2-DICHLOROETHENE	ND	ND	ND	ND	ND
DICHLOROMETHANE	ND	TR	ND	ND	ND
1,2-DICHLOROPROPANE	ND	ND	ND	ND	ND
ETHYLBENZENE	ND	ND	ND	ND	ND
METHYLENE CHLORIDE	ND	ND	ND	ND	1.8
1,1,2,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND
TETRACHLOROETHENE	ND	TR	ND	0.7	ND
TOLUENE	ND	ND	ND	ND	ND
1,1,1-TRICHLOROETHANE	2.4	1.2	2.4	2.0	0.85
1,1,2-TRICHLOROETHANE	ND	ND	ND	ND	ND
TRICHLOROETHENE	ND	TR	TR	ND	ND
TRICHLOROFLUOROMETHANE	ND	ND	ND	0.6	ND
VINYL CHLORIDE	ND	ND	ND	ND	ND
TOTAL XYLENES	ND	ND	ND	ND	ND

TR - TRACE
ND - NOT DETECTED
NA - NOT ANALYZED
* - DUPLICATE ANALYSIS

PURGEABLE VOLATILE ORGANIC CONCENTRATIONS (pbb)
IN GROUND WATER, GIANT BLOOMFIELD REFINERY

MONITOR WELL GBR-17

<u>SAMPLER</u>	<u>GIANT</u>	<u>GIANT</u>	<u>GIANT</u>	<u>EID</u>	<u>GIANT</u>
<u>ANALYTE</u>	<u>10/7/87</u>	<u>11/12/87</u>	<u>4/20/88</u>	<u>4/20/88</u>	<u>6/2/88</u>
BENZENE	ND	ND	ND	ND	ND
BROMODICHLOROMETHANE	ND	ND	ND	ND	ND
BROMOFORM	ND	ND	ND	ND	ND
BROMOMETHANE	ND	ND	ND	ND	ND
CARBON TETRACHLORIDE	ND	ND	ND	ND	ND
CHLOROBENZENE	ND	ND	ND	ND	ND
CHLOROETHANE	ND	ND	ND	ND	ND
CHLOROFORM	ND	1.3	ND	ND	ND
CHLOROMETHANE	ND	ND	ND	ND	ND
DIBROMOCHLOROMETHANE	ND	ND	ND	ND	ND
1,2-DICHLOROBENZENE	ND	ND	ND	ND	ND
1,3-DICHLOROBENZENE	ND	ND	ND	ND	ND
1,4-DICHLOROBENZENE	ND	ND	ND	ND	ND
DICHLORODIFLUOROMETHANE	ND	ND	ND	ND	ND
1,1-DICHLOROETHANE	3.3	4.0	ND	TR	ND
1,2-DICHLOROETHANE	ND	ND	ND	ND	ND
1,1-DICHLOROETHENE	ND	ND	ND	TR	ND
CIS-1,2-DICHLOROETHENE	ND	ND	ND	ND	ND
TRANS-1,2-DICHLOROETHENE	1.2	0.9	ND	ND	ND
DICHLOROMETHANE	ND	ND	ND	ND	ND
1,2-DICHLOROPROPANE	ND	ND	ND	ND	ND
ETHYLBENZENE	ND	ND	ND	ND	ND
METHYLENE CHLORIDE	ND	ND	ND	ND	ND
1,1,2,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND
TETRACHLOROETHENE	0.4	0.6	ND	TR	ND
TOLUENE	ND	ND	ND	ND	ND
1,1,1-TRICHLOROETHANE	4.0	2.1	4.4	2.4	3.1
1,1,2-TRICHLOROETHANE	ND	ND	ND	ND	ND
TRICHLOROETHENE	0.4	0.5	ND	TR	ND
TRICHLOROFLUOROMETHANE	ND	ND	ND	TR	ND
VINYL CHLORIDE	ND	ND	ND	ND	ND
TOTAL XYLENES	ND	ND	ND	ND	ND

TR - TRACE
ND - NOT DETECTED
NA - NOT ANALYZED
* - DUPLICATE ANALYSIS

PURGEABLE VOLATILE ORGANIC CONCENTRATIONS (pbb)
IN GROUND WATER, GIANT BLOOMFIELD REFINERY

MONITOR WELL GBR-17

<u>SAMPLER</u>	<u>GIANT</u>	<u>OCD</u>	<u>GIANT</u>	<u>OCD</u>	<u>EID</u>
<u>ANALYTE</u>	<u>5/29/86</u>	<u>6/5/86</u>	<u>7/15/86</u>	<u>11/21/86</u>	<u>8/5/87</u>
BENZENE	ND	ND	ND	TR	ND
BROMODICHLOROMETHANE	NA	ND	ND	ND	ND
BROMOFORM	NA	ND	ND	ND	ND
BROMOMETHANE	NA	ND	ND	ND	ND
CARBON TETRACHLORIDE	NA	ND	ND	ND	ND
CHLOROBENZENE	NA	ND	ND	ND	ND
CHLOROETHANE	NA	ND	ND	ND	ND
CHLOROFORM	NA	ND	ND	ND	ND
CHLOROMETHANE	NA	ND	ND	ND	ND
DIBROMOCHLOROMETHANE	NA	ND	ND	ND	ND
1,2-DICHLOROBENZENE	NA	ND	ND	ND	ND
1,3-DICHLOROBENZENE	NA	ND	ND	ND	ND
1,4-DICHLOROBENZENE	NA	ND	ND	ND	ND
DICHLORODIFLUOROMETHANE	NA	ND	ND	ND	ND
1,1-DICHLOROETHANE	NA	20.0	ND	6.0	TR
1,2-DICHLOROETHANE	NA	ND	ND	ND	ND
1,1-DICHLOROETHENE	NA	ND	ND	ND	ND
CIS-1,2-DICHLOROETHENE	NA	ND	ND	ND	ND
TRANS-1,2-DICHLOROETHENE	NA	ND	ND	ND	ND
DICHLOROMETHANE	NA	15.0	ND	TR	ND
1,2-DICHLOROPROPANE	NA	ND	ND	ND	ND
ETHYLBENZENE	ND	ND	ND	ND	ND
METHYLENE CHLORIDE	NA	ND	ND	ND	ND
1,1,2,2-TETRACHLOROETHANE	NA	ND	ND	ND	ND
TETRACHLOROETHENE	NA	1.0	ND	TR	TR
TOLUENE	ND	ND	ND	ND	ND
1,1,1-TRICHLOROETHANE	NA	14.0	ND	7.0	4.0
1,1,2-TRICHLOROETHANE	NA	ND	ND	ND	ND
TRICHLOROETHENE	NA	1.0	ND	TR	TR
TRICHLOROFLUOROMETHANE	NA	ND	ND	ND	ND
VINYL CHLORIDE	NA	ND	ND	ND	ND
TOTAL XYLENES	ND	ND	ND	ND	ND

TR - TRACE
ND - NOT DETECTED
NA - NOT ANALYZED
* - DUPLICATE ANALYSIS

PURGEABLE VOLATILE ORGANIC CONCENTRATIONS (pbb)
IN GROUND WATER, GIANT BLOOMFIELD REFINERY

MONITOR WELL GBR-19

<u>SAMPLER</u>	<u>GIANT</u>	<u>OCD</u>	<u>GIANT</u>	<u>GIANT</u>	<u>EID</u>
<u>ANALYTE</u>	<u>10/17/86</u>	<u>11/21/86</u>	<u>4/20/88</u>	<u>8/25/88</u>	<u>8/25/88</u>
BENZENE	0.112	200.0	26.0	ND	ND
BROMODICHLOROMETHANE	ND	ND	ND	ND	ND
BROMOFORM	ND	ND	ND	ND	ND
BROMOMETHANE	ND	ND	ND	ND	ND
CARBON TETRACHLORIDE	ND	ND	ND	ND	ND
CHLOROBENZENE	ND	ND	ND	ND	ND
CHLOROETHANE	ND	ND	ND	ND	ND
CHLOROFORM	ND	ND	ND	ND	ND
CHLOROMETHANE	ND	ND	ND	ND	ND
DIBROMOCHLOROMETHANE	ND	ND	ND	ND	ND
1,2-DICHLOROBENZENE	ND	TR	ND	ND	ND
1,3-DICHLOROBENZENE	ND	ND	ND	ND	ND
1,4-DICHLOROBENZENE	ND	ND	ND	ND	ND
DICHLORODIFLUOROMETHANE	ND	ND	ND	ND	ND
1,1-DICHLOROETHANE	12.0	4.0	5.9	6.0	ND
1,2-DICHLOROETHANE	5.9	10.0	5.0	ND	ND
1,1-DICHLOROETHENE	ND	ND	ND	ND	ND
CIS-1,2-DICHLOROETHENE	ND	4.0	ND	ND	ND
TRANS-1,2-DICHLOROETHENE	14.0	ND	35.0	ND	ND
TOTAL 1,2-DICHLOROETHENE				33.0	ND
DICHLOROMETHANE	ND	ND	ND	ND	ND
1,2-DICHLOROPROPANE	ND	ND	ND	ND	ND
ETHYLBENZENE	0.111	270.0	17.0	ND	ND
METHYLENE CHLORIDE	ND	ND	ND	ND	ND
1,1,2,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND
TETRACHLOROETHENE	ND	TR	1.0	8.0	ND
TOLUENE	0.105	18.0	3.3	ND	ND
1,1,1-TRICHLOROETHANE	ND	ND	ND	ND	ND
1,1,2-TRICHLOROETHANE	ND	ND	ND	ND	ND
TRICHLOROETHENE	9.3	11.0	7.2	5.0	ND
TRICHLOROFLUOROMETHANE	ND	ND	ND	ND	ND
VINYL CHLORIDE	ND	ND	ND	ND	ND
TOTAL XYLENES	0.306	274.0	120.0	ND	ND

TR - TRACE
ND - NOT DETECTED
NA - NOT ANALYZED
* - DUPLICATE ANALYSIS

PURGEABLE VOLATILE ORGANIC CONCENTRATIONS (pbb)
IN GROUND WATER, GIANT BLOOMFIELD REFINERY

MONITOR WELL GBR-20

<u>SAMPLER</u>	<u>GIANT</u>	<u>OCD</u>	<u>OCD</u>
<u>ANALYTE</u>	<u>5/9/86</u>	<u>6/5/86</u>	<u>11/20/86</u>
BENZENE	ND	4.0	41.0
BROMODICHLOROMETHANE	NA	ND	ND
BROMOFORM	NA	ND	ND
BROMOMETHANE	NA	ND	ND
CARBON TETRACHLORIDE	NA	ND	ND
CHLOROBENZENE	NA	ND	ND
CHLOROETHANE	NA	ND	ND
CHLOROFORM	NA	ND	ND
CHLOROMETHANE	NA	ND	ND
DIBROMOCHLOROMETHANE	NA	ND	ND
1,2-DICHLOROBENZENE	NA	ND	ND
1,3-DICHLOROBENZENE	NA	ND	ND
1,4-DICHLOROBENZENE	NA	ND	ND
DICHLORODIFLUOROMETHANE	NA	ND	ND
1,1-DICHLOROETHANE	NA	ND	ND
1,2-DICHLOROETHANE	NA	ND	ND
1,1-DICHLOROETHENE	NA	ND	ND
CIS-1,2-DICHLOROETHENE	NA	ND	ND
TRANS-1,2-DICHLOROETHENE	NA	ND	ND
DICHLOROMETHANE	NA	ND	ND
1,2-DICHLOROPROPANE	NA	ND	ND
ETHYLBENZENE	ND	TR	ND
METHYLENE CHLORIDE	NA	ND	ND
1,1,2,2-TETRACHLOROETHANE	NA	ND	ND
TETRACHLOROETHENE	NA	ND	TR
TOLUENE	ND	ND	ND
1,1,1-TRICHLOROETHANE	NA	ND	ND
1,1,2-TRICHLOROETHANE	NA	ND	ND
TRICHLOROETHENE	NA	ND	TR
TRICHLOROFLUOROMETHANE	NA	ND	ND
VINYL CHLORIDE	NA	ND	ND
TOTAL XYLENES	ND	ND	50.0

TR - TRACE
 ND - NOT DETECTED
 NA - NOT ANALYZED
 * - DUPLICATE ANALYSIS

PURGEABLE VOLATILE ORGANIC CONCENTRATIONS (pbb)
IN GROUND WATER, GIANT BLOOMFIELD REFINERY

MONITOR WELL GBR-24S

<u>SAMPLER</u>	<u>GIANT</u>	<u>OCD</u>	<u>OCD</u>
<u>ANALYTE</u>	<u>5/9/86</u>	<u>6/5/86</u>	<u>11/21/86</u>
BENZENE	1154.0	680.0	580.0
BROMODICHLOROETHANE	NA	TR	11.0
BROMOFORM	NA	ND	ND
BROMOMETHANE	NA	ND	ND
CARBON TETRACHLORIDE	NA	ND	ND
CHLOROBENZENE	NA	ND	ND
CHLOROETHANE	NA	ND	ND
CHLOROFORM	NA	ND	ND
CHLOROMETHANE	NA	ND	ND
DIBROMOCHLOROMETHANE	NA	ND	ND
1,2-DICHLOROBENZENE	NA	ND	ND
1,3-DICHLOROBENZENE	NA	ND	ND
1,4-DICHLOROBENZENE	NA	ND	ND
DICHLORODIFLUOROMETHANE	NA	ND	ND
1,1-DICHLOROETHANE	NA	ND	ND
1,2-DICHLOROETHANE	NA	TR	60.0
1,1-DICHLOROETHENE	NA	ND	ND
CIS-1,2-DICHLOROETHENE	NA	ND	ND
TRANS-1,2-DICHLOROETHENE	NA	ND	ND
DICHLOROMETHANE	NA	ND	ND
1,2-DICHLOROPROPANE	NA	ND	ND
ETHYLBENZENE	147.0	140.0	300.0
METHYLENE CHLORIDE	NA	ND	ND
1,1,2,2-TETRACHLOROETHANE	NA	ND	ND
TETRACHLOROETHENE	NA	TR	ND
TOLUENE	803.0	690.0	200.0
1,1,1-TRICHLOROETHANE	NA	ND	ND
1,1,2-TRICHLOROETHANE	NA	ND	ND
TRICHLOROETHENE	NA	TR	ND
TRICHLOROFLUOROMETHANE	NA	ND	ND
VINYL CHLORIDE	NA	ND	ND
TOTAL XYLENES	1020.0	890.0	495.0

TR - TRACE
 ND - NOT DETECTED
 NA - NOT ANALYZED
 * - DUPLICATE ANALYSIS

PURGEABLE VOLATILE ORGANIC CONCENTRATIONS (pbb)
IN GROUND WATER, GIANT BLOOMFIELD REFINERY

MONITOR WELL GBR-24D

<u>SAMPLER</u>	GIANT	GIANT	GIANT
<u>ANALYTE</u>	<u>9/13/89</u>	<u>12/13/89</u>	<u>4/3/90</u>
BENZENE	12.0	21.0	31.0
BROMODICHLOROMETHANE	ND	ND	ND
BROMOFORM	ND	ND	ND
BROMOMETHANE	ND	ND	ND
CARBON TETRACHLORIDE	ND	ND	ND
CHLOROBENZENE	0.47	ND	ND
CHLOROETHANE	ND	ND	ND
CHLOROFORM	ND	ND	ND
CHLOROMETHANE	ND	ND	ND
DIBROMOCHLOROMETHANE	ND	ND	ND
1,2-DICHLOROBENZENE	ND	0.6	ND
1,3-DICHLOROBENZENE	ND	ND	ND
1,4-DICHLOROBENZENE	ND	ND	ND
DICHLORODIFLUOROMETHANE	ND	ND	ND
1,1-DICHLOROETHANE	ND	ND	ND
1,2-DICHLOROETHANE	18.0	18.0	16.0
1,1-DICHLOROETHENE	ND	ND	ND
CIS-1,2-DICHLOROETHENE	ND	ND	ND
TRANS-1,2-DICHLOROETHENE	ND	ND	ND
DICHLOROMETHANE	ND	ND	ND
1,2-DICHLOROPROPANE	ND	ND	ND
ETHYLBENZENE	18.0	27.0	13.0
METHYLENE CHLORIDE	0.5	ND	ND
1,1,2,2-TETRACHLOROETHANE	ND	ND	ND
TETRACHLOROETHENE	ND	ND	0.21
TOLUENE	2.8	ND	2.3
1,1,1-TRICHLOROETHANE	ND	ND	ND
1,1,2-TRICHLOROETHANE	ND	ND	ND
TRICHLOROETHENE	ND	ND	ND
TRICHLOROFLUOROMETHANE	2.5	ND	ND
VINYL CHLORIDE	ND	ND	ND
TOTAL XYLENES	19.0	6.9	6.7

TR - TRACE
 ND - NOT DETECTED
 NA - NOT ANALYZED
 * - DUPLICATE ANALYSIS

PURGEABLE VOLATILE ORGANIC CONCENTRATIONS (pbb)
IN GROUND WATER, GIANT BLOOMFIELD REFINERY

MONITOR WELL GBR-24D

<u>SAMPLER</u>	GIANT	OCD	GIANT	GIANT	GIANT
<u>ANALYTE</u>	<u>8/25/88</u>	<u>8/25/88</u>	<u>12/7/88</u>	<u>3/14/89</u>	<u>6/13/89</u>
BENZENE	39.1	27	28.0	28.7	19.4
BROMODICHLOROMETHANE	ND	ND	ND	ND	ND
BROMOFORM	ND	ND	ND	ND	ND
BROMOMETHANE	ND	ND	ND	ND	ND
CARBON TETRACHLORIDE	ND	ND	ND	ND	ND
CHLOROBENZENE	ND	ND	ND	ND	ND
CHLOROETHANE	ND	ND	ND	ND	ND
CHLOROFORM	ND	ND	ND	ND	ND
CHLOROMETHANE	ND	ND	ND	ND	ND
DIBROMOCHLOROMETHANE	ND	ND	ND	ND	ND
1,2-DICHLOROBENZENE	1.1	ND	ND	ND	ND
1,3-DICHLOROBENZENE	ND	ND	ND	ND	ND
1,4-DICHLOROBENZENE	ND	ND	ND	ND	ND
DICHLORODIFLUOROMETHANE	ND	ND	ND	ND	ND
1,1-DICHLOROETHANE	ND	ND	ND	ND	ND
1,2-DICHLOROETHANE	25.7	6.0	21.0	6.8	13.1
1,1-DICHLOROETHENE	ND	ND	ND	ND	ND
CIS-1,2-DICHLOROETHENE	ND	ND	ND	ND	ND
TRANS-1,2-DICHLOROETHENE	ND	ND	ND	ND	ND
DICHLOROMETHANE	ND	ND	ND	ND	ND
1,2-DICHLOROPROPANE	ND	ND	ND	ND	ND
ETHYLBENZENE	87.3	55.0	45.0	58.9	34.0
METHYLENE CHLORIDE	ND	ND	ND	ND	4.3
1,1,2,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND
TETRACHLOROETHENE	0.6	ND	ND	ND	ND
TOLUENE	6.5	TR	4.8	8.9	6.9
1,1,1-TRICHLOROETHANE	ND	ND	ND	ND	ND
1,1,2-TRICHLOROETHANE	ND	ND	ND	ND	ND
TRICHLOROETHENE	ND	ND	ND	ND	ND
TRICHLOROFLUOROMETHANE	ND	ND	ND	ND	ND
VINYL CHLORIDE	ND	ND	ND	ND	ND
TOTAL XYLENES	30.4	10.0	25.0	18.9	10.6

TR - TRACE
ND - NOT DETECTED
NA - NOT ANALYZED
* - DUPLICATE ANALYSIS

PURGEABLE VOLATILE ORGANIC CONCENTRATIONS (pbb)
IN GROUND WATER, GIANT BLOOMFIELD REFINERY

MONITOR WELL GBR-24D

<u>SAMPLER</u>	<u>OCD</u>	<u>GIANT</u>	<u>GIANT</u>	<u>GIANT</u>	<u>GIANT</u>
<u>ANALYTE</u>	<u>11/21/86</u>	<u>9/10/87</u>	<u>10/7/87</u>	<u>11/16/87</u>	<u>6/2/88</u>
BENZENE	230.0	100.0	100.0	1200.0	63.0
BROMODICHLOROMETHANE	ND	ND	ND	ND	ND
BROMOFORM	ND	ND	ND	ND	ND
BROMOMETHANE	ND	ND	ND	ND	ND
CARBON TETRACHLORIDE	ND	ND	ND	ND	ND
CHLOROBENZENE	ND	ND	ND	ND	ND
CHLOROETHANE	ND	ND	ND	ND	ND
CHLOROFORM	ND	ND	ND	23.0	ND
CHLOROMETHANE	ND	ND	ND	ND	ND
DIBROMOCHLOROMETHANE	ND	ND	ND	ND	ND
1,2-DICHLOROBENZENE	TR	1.9	ND	ND	ND
1,3-DICHLOROBENZENE	ND	ND	ND	ND	1.3
1,4-DICHLOROBENZENE	ND	ND	ND	ND	ND
DICHLORODIFLUOROMETHANE	ND	ND	ND	ND	ND
1,1-DICHLOROETHANE	ND	ND	ND	ND	ND
1,2-DICHLOROETHANE	69.0	44.7	35.0	34.0	55.0
1,1-DICHLOROETHENE	ND	ND	ND	ND	ND
CIS-1,2-DICHLOROETHENE	ND	ND	ND	ND	ND
TRANS-1,2-DICHLOROETHENE	ND	ND	ND	ND	ND
DICHLOROMETHANE	ND	ND	ND	ND	ND
1,2-DICHLOROPROPANE	ND	ND	ND	ND	ND
ETHYLBENZENE	180.0	211.0	181.0	1100.0	73.0
METHYLENE CHLORIDE	ND	ND	ND	ND	ND
1,1,2,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND
TETRACHLOROETHENE	TR	1.1	ND	2.9	0.69
TOLUENE	5.0	47.7	35.0	22.0	11.0
1,1,1-TRICHLOROETHANE	ND	ND	ND	ND	ND
1,1,2-TRICHLOROETHANE	ND	ND	ND	ND	ND
TRICHLOROETHENE	ND	ND	ND	2.0	ND
TRICHLOROFLUOROMETHANE	ND	ND	ND	ND	ND
VINYL CHLORIDE	ND	ND	ND	ND	ND
TOTAL XYLENES	147.0	246.1	165.0	55.0	40.0

TR - TRACE
ND - NOT DETECTED
NA - NOT ANALYZED
* - DUPLICATE ANALYSIS

PURGEABLE VOLATILE ORGANIC CONCENTRATIONS (pbb)
IN GROUND WATER, GIANT BLOOMFIELD REFINERY

MONITOR WELL GBR-29

<u>SAMPLER</u>	<u>GIANT</u>
<u>ANALYTE</u>	<u>4/2/90</u>
BENZENE	280.0
BROMODICHLOROMETHANE	ND
BROMOFORM	ND
BROMOMETHANE	ND
CARBON TETRACHLORIDE	ND
CHLOROBENZENE	ND
CHLOROETHANE	ND
CHLOROFORM	ND
CHLOROMETHANE	ND
DIBROMOCHLOROMETHANE	ND
1,2-DICHLOROBENZENE	ND
1,3-DICHLOROBENZENE	ND
1,4-DICHLOROBENZENE	ND
DICHLORODIFLUOROMETHANE	ND
1,1-DICHLOROETHANE	ND
1,2-DICHLOROETHANE	ND
1,1-DICHLOROETHENE	ND
CIS-1,2-DICHLOROETHENE	14.0
TRANS-1,2-DICHLOROETHENE	ND
DICHLOROMETHANE	ND
1,2-DICHLOROPROPANE	ND
ETHYLBENZENE	98.0
METHYLENE CHLORIDE	ND
1,1,2,2-TETRACHLOROETHANE	ND
TETRACHLOROETHENE	ND
TOLUENE	ND
1,1,1-TRICHLOROETHANE	ND
1,1,2-TRICHLOROETHANE	ND
TRICHLOROETHENE	ND
TRICHLOROFLUOROMETHANE	ND
VINYL CHLORIDE	ND
TOTAL XYLENES	33.0

TR - TRACE
ND - NOT DETECTED
NA - NOT ANALYZED
* - DUPLICATE ANALYSIS

PURGEABLE VOLATILE ORGANIC CONCENTRATIONS (pbb)
IN GROUND WATER, GIANT BLOOMFIELD REFINERY

MONITOR WELL GBR-29

<u>SAMPLER</u>	GIANT	GIANT	OCD	OCD	OCD
<u>ANALYTE</u>	<u>5/30/86</u>	<u>6/5/86</u>	<u>6/5/86</u>	<u>11/20/86</u>	<u>6/8/88</u>
BENZENE	388.0	3818.0	2600.0	240.0	3500.0
BROMODICHLOROMETHANE	NA	NA	ND	ND	ND
BROMOFORM	NA	NA	ND	ND	ND
BROMOMETHANE	NA	NA	ND	ND	ND
CARBON TETRACHLORIDE	NA	NA	ND	ND	ND
CHLOROBENZENE	NA	NA	ND	ND	ND
CHLOROETHANE	NA	NA	ND	ND	ND
CHLOROFORM	NA	NA	ND	ND	ND
CHLOROMETHANE	NA	NA	ND	ND	ND
DIBROMOCHLOROMETHANE	NA	NA	ND	ND	ND
1,2-DICHLOROBENZENE	NA	NA	ND	ND	ND
1,3-DICHLOROBENZENE	NA	NA	ND	ND	ND
1,4-DICHLOROBENZENE	NA	NA	ND	ND	ND
DICHLORODIFLUOROMETHANE	NA	NA	ND	ND	ND
1,1-DICHLOROETHANE	NA	NA	30.0	34.0	ND
1,2-DICHLOROETHANE	NA	NA	36.0	28.0	ND
1,1-DICHLOROETHENE	NA	NA	ND	ND	ND
CIS-1,2-DICHLOROETHENE	NA	NA	ND	14.0	ND
TRANS-1,2-DICHLOROETHENE	NA	NA	ND	ND	ND
TOTAL 1,2 DICHLOROETHENE			30.0		
DICHLOROMETHANE	NA	NA	ND	TR	ND
1,2-DICHLOROPROPANE	NA	NA	ND	ND	ND
ETHYLBENZENE	NA	NA	600.0	98.0	800.0
METHYLENE CHLORIDE	NA	NA	ND	ND	ND
1,1,2,2-TETRACHLOROETHANE	NA	NA	ND	ND	ND
TETRACHLOROETHENE	NA	NA	ND	ND	ND
TOLUENE	643.0	3338.0	3000.0	72.0	320.0
1,1,1-TRICHLOROETHANE	NA	NA	TR	8.0	ND
1,1,2-TRICHLOROETHANE	NA	NA	ND	ND	ND
TRICHLOROETHENE	NA	NA	TR	12.0	ND
TRICHLOROFLUOROMETHANE	NA	NA	ND	ND	ND
VINYL CHLORIDE	NA	NA	ND	ND	ND
TOTAL XYLENES	2000.0	5210.0	2870.0	1390.0	1880.0

TR - TRACE
ND - NOT DETECTED
NA - NOT ANALYZED
* - DUPLICATE ANALYSIS

PURGEABLE VOLATILE ORGANIC CONCENTRATIONS (pbb)
IN GROUND WATER, GIANT BLOOMFIELD REFINERY

MONITOR WELL GBR-30

<u>SAMPLER</u>	GIANT	GIANT	GIANT	GIANT
<u>ANALYTE</u>	<u>6/13/89</u>	<u>9/13/89</u>	<u>12/13/89</u>	<u>4/3/90</u>
BENZENE	ND	0.96	1.1	ND
BROMODICHLOROMETHANE	ND	ND	ND	ND
BROMOFORM	ND	ND	ND	ND
BROMOMETHANE	ND	ND	ND	ND
CARBON TETRACHLORIDE	ND	ND	ND	ND
CHLOROBENZENE	ND	2.7	ND	ND
CHLOROETHANE	ND	ND	ND	ND
CHLOROFORM	ND	ND	ND	ND
CHLOROMETHANE	ND	ND	ND	ND
DIBROMOCHLOROMETHANE	ND	ND	ND	ND
1,2-DICHLOROBENZENE	ND	35.0	ND	ND
1,3-DICHLOROBENZENE	ND	17.0	ND	ND
1,4-DICHLOROBENZENE	ND	40.0	ND	ND
DICHLORODIFLUOROMETHANE	ND	ND	ND	ND
1,1-DICHLOROETHANE	ND	0.88	ND	ND
1,2-DICHLOROETHANE	ND	9.6	0.94	ND
1,1-DICHLOROETHENE	ND	ND	ND	ND
CIS-1,2-DICHLOROETHENE	ND	ND	ND	ND
TRANS-1,2-DICHLOROETHENE	ND	ND	ND	ND
DICHLOROMETHANE	ND	ND	ND	ND
1,2-DICHLOROPROPANE	ND	ND	ND	ND
ETHYLBENZENE	ND	11.0	ND	2.0
METHYLENE CHLORIDE	ND	ND	ND	ND
1,1,2,2-TETRACHLOROETHANE	ND	ND	ND	ND
TETRACHLOROETHENE	ND	ND	ND	ND
TOLUENE	ND	4.3	0.28	3.1
1,1,1-TRICHLOROETHANE	ND	ND	ND	ND
1,1,2-TRICHLOROETHANE	ND	ND	ND	ND
TRICHLOROETHENE	ND	ND	ND	ND
TRICHLOROFLUOROMETHANE	ND	0.91	ND	ND
VINYL CHLORIDE	ND	ND	ND	ND
TOTAL XYLENES	4.3	44.0	1.3	ND

TR - TRACE
ND - NOT DETECTED
NA - NOT ANALYZED
* - DUPLICATE ANALYSIS

PURGEABLE VOLATILE ORGANIC CONCENTRATIONS (pbb)
IN GROUND WATER, GIANT BLOOMFIELD REFINERY

MONITOR WELL GBR-30

<u>SAMPLER</u>	<u>GIANT</u>	<u>OCD</u>	<u>GIANT</u>	<u>GIANT</u>	<u>GIANT</u>
<u>ANALYTE</u>	<u>10/17/86</u>	<u>11/12/86</u>	<u>6/2/88</u>	<u>12/7/88</u>	<u>3/14/89</u>
BENZENE	ND	ND	ND	ND	1.9
BROMODICHLOROMETHANE	ND	ND	ND	ND	ND
BROMOFORM	ND	ND	ND	ND	ND
BROMOMETHANE	ND	ND	ND	ND	ND
CARBON TETRACHLORIDE	ND	ND	ND	ND	ND
CHLOROBENZENE	ND	ND	ND	ND	ND
CHLOROETHANE	ND	ND	ND	ND	ND
CHLOROFORM	ND	ND	ND	ND	ND
CHLOROMETHANE	ND	ND	ND	ND	ND
DIBROMOCHLOROMETHANE	ND	ND	ND	ND	ND
1,2-DICHLOROBENZENE	ND	ND	ND	ND	ND
1,3-DICHLOROBENZENE	ND	ND	ND	ND	ND
1,4-DICHLOROBENZENE	ND	ND	ND	ND	ND
DICHLORODIFLUOROMETHANE	ND	ND	ND	ND	ND
1,1-DICHLOROETHANE	ND	ND	0.98	0.5	0.08
1,2-DICHLOROETHANE	ND	ND	ND	1.2	0.1
1,1-DICHLOROETHENE	ND	ND	ND	ND	ND
CIS-1,2-DICHLOROETHENE	ND	ND	ND	ND	ND
TRANS-1,2-DICHLOROETHENE	ND	ND	1.0	ND	ND
DICHLOROMETHANE	ND	ND	ND	ND	ND
1,2-DICHLOROPROPANE	ND	ND	ND	ND	ND
ETHYLBENZENE	ND	ND	ND	2.4	3.5
METHYLENE CHLORIDE	ND	ND	ND	ND	1.0
1,1,2,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND
TETRACHLOROETHENE	ND	TR	0.61	ND	ND
TOLUENE	ND	ND	ND	ND	5.3
1,1,1-TRICHLOROETHANE	ND	ND	ND	ND	ND
1,1,2-TRICHLOROETHANE	ND	ND	ND	ND	ND
TRICHLOROETHENE	ND	TR	0.52	ND	ND
TRICHLOROFLUOROMETHANE	ND	ND	ND	0.6	ND
VINYL CHLORIDE	ND	ND	ND	ND	ND
TOTAL XYLENES	ND	89.0	20.0	13.6	11.6

TR - TRACE
ND - NOT DETECTED
NA - NOT ANALYZED
* - DUPLICATE ANALYSIS

PURGEABLE VOLATILE ORGANIC CONCENTRATIONS (pbb)
IN GROUND WATER, GIANT BLOOMFIELD REFINERY

MONITOR WELL GBR-31

<u>SAMPLER</u>	GIANT	GIANT	GIANT
<u>ANALYTE</u>	<u>9/13/89</u>	<u>12/13/89</u>	<u>4/4/89</u>
BENZENE	0.38	ND	0.98
BROMODICHLOROMETHANE	ND	ND	ND
BROMOFORM	ND	ND	ND
BROMOMETHANE	ND	ND	ND
CARBON TETRACHLORIDE	ND	ND	ND
CHLOROBENZENE	ND	ND	ND
CHLOROETHANE	ND	ND	ND
CHLOROFORM	ND	ND	ND
CHLOROMETHANE	ND	ND	ND
DIBROMOCHLOROMETHANE	ND	ND	ND
1,2-DICHLOROBENZENE	ND	ND	ND
1,3-DICHLOROBENZENE	ND	ND	ND
1,4-DICHLOROBENZENE	ND	ND	ND
DICHLORODIFLUOROMETHANE	ND	ND	ND
1,1-DICHLOROETHANE	2.8	3.4	ND
1,2-DICHLOROETHANE	1.8	2.0	1.0
1,1-DICHLOROETHENE	ND	ND	ND
CIS-1,2-DICHLOROETHENE	ND	ND	6.2
TRANS-1,2-DICHLOROETHENE	ND	44.0	ND
TOTAL 1,2-DICHLOROETHENE	23.0		
DICHLOROMETHANE	ND	ND	ND
1,2-DICHLOROPROPANE	ND	ND	ND
ETHYLBENZENE	ND	ND	ND
METHYLENE CHLORIDE	0.71	1.1	ND
1,1,2,2-TETRACHLOROETHANE	ND	ND	ND
TETRACHLOROETHENE	4.7	12.0	0.64
TOLUENE	ND	ND	ND
1,1,1-TRICHLOROETHANE	0.65	1.4	ND
1,1,2-TRICHLOROETHANE	ND	ND	ND
TRICHLOROETHENE	ND	7.9	0.86
TRICHLOROFLUOROMETHANE	3.6	ND	ND
VINYL CHLORIDE	ND	ND	ND
TOTAL XYLENES	ND	ND	6.0

TR - TRACE
ND - NOT DETECTED
NA - NOT ANALYZED
* - DUPLICATE ANALYSIS

PURGEABLE VOLATILE ORGANIC CONCENTRATIONS (pbb)
IN GROUND WATER, GIANT BLOOMFIELD REFINERY

MONITOR WELL GBR-31

<u>SAMPLER</u>	<u>GIANT</u>	<u>EID</u>	<u>GIANT</u>	<u>GIANT</u>	<u>GIANT</u>
<u>ANALYTE</u>	<u>8/25/88</u>	<u>8/25/88</u>	<u>12/07/88</u>	<u>3/15/89</u>	<u>6/13/89</u>
BENZENE	ND	ND	ND	12.6	ND
BROMODICHLOROMETHANE	ND	ND	ND	ND	ND
BROMOFORM	ND	ND	ND	ND	ND
BROMOMETHANE	ND	ND	ND	ND	ND
CARBON TETRACHLORIDE	ND	ND	ND	ND	ND
CHLOROBENZENE	ND	ND	ND	ND	ND
CHLOROETHANE	ND	ND	ND	ND	ND
CHLOROFORM	ND	ND	ND	ND	1.9
CHLOROMETHANE	ND	ND	ND	ND	ND
DIBROMOCHLOROMETHANE	ND	ND	ND	ND	ND
1,2-DICHLOROBENZENE	ND	ND	ND	ND	ND
1,3-DICHLOROBENZENE	ND	ND	ND	ND	ND
1,4-DICHLOROBENZENE	ND	ND	ND	ND	ND
DICHLORODIFLUOROMETHANE	ND	ND	ND	ND	ND
1,1-DICHLOROETHANE	ND	ND	0.9	0.18	5.7
1,2-DICHLOROETHANE	1.8	0.6	0.8	0.84	ND
1,1-DICHLOROETHENE	ND	ND	ND	ND	ND
CIS-1,2-DICHLOROETHENE	ND	ND	ND	ND	ND
TRANS-1,2-DICHLOROETHENE	ND	ND	4.5	ND	ND
DICHLOROMETHANE	ND	ND	ND	ND	ND
1,2-DICHLOROPROPANE	ND	ND	ND	ND	ND
ETHYLBENZENE	ND	ND	ND	16.3	ND
METHYLENE CHLORIDE	ND	ND	0.3	3.2	ND
1,1,2,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND
TETRACHLOROETHENE	0.3	TR	3.9	0.17	17.2
TOLUENE	ND	ND	ND	3.3	ND
1,1,1-TRICHLOROETHANE	ND	ND	0.7	ND	1.6
1,1,2-TRICHLOROETHANE	ND	ND	1.1	ND	ND
TRICHLOROETHENE	ND	ND	ND	ND	10.8
TRICHLOROFLUOROMETHANE	ND	ND	ND	ND	ND
VINYL CHLORIDE	ND	ND	ND	ND	ND
TOTAL XYLENES	ND	ND	ND	18.3	ND

TR - TRACE
ND - NOT DETECTED
NA - NOT ANALYZED
* - DUPLICATE ANALYSIS

PURGEABLE VOLATILE ORGANIC CONCENTRATIONS (pbb)
IN GROUND WATER, GIANT BLOOMFIELD REFINERY

MONITOR WELL GBR-31

<u>SAMPLER</u>	GIANT	OCD	GIANT	EID	GIANT
<u>ANALYTE</u>	<u>10/17/86</u>	<u>11/21/86</u>	<u>4/20/88</u>	<u>4/20/88</u>	<u>6/2/88</u>
BENZENE	0.004	ND	ND	ND	ND
BROMODICHLOROETHANE	ND	TR	ND	ND	ND
BROMOFORM	ND	ND	ND	ND	ND
BROMOMETHANE	ND	ND	ND	ND	ND
CARBON TETRACHLORIDE	ND	ND	ND	ND	ND
CHLOROBENZENE	ND	ND	ND	ND	ND
CHLOROETHANE	ND	ND	ND	ND	ND
CHLOROFORM	ND	ND	ND	TR	ND
CHLOROMETHANE	ND	ND	ND	ND	ND
DIBROMOCHLOROMETHANE	ND	ND	0.76	ND	ND
1,2-DICHLOROBENZENE	ND	ND	ND	ND	ND
1,3-DICHLOROBENZENE	ND	ND	ND	ND	ND
1,4-DICHLOROBENZENE	ND	ND	ND	ND	ND
DICHLORODIFLUOROMETHANE	ND	ND	ND	ND	ND
1,1-DICHLOROETHANE	11.0	22.0	4.8	3.5	4.6
1,2-DICHLOROETHANE	ND	TR	ND	ND	ND
1,1-DICHLOROETHENE	ND	ND	ND	ND	ND
CIS-1,2-DICHLOROETHENE	ND	23.0	ND	29.0	ND
TRANS-1,2-DICHLOROETHENE	21.0	ND	58.0	ND	53.0
DICHLOROMETHANE	ND	TR	ND	ND	ND
1,2-DICHLOROPROPANE	ND	TR	ND	ND	ND
ETHYLBENZENE	ND	ND	ND	ND	ND
METHYLENE CHLORIDE	7.0	ND	ND	ND	ND
1,1,2,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND
TETRACHLOROETHENE	11.0	16.0	ND	8.3	5.0
TOLUENE	0.006	ND	ND	ND	ND
1,1,1-TRICHLOROETHANE	7.3	12.0	2.9	0.8	1.8
1,1,2-TRICHLOROETHANE	ND	ND	ND	ND	ND
TRICHLOROETHENE	ND	12.0	7.3	5.4	7.6
TRICHLOROFLUOROMETHANE	ND	ND	ND	0.7	ND
VINYL CHLORIDE	ND	ND	ND	ND	ND
TOTAL XYLENES	0.014	ND	ND	ND	ND

TR ~ TRACE
ND ~ NOT DETECTED
NA ~ NOT ANALYZED
* ~ DUPLICATE ANALYSIS

PURGEABLE VOLATILE ORGANIC CONCENTRATIONS (pbb)
IN GROUND WATER, GIANT BLOOMFIELD REFINERY

MONITOR WELL GBR-32

<u>SAMPLER</u>	GIANT	GIANT	OCD
<u>ANALYTE</u>	<u>12/11/89</u>	<u>12/18/89</u>	<u>4/9/90</u>
BENZENE	96.0	ND	ND
BROMODICHLOROMETHANE	ND	ND	ND
BROMOFORM	ND	ND	ND
BROMOMETHANE	ND	ND	ND
CARBON TETRACHLORIDE	ND	ND	ND
CHLOROBENZENE	ND	ND	ND
CHLOROETHANE	ND	ND	ND
CHLOROFORM	ND	ND	ND
CHLOROMETHANE	ND	ND	ND
DIBROMOCHLOROMETHANE	ND	ND	ND
1,2-DICHLOROBENZENE	ND	ND	ND
1,3-DICHLOROBENZENE	ND	ND	ND
1,4-DICHLOROBENZENE	ND	ND	ND
DICHLORODIFLUOROMETHANE	ND	ND	ND
1,1-DICHLOROETHANE	3.0	ND	1.5
1,2-DICHLOROETHANE	ND	ND	ND
1,1-DICHLOROETHENE	ND	ND	ND
CIS-1,2-DICHLOROETHENE	ND	ND	88.3
TRANS-1,2-DICHLOROETHENE	140.0	160.0	ND
DICHLOROMETHANE	ND	ND	ND
1,2-DICHLOROPROPANE	ND	ND	ND
ETHYLBENZENE	ND	ND	ND
METHYLENE CHLORIDE	1.2	1.1	ND
1,1,2,2-TETRACHLOROETHANE	ND	ND	ND
TETRACHLOROETHENE	17.0	22.0	15.0
TOLUENE	ND	ND	ND
1,1,1-TRICHLOROETHANE	1.3	1.5	ND
1,1,2-TRICHLOROETHANE	ND	ND	ND
TRICHLOROETHENE	10.0	12.0	10.9
TRICHLOROFLUOROMETHANE	ND	1.1	ND
VINYL CHLORIDE	ND	ND	ND
TOTAL XYLENES	ND	ND	ND

TR - TRACE
ND - NOT DETECTED
NA - NOT ANALYZED
* - DUPLICATE ANALYSIS

PURGEABLE VOLATILE ORGANIC CONCENTRATIONS (pbb)
IN GROUND WATER, GIANT BLOOMFIELD REFINERY

MONITOR WELL GBR-32

<u>SAMPLER</u>	GIANT	EID	GIANT	GIANT	GIANT
<u>ANALYTE</u>	<u>8/24/88</u>	<u>8/24/88</u>	<u>11/8/88</u>	<u>3/14/89</u>	<u>6/23/89</u>
BENZENE	ND	ND	ND	0.81	ND
BROMODICHLOROMETHANE	ND	ND	ND	ND	ND
BROMOFORM	ND	ND	ND	ND	ND
BROMOMETHANE	ND	ND	ND	ND	ND
CARBON TETRACHLORIDE	ND	ND	ND	ND	ND
CHLOROBENZENE	ND	ND	ND	ND	ND
CHLOROETHANE	ND	ND	ND	ND	ND
CHLOROFORM	ND	3.9	8.2	0.4	3.0
CHLOROMETHANE	ND	ND	ND	ND	ND
DIBROMOCHLOROMETHANE	ND	ND	ND	ND	ND
1,2-DICHLOROBENZENE	ND	ND	ND	ND	ND
1,3-DICHLOROBENZENE	ND	ND	ND	ND	ND
1,4-DICHLOROBENZENE	ND	ND	ND	ND	ND
DICHLORODIFLUOROMETHANE	ND	ND	ND	ND	ND
1,1-DICHLOROETHANE	6.0	3.6	5.8	3.1	3.9
1,2-DICHLOROETHANE	ND	ND	ND	ND	ND
1,1-DICHLOROETHENE	ND	ND	ND	ND	ND
CIS-1,2-DICHLOROETHENE	ND	97.0	ND	ND	ND
TRANS-1,2-DICHLOROETHENE	ND	ND	120.0	ND	ND
TOTAL 1,2-DICHLOROETHENE	100				
DICHLOROMETHANE	ND	TR	ND	ND	ND
1,2-DICHLOROPROPANE	ND	ND	ND	ND	ND
ETHYLBENZENE	ND	ND	ND	ND	ND
METHYLENE CHLORIDE	ND	ND	ND	10.8	ND
1,1,2,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND
TETRACHLOROETHENE	9.0	24.0	20.0	11.7	17.3
TOLUENE	ND	ND	ND	1.1	ND
1,1,1-TRICHLOROETHANE	ND	4.5	6.6	0.78	1.5
1,1,2-TRICHLOROETHANE	ND	ND	ND	ND	ND
TRICHLOROETHENE	8.0	16.0	13.0	8.1	12.2
TRICHLOROFLUOROMETHANE	ND	0.8	ND	ND	ND
VINYL CHLORIDE	ND	ND	ND	ND	ND
TOTAL XYLENES	ND	ND	ND	ND	ND

TR - TRACE
ND - NOT DETECTED
NA - NOT ANALYZED
* - DUPLICATE ANALYSIS

VOLATILE PUGEABLE ORGANIC CONCENTRATIONS (ppb)
IN GROUND WATER GIANT BLOOMFIELD REFINERY

MONITOR WELL GBR-32

<u>SAMPLER</u>	<u>EID</u>	<u>GIANT</u>	<u>GIANT</u>	<u>GIANT</u>	<u>EID</u>
<u>ANALYTE</u>	<u>8/5/87</u>	<u>10/7/87</u>	<u>11/12/87</u>	<u>4/20/88</u>	<u>4/20/88</u>
BENZENE	ND	ND	ND	ND	ND
BROMODICHLOROMETHANE	ND	ND	ND	ND	ND
BROMOFORM	ND	ND	ND	ND	ND
BROMOMETHANE	ND	ND	ND	ND	ND
CARBON TETRACHLORIDE	ND	ND	ND	ND	ND
CHLOROBENZENE	ND	ND	ND	ND	ND
CHLOROETHANE	ND	ND	ND	ND	ND
CHLOROFORM	ND	ND	11.0	1.1	0.9
CHLOROMETHANE	ND	ND	ND	ND	ND
DIBROMOCHLOROMETHANE	ND	ND	ND	ND	ND
1,2-DICHLOROBENZENE	ND	ND	ND	ND	ND
1,3-DICHLOROBENZENE	ND	ND	ND	ND	ND
1,4-DICHLOROBENZENE	ND	ND	ND	ND	ND
DICHLORODIFLUOROMETHANE	ND	ND	ND	ND	ND
1,1-DICHLOROETHANE	3.0	10.4	10.7	5.7	8.5
1,2-DICHLOROETHANE	ND	ND	ND	ND	ND
1,1-DICHLOROETHENE	ND	ND	106.0	ND	ND
CIS-1,2-DICHLOROETHENE	79.0	ND	ND	ND	88.0
TRANS-1,2-DICHLOROETHENE	ND	35.0	ND	160.0	ND
DICHLOROMETHANE	ND	ND	ND	ND	ND
1,2-DICHLOROPROPANE	ND	0.5	ND	ND	ND
ETHYLBENZENE	ND	ND	ND	ND	ND
METHYLENE CHLORIDE	ND	ND	ND	ND	ND
1,1,2,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND
TETRACHLOROETHENE	19.0	16.6	15.3	17.0	18.0
TOLUENE	ND	ND	ND	ND	ND
1,1,1-TRICHLOROETHANE	3.0	3.3	2.3	1.9	1.0
1,1,2-TRICHLOROETHANE	ND	ND	ND	ND	ND
TRICHLOROETHENE	17.0	13.4	11.4	16.0	ND
TRICHLOROFLUOROMETHANE	ND	ND	ND	ND	2.0
VINYL CHLORIDE	ND	ND	ND	ND	ND
TOTAL XYLENES	ND	ND	ND	ND	ND

TR - TRACE
ND - NOT DETECTED
NA - NOT ANALYZED
* - DUPLICATE ANALYSIS

MONITOR WELL GBR-33

<u>SAMPLER</u>	GIANT	GIANT	GIANT
<u>ANALYTE</u>	<u>9/12/89</u>	<u>12/13/89</u>	<u>4/4/90</u>
BENZENE	ND	73.0	ND
BROMODICHLOROMETHANE	ND	ND	ND
BROMOFORM	ND	ND	ND
BROMOMETHANE	ND	ND	ND
CARBON TETRACHLORIDE	ND	ND	ND
CHLOROBENZENE	ND	ND	ND
CHLOROETHANE	ND	ND	ND
CHLOROFORM	ND	ND	ND
CHLOROMETHANE	ND	ND	ND
DIBROMOCHLOROMETHANE	ND	ND	ND
1,2-DICHLOROBENZENE	ND	ND	ND
1,3-DICHLOROBENZENE	ND	ND	ND
1,4-DICHLOROBENZENE	ND	ND	ND
DICHLORODIFLUOROMETHANE	ND	ND	ND
1,1-DICHLOROETHANE	ND	ND	1.3
1,2-DICHLOROETHANE	0.97	4.0	0.21
1,1-DICHLOROETHENE	ND	ND	ND
CIS-1,2-DICHLOROETHENE	ND	ND	12.0
TRANS-1,2-DICHLOROETHENE	ND	1.1	ND
TOTAL 1,2-DICHLOROETHENE	2.5		
DICHLOROMETHANE	ND	ND	ND
1,2-DICHLOROPROPANE	ND	ND	ND
ETHYLBENZENE	7.9	120.0	ND
METHYLENE CHLORIDE	ND	ND	ND
1,1,2,2-TETRACHLOROETHANE	ND	ND	ND
TETRACHLOROETHENE	ND	ND	2.5
TOLUENE	ND	ND	ND
1,1,1-TRICHLOROETHANE	ND	ND	0.24
1,1,2-TRICHLOROETHANE	ND	ND	ND
TRICHLOROETHENE	ND	ND	1.1
TRICHLOROFLUOROMETHANE	ND	ND	ND
VINYL CHLORIDE	ND	ND	ND
TOTAL XYLENES	17.0	170.0	ND

TR - TRACE
 ND - NOT DETECTED
 NA - NOT ANALYZED
 * - DUPLICATE ANALYSIS

MONITOR WELL GBR-33

<u>SAMPLER</u>	GIANT	GIANT	GIANT	GIANT	GIANT
<u>ANALYTE</u>	<u>9/9/87</u>	<u>10/7/87</u>	<u>12/7/89</u>	<u>3/15/89</u>	<u>6/13/89</u>
BENZENE	764.0	503.0	130.0	0.3	32.6
BROMODICHLOROMETHANE	ND	ND	ND	ND	ND
BROMOFORM	ND	ND	ND	ND	ND
BROMOMETHANE	ND	ND	ND	ND	ND
CARBON TETRACHLORIDE	ND	ND	ND	ND	ND
CHLOROBENZENE	ND	ND	ND	ND	ND
CHLOROETHANE	0.4	ND	ND	ND	ND
CHLOROFORM	ND	ND	ND	ND	ND
CHLOROMETHANE	ND	ND	ND	ND	ND
DIBROMOCHLOROMETHANE	ND	ND	ND	ND	ND
1,2-DICHLOROBENZENE	1.1	ND	ND	ND	ND
1,3-DICHLOROBENZENE	ND	ND	ND	ND	ND
1,4-DICHLOROBENZENE	ND	ND	ND	ND	ND
DICHLORODIFLUOROMETHANE	ND	ND	ND	ND	ND
1,1-DICHLOROETHANE	1.0	ND	0.5	1.4	ND
1,2-DICHLOROETHANE	22.8	ND	4.3	0.33	1.8
1,1-DICHLOROETHENE	ND	ND	ND	ND	ND
CIS-1,2-DICHLOROETHENE	ND	ND	ND	ND	ND
TRANS-1,2-DICHLOROETHENE	3.4	ND	1.7	ND	ND
DICHLOROMETHANE	ND	ND	ND	ND	ND
1,2-DICHLOROPROPANE	ND	ND	ND	ND	ND
ETHYLBENZENE	1120.0	370.0	80.0	ND	76.0
METHYLENE CHLORIDE	ND	ND	ND	5.8	ND
1,1,2,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND
TETRACHLOROETHENE	0.4	ND	0.7	1.4	ND
TOLUENE	188.0	136.0	9.9	ND	11.3
1,1,1-TRICHLOROETHANE	ND	ND	ND	0.32	ND
1,1,2-TRICHLOROETHANE	ND	ND	ND	ND	ND
TRICHLOROETHENE	0.4	37.0	0.5	1.1	ND
TRICHLOROFLUOROMETHANE	ND	ND	0.8	ND	ND
VINYL CHLORIDE	ND	ND	ND	ND	ND
TOTAL XYLENES	1393.0	1332.0	152.0	ND	74.1

TR - TRACE
 ND - NOT DETECTED
 NA - NOT ANALYZED
 * - DUPLICATE ANALYSIS

MONITOR WELL GBR-36

<u>SAMPLER</u>	OCD
<u>ANALYTE</u>	<u>6/8/88</u>
BENZENE	15.0
BROMODICHLOROMETHANE	ND
BROMOFORM	ND
BROMOMETHANE	ND
CARBON TETRACHLORIDE	ND
CHLOROBENZENE	ND
CHLOROETHANE	ND
CHLOROFORM	ND
CHLOROMETHANE	ND
DIBROMOCHLOROMETHANE	ND
1,2-DICHLOROBENZENE	ND
1,3-DICHLOROBENZENE	ND
1,4-DICHLOROBENZENE	ND
DICHLORODIFLUOROMETHANE	ND
1,1-DICHLOROETHANE	9.6
1,2-DICHLOROETHANE	3.5
1,1-DICHLOROETHENE	ND
CIS-1,2-DICHLOROETHENE	80.0
TRANS-1,2-DICHLOROETHENE	ND
DICHLOROMETHANE	6.3
1,2-DICHLOROPROPANE	ND
ETHYLBENZENE	TR
METHYLENE CHLORIDE	ND
1,1,2,2-TETRACHLOROETHANE	ND
TETRACHLOROETHENE	17.0
TOLUENE	ND
1,1,1-TRICHLOROETHANE	10.0
1,1,2-TRICHLOROETHANE	ND
TRICHLOROETHENE	10.0
TRICHLOROFLUOROMETHANE	ND
VINYL CHLORIDE	ND
TOTAL XYLENES	12.5

TR - TRACE
ND - NOT DETECTED
NA - NOT ANALYZED
* - DUPLICATE ANALYSIS

MONITOR WELL GBR-37

<u>SAMPLER</u>	OCD
<u>ANALYTE</u>	<u>6/8/88</u>
BENZENE	68.0
BROMODICHLOROMETHANE	ND
BROMOFORM	ND
BROMOMETHANE	ND
CARBON TETRACHLORIDE	ND
CHLOROBENZENE	ND
CHLOROETHANE	ND
CHLOROFORM	ND
CHLOROMETHANE	ND
DIBROMOCHLOROMETHANE	ND
1,2-DICHLOROBENZENE	ND
1,3-DICHLOROBENZENE	ND
1,4-DICHLOROBENZENE	ND
DICHLORODIFLUOROMETHANE	ND
1,1-DICHLOROETHANE	2.5
1,2-DICHLOROETHANE	4.0
1,1-DICHLOROETHENE	ND
CIS-1,2-DICHLOROETHENE	7.0
TRANS-1,2-DICHLOROETHENE	ND
DICHLOROMETHANE	1.7
1,2-DICHLOROPROPANE	ND
ETHYLBENZENE	61.0
METHYLENE CHLORIDE	ND
1,1,2,2-TETRACHLOROETHANE	ND
TETRACHLOROETHENE	2.3
TOLUENE	2.0
1,1,1-TRICHLOROETHANE	1.5
1,1,2-TRICHLOROETHANE	ND
TRICHLOROETHENE	2.4
TRICHLOROFLUOROMETHANE	ND
VINYL CHLORIDE	ND
TOTAL XYLENES	43.0

TR ~ TRACE
ND ~ NOT DETECTED
NA ~ NOT ANALYZED
* ~ DUPLICATE ANALYSIS

MONITOR WELL GBR-43

<u>SAMPLER</u>	GIANT	GIANT
<u>ANALYTE</u>	<u>9/7/89</u>	<u>4/2/89</u>
BENZENE	950.0	440.0
BROMODICHLOROMETHANE	ND	ND
BROMOFORM	ND	ND
BROMOMETHANE	ND	ND
CARBON TETRACHLORIDE	ND	ND
CHLOROBENZENE	ND	ND
CHLOROETHANE	ND	ND
CHLOROFORM	ND	ND
CHLOROMETHANE	ND	ND
DIBROMOCHLOROMETHANE	ND	ND
1,2-DICHLOROBENZENE	ND	ND
1,3-DICHLOROBENZENE	ND	ND
1,4-DICHLOROBENZENE	ND	ND
DICHLORODIFLUOROMETHANE	ND	ND
1,1-DICHLOROETHANE	ND	ND
1,2-DICHLOROETHANE	ND	ND
1,1-DICHLOROETHENE	ND	ND
CIS-1,2-DICHLOROETHENE	ND	21.0
TRANS-1,2-DICHLOROETHENE	ND	ND
TOTAL 1,2-DICHLOROETHENE	28.0	
DICHLOROMETHANE	ND	ND
1,2-DICHLOROPROPANE	ND	ND
ETHYLBENZENE	200.0	65.0
METHYLENE CHLORIDE	ND	ND
1,1,2,2-TETRACHLOROETHANE	ND	ND
TETRACHLOROETHENE	ND	ND
TOLUENE	ND	ND
1,1,1-TRICHLOROETHANE	71.0	ND
1,1,2-TRICHLOROETHANE	ND	ND
TRICHLOROETHENE	ND	8.6
TRICHLOROFLUOROMETHANE	ND	ND
VINYL CHLORIDE	ND	ND
TOTAL XYLENES	200.0	ND

TR - TRACE
ND - NOT DETECTED
NA - NOT ANALYZED
* - DUPLICATE ANALYSIS

MONITOR WELL GBR-44

<u>SAMPLER</u>	OCD	GIANT	GIANT
<u>ANALYTE</u>	<u>6/8/88</u>	<u>9/7/89</u>	<u>6/13/89</u>
BENZENE	10.0	10.8	16.0
BROMODICHLOROMETHANE	ND	ND	ND
BROMOFORM	ND	ND	ND
BROMOMETHANE	ND	ND	ND
CARBON TETRACHLORIDE	ND	ND	ND
CHLOROBENZENE	ND	ND	ND
CHLOROETHANE	ND	ND	ND
CHLOROFORM	ND	ND	ND
CHLOROMETHANE	ND	ND	ND
DIBROMOCHLOROMETHANE	ND	ND	ND
1,2-DICHLOROBENZENE	ND	ND	ND
1,3-DICHLOROBENZENE	ND	ND	ND
1,4-DICHLOROBENZENE	ND	ND	ND
DICHLORODIFLUOROMETHANE	ND	ND	ND
1,1-DICHLOROETHANE	5.5	1.4	2.1
1,2-DICHLOROETHANE	2.4	3.5	7.9
1,1-DICHLOROETHENE	ND	ND	ND
CIS-1,2-DICHLOROETHENE	20.0	ND	ND
TRANS-1,2-DICHLOROETHENE	ND	ND	ND
TOTAL 1,2-DICHLOROETHENE	ND	0.48	ND
DICHLOROMETHANE	4.0	ND	ND
1,2-DICHLOROPROPANE	ND	ND	ND
ETHYLBENZENE	ND	16.0	ND
METHYLENE CHLORIDE	ND	1.1	1.1
1,1,2,2-TETRACHLOROETHANE	ND	ND	ND
TETRACHLOROETHENE	6.7	ND	ND
TOLUENE	0.7	ND	0.65
1,1,1-TRICHLOROETHANE	5.5	0.97	2.7
1,1,2-TRICHLOROETHANE	ND	ND	1.6
TRICHLOROETHENE	3.6	0.77	2.3
TRICHLOROFLUOROMETHANE	ND	ND	ND
VINYL CHLORIDE	ND	ND	ND
TOTAL XYLENES	ND	15.0	3.4

TR - TRACE
 ND - NOT DETECTED
 NA - NOT ANALYZED
 * - DUPLICATE ANALYSIS

MONITOR WELL GBR-47

<u>SAMPLER</u>	GIANT	GIANT	GIANT
<u>ANALYTE</u>	<u>3/14/88</u>	<u>3/15/89</u>	<u>6/13/89</u>
BENZENE	ND	ND	17.7
BROMODICHLOROMETHANE	ND	ND	ND
BROMOFORM	ND	ND	ND
BROMOMETHANE	ND	ND	ND
CARBON TETRACHLORIDE	ND	ND	ND
CHLOROBENZENE	ND	ND	ND
CHLOROETHANE	ND	ND	ND
CHLOROFORM	ND	ND	1.0
CHLOROMETHANE	ND	ND	ND
DIBROMOCHLOROMETHANE	ND	ND	ND
1,2-DICHLOROBENZENE	ND	ND	ND
1,3-DICHLOROBENZENE	ND	ND	ND
1,4-DICHLOROBENZENE	ND	ND	ND
DICHLORODIFLUOROMETHANE	ND	ND	ND
1,1-DICHLOROETHANE	ND	0.81	ND
1,2-DICHLOROETHANE	ND	0.45	9.3
1,1-DICHLOROETHENE	ND	ND	ND
CIS-1,2-DICHLOROETHENE	ND	ND	ND
TRANS-1,2-DICHLOROETHENE	ND	ND	ND
DICHLOROMETHANE	ND	ND	ND
1,2-DICHLOROPROPANE	ND	ND	ND
ETHYLBENZENE	ND	ND	15.5
METHYLENE CHLORIDE	3.1	0.5	4.0
1,1,2,2-TETRACHLOROETHANE	ND	ND	ND
TETRACHLOROETHENE	ND	2.0	ND
TOLUENE	ND	0.26	22.5
1,1,1-TRICHLOROETHANE	ND	0.24	ND
1,1,2-TRICHLOROETHANE	ND	ND	ND
TRICHLOROETHENE	ND	1.2	ND
TRICHLOROFLUOROMETHANE	ND	ND	ND
VINYL CHLORIDE	ND	ND	ND
TOTAL XYLENES	ND	ND	56.0

TR - TRACE
 ND - NOT DETECTED
 NA - NOT ANALYZED

MONITOR WELL GBR-48

<u>SAMPLER</u>	GIANT	GIANT	GIANT*	GIANT	OCD
<u>ANALYTE</u>	<u>11/8/88</u>	<u>3/14/89</u>	<u>3/14/89</u>	<u>6/13/89</u>	<u>4/9/90</u>
BENZENE	ND	0.24	ND	ND	ND
BROMODICHLOROMETHANE	ND	ND	ND	ND	ND
BROMOFORM	ND	ND	ND	ND	ND
BROMOMETHANE	ND	ND	ND	ND	ND
CARBON TETRACHLORIDE	ND	ND	ND	ND	ND
CHLOROBENZENE	ND	ND	ND	ND	ND
CHLOROETHANE	ND	ND	ND	ND	ND
CHLOROFORM	ND	0.5	0.5	ND	7.5
CHLOROMETHANE	ND	ND	ND	ND	ND
DIBROMOCHLOROMETHANE	ND	ND	ND	ND	ND
1,2-DICHLOROBENZENE	ND	ND	ND	ND	ND
1,3-DICHLOROBENZENE	ND	ND	ND	ND	ND
1,4-DICHLOROBENZENE	ND	ND	ND	ND	ND
DICHLORODIFLUOROMETHANE	ND	ND	ND	ND	ND
1,1-DICHLOROETHANE	180	3.0	3.3	5.2	ND
1,2-DICHLOROETHANE	ND	ND	ND	ND	ND
1,1-DICHLOROETHENE	ND	ND	ND	ND	ND
CIS-1,2-DICHLOROETHENE	ND	ND	ND	ND	65.0
TRANS-1,2-DICHLOROETHENE	ND	ND	ND	ND	ND
DICHLOROMETHANE	ND	ND	ND	ND	ND
1,2-DICHLOROPROPANE	ND	ND	ND	ND	ND
ETHYLBENZENE	ND	ND	ND	ND	ND
METHYLENE CHLORIDE	0.3	0.6	1.1	ND	ND
1,1,2,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND
TETRACHLOROETHENE	31.0	7.4	7.6	26.1	11.3
TOLUENE	ND	0.23	ND	ND	ND
1,1,1-TRICHLOROETHANE	ND	0.69	0.73	2.4	ND
1,1,2-TRICHLOROETHANE	ND	ND	ND	ND	ND
TRICHLOROETHENE	25.0	5.4	6.0	14.7	20.8
TRICHLOROFLUOROMETHANE	ND	ND	ND	ND	ND
VINYL CHLORIDE	ND	ND	ND	ND	ND
TOTAL XYLENES	ND	ND	ND	ND	ND

TR - TRACE
 ND - NOT DETECTED
 NA - NOT ANALYZED
 * - DUPLICATE ANALYSIS

MONITOR WELL GBR-49

<u>SAMPLER</u>	GIANT	GIANT	GIANT	GIANT	OCD
<u>ANALYTE</u>	<u>11/8/88</u>	<u>3/14/89</u>	<u>6/14/89</u>	<u>12/11/89</u>	<u>4/9/90</u>
BENZENE	ND	0.63	ND	74.0	ND
BROMODICHLOROMETHANE	ND	ND	ND	ND	ND
BROMOFORM	ND	ND	ND	ND	ND
BROMOMETHANE	ND	ND	ND	ND	ND
CARBON TETRACHLORIDE	ND	ND	ND	ND	ND
CHLOROBENZENE	ND	ND	ND	ND	ND
CHLOROETHANE	ND	ND	ND	ND	ND
CHLOROFORM	6.9	1.0	ND	ND	ND
CHLOROMETHANE	ND	ND	ND	ND	ND
DIBROMOCHLOROMETHANE	ND	ND	ND	ND	ND
1,2-DICHLOROBENZENE	ND	ND	ND	ND	ND
1,3-DICHLOROBENZENE	ND	ND	ND	ND	ND
1,4-DICHLOROBENZENE	ND	ND	ND	ND	ND
DICHLORODIFLUOROMETHANE	ND	ND	ND	ND	ND
1,1-DICHLOROETHANE	6.8	10.4	ND	2.8	1.2
1,2-DICHLOROETHANE	ND	0.07	ND	ND	ND
1,1-DICHLOROETHENE	ND	ND	ND	ND	ND
CIS-1,2-DICHLOROETHENE	ND	ND	ND	ND	86.7
TRANS-1,2-DICHLOROETHENE	88.0	0.3	ND	150	ND
DICHLOROMETHANE	ND	ND	ND	ND	ND
1,2-DICHLOROPROPANE	ND	ND	ND	ND	ND
ETHYLBENZENE	ND	ND	ND	ND	ND
METHYLENE CHLORIDE	ND	2.5	ND	ND	ND
1,1,2,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND
TETRACHLOROETHENE	15.0	25.3	4.2	25	11.9
TOLUENE	ND	ND	ND	ND	ND
1,1,1-TRICHLOROETHANE	6.6	3.5	ND	1.0	ND
1,1,2-TRICHLOROETHANE	ND	ND	ND	ND	ND
TRICHLOROETHENE	11.0	24.9	2.7	14	7.2
TRICHLOROFLUOROMETHANE	ND	ND	ND	ND	ND
VINYL CHLORIDE	ND	ND	ND	ND	ND
TOTAL XYLENES	ND	0.28	ND	ND	ND

TR - TRACE
ND - NOT DETECTED
NA - NOT ANALYZED

MONITOR WELL GBR-50

<u>SAMPLER</u>	GIANT	GIANT	GIANT	GIANT
<u>ANALYTE</u>	<u>11/8/88</u>	<u>3/14/89</u>	<u>6/13/89</u>	<u>12/11/89</u>
BENZENE	0.8	ND	ND	ND
BROMODICHLOROMETHANE	ND	ND	ND	ND
BROMOFORM	ND	ND	ND	ND
BROMOMETHANE	ND	ND	ND	ND
CARBON TETRACHLORIDE	ND	ND	ND	ND
CHLOROBENZENE	ND	ND	ND	ND
CHLOROETHANE	ND	ND	ND	ND
CHLOROFORM	0.2	ND	ND	ND
CHLOROMETHANE	ND	ND	ND	ND
DIBROMOCHLOROMETHANE	ND	ND	ND	ND
1,2-DICHLOROBENZENE	ND	ND	ND	ND
1,3-DICHLOROBENZENE	ND	ND	ND	ND
1,4-DICHLOROBENZENE	ND	ND	ND	ND
DICHLORODIFLUOROMETHANE	ND	ND	ND	ND
1,1-DICHLOROETHANE	0.7	0.1	ND	ND
1,2-DICHLOROETHANE	ND	ND	ND	ND
1,1-DICHLOROETHENE	ND	ND	ND	ND
CIS-1,2-DICHLOROETHENE	ND	ND	ND	ND
TRANS-1,2-DICHLOROETHENE	0.3	ND	ND	0.27
DICHLOROMETHANE	ND	ND	ND	ND
1,2-DICHLOROPROPANE	ND	ND	ND	ND
ETHYLBENZENE	ND	ND	ND	ND
METHYLENE CHLORIDE	0.3	1.2	ND	ND
1,1,2,2-TETRACHLOROETHANE	ND	0.19	ND	ND
TETRACHLOROETHENE	0.7	ND	ND	1.2
TOLUENE	ND	ND	ND	ND
1,1,1-TRICHLOROETHANE	0.6	ND	ND	0.26
1,1,2-TRICHLOROETHANE	ND	ND	ND	ND
TRICHLOROETHENE	0.2	ND	ND	ND
TRICHLOROFLUOROMETHANE	ND	ND	ND	ND
VINYL CHLORIDE	ND	ND	ND	ND
TOTAL XYLENES	ND	ND	6.0	ND

TR - TRACE
 ND - NOT DETECTED
 NA - NOT ANALYZED

MONITOR WELL GBR-51

<u>SAMPLER</u>	GIANT	GIANT	GIANT*
<u>ANALYTE</u>	<u>11/8/88</u>	<u>6/12/89</u>	<u>6/12/89</u>
BENZENE	ND	ND	ND
BROMODICHLOROMETHANE	ND	ND	ND
BROMOFORM	ND	ND	ND
BROMOMETHANE	ND	ND	ND
CARBON TETRACHLORIDE	ND	ND	ND
CHLOROBENZENE	ND	ND	ND
CHLOROETHANE	ND	ND	ND
CHLOROFORM	0.5	ND	ND
CHLOROMETHANE	ND	ND	ND
DIBROMOCHLOROMETHANE	ND	ND	ND
1,2-DICHLOROBENZENE	ND	ND	ND
1,3-DICHLOROBENZENE	ND	ND	ND
1,4-DICHLOROBENZENE	ND	ND	ND
DICHLORODIFLUOROMETHANE	ND	ND	ND
1,1-DICHLOROETHANE	0.6	3.3	2.0
1,2-DICHLOROETHANE	ND	ND	ND
1,1-DICHLOROETHENE	ND	ND	ND
CIS-1,2-DICHLOROETHENE	ND	ND	ND
TRANS-1,2-DICHLOROETHENE	0.7	ND	ND
DICHLOROMETHANE	ND	ND	ND
1,2-DICHLOROPROPANE	ND	ND	ND
ETHYLBENZENE	ND	ND	ND
METHYLENE CHLORIDE	ND	ND	ND
1,1,2,2-TETRACHLOROETHANE	ND	ND	ND
TETRACHLOROETHENE	2.1	ND	ND
TOLUENE	ND	ND	ND
1,1,1-TRICHLOROETHANE	1.0	1.3	1.0
1,1,2-TRICHLOROETHANE	ND	ND	ND
TRICHLOROETHENE	ND	ND	ND
TRICHLOROFLUOROMETHANE	ND	ND	ND
VINYL CHLORIDE	ND	ND	ND
TOTAL XYLENES	ND	1.4	1.9

TR - TRACE
 ND - NOT DETECTED
 NA - NOT ANALYZED
 * - DUPLICATE ANALYSIS

MONITOR WELL GBR-52

<u>SAMPLER</u>	GIANT	GIANT	GIANT*	GIANT
<u>ANALYTE</u>	<u>11/8/88</u>	<u>6/12/89</u>	<u>6/12/89</u>	<u>9/7/89</u>
BENZENE	0.8	7.6	5.4	ND
BROMODICHLOROMETHANE	ND	ND	ND	ND
BROMOFORM	ND	ND	ND	ND
BROMOMETHANE	ND	ND	ND	ND
CARBON TETRACHLORIDE	ND	ND	ND	ND
CHLOROBENZENE	ND	ND	ND	ND
CHLOROETHANE	ND	ND	ND	ND
CHLOROFORM	0.7	ND	ND	ND
CHLOROMETHANE	ND	ND	ND	ND
DIBROMOCHLOROMETHANE	ND	ND	ND	ND
1,2-DICHLOROBENZENE	ND	ND	ND	ND
1,3-DICHLOROBENZENE	ND	ND	ND	ND
1,4-DICHLOROBENZENE	ND	ND	ND	ND
DICHLORODIFLUOROMETHANE	ND	ND	ND	ND
1,1-DICHLOROETHANE	ND	ND	ND	ND
1,2-DICHLOROETHANE	ND	ND	ND	ND
1,1-DICHLOROETHENE	ND	ND	ND	ND
CIS-1,2-DICHLOROETHENE	ND	ND	ND	ND
TRANS-1,2-DICHLOROETHENE	ND	ND	ND	ND
DICHLOROMETHANE	ND	ND	ND	ND
1,2-DICHLOROPROPANE	ND	ND	ND	ND
ETHYLBENZENE	ND	ND	ND	ND
METHYLENE CHLORIDE	ND	ND	ND	ND
1,1,2,2-TETRACHLOROETHANE	ND	ND	ND	ND
TETRACHLOROETHENE	ND	1.3	1.3	ND
TOLUENE	ND	ND	ND	ND
1,1,1-TRICHLOROETHANE	ND	ND	ND	ND
1,1,2-TRICHLOROETHANE	ND	ND	ND	ND
TRICHLOROETHENE	ND	ND	ND	ND
TRICHLOROFLUOROMETHANE	ND	ND	ND	1.1
VINYL CHLORIDE	ND	ND	ND	ND
TOTAL XYLENES	ND	ND	ND	ND

TR - TRACE
 ND - NOT DETECTED
 NA - NOT ANALYZED
 * - DUPLICATE ANALYSIS

ATTACHMENT 1

Analyses of Water Samples
Collected by GTI
on June 1 and 2, 1988

copy to
Water Quality
File on
2/28/90

GIANT BLOOMFIELD REFINERY

Date: June 2, 1988

Project No.: 232-799-5009

Geologist: T. Le Page

Weather: ~75, warm/breezy

Well: GBR-17

Initial Liquid Levels:

Well #	DTW	DTP	PT
GBR-17	33.65	---	---

Description of Water:

clear, no hydrocarbon odor

pH Readings:

initial: 7.02

after 5 gallons: 7.03

prior to sampling: 7.00

Conductivity:

initial: 2990 uMohs/cm

after 5 gallons: 3000 uMohs/cm

prior to sampling: 2970 uMohs/cm

Amount bailed:

~15 gallons

well recharged ~10 min.

Samples taken:

4 40 ml vials

4 1 liter bottles

Analyses Performed:

601 and 602, PAH

TDS, Major Ca⁺ and An⁻

Sample ID #: 8806021220



GROUNDWATER
TECHNOLOGY, INC.

GIANT BLOOMFIELD REFINERY

Project No.: 232-799-5009

Date: June 1, 1988

Geologist: T. Le Page

Weather: ~72, warm/breezy

Well: GBR-24D

Initial Liquid Levels:

Well #	DTW	DTP	PT
GBR-24D	28.13	---	---

Description of Water:

Dark gray color, strong hydrocarbon odor

pH Readings:

initial: 7.53

after 5 gallons: 7.75

prior to sampling: 8.02

Conductivity:

initial: 3280 uMohs/cm

after 5 gallons: 4190 uMohs/cm

prior to sampling: 4450 uMohs/cm

Amount bailed:

~13 gallons

well recharged ~20 min.

Samples taken:

4 40 ml vials

4 1 liter bottles

Analyses Performed:

601 and 602, PAH

TDS, Major Ca⁺ and An⁻

Sample ID #: 8806010347



GROUNDWATER
TECHNOLOGY, INC.

GIANT BLOOMFIELD REFINERY

Project No.: 232-799-5009

Date: June 1, 1988

Geologist: T. Le Page

Weather: ~72, warm/breezy

Well: GBR-30

Initial Liquid Levels:

Well #	DTW	DTP	PT
GBR-30	33.10	33.09	0.01

Description of Water:

clear, strong hydrocarbon odor

pH Readings:

initial: 6.95

after 5 gallons: 7.05

prior to sampling: 7.02

Conductivity:

initial: 4460 uMohs/cm

after 5 gallons: 4570 uMohs/cm

prior to sampling: 4620 uMohs/cm

Amount Bailed:

~13 gallons

well recharged ~15 min.

Samples taken:

4 40 ml vials

4 1 liter bottles

Analyses Performed:

601 and 602, PAH

TDS, Major Ca⁺ and An⁻

Sample ID #: 8806010530



GROUNDWATER
TECHNOLOGY, INC.

GIANT BLOOMFIELD REFINERY

Project No.: 232-799-5009

Date: June 2, 1988

Geologist: T. Le Page

Weather: ~75, warm/breezy

Well: GBR-31

Initial Liquid Levels:

Well #	DTW	DTP	PT
GBR-31	34.37	---	---

Description of Water:

clear, slight hydrocarbon odor, no sheen

pH Readings:

initial: 7.17

after 5 gallons: 6.96

prior to sampling: 7.01

Conductivity:

initial: 4190 uMohs/cm

after 5 gallons: 5420 uMohs/cm

prior to sampling: 5910 uMohs/cm

Amount bailed:

~15 gallons

well recharged ~15 min.

Samples taken:

4 40 ml vials

4 1 liter bottles

Analyses Performed:

601 and 602, PAH

TDS, Major Ca⁺ and An⁻

Sample ID #: 8806021015



GROUNDWATER
TECHNOLOGY, INC.

WATER SAMPLE I.D. CORRELATION SHEET
GIANT BLOOMFIELD REFINERY
DATE: 01-Jun-88
SAMPLER: T. Le Page

Sample I.D.	Well #	Analysis
8806010347	GBR 24D	601,602 Cations, anions TDS, PAH
8806010530	GBR 30	"
8806021220	GBR 17	"
8806021015	GBR 31	"
8806020105	Tank 24	"
8806020135	Tank 22	"
8806020205	Tank 32	"



GTEL Environmental Laboratories

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MAJOR CATIONS TEST RESULTS

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06/16/88 rw

MANAGER: Michael Wood
Groundwater Technology, Inc.
3620 Wyoming Northeast, Suite 104
Albuquerque, NM 87111

PROJECT#: 232-799-5009-11

LOCATION: Farmington, NM

SAMPLED: 06/01/88 BY: T. LePage
RECEIVED: 06/03/88 BY: J. Floro
ANALYZED: 06/15/88 BY: C. Miller
MATRIX: Water

GER 30 GBR 2AL Tank 20 GBR 31

PARAMETER	UNITS	MDL	LAB #	I.D.#	24480A	24481A	24482A	24483A
					010530	010347	020135	021015
Sodium	mg/L	0.1			578	491	686	769
Potassium	mg/L	1.0			3.3	5.3	3.4	3.5
Calcium	mg/L	0.1			586	500	558	598
Magnesium	mg/L	0.1			50	75	52	51

MDL = Method Detection Limit; compound below this level would not be detected.

METHOD: EPA 3005/6010



GTEL Environmental Laboratories

A division of Groundwater Technology, Inc.

Western Region
4080-C Pike Lane
Concord, CA 94520

(415) 885-7852
(800) 544-3422 from inside California
(800) 423-7143 from outside California

Page 2 of 3

MANAGER: Michael Wood
PROJECT#: 232-799-5009-11
LOCATION: Farmington, NM

MAJOR CATIONS TEST RESULTS

MATRIX: Water

GBR 17 Tank 32 Tank 24 Tank 22

PARAMETER	UNITS	MDL	LAB #	I.D. #	24484A	24485A	24486A	24487A
					021220	020205	020105	020135

Sodium	mg/L	0.1			281	620	700	752
Potassium	mg/L	1.0			1.1	2.9	3.5	3.8
Calcium	mg/L	0.1			411	474	521	579
Magnesium	mg/L	0.1			44	48	50	54

MDL = Method Detection Limit; compound below this level would not be detected.

METHOD: EPA 3005/6010



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7/21/84

Page 1 of 2

06/17/88 rw
MANAGER: Michael Wood
Groundwater Technology, Inc.
3620 Wyoming N.E. Suite 104
Albuquerque, NM 87111

PROJECT#: 232-799-5009-9
LOCATION: Farmington, NM

SAMPLED: 06/01/88 BY: T. LaPage
RECEIVED: 06/03/88 BY: J. Floro
ANALYZED: 06/07/88 BY: R. Haines
MATRIX: Water
UNITS: mg/L

TEST RESULTS

PARAMETER	MDL	LAB # I.D. #	24480 010530	24481 010347	24482 020135	24483 021015	24484 021220
			GBR 30	GBR 295	JNR 22	GBR 31	GBR-17
Total Dissolved Solids	10		3996	3487	4094	4374	2382
Bicarbonate	20		124	130	297	211	140
Carbonate	20		120	120	120	120	120
Chloride	1		370	630	910	850	190
Sulfate	1		2270	1640	1570	1920	1350

MDL = Method Detection Limit; compound below this level would not be detected.

METHOD: TDS by Standard Method 209B
Bicarbonate by Standard Method 403
Carbonate by Standard Method 403
Chloride by Standard Method 429
Sulfate by Standard Method 429

Western Region
4080-C Pike Lane
Concord, CA 94520
(415) 685-7852
(800) 544-3422 from inside California
(800) 423-7143 from outside California

06/29/88 mh

Page 1 of 3

PROJECT MGR: Michael Wood
Groundwater Technology, Inc.
3620 Wyoming N.E. Suite 104
Albuquerque, NM 87111

PROJECT#: 232-799-5009-10

LOCATION: Farmington, NM

SAMPLED: 06/01/88 BY: T. LePage

RECEIVED: 06/03/88 BY: J. Floro

ANALYZED: 06/15/88 BY: P. Sra

MATRIX: Water

UNITS: ug/L (ppb) GBR-24E

GBR-31

TEST RESULTS

COMPOUND	MDL	LAB #	I.D.#	24489	24490	24491	24492
				010530	010347	TRIPBLANK	021015
Benzene	0.5			0.5	63	0.5	0.5
Bromodichloromethane	0.5			0.5	0.5	0.5	0.5
Bromoform	0.5			0.5	0.5	0.5	0.5
Bromomethane	0.5			0.5	0.5	0.5	0.5
Carbon tetrachloride	0.5			0.5	0.5	0.5	0.5
Chlorobenzene	0.5			0.5	0.5	0.5	0.5
Chloroethane	0.5			0.5	0.5	0.5	0.5
2-Chloroethylvinyl ether	1.0			1.0	1.0	1.0	1.0
Chloroform	0.5			0.5	0.5	0.5	0.5
Chloromethane	0.5			0.5	0.5	0.5	0.5
Dibromochloromethane	0.5			0.5	0.5	0.5	0.5
1,2-Dichlorobenzene	0.5			0.5	0.5	0.5	0.5
1,3-Dichlorobenzene	0.5			0.5	1.3	0.5	0.5
1,4-Dichlorobenzene	0.2			0.2	0.2	0.2	0.2
Dichlorodifluoromethane	0.5			0.5	0.5	0.5	0.5
1,1-Dichloroethane	0.5			0.98	0.5	0.5	4.6
1,2-Dichloroethane	0.5			0.5	55	0.5	0.5
1,1-Dichloroethene	0.2			0.2	0.2	0.2	0.2
trans-1,2-Dichloroethene	0.5			1.0	0.5	0.5	53
1,2-Dichloropropane	0.5			0.5	0.5	0.5	0.5
cis-1,3-Dichloropropene	0.5			0.5	0.5	0.5	0.5
trans-1,3-Dichloropropene	0.5			0.5	0.5	0.5	0.5
Ethylbenzene	0.5			0.5	73	0.5	0.5
Methylene chloride	0.5			0.5	0.5	0.5	0.5
1,1,2,2-Tetrachloroethane	0.5			0.5	0.5	0.5	0.5
Tetrachloroethene	0.5			0.61	0.69	0.5	5.0
1,1,1-Trichloroethane	0.5			0.5	0.5	0.5	1.8
1,1,2-Trichloroethane	0.5			0.5	0.5	0.5	0.5
Trichloroethene	0.5			0.52	0.5	0.5	7.6
Trichlorofluoromethane	0.5			0.5	0.5	0.5	0.5
Vinyl Chloride	1.0			1.0	1.0	1.0	1.0
Xylenes	0.5			20	40	0.5	0.5
Toluene	0.5			0.5	11	0.5	0.5

MDL = Method Detection Limit.

METHODS: EPA 8010/8020.

Page 2 of 3

 Western Region
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 Concord, CA 94520
 (415) 685-7852
 (800) 544-3422 from inside California
 (800) 423-7143 from outside California

 PROJECT MGR: Michael Wood
 PROJECT#: 232-799-5009-10
 LOCATION: Farmington, NM
 MATRIX: Water
 UNITS: ug/L (ppb)

TEST RESULTS

GBR-17

Tank 22

Tank 24

COMPOUND	MDL	LAB #	24493	24494	24495	24496
		I.D.#	021220	020205	TripBlank	020105
Benzene	0.5		<0.5	360	<0.5	1100
Bromodichloromethane	0.5		<0.5	<0.5	<0.5	<0.5
Bromoform	0.5		<0.5	<0.5	<0.5	<0.5
Bromomethane	0.5		<0.5	<0.5	<0.5	<0.5
Carbon tetrachloride	0.5		<0.5	<0.5	<0.5	<0.5
Chlorobenzene	0.5		<0.5	<0.5	<0.5	<0.5
Chloroethane	0.5		<0.5	<0.5	<0.5	<0.5
2-Chloroethylvinyl ether	1.0		<1.0	<1.0	<1.0	<1.0
Chloroform	0.5		<0.5	<0.5	<0.5	<0.5
Chloromethane	0.5		<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	0.5		<0.5	<0.5	<0.5	<0.5
1,2-Dichlorobenzene	0.5		<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	0.5		<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	0.2		<0.2	<0.2	<0.2	<0.2
Dichlorodifluoromethane	0.5		<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethane	0.5		<0.5	12	<0.5	8.0
1,2-Dichloroethane	0.5		<0.5	10	<0.5	130
1,1-Dichloroethane	0.2		<0.2	0.51	<0.2	0.61
trans-1,2-Dichloroethane	0.5		<0.5	10	<0.5	13
1,2-Dichloropropane	0.5		<0.5	<0.5	<0.5	<0.5
cis-1,3-Dichloropropene	0.5		<0.5	<0.5	<0.5	<0.5
trans-1,3-Dichloropropene	0.5		<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.5		<0.5	82	<0.5	2.5
Methylene chloride	0.5		<0.5	<0.5	<0.5	<0.5
1,1,2,2-Tetrachloroethane	0.5		<0.5	<0.5	<0.5	<0.5
Tetrachloroethane	0.5		<0.5	1.5	<0.5	1.0
1,1,1-Trichloroethane	0.5		3.1	2.3	<0.5	5.5
1,1,2-Trichloroethane	0.5		<0.5	<0.5	<0.5	<0.5
Trichloroethane	0.5		<0.5	4.9	<0.5	4.1
Trichlorofluoromethane	0.5		<0.5	<0.5	<0.5	<0.5
Vinyl Chloride	1.0		<1.0	<1.0	<1.0	<1.0
Xylenes	0.5		<0.5	300	<0.5	1300
Toluene	0.5		<0.5	15	<0.5	940

 MDL = Method Detection Limit.
 METHODS: EPA 8010/8020.



GTEL Environmental Laboratories

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Western Region
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07/14/88 MH

Page 1 of 3

RECEIVED
7/21/88

CLIENT: Michael Wood
Groundwater Technology, Inc.
3620 Wyoming Northeast #104
Albuquerque, NM 87111
PROJECT#: 232-799-5009-17
LOCATION: Farmington, NM
SAMPLED: 06/1, 2/88 BY: T. LePage
RECEIVED: 06/27/88 BY: K. Biava
ANALYZED: 7/6-8, 11/88 BY: L. Hinson
MATRIX: Water
UNITS: ug/L

TEST RESULTS

COMPOUNDS	MDL	LAB #	24480C	24481C	24482C	24483C
	I.D.#		010530	010347	020135	021015
Acenaphthene	10		<10	<10	<10	<10
Acenaphthylene	10		<10	<10	<10	<10
Anthracene	10		<10	<10	<10	<10
Benzo (a) anthracene	10		<10	<10	<10	<10
Benzo (a) pyrene	10		<10	<10	<10	<10
Benzo (b) fluoranthene	10		<10	<10	<10	<10
Benzo (ghi) perylene	10		<10	<10	<10	<10
Benzo (k) fluoranthene	10		<10	<10	<10	<10
Chrysene	10		<10	<10	<10	<10
Dibenzo (a,h) anthracene	10		<10	<10	<10	<10
Fluoranthene	10		<10	<10	<10	<10
Fluorene	10		<10	<10	<10	<10
Indeno (1,2,3-cd) pyrene	10		<10	<10	<10	<10
Naphthalene	10		<10	<10	<10	<10
Phenanthrene	10		<10	<10	<10	<10
Pyrene	10		<10	<10	<10	<10

MDL=Method Detection Limit.
METHOD: EPA Method 610.



GTEL Environmental Laboratories

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7/21/93

Page 2 of 3

Western Region
4080-C Pike Lane
Concord, CA 94520
(415) 685-7852
(800) 544-3422 from inside California
(800) 423-7143 from outside California

CLIENT: Michael Wood
PROJECT#: 232-799-5009-17
LOCATION: Farmington, NM

TEST RESULTS		MATRIX: Water					
		UNITS: ug/L		GRR-17 Tank 32 Tank 34 Tank 2			
COMPOUNDS	MDL	LAB #		24484C	24485C	24486C	24487C
	I.D.#			021220	020205	020105	020135
Acenaphthene	10			<10	<10	<10	<10
Acenaphthylene	10			<10	<10	<10	<10
Anthracene	10			<10	<10	<10	<10
Benzo (a) anthracene	10			<10	<10	<10	<10
Benzo (a) pyrene	10			<10	<10	<10	<10
Benzo (b) fluoranthene	10			<10	<10	<10	<10
Benzo (ghi) perylene	10			<10	<10	<10	<10
Benzo (k) fluoranthene	10			<10	<10	<10	<10
Chrysene	10			<10	<10	<10	<10
Dibenzo (a,h) anthracene	10			<10	<10	<10	<10
Fluoranthene	10			<10	<10	<10	<10
Fluorene	10			<10	<10	<10	<10
Indeno (1,2,3-cd) pyrene	10			<10	<10	<10	<10
Naphthalene	10			<10	42	39	10
Phenanthrene	10			<10	<10	<10	<10
Pyrene	10			<10	<10	<10	<10

MDL=Method Detection Limit.
METHOD: EPA Method 610.

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

LABORATORY SAMPLE RECORD

PROJ. NO.	PROJECT NAME	NO. OF CON. TAINERS	REMARKS
SAMPLERS: (Signature) Boyer, Olson			
DATE	TIME	STATION LOCATION	
861120	1440	GBR-29	
	1515	GBR-11	
	1545	GBR-6	
	1615	GBR-7	
	1640	GBR-5	
	1711	GBR-20	
	1735	GBR-13	
861121	0820	GBR-9	
	0845	GBR-10	
	0930	GBR-30	
	0945	GBR-24 Shallow	
	1105	GBR-24 Deep	
	1135	GBR-14	
	1205	GBR-31	
	1220	GBR-27	
Relinquished by: (Signature) Olson, SLD		Date / Time 11/28/87 4PM	Received by: (Signature)
Relinquished by: (Signature)		Date / Time	Received by: (Signature)
Relinquished by: (Signature)		Date / Time	Received for Laboratory by: (Signature)
		Date / Time	Remarks

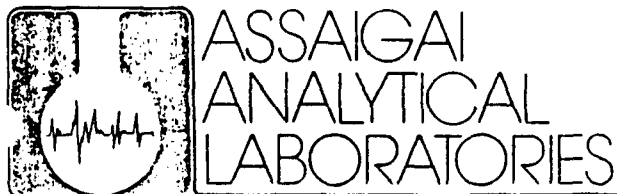
sent to Giant, EID, GeoSci. 2/3/87 H/R

STATE OF NEW MEXICO

[illegible]

The above is a listing of
Grant refinery / Lee Hovey samples
by OXID 11 / 26-21/86 call is missing
any results. A.G. Bowers

Outbullen: Original Accompanies Shipment; Copy to Coordinator Field File



TO: Geoscience Consultants Ltd.
Attn: Claude Schleyer
500 Copper NW Suite 325
Albuquerque, NM 87158

DATE: 17 December 1986
1919

SAMPLE ID: 1107861420 *Sample 1107861420*

ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMIT
Benzene	0.007 mg/l	0.001 mg/l
Chlorobenzene	<0.001 mg/l	0.001 mg/l
1,2-Dichlorobenzene	<0.001 mg/l	0.001 mg/l
1,3-Dichlorobenzene	<0.001 mg/l	0.001 mg/l
1,4-Dichlorobenzene	<0.001 mg/l	0.001 mg/l
Ethylbenzene	<0.001 mg/l	0.001 mg/l
Toluene	<0.001 mg/l	0.001 mg/l
Xylenes	<0.001 mg/l	0.001 mg/l
Acrolein	<25 ug/l	25 ug/l
Acrylonitrile	<25 ug/l	25 ug/l
Bromoform	<5.0 ug/l	5.0 ug/l
Carbon Tetrachloride	<5.0 ug/l	5.0 ug/l
Chlorodibromomethane	<5.0 ug/l	5.0 ug/l
Chloroethane	<5.0 ug/l	5.0 ug/l
2-Chloroethylvinyl Ether	<5.0 ug/l	5.0 ug/l
Chloroform	<5.0 ug/l	5.0 ug/l
Dichlorobromomethane	<5.0 ug/l	5.0 ug/l
1,1-Dichloroethane	<5.0 ug/l	5.0 ug/l
1,2-Dichloroethane	<5.0 ug/l	5.0 ug/l
1,1-Dichloroethene	<5.0 ug/l	5.0 ug/l
1,2-Dichloropropane	<5.0 ug/l	5.0 ug/l
1,3-Dichloropropylene	<5.0 ug/l	5.0 ug/l
Methyl Bromide	<5.0 ug/l	5.0 ug/l
Methyl Chloride	<5.0 ug/l	5.0 ug/l
Methylene Chloride	<5.0 ug/l	5.0 ug/l
1,1,2,2-Tetrachloroethane	<5.0 ug/l	5.0 ug/l
Tetrachloroethene	<5.0 ug/l	5.0 ug/l
Trans-1,2-Dichloroethene	<5.0 ug/l	5.0 ug/l
1,1,1-Trichloroethane	<5.0 ug/l	5.0 ug/l
1,1,2-Trichloroethane	<5.0 ug/l	5.0 ug/l
Trichloroethene	<5.0 ug/l	5.0 ug/l
Vinyl Chloride	<5.0 ug/l	5.0 ug/l

REFERENCE: "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," USEPA, SW 846, EMSL-Cincinnati, 1982.



TO: Geoscience Consultants Ltd.
 Attn: Claude Schleyer
 500 Copper NW Suite 325
 Albuquerque, NM 87158

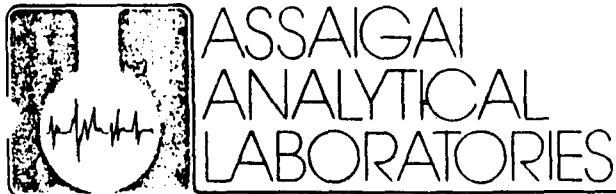
DATE: 17 December 1986
 1919

SAMPLE ID: 1107861410

*from jet
pump hoses*

ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMIT
Benzene	0.002 mg/l	0.001 mg/l
Chlorobenzene	<0.001 mg/l	0.001 mg/l
1,2-Dichlorobenzene	<0.001 mg/l	0.001 mg/l
1,3-Dichlorobenzene	<0.001 mg/l	0.001 mg/l
1,4-Dichlorobenzene	<0.001 mg/l	0.001 mg/l
Ethylbenzene	<0.001 mg/l	0.001 mg/l
Toluene	<0.001 mg/l	0.001 mg/l
Xylenes	<0.001 mg/l	0.001 mg/l
Acrolein	<25 ug/l	25 ug/l
Acrylonitrile	<25 ug/l	25 ug/l
Bromoform	<5.0 ug/l	5.0 ug/l
Carbon Tetrachloride	<5.0 ug/l	5.0 ug/l
Chlorodibromomethane	<5.0 ug/l	5.0 ug/l
Chloroethane	<5.0 ug/l	5.0 ug/l
2-Chloroethylvinyl Ether	<5.0 ug/l	5.0 ug/l
Chloroform	<5.0 ug/l	5.0 ug/l
Dichlorobromomethane	<5.0 ug/l	5.0 ug/l
1,1-Dichloroethane	<5.0 ug/l	5.0 ug/l
1,2-Dichloroethane	7.1 ug/l	5.0 ug/l
1,1-Dichloroethene	<5.0 ug/l	5.0 ug/l
1,2-Dichloropropane	<5.0 ug/l	5.0 ug/l
1,3-Dichloropropylene	<5.0 ug/l	5.0 ug/l
Methyl Bromide	<5.0 ug/l	5.0 ug/l
Methyl Chloride	<5.0 ug/l	5.0 ug/l
Methylene Chloride	<5.0 ug/l	5.0 ug/l
1,1,2,2-Tetrachloroethane	<5.0 ug/l	5.0 ug/l
Tetrachloroethene	<5.0 ug/l	5.0 ug/l
Trans-1,2-Dichloroethene	<5.0 ug/l	5.0 ug/l
1,1,1-Trichloroethane	<5.0 ug/l	5.0 ug/l
1,1,2-Trichloroethane	<5.0 ug/l	5.0 ug/l
Trichloroethene	<5.0 ug/l	5.0 ug/l
Vinyl Chloride	<5.0 ug/l	5.0 ug/l

REFERENCE: "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," USEPA, SW 846, EMSL-Cincinnati, 1982.



TO: Geoscience Consultants Ltd.
 Attn: Claude Schleyer
 500 Copper NW Suite 325
 Albuquerque, NM 87158

DATE: 17 December 1986
 1919

SAMPLE ID: 1107861400

*base of
 samples*

ANALYTE	ANALYTICAL RESULTS	NOMINAL DETECTION LIMIT
Benzene	<0.001 mg/l	0.001 mg/l
Chlorobenzene	<0.001 mg/l	0.001 mg/l
1,2-Dichlorobenzene	<0.001 mg/l	0.001 mg/l
1,3-Dichlorobenzene	<0.001 mg/l	0.001 mg/l
1,4-Dichlorobenzene	<0.001 mg/l	0.001 mg/l
Ethylbenzene	<0.001 mg/l	0.001 mg/l
Toluene	<0.001 mg/l	0.001 mg/l
Xylenes	<0.001 mg/l	0.001 mg/l
Acrolein	<25 ug/l	25 ug/l
Acrylonitrile	<25 ug/l	25 ug/l
Bromoform	<5.0 ug/l	5.0 ug/l
Carbon Tetrachloride	<5.0 ug/l	5.0 ug/l
Chlorodibromomethane	<5.0 ug/l	5.0 ug/l
Chloroethane	<5.0 ug/l	5.0 ug/l
2-Chloroethylvinyl Ether	<5.0 ug/l	5.0 ug/l
Chloroform	<5.0 ug/l	5.0 ug/l
Dichlorobromomethane	<5.0 ug/l	5.0 ug/l
1,1-Dichloroethane	<5.0 ug/l	5.0 ug/l
1,2-Dichloroethane	6.3 ug/l	5.0 ug/l
1,1-Dichloroethene	<5.0 ug/l	5.0 ug/l
1,2-Dichloropropane	<5.0 ug/l	5.0 ug/l
1,3-Dichloropropylene	<5.0 ug/l	5.0 ug/l
Methyl Bromide	<5.0 ug/l	5.0 ug/l
Methyl Chloride	<5.0 ug/l	5.0 ug/l
Methylene Chloride	<5.0 ug/l	5.0 ug/l
1,1,2,2-Tetrachloroethane	<5.0 ug/l	5.0 ug/l
Tetrachloroethene	<5.0 ug/l	5.0 ug/l
Trans-1,2-Dichloroethene	<5.0 ug/l	5.0 ug/l
1,1,1-Trichloroethane	<5.0 ug/l	5.0 ug/l
1,1,2-Trichloroethane	<5.0 ug/l	5.0 ug/l
Trichloroethene	<5.0 ug/l	5.0 ug/l
Vinyl Chloride	<5.0 ug/l	5.0 ug/l

REFERENCE: "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," USEPA, SW 846, EMSL-Cincinnati, 1982.

In August, 1989, the Bureau of Land Management ("BLM") requested that Giant provide all well and soil sample data collected by Giant on its property. In response, Giant provided BLM with extensive information concerning Giant's investigation of soil and ground water conditions south of the Lee Acres Landfill. In transmitting this information to BLM and the Oil Conservation Division, Giant noted that the only well and soil sample data not provided related to an investigation conducted by Groudwater Technology, Inc. The data were collected from boreholes for the purpose of providing background information about the site. The following pages of the report contain the data from that investigation.



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12-22-87 MH

Page 1 of 2

PROJECT MGR: Tom Fox
Groundwater Technology, Inc.
6879 S. Emporia
Englewood, CO 80112

PROJECT #: 238-799-5009-4

LOCATION: Farmington, NM

SAMPLED: 12-15/15-87 **BY:** M. Wood

RECEIVED: 12-18-87 **BY:** K. Biava

ANALYZED: 12-19-87 **BY:** J. Floro

MATRIX: Water

TEST RESULTS (ppb)

COMPOUNDS	MDL	LAB # I.I.D.#	11071 TH-8	11056 TH-9	11057 TH-11	11058 TH-12	11059 TH-13
Benzene	0.5		1	1	<0.5	<0.5	<0.5
Ethylbenzene	0.5		<0.5	1	<0.5	<0.5	18
Toluene	0.5		2	3	<0.5	<0.5	1
Xylenes	0.5		<0.5	5	<0.5	<0.5	58
Total BTEX	0.5		3	10	<0.5	<0.5	77
Misc. Hydrocarbons (C4-12)	1		5	13	<1	<1	380
Total Petroleum Hydrocarbons as Gasoline	1		8	23	<1	<1	460

MDL = Method Detection Limit; compounds below this level would not be detected.

Results rounded to two significant figures.

METHODS: Modified EPA 5030/8015/8020.



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Page 2 of 2

PROJECT MGR: Tom Fox

PROJECT #: 230-799-5009-4

LOCATION: Farmington, NM

TEST RESULTS

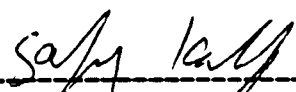
(ppb)

COMPOUNDS	MDL	LAB # I.I.D.#	11060 TH-14	11061 TH-15
Benzene	0.5		2	70
Ethylbenzene	0.5		2	13
Toluene	0.5		1	6
Xylenes	0.5		8	70
Total BTEX	0.5		13	160
Misc. Hydrocarbons (C4-C12)	1		25	8600
Total Petroleum Hydrocarbons as Gasoline	1		38	8800

Results rounded to two significant figures.

MDL = Method Detection Limit; compound below this level would not be detected.

METHODS: Modified EPA 5030/8015/8020.


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12-22-87 MH

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PROJECT MGR: Tom Fox
Groundwater Technology, Inc.
6879 S. Emporia, #4
Englewood, CO 80112

PROJECT #: 230-799-5009-5

LOCATION: Farmington, NM

SAMPLED: 12-11/15/87 BY: M. Wood

RECEIVED: 12-18-87 BY: K. Biava

ANALYZED: 12-21-87 BY: E. Popek

MATRIX:

TEST RESULTS		(ppb)					
COMPOUND		MDL	LAB #	11072	11073	11074	11075
			I.I.D.#	TH-8	TH-9	TH-11	TH-12
Bromodichloromethane		0.5		0.5	0.5	0.5	0.5
Bromoform		0.5		0.5	0.5	0.5	0.5
Bromomethane		0.5		0.5	0.5	0.5	0.5
Carbon tetrachloride		0.5		0.5	0.5	0.5	0.5
Chlorobenzene		0.5		0.5	0.5	0.5	0.5
Chloroethane		0.5		20	0.5	0.5	0.5
2-Chloroethylvinyl ether		1.0		1.0	1.0	1.0	1.0
Chloroform		2.0		2.0	2.0	2.0	2.0
Chloromethane		0.5		0.5	0.5	0.5	0.5
Dibromochloromethane		0.5		0.5	0.5	0.5	0.5
1,2-Dichlorobenzene		0.5		0.5	0.5	0.5	0.5
1,3-Dichlorobenzene		0.5		0.5	0.5	0.5	0.5
1,4-Dichlorobenzene		0.5		0.5	0.5	0.5	0.5
1,1-Dichloroethane		0.5		12	0.5	0.5	0.5
1,2-Dichloroethane		0.5		0.5	0.5	0.5	0.5
1,1-Dichloroethene		0.2		0.2	0.2	0.2	6.0
trans-1,2-Dichloroethene		2.0		2.0	2.0	2.0	2.0
1,2-Dichloropropane		0.5		0.5	0.5	0.5	0.5
cis-1,3-Dichloropropene		0.5		0.5	0.5	0.5	0.5
trans-1,3-Dichloropropene		0.5		0.5	0.5	0.5	0.5
Methylene chloride		2.0		7.0	7.0	8	28
1,1,2,2-Tetrachloroethane		0.5		0.5	0.5	0.5	0.5
Tetrachloroethene		0.5		0.5	0.5	0.5	1.0
1,1,1-Trichloroethane		0.5		1.0	0.5	0.5	0.5
1,1,2-Trichloroethane		0.5		0.5	0.5	0.5	0.5
Trichloroethene		0.5		0.5	0.5	0.5	0.5
Trichlorofluoromethane		0.5		0.5	0.5	0.5	0.5
Vinyl Chloride		1.0		1.0	1.0	1.0	1.0

MDL = Method Detection Limit.
METHOD: EPA 8010.

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PROJECT MGR: Tom Fox
PROJECT ID#: 230-799-5009-5
LOCATION: Farmington, NM

TEST RESULTS		(ppb)					
COMPOUND	MDL	LAB # I.I.D. #	11076 TH-13	11077 TH-14	11078 TH-15		
Bromodichloromethane	0.5		0.5	0.5	0.5		
Bromoform	0.5		0.5	0.5	0.5		
Bromomethane	0.5		0.5	0.5	0.5		
Carbon tetrachloride	0.5		0.5	0.5	0.5		
Chlorobenzene	0.5		0.5	0.5	0.5		
Chloroethane	0.5		0.5	0.5	0.5		
2-Chloroethylvinyl ether	1.0		1.0	1.0	1.0		
Chloroform	2.0		2.0	2.0	2.0		
Chloromethane	0.5		0.5	0.5	0.5		
Dibromochloromethane	0.5		0.5	0.5	0.5		
1,2-Dichlorobenzene	0.5		0.5	0.5	0.5		
1,3-Dichlorobenzene	0.5		0.5	0.5	0.5		
1,4-Dichlorobenzene	0.5		0.5	0.5	0.5		
1,1-Dichloroethane	0.5		16	0.5	8.0		
1,2-Dichloroethane	0.5		2.0	0.5	54		
1,1-Dichloroethene	0.2		0.2	0.2	0.2		
trans-1,2-Dichloroethene	2.0		23	2.0	2.0		
1,2-Dichloropropane	0.5		0.5	0.5	0.5		
cis-1,3-Dichloropropene	0.5		0.5	0.5	0.5		
trans-1,3-Dichloropropene	0.5		0.5	0.5	0.5		
Methylene chloride	2.0		31	10	10		
1,1,2,2-Tetrachloroethane	0.5		0.5	0.5	0.5		
Tetrachloroethene	0.5		12	0.5	7.0		
1,1,1-Trichloroethane	0.5		9.0	0.5	0.5		
1,1,2-Trichloroethane	0.5		0.5	0.5	0.5		
Trichloroethene	0.5		7.0	0.5	4.0		
Trichlorofluoromethane	0.5		0.5	0.5	0.5		
Vinyl Chloride	1.0		1.0	1.0	1.0		

MDL = Method Detection Limit.
METHOD: EPA 8010.

Safy Khalifa
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1/07/88 rw
PROJECT MGR: Tom Fox
Groundwater Technology, Inc.
6879 S. Emporia
Englewood, CO 80112
PROJECT #: 230-799-5009-3
LOCATION: Farmington, NM
SAMPLED: 12/11-15/87 BY: M. Wood
RECEIVED: 12/18/87 BY: K. Biava
ANALYZED: 12/25/87 BY: L. Hinson
MATRIX: Soil R. Craven

TEST RESULTS ppm (mg/kg)

PARAMETER	MDL	I.D.#	LAB #					
			I.D.#					

Total Petroleum	5	< 5	< 5	< 5	< 5
Hydrocarbons as					
Diesel					

MDL = Method Detection Limit.
METHOD: Modified 8270/3550.

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PROJECT MGR: Tom Fox

PROJECT #:230-799-5009-3

LOCATION: Farmington, NM

TEST RESULTS		(ppm)			
PARAMETER	MDL	LAB #	11066C	11067C	11068C
		I.D.#	16-20	6-20	9-30
					11069C
					13-35
Total Petroleum	5		1500	< 5	< 5
Hydrocarbons as					450
Diesel					

MDL = Method Detection Limit.

METHOD: Modified 8270/3550.

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PROJECT MGR: Tom Fox

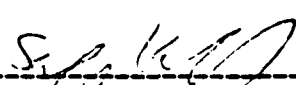
PROJECT #: 230-799-5009-3

LOCATION: Farmington, NM

TEST RESULTS		(ppm)
PARAMETER	MDL	LAB # I.D.#
		11070C 15-30

Total Petroleum 5 < 5
Hydrocarbons as
Diesel

MDL = Method Detection Limit.
METHOD: Modified 8270/3550.


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12/30/87 rw
PROJECT MGR: Tom Fox
Groundwater Technology, Inc.
6879 S. Emporia
Englewood, CO 80112
PROJECT #: 230-799-5009-6
LOCATION: Farmington, NM
SAMPLED: 12/11-15/87 BY: M. Wood
RECEIVED: 12/18/87 BY: K. Biava
ANALYZED: 12/29/87 BY: L. Hinson
MATRIX: Water R. Craven

TEST RESULTS		(ppb)							
PARAMETER	MDL	LAB #	I.D. #	11079	11080	11081	11082		
				TH-8	TH-9	TH-11	TH-12		
Total Petroleum	250			(250	(250	(250	(250		
Hydrocarbons as									
Diesel									

MDL = Method Detection Limit.
METHOD: Modified 625/3510.

Western Region

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(800) 423-7143 *from outside California*

PROJECT MGR: Tom Fox

PROJECT #: 230-799-5009-6

LOCATION: Farmington, NM

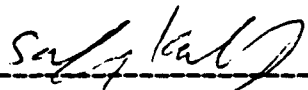
TEST RESULTS (ppb)

PARAMETER	MDL	LAB #	11083	11084	11085	
		I.D. #	TH-13	TH-14	TH-15	

Total Petroleum	250	< 250	< 250	< 250
Hydrocarbons as Diesel				

MDL = Method Detection Limit.

METHOD: Modified 625/3510.


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PROJECT MGR: Tom Fox
Groundwater Technology, Inc.
6879 S. Emporia, #4
Englewood, CO 80112

PROJECT #: 230-799-5009-7

LOCATION: Farmington, NM

SAMPLED: 12-11/15-87

BY: M. Wood

RECEIVED: 12-18-87

BY: K. Biava

ANALYZED: 12-30-87

BY: C. Miller

MATRIX: Water

P. Voitoff

TEST RESULTS

PARAMETER	MDL	LAB #	11086	11087	11088
		I.D. #	TH-9	TH-11	TH-12
pH			7.5	7.4	7.5
Methyl Orange Alkalinity (mg CaCO ₃ /L)	10		184	202	194
Calcium Hardness (mg CaCO ₃ /L)	1		1750	1200	1350
TDS (mg/L)	10		5810	2670	3040

MDL = Method Detection Limit.

METHODS: pH by Standard Method 423, Ion Specific Electrode

Alkalinity by Standard Method 403 (Total Alkalinity calculations)

TDS by Standard Method 209B.

Calcium Hardness by Standard Method 314A, RCRA 6010.

Western Region

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PROJECT MGR: Tom Fox

PROJECT #: 230-799-5009-7

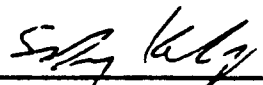
LOCATION: Farmington, NM

TEST RESULTS

PARAMETER	MDL	LAB #	11089	11090	
		I.D.#	TH-13	TH-14	
pH			7.0	7.7	
Methyl Orange Alkalinity (mg CaCO ₃ /L)	10		300	137	
Calcium Hardness (mg CaCO ₃ /L)	1		800	1200	
TDS (mg/L)	10		4560	4030	

MDL = Method Detection Limit.

METHODS: pH by Standard Method 423, Ion Specific Electrode
Alkalinity by Standard Method 403 (Total Alkalinity calculations)
TDS by Standard Method 209B
Calcium Hardness by Standard Method 314A, RCRA 6010


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1/04/88 rw
PROJECT MGR: Tom Fox
Groundwater Technology, Inc.
6879 S. Emporia, #4
Englewood, CO 80112
PROJECT #: 230-799-5009-2
LOCATION: Farmington, NM
SAMPLED: 12/11-14/87 **BY:** M. Wood
RECEIVED: 12-18-87 **BY:** K. Biava
ANALYZED: 12-23-87 **BY:** K. Patton
MATRIX: Soil

TEST RESULTS (mg/kg = ppm)

COMPOUNDS	MDL	LAB # I.I.D.#	11062B 14-45	11063B 8-30	11064B 12-30	11065B 11-30	11066B 16-20
Benzene	0.5		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Ethylbenzene	0.5		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Toluene	0.5		< 0.5	< 0.5	< 0.5	< 0.5	1
Xylenes	0.5		< 0.5	< 0.5	< 0.5	< 0.5	3
Total BTEX	0.5		< 0.5	< 0.5	< 0.5	< 0.5	4
Misc. Hydrocarbons (C4-12)	1.0		4	4	< 1.0	< 1.0	360
Total Petroleum Hydrocarbons as Gasoline	1.0		4	4	< 1.0	< 1.0	370

MDL = Method Detection Limit; compounds below this level would not be detected.

Results rounded to two significant figures.

METHODS: Modified EPA Methods 5030/8015/8020.

Western Region

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PROJECT MGR: Tom Fox

PROJECT #: 230-799-5009-2

LOCATION: Farmington, NM

TEST RESULTS

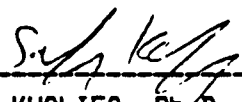
(mg/kg = ppm)

COMPOUNDS	MDL	LAB #	11067B	11068B	11069B	11070B
		I.D. #	6-20	9-30	13-35	15-30
Benzene	0.5		< 0.5	< 0.5	< 0.5	< 0.5
Ethylbenzene	0.5		< 0.5	< 0.5	2	< 0.5
Toluene	0.5		< 0.5	< 0.5	< 0.5	< 0.5
Xylenes	0.5		< 0.5	< 0.5	15	< 0.5
Total BTEX	0.5		< 0.5	< 0.5	17	< 0.5
Misc. Hydrocarbons (C4-C12)	1.0		< 1.0	< 1.0	410	< 1.0
Total Petroleum Hydrocarbons as Gasoline	1.0		< 1.0	< 1.0	430	< 1.0

Results rounded to two significant figures.

MDL = Method Detection Limit; compound below this level would not be detected.

METHODS: Modified EPA Methods 5030/8020/8015.


SAFY KHALIFA, Ph.D., Director

DATE	6	29	14	27	28	22			
1-21-87		68979	27240	19416	29698				
1-22-87		68979	27297	19477	29925				
1-23-87		68979	27297	20365	30553				
1-26-87		68979	28315	20575	32904				
1-27-87		68979	29768	20575	33675				
1-28-87		68979	31256	20575	33897				
1-29-87		68979	32559	20581	33898				
1-30-87		68979	33924	20581	33898				
2-2-87		68979	37965	20581	33899				
2-3-87		68979	39354	20581	33900	ON			
2-4-87	ON	68987	40838	22053	34510	ON			
2-5-87	ON	69449	41679	22255	34792	ON			
2-6-87	ON	69864	42976	22338	35169	ON			
		885	15136	2911	5471				
2-9-87	ON	69872	43265	22339	35329	ON			
2-10-87	ON	70315	44629	22541	36150	ON			
2-11-87	ON	70606	46108	22813	37019	ON			
2-12-87	ON	71068	47486	22952	37809	ON			
2-13-87	ON	71490	48841	22952	38601	ON			
Gals/cycle		1.0	.9	1.0	.8				
Depth below									
static water level		≈ 2"	7.5'	8.0'	0.6'	≈ 2'			
at pump suction									
2-4-87	10'1" at 1	10:10 AM							

UNPUBLISHED RECORDS
SUBJECT TO REVISION

UNPUBLISHED RECORDS
SUBJECT TO REVISION

UNPUBLISHED RECORDS
SUBJECT TO REVISION

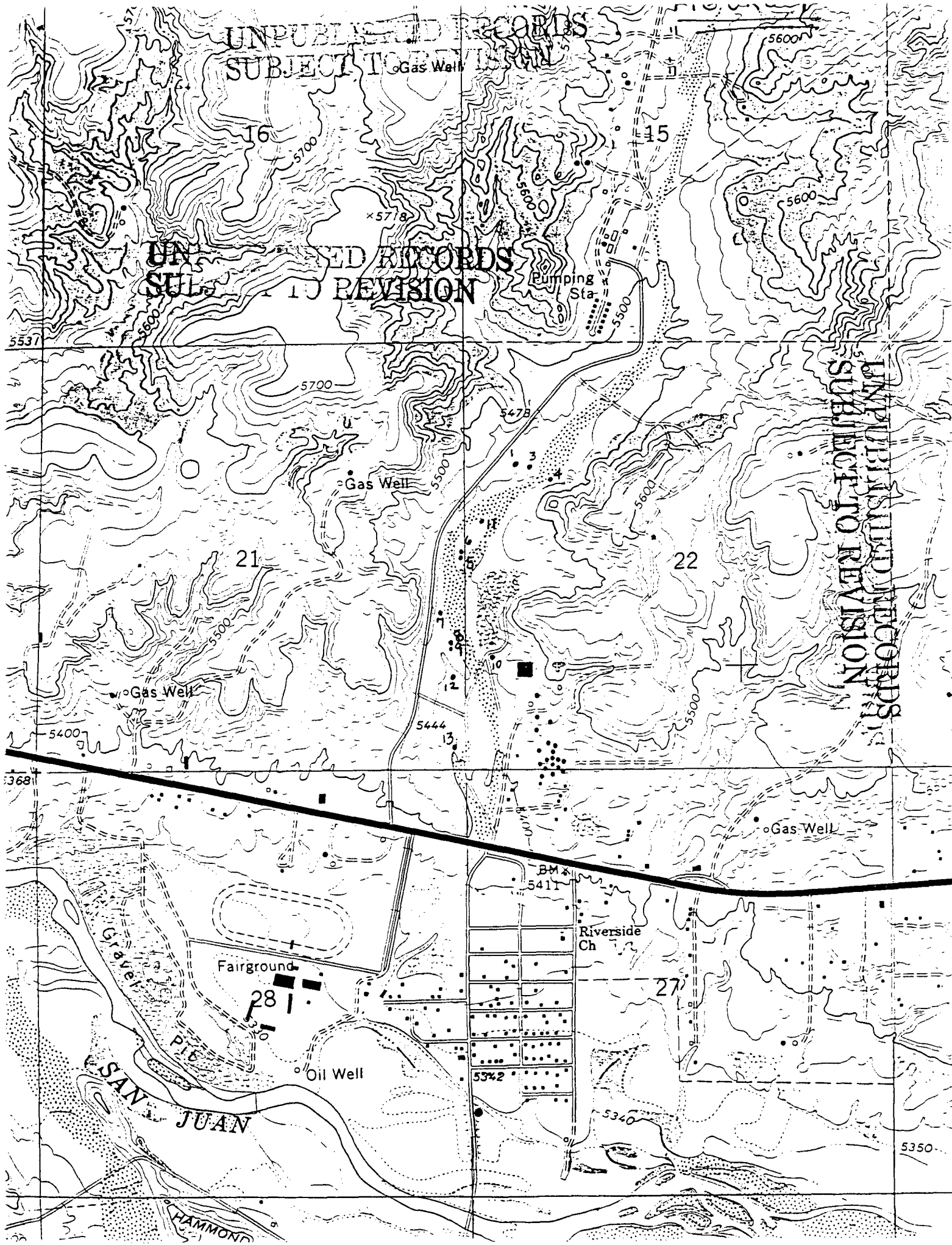


Table 1.--Hole and well data. (Depths in feet below land surface. Altitude in feet above NGVD of 1

UNPUBLISHED RECORDS
SUBJECT TO REVISION

Number on fig. 1	Location	Altitude of measuring point	Total hole depth, in feet	Thickness of alluvium, in feet	Depth to water in feet	Remarks
1	29N.12W.22.1312	5,470	31.5	31.5	Dry	Bottom at sandstone. Plugged and abandoned.
3	29N.12W.22.1321	5,460	61.5	61.5	34.8	Cased to 57.3 feet below land surface. Measuring point 3.5 feet above land surface.
4	29N.12W.22.1324	5,460	15.2	13.7	Dry	Bottom in increasingly consolidated sandstone. Plugged and abandoned.
5	29N.12W.21.4222A	5,440	55.0	45.5	33.2	Bottom in 9.5 feet sandy clay. Cased to 54.0 feet below land surface. Measuring point 1.3 feet above land surface.
6	29N.12W.21.4222B	5,440	46.5	46.5	33.1	Cased to 43.7 feet below land surface. Measuring point 1.5 feet above land surface.
7	29N.12W.21.4242	5,425.27	20.5	18.0	Dry	Plugged and abandoned.
8	29N.12W.21.4244A	5,421.56	42.5	42.3	32.0	Bottom in tough clay. Cased to 43.4 feet below land surface. Measuring point 1.8 feet above land surface.
9	29N.12W.21.4244B	5,421.56	50.5	40.5	Dry	Bottom at sandstone.
10	29N.12W.22.3133	5,418.72	19.6	15.5	Dry	Bottom in silt streaked with red clay.
11	29N.12W.22.1331	5,450	52.5	52.0	34.8	Bottom in tough clay. Cased to 48.8 feet below land surface. Measuring point 1.5 feet above land surface.
12	29N.12W.21.4422	5,411.01	43.5	40.0	26.8	Bottom in tough clay. Cased to 44.0 feet below land surface. Measuring point 1.2 feet above land surface.
13	29N.12W.21.4444	5,402.16	57.0	54.5	26.6	Bottom in liquid clay-sand mixture over hard clay. Cased to 32.1 feet with no blank beneath screen, no sand pack.

09355500 SAN JUAN RIVER NEAR ARCHULETA, NM

LOCATION.--Lat 36°48'05", long 107°41'51", in N sec.20, T.30 N., R.8 W., San Juan County, Hydrologic Unit 14080101, on left bank 0.5 mi upstream from Gobernador Canyon, 0.8 mi northeast of Archuleta, 7.2 mi downstream from Navajo Dam, and at mile 291.4.

DRAINAGE AREA.--3,260 mi², approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--December 1954 to current year.

REVISED RECORDS.--The annual runoff for the 1958 water year as published in table 2, WSP 1733, is 455,000 acre-ft. The correct value is 1,455,000 acre-ft.

GAGE.--Water-stage recorder. Elevation of gage is 5,653 ft above National Geodetic Vertical Datum of 1929, from river-profile survey. Prior to Dec. 29, 1959, at site 5.0 mi upstream at elevation 55 ft higher. Dec. 29, 1959 to Nov. 15, 1964, at site 0.4 mi upstream at elevation 5 ft higher. Prior to Nov. 28, 1966, at elevation 2.0 ft higher.

REMARKS.--No estimated daily discharges. Water-discharge records good. Flow completely regulated by Navajo Reservoir (station 09355100) 7 mi upstream except for minor inflow from 30 mi² intervening drainage area. Highwater diversions through Azotes tunnel (station 08284160) into Rio Grande Basin began in March 1971. Diversions for irrigation of about 47,000 acres upstream from station. Releases from Navajo Reservoir, beginning in January 1976, for use on Navajo Indian Irrigation Project bypass gage in tunnel on left bank. See tabulation below for monthly and annual releases as provided by U.S. Bureau of Reclamation.

AVERAGE DISCHARGE.--7 years (water years 1956-62), 1,304 ft³/s, 944,700 acre-ft/yr, prior to closure of Navajo Dam. 23 years (water years 1963-85), 1,180 ft³/s, 854,900 acre-ft/yr, since closure of Navajo Dam.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 18,900 ft³/s, July 27, 1957, gage height, 11.00 ft, site and datum then in use; minimum determined, 8 ft³/s, Feb. 28, 1963. Maximum discharge since construction of Navajo Dam in 1962, 6,500 ft³/s, June 20, 1965, gage height, 4.57 ft.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 5,120 ft³/s, May 23, 30; minimum daily, 536 ft³/s, Oct. 30.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1984 TO SEPTEMBER 1985
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1120	1410	1800	1830	2150	1240	3190	4420	4590	3410	1590	1500
2	1120	1420	1800	1830	2150	1370	3200	4800	4600	2560	1590	1500
3	1130	1420	1800	1830	2150	1370	3210	4870	4610	2010	1590	1500
4	1120	1420	1800	1830	2160	1690	3400	4860	4600	2120	1590	1500
5	1120	1430	1810	1830	2310	2270	3650	4860	4620	2010	1240	1490
6	1120	1430	1810	1830	2500	2380	3660	4870	4640	1770	707	1490
7	1120	1430	1810	1460	2500	2400	3630	4880	4660	1780	781	1480
8	1120	1430	1810	951	2500	2400	3630	4860	4700	1780	773	1480
9	1250	1420	1810	950	2500	2400	3640	4870	4700	1790	779	1480
10	1460	1420	1820	946	2520	2410	3640	4880	4700	1790	778	1480
11	1530	1420	1830	950	2560	2410	3630	4880	4720	1800	775	1500
12	1540	1430	1830	950	2640	2420	3620	4880	4750	1800	776	1480
13	1540	1470	1830	941	2640	2410	3620	4870	4750	1800	774	1470
14	1540	1590	1830	1390	2640	2410	3620	4880	4760	1810	776	1480
15	1540	1690	1830	2130	2640	2430	3620	4880	4750	1810	777	1500
16	1540	1760	1820	2140	2640	2420	3620	4960	4760	1800	778	1470
17	1540	1780	1830	2140	2640	2430	3620	5100	4780	1800	781	1470
18	1530	1780	1830	2140	2640	2750	3620	5090	4790	1800	780	1490
19	1530	1780	1820	2140	2640	3220	3620	5090	4790	1810	1070	1470
20	1530	1780	1820	2140	2640	3200	3630	5090	4850	1800	1550	1480
21	1530	1780	1810	2140	2420	3200	3650	5090	4900	1810	1500	1470
22	1540	1780	1810	2140	1350	3200	3680	5100	4900	1760	1500	1480
23	1540	1780	1810	2140	1080	3190	3840	5120	4910	1590	1500	1480
24	1550	1800	1810	2150	1080	3180	3890	5110	4920	1590	1500	1470
25	1550	1800	1810	2150	1080	3190	3900	5100	4920	1590	1500	1480
26	1550	1800	1830	2170	1080	3200	3910	5100	4890	1580	1490	1470
27	1550	1800	1840	2170	1080	3200	3880	5100	4860	1580	1500	1480
28	1550	1800	1830	2170	1080	3200	3900	5100	4650	1590	1510	1480
29	1210	1800	1830	2180	---	3190	4090	5100	3980	1580	1500	1480
30	536	1800	1830	2170	---	3180	4310	5120	3800	1590	1500	1270
31	856	---	1830	2170	---	3190	---	4900	---	1590	1500	---
TOTAL	42002	48650	56380	56098	60210	81150	110120	153830	140850	56900	36755	44270
MEAN	1355	1622	1819	1810	2150	2618	3671	4962	4695	1835	1186	1476
MAX	1550	1800	1840	2180	2640	3220	4310	5120	4920	3410	1590	1500
MIN	536	1410	1800	941	1080	1240	3190	4420	3800	1580	707	1270
AC-FT	83310	96500	111800	111300	119400	161000	218400	305100	279400	112900	72900	87810
(†)	4250	0	0	0	0	3680	7930	15210	29220	32630	26440	14990
CAL YR 1984 TOTAL	547878			MEAN	1497	MAX	2530	MIN	536	AC-FT	1087000	
WTR YR 1985 TOTAL	887215			MEAN	2431	MAX	5120	MIN	536	AC-FT	1760000	

(†) DISCHARGE, IN ACRE-FT, THROUGH NAVAJO INDIAN IRRIGATION TUNNEL.

09355500 SAN JUAN RIVER NEAR ARCHULETA, NM -- Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1955 to current year.

CHEMICAL ANALYSES, WATER YEAR OCTOBER 1984 TO SEPTEMBER 1985

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUC- TANCE (US/CM) (00095)	SPE- CIFIC CON- DUC- TANCE LAB (US/CM) (90095)	PH (STAND- ARD UNITS) (00400)	PH LAB (STAND- ARD UNITS) (00403)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	TUR- BID- ITY (NTU) (00076)
NOV 05...	1230	1430	250	267	8.3	8.5	18.5	9.0	4.7
JAN 08...	1300	907	235	258	7.9	8.3	6.0	5.0	9.0
MAR 04...	1430	1710	240	257	9.1	8.8	5.5	6.0	10
APR 29...	1300	3860	250	281	7.6	8.5	12.0	6.0	20
JUL 15...	1145	1730	243	262	8.1	8.2	20.0	11.0	4.4
SEP 09...	1230	1500	240	257	7.8	8.3	27.0	11.0	3.6

DATE	OXYGEN, DIS- SOLVED (MG/L) (00300)	HARD- NESS (MG/L AS CAC03) (00900)	HARD- NESS, NONCAR- BONATE (MG/L AS CAC03) (00902)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	BICAR- BONATE IT-FLD AS HCO3) (99440)
NOV 05...	11.8	100	22	30	6.4	12	.5	1.5	82
JAN 08...	10.0	98	21	29	6.1	13	.6	1.9	93
MAR 04...	15.2	74	0	22	4.6	11	.6	1.4	59
APR 29...	10.8	110	28	31	7.0	15	.7	1.9	95
JUL 15...	12.0	97	16	28	6.6	13	.6	2.1	91
SEP 09...	12.2	93	20	27	6.1	12	.6	2.3	88

DATE	CAR- BONATE IT-FLD (MG/L AS CO3) (99445)	ALKA- LITY FIELD (MG/L AS CAC03) (00410)	ALKA- LITY, CARBON- ATE IT-FLD (MG/L - CAC03) (99430)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	FLUO- RIDE, DIS- SOLVED (MG/L AS F) (00950)	SILICA, DIS- SOLVED (MG/L AS SiO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTITUENTS, DIS- SOLVED (MG/L) (70301)
NOV 05...	7.0	79	79	47	2.1	.20	10	157	160
JAN 08...	.000	76	76	47	2.0	.20	12	163	160
MAR 04...	21	83	83	47	2.2	.20	8.4	144	170
APR 29...	.000	77	77	51	2.2	.20	11	158	170
JUL 15...	4.0	81	81	41	2.0	.20	11	157	160
SEP 09...	.000	79	79	45	2.3	.10	10	158	150

09365000 SAN JUAN RIVER AT FARMINGTON, NM

LOCATION.--Lat 36°43'22", long 108°13'30", in NW¼ sec. 17, T.29 N., R.13 W., San Juan County, Hydrologic Unit 14080105, on left bank 360 ft downstream from highway bridge on State Highway 371 in Farmington, 4,000 ft downstream from Animas River, 2.3 mi upstream from La Plata River, and at mile 251.4.

DRAINAGE AREA.--7,240 mi², approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--June to December 1904, January 1905 to September 1906 (gage heights and discharge measurements only), September 1912 to current year. Monthly discharge only for some periods, published in WSP 1313. Discharge records for January to December 1905, published in WSP 175, are unreliable and should not be used.

REVISED RECORDS.--WSP 1119: Drainage area. WSP 1243: 1938. WSP 1313: 1905, 1914. See also PERIOD OF RECORD.

GAGE.--Water-stage recorder. Datum of gage is 5,230.37 ft above National Geodetic Vertical Datum of 1929. See WSP 1313 or 1733 for history of changes prior to Nov. 19, 1933.

REMARKS.--Estimated daily discharges: Aug. 12-14. Water-discharge records good. Since June 1962 flow is partly controlled by operation of Navajo Reservoir (station 09355100) 50 mi upstream. Diversions upstream from station for irrigation of about 86,000 acres, 4,000 of which is irrigated by Farmers Mutual ditch which diverts from Animas River and bypasses this station; ditch flow not included in record. At times this ditch may be supplied partly or entirely by diversion from San Juan River downstream from this station. National Weather Service gage height telemeter at station.

AVERAGE DISCHARGE.--73 years (water years 1913-85), 2,372 ft³/s, 1,719,000 acre-ft/yr, unadjusted.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, about 68,000 ft³/s, June 29, 1927, gage height, 10.2 ft, site and datum then in use, from rating curve extended above 37,000 ft³/s; minimum, 14 ft³/s, Aug. 22, 1939.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum flood occurred Oct. 6, 1911. Flood of Sept. 6, 1909, reached a stage of about 12.3 ft, site and datum in use May to September 1906.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 8,000 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
May 5	1715	9,570	6.37	June 10	0200	*12,600	*7.61
May 29	1845	9,880	6.50				

Minimum discharge, 757 ft³/s, Aug. 19.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1984 TO SEPTEMBER 1985
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1310	1940	2180	2200	2430	1630	3760	6070	8110	5480	2270	1570
2	1400	2010	2180	2150	2370	1910	3760	6890	7660	4370	2310	1590
3	1720	2010	2200	2090	2440	1940	3840	7240	8060	3910	2410	1610
4	1930	2020	2190	2100	2500	1930	4080	8140	8320	3930	2260	1690
5	1890	2000	2210	2110	2500	2520	4730	9130	8220	3870	2040	1720
6	1910	2000	2220	2120	2770	2650	4820	9350	8760	3490	1170	1760
7	1870	1990	2200	2100	2770	2670	5100	9260	9780	3360	1040	1830
8	1780	1970	2200	1390	2780	2670	5350	9260	11100	3200	941	1870
9	1790	1990	2240	1320	2810	2690	5490	9350	11800	3060	900	1930
10	1970	1980	2220	1290	2840	2910	5500	9260	12100	3080	900	1920
11	2090	1970	2230	1250	2820	3730	5700	8940	11500	3050	905	2410
12	2150	1960	2270	1230	2870	4410	5800	8020	10900	3040	1030	2820
13	2150	1940	2300	1220	2870	4240	6070	7390	10400	2970	1030	2620
14	2150	2040	2270	1230	2880	3370	6320	6980	10200	3040	1010	2420
15	2190	2140	2290	2330	2880	3250	6540	6670	9940	2970	889	2300
16	2160	2170	2240	2450	2920	3360	6870	6630	10000	2880	895	2540
17	2310	2160	2210	2440	3190	3450	6860	6950	9830	2750	838	2770
18	2360	2200	2200	2450	3610	3380	6830	6990	9270	2750	798	2740
19	2270	2180	2200	2500	3610	3900	6910	7060	8970	3080	776	3180
20	2190	2170	2190	2510	3370	4260	6260	7080	8750	3020	1400	3630
21	2170	2160	2180	2530	3550	4100	5790	6930	8660	2910	1410	3210
22	2190	2160	2160	2530	2670	3860	5600	6860	8700	2870	1410	3000
23	2150	2160	2140	2590	1880	3750	5380	6770	8450	3260	1370	2920
24	2210	2200	2140	2590	1760	3680	5240	6980	8090	2610	1370	2800
25	2150	2220	2130	2570	1640	3730	5190	7430	8000	2420	1390	2620
26	2100	2190	2140	2560	1550	3790	5190	7920	8000	2350	1470	2440
27	2070	2170	2180	2550	1540	3830	5260	8590	7220	2280	1460	2320
28	2080	2150	2540	2550	1580	3850	5900	9140	6870	2210	1520	2240
29	2060	2170	2590	2540	---	3910	6640	9480	6210	2410	1480	2210
30	1180	2200	2390	2510	---	3850	6000	9510	5730	2850	1480	2220
31	1050	---	2270	2470	---	3790	---	9120	---	2380	1530	---
TOTAL	61000	62620	69300	66470	73400	103010	166780	245390	269600	96050	41702	70900
MEAN	1968	2087	2235	2144	2621	3323	5559	7916	8987	3098	1345	2363
MAX	2360	2220	2590	2590	3610	4410	6910	9510	12100	5480	2410	3630
MIN	1050	1940	2130	1220	1540	1630	3760	6070	5730	2210	776	1570
AC-FT	121000	124200	137500	131800	145600	204300	330800	486700	534800	190500	82720	140600
CAL YR 1984	TOTAL	914670		MEAN	2499	MAX	8980	MIN	1050	AC-FT	1814000	
WTR YR 1985	TOTAL	1326222		MEAN	3633	MAX	12100	MIN	776	AC-FT	2631000	

SUMMARY OF TRANSMISSIVITIES (T)
AND STORATIVITIES (S)
GIANT BLOOMFIELD REFINERY

<u>DIESEL SPILL AREA</u>	<u>T(gpd/ft)</u>	<u>S</u>
GBR 14	792 8-100	NA
GBR 15	128 None	0.0045
GBR 25	387 183	0.00016
GBR 27	126 20-12	NA

SOUTHERN REFINERY AREA

GBR 8	2340	0.051
GBR 29	1040	NA

NA = Not Applicable
(S cannot be estimated at pumped wells due to borehole storage effects)

Appendix P
March 88
Report

The values
in Appendix
for Diesel spill
or those c
on the follow

See Appendix
for commens
pump test

GIANT INDUSTRIES BLOOMFIELD REFINERY
CHRONOLOGY OF STATIC WATER LEVELS AND PETROLEUM THICKNESS IN FEET

WELL NUMBER
GBR-05

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
11/09/88	5361.90	0.17	5362.04
12/06/88	5361.16	0.00	5361.16

WELL NUMBER
GBR-06

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
11/09/88	5356.62	0.08	5356.68
12/06/88	5356.88	0.11	5356.97

WELL NUMBER
GBR-07

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
11/09/88	5361.85	0.00	5361.85
12/06/88	5361.80	0.00	5361.80

WELL NUMBER
GBR-08

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
11/09/88	5347.91	0.00	5347.91
12/06/88	5348.05	0.28	5348.27

WELL NUMBER
GBR-09

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
11/09/88	5342.29	0.00	5342.29
12/06/88	5342.61	0.00	5342.61

WELL NUMBER
GBR-10

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
11/09/88	5345.29	3.04	5347.73
12/06/88	5345.41	3.02	5347.83

WELL NUMBER
GBR-11

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
11/09/88	5346.43	2.38	5348.33
12/06/88	5346.68	2.37	5348.58

WELL NUMBER
GBR-13

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
11/09/88	5352.64	0.28	5352.86
12/06/88	5352.84	0.25	5353.04

WELL NUMBER
GBR-15

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
11/09/88	5364.91	0.00	5364.91
12/06/88	5367.38	0.00	5367.38

WELL NUMBER
GBR-17

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
11/09/88	5370.19	0.00	5370.19
12/06/88	5370.44	0.00	5370.44

WELL NUMBER
GBR-18

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
11/09/88	5407.85	0.00	5407.85
12/06/88	5407.73	0.00	5407.73

WELL NUMBER
GBR-19

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
11/09/88	5355.52	0.00	5355.52

WELL NUMBER
GBR-20

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
11/09/88	5353.21	0.96	5353.98
12/06/88	5353.63	0.73	5354.21

WELL NUMBER
GBR-21D

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
11/09/88	5368.67	0.00	5368.67
12/06/88	5369.75	0.00	5369.75

WELL NUMBER
GBR-21S

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
11/09/88	5380.49	0.19	5380.64
12/06/88	5380.99	0.13	5381.09

WELL NUMBER
GBR-22

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
11/09/88	5362.91	0.43	5363.26
12/06/88	5361.76	0.19	5361.91

WELL NUMBER
GBR-23

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
11/09/88	5381.37	0.00	5381.37
12/06/88	5381.89	0.00	5381.89

WELL NUMBER
GBR-24D

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
11/09/88	5370.06	0.00	5370.06
12/06/88	5367.26	0.00	5367.26

WELL NUMBER
GBR-24S

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
11/09/88	5373.69	0.00	5373.69
12/06/88	5373.86	0.00	5373.86

WELL NUMBER
GBR-25

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
11/09/88	5359.47	0.00	5359.47
12/06/88	5369.89	0.00	5369.89

WELL NUMBER
GBR-26

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
11/09/88	5364.31	0.00	5364.31
12/06/88	5365.02	0.00	5365.02

WELL NUMBER
GBR-30

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
11/09/88	5364.15	0.10	5364.23
12/06/88	5365.46	0.00	5365.46

WELL NUMBER
GBR-31

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
11/09/88	5361.86	0.00	5361.86
12/06/88	5362.18	0.00	5362.18

WELL NUMBER
GBR-32

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
11/09/88	5382.00	0.00	5382.00
12/06/88	5381.90	0.00	5381.90

WELL NUMBER
GBR-33

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
11/09/88	5362.28	0.00	5362.28
12/06/88	5360.57	0.00	5360.57

WELL NUMBER
GBR-34

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
11/09/88	5361.34	0.00	5361.34
12/06/88	5360.61	0.00	5360.61

WELL NUMBER
GBR-35

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
11/09/88	5359.10	0.00	5359.10
12/06/88	5359.98	0.00	5359.98

WELL NUMBER
GBR-39

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
11/09/88	5364.36	0.00	5364.36
12/06/88	5365.07	0.00	5365.07

WELL NUMBER
GBR-40

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
11/09/88	5368.57	0.00	5368.57
12/06/88	5368.78	0.00	5368.78

WELL NUMBER
GBR-41

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
11/09/88	5366.61	0.00	5366.61
12/06/88	5366.67	0.00	5366.67

WELL NUMBER
GBR-48

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
11/09/88	5382.90	0.00	5382.90
12/06/88	5382.81	0.00	5382.81

WELL NUMBER
GBR-50

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
11/09/88	5384.16	0.00	5384.16
12/06/88	5384.03	0.00	5384.03

WELL NUMBER
GRW-01

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
11/09/88	5336.05	0.00	5336.05
12/06/88	5353.55	0.00	5353.55

WELL NUMBER
GRW-02

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
11/09/88	5342.74	0.00	5342.74
12/06/88	5347.82	0.00	5347.82

WELL NUMBER
GRW-03

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
11/09/88	5344.49	2.19	5346.24
12/06/88	5336.59	1.23	5337.57

WELL NUMBER
GRW-04

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
11/09/88	5338.02	0.00	5338.02
12/06/88	5346.52	0.02	5346.54

WELL NUMBER
GRW-05

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
11/09/88	5348.44	0.00	5348.44
12/06/88	5348.83	0.00	5348.83

WELL NUMBER
GRW-06

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
11/09/88	5345.44	0.00	5345.44
12/06/88	5347.67	0.00	5347.67

WELL NUMBER
GRW-07

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
11/09/88	5350.76	0.00	5350.76
12/06/88	5351.02	0.00	5351.02

WELL NUMBER
GRW-08

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
11/09/88	5351.41	0.00	5351.41
12/06/88	5351.41	0.00	5351.41

WELL NUMBER
GRW-10

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
11/09/88	5353.02	3.82	5356.07
12/06/88	5354.30	0.00	5354.30

WELL NUMBER
GRW-11

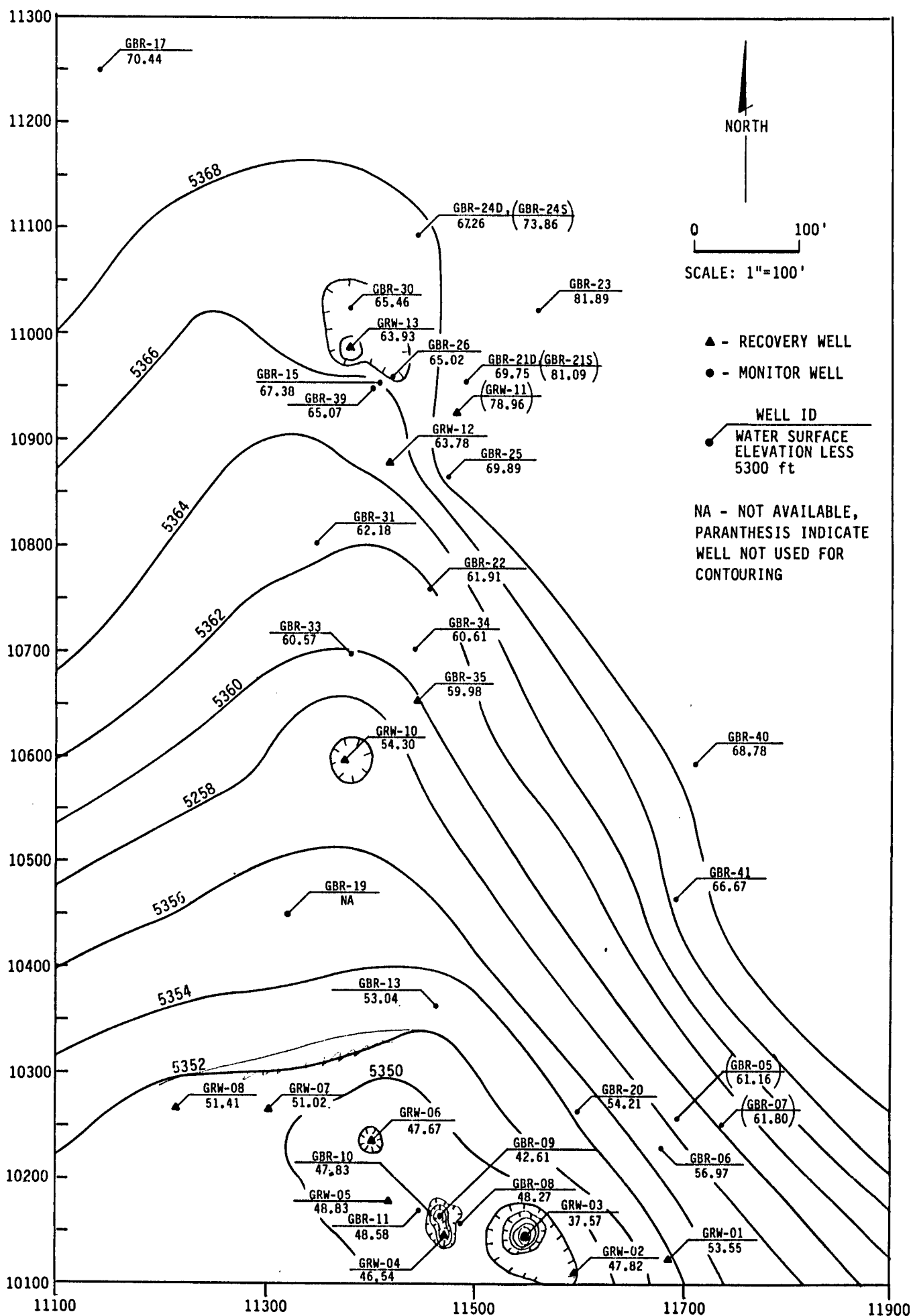
SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
11/09/88	5359.85	0.00	5359.85
12/06/88	5378.96	0.00	5378.96

WELL NUMBER
GRW-12

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
11/09/88	5362.74	0.00	5362.74
12/06/88	5363.78	0.00	5363.78

WELL NUMBER
GRW-13

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
11/09/88	5355.27	0.00	5355.27
12/06/88	5363.93	0.00	5363.93



DECEMBER, 1988 WATER SURFACE CONTOUR MAP GIANT-BLOOMFIELD REFINERY

[GRID] Random Function Modify Equip
Input data consists of irregularly spaced XYZ data points

9/16/88 Surfer files

Directory mask: C:\SURFER*.*

Directory of C:\SURFER*.*

SURFER.EXE	GRID.EXE	GRID.HLB	DEMOGRID.DAT
GRIDCONV.EXE	VOLUME.EXE	GRAFIT.EXE	DEMOGRAPH.DAT
DEMO.PLT	GRIDOUT.CMD	READ.ME	SLICE.EXE
SURF.EXE	SURF.CMD	TOPO.HLB	TOPO.EXE
SURF.HLB	TOPO.CMD	INSTALL.DLB	INSTALL.EXE
VIEW.EXE	ALTERSYM.EXE	SYNGEN.BAS	CONVERT.EXE
SET1.SYM	SET2.SYM	SET3.SYM	SET4.SYM
SET5.SYM	SET6.SYM	SET7.SYM	SET8.SYM

More files exist. Press any key to continue...

F1=Help F3=Main F4=Store F5=Directory Esc=Backup Arrow keys=Move pointer

[GRID] Random Function Modify Equip
Input data consists of irregularly spaced XYZ data points

Directory mask: C:\SURFER*.*

Directory of C:\SURFER*.*

SET9.SYM	SET10.SYM	SET11.SYM	SET12.SYM
SET13.SYM	SET14.SYM	SET15.SYM	SET16.SYM
CENTERED.SYM	PLOT.EXE	INSTALL.CNF	DEMOGRID.GRD
DEMOGRID.PLT	DEMOGRID.OPT	GBR06098.DAT	GBR06098.DAT
GBR06098.DAT	GBR06098.GRD	GBR06098.PLT	GBR06098.OPT
OUT.GRD	GBR05178.DAT	OUT.PLT	OUT.OPT
GRID.CMD	GBR05178.PLT	GBR05178.OPT	GBR05178.DAT
GBR05178.GRD	GBR05178.PLT	GBR05178.OPT	GBR05178.DAT

Press any key to return..

TOPDOUT.CMD, GBRBLANK, BLW

F1=Help F3=Main F4=Store F5=Directory Esc=Backup Arrow keys=Move pointer

June 85

[Random Input] Edit Xtternal Insert Delete Copy Move Format Transform Save
Edit values in worksheet

	A	B	C	D	E
1	1696.18	248.00	63.25	5	P
2	1679.98	235.41	55.79	6	
3	1687.80	241.55	61.57	7	
4	1486.73	150.28	47.22	8	P
5	1467.59	155.35	46.86	9	
6	1458.56	157.79	46.00	10	P
7	1447.98	160.42	48.20	11	P
8	1465.23	355.10	51.26	13	P
9	1382.00	977.84	55.45	14/13	
10	1411.38	944.47	60.92	15	
11	1528.06	2021.64	101.73	18	
12	1321.53	438.60	53.68	19	(P)
13	1601.00	254.66	53.69	20	P
14	1492.75	945.78	67.39	215	
15	1458.90	751.42	61.23	22	P
16	1503.06	1014.34	80.16	23	
17	1447.00	1083.96	68.65	245	
18	1476.29	853.81	67.73	25	
19	1421.89	949.97	62.77	26	(P)
20	1483.66	937.41	79.21	27/11	
21	1419.18	868.86	60.32	28/12	(P)
22	1550.03	134.61	45.97	→ 29/3	P

[Random Input] Edit Xtternal Insert Delete Copy Move Format Transform Save
Edit values in worksheet

	A	B	C	D	E
23	1382.06	1014.84	63.00	30	(P)
24	1350.85	794.15	62.43	31	
25	1382.64	689.08	58.92	33	P
26	1445.12	694.24	59.21	34	P
27	1447.15	644.16	57.47	35	P
28	1377.90	588.79	56.14	→ 36/10	P
29	1419.53	167.89	47.07	37/5	
30	1688.26	114.02	49.91	38/1	
31	1404.59	940.69	62.90	39	
32	1713.64	584.07	68.60	40	
33	1694.52	455.92	75.19	41	
34	1598.80	99.54	47.80	42/2	
35	1472.88	136.32	47.40	43/4	
36	1402.59	225.60	49.79	44/6	
37					
38					
39					
40					
41					
42					
43					
44					

June 88

[Random] Input Output Duplicate GridSize Method Search Limits Begin
Begin creating a grid with the current settings

	DATA MINIMUM	DATA MAXIMUM	GRID MINIMUM	GRID MAXIMUM
X	1321.5300293	1713.6400146	1300	1600
Y	98.5400009	2021.6400146	500	1100
Z	45.9700012	101.7300034		

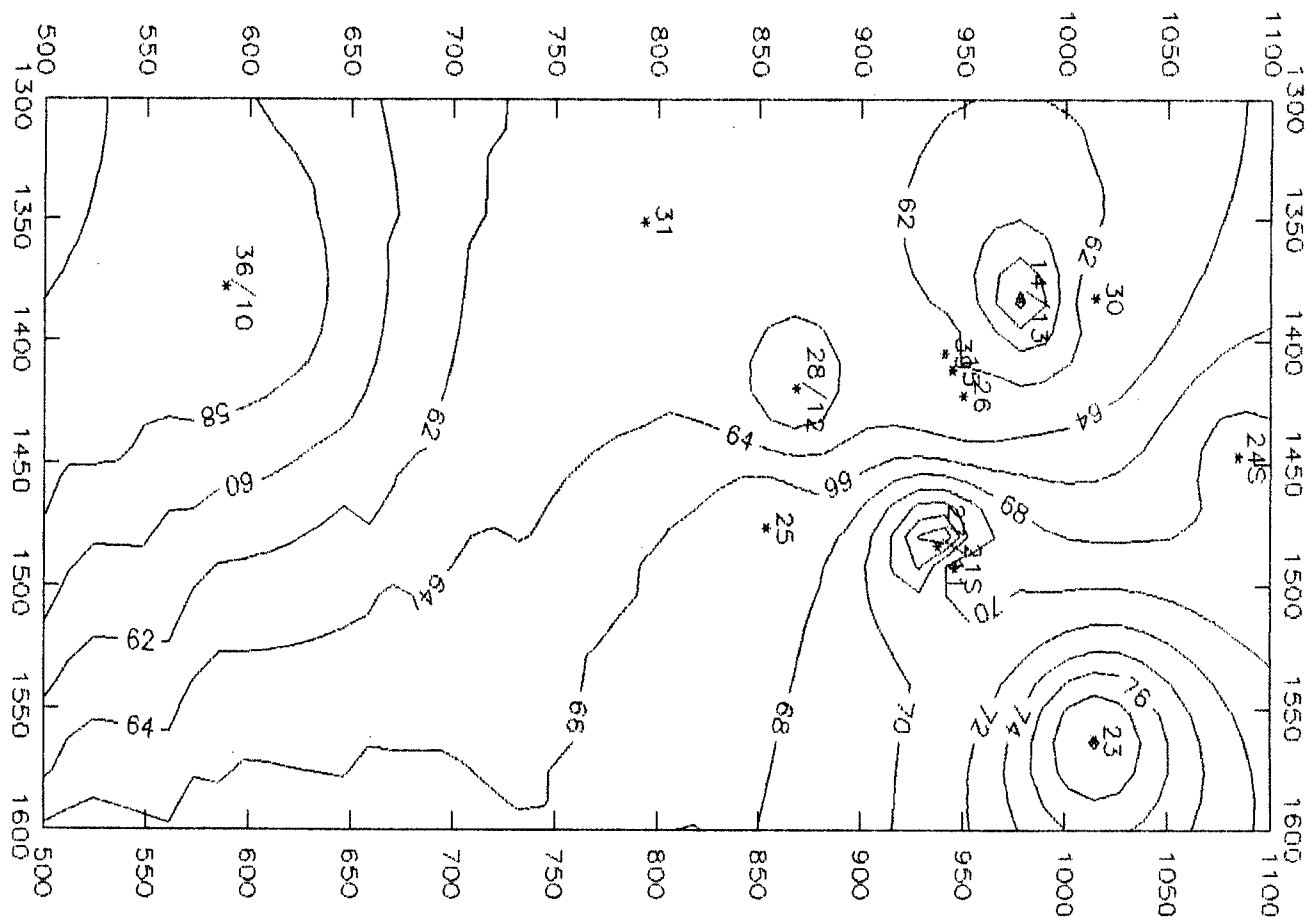
No. data points: 26
Discard data: No
Duplicate points: Delete
Grid Method: Inverse Distance ²

Search Method: Normal
Search Radius: 2044.0596124
Nearest Points: 10
X Grid Size: 26 (12)
Y Grid Size: 50 (12.244896)

Input file: GBRU6098.DAT
Output file: GBRU6098.GRD
Output format: Binary

Wells w/o product
(No w.L. for 218, 248)

F1=Help F3=Main F4=Store F5=Directory Esc=Backup Arrow keys=Move pointer



June 88

[Random] Input Output Duplicate GridSize Method Search Limits Begin
Begin creating a grid with the current settings

	DATA MINIMUM	DATA MAXIMUM	GRID MINIMUM	GRID MAXIMUM
X	1321.5300293	1713.6400146	1300	1600
Y	99.5400009	2021.6400146	500	1100
Z	45.9700012	101.7300034		

No. data points: 36
Discard data: No
Duplicate points: Delete
Grid Method: Inverse Distance ²

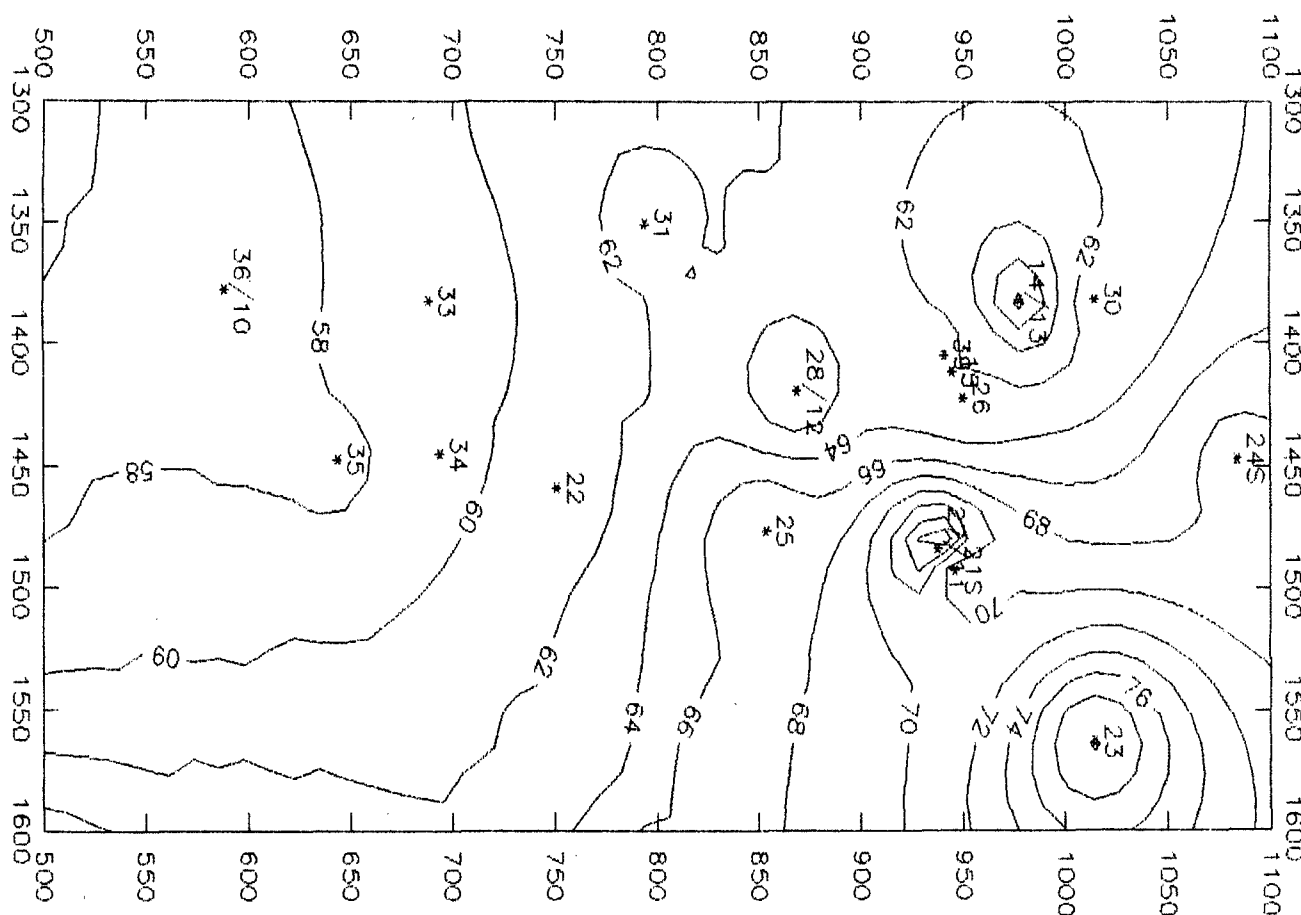
Search Method: Normal
Search Radius: 2044.0596124
Nearest Points: 10
X Grid Size: 26 (12)
Y Grid Size: 50 (12.244898)

Input File: GBR06098.DAT
Output file: GBR06098.GRD
Output format: Binary

Gridding row 6 of 50

Wells w/product
(no w.L. for 210, 240)

Press Esc to abort...



May 88

[Random] Input Output Duplicate GridSize Method Search Limits Begin
Begin creating a grid with the current settings

	DATA MINIMUM	DATA MAXIMUM	GRID MINIMUM	GRID MAXIMUM
X	1141.6899414	1713.6400146	1300	1900
Y	99.5400009	2061.9499512	500	1100
Z	44.0900002	108.5999985		

No. data points: 37
Discard data: No
Duplicate points: Delete
Grid Method: Inverse Distance 12

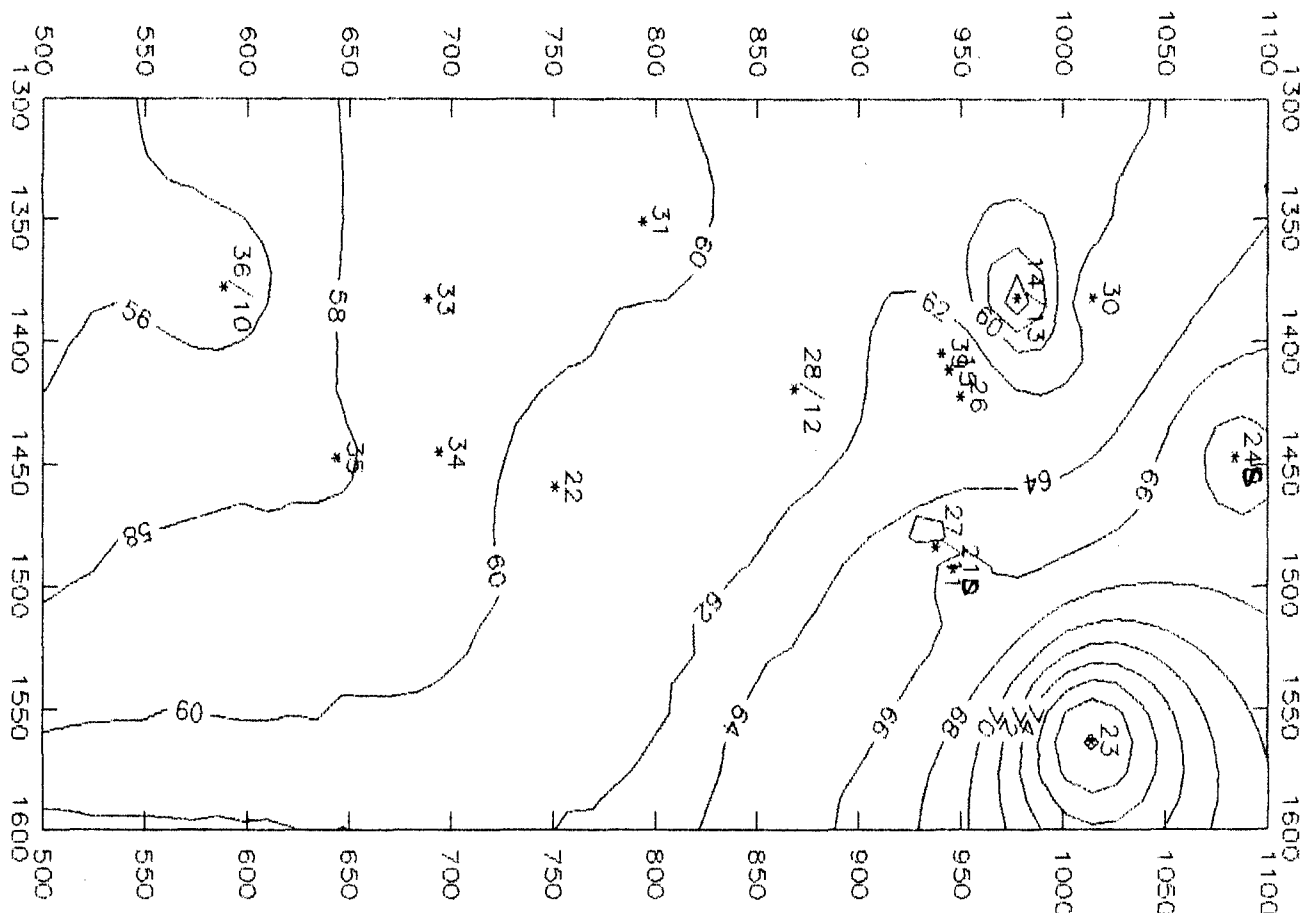
Search Method: Normal
Search Radius: 2044.00596124
Nearest Points: 10
X Grid Size: 26 (12)
Y Grid Size: 50 (12.244890)

Input file: GBR05178.DAT
Output file: GBR05178.GRD
Output format: Binary

Gridding row 4 of 50

Wells w/ product
GBR 21 & 24 deleted

Press Esc to abort...



May 88

[Random] Input Output Duplicate GridSize Method Search Limits Begin
Begin creating a grid with the current settings

	DATA MINIMUM	DATA MAXIMUM	GRID MINIMUM	GRID MAXIMUM
X	1141.6899414	1713.6400146	1300	1600
Y	99.5400009	2061.9499512	500	1100
Z	44.0900002	108.5999985		

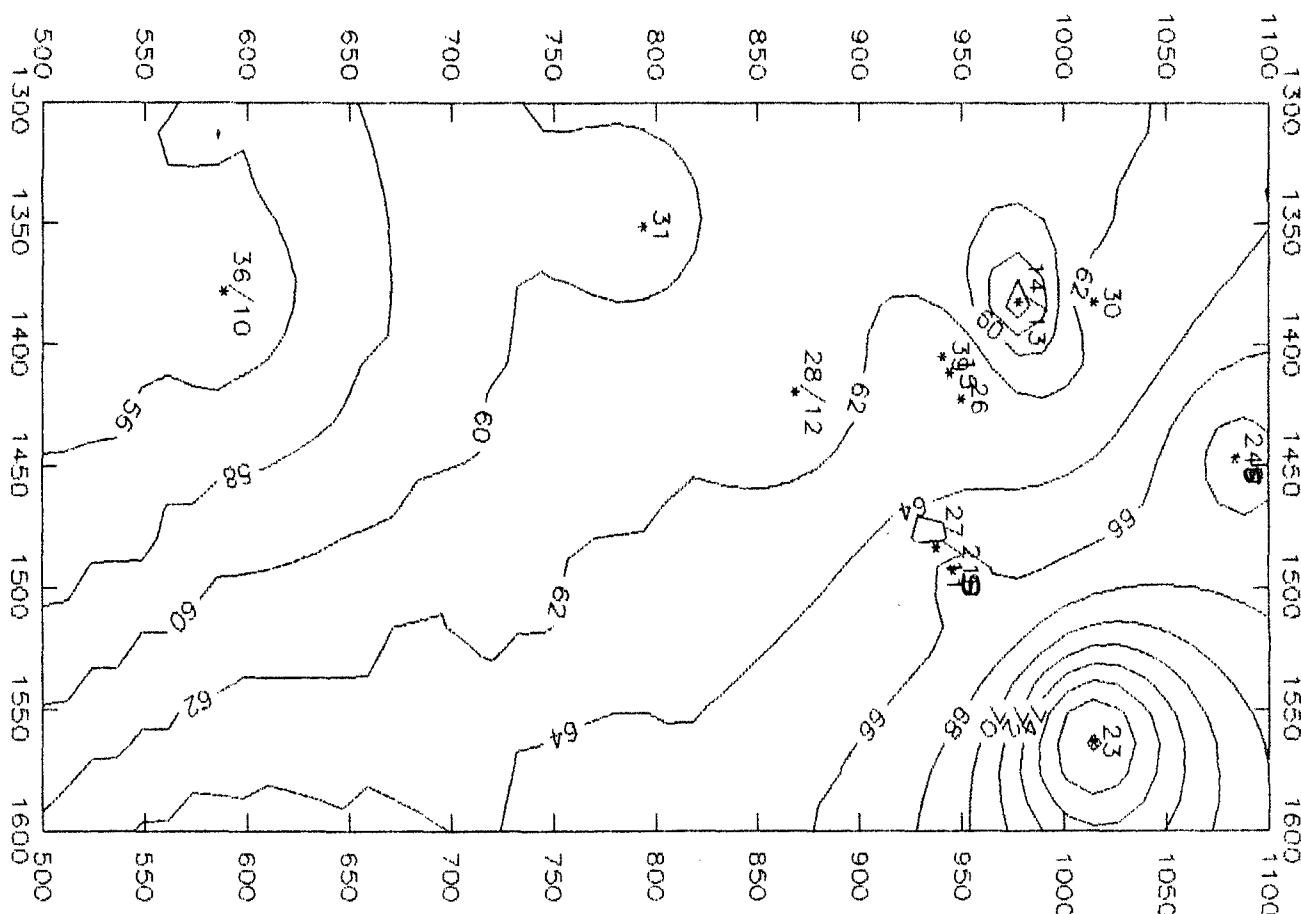
No. data points: 27
Discard data: No
Duplicate points: Delete
Grid Method: Inverse Distance ²

Search Method: Normal
Search Radius: 2044.0590124
Nearest Points: 10
X Grid Size: 25 (12)
Y Grid Size: 50 (12.244899)

Input file: GBRU5178.DAT
Output file: GBRU5178.GRD
Output format: Binary

w/o well w/product
GBR 21 & 24 & deleted

F1=Help F3=Main F4=Store F5=Directory Esc=Backup Arrow keys=Move pointer



June 88

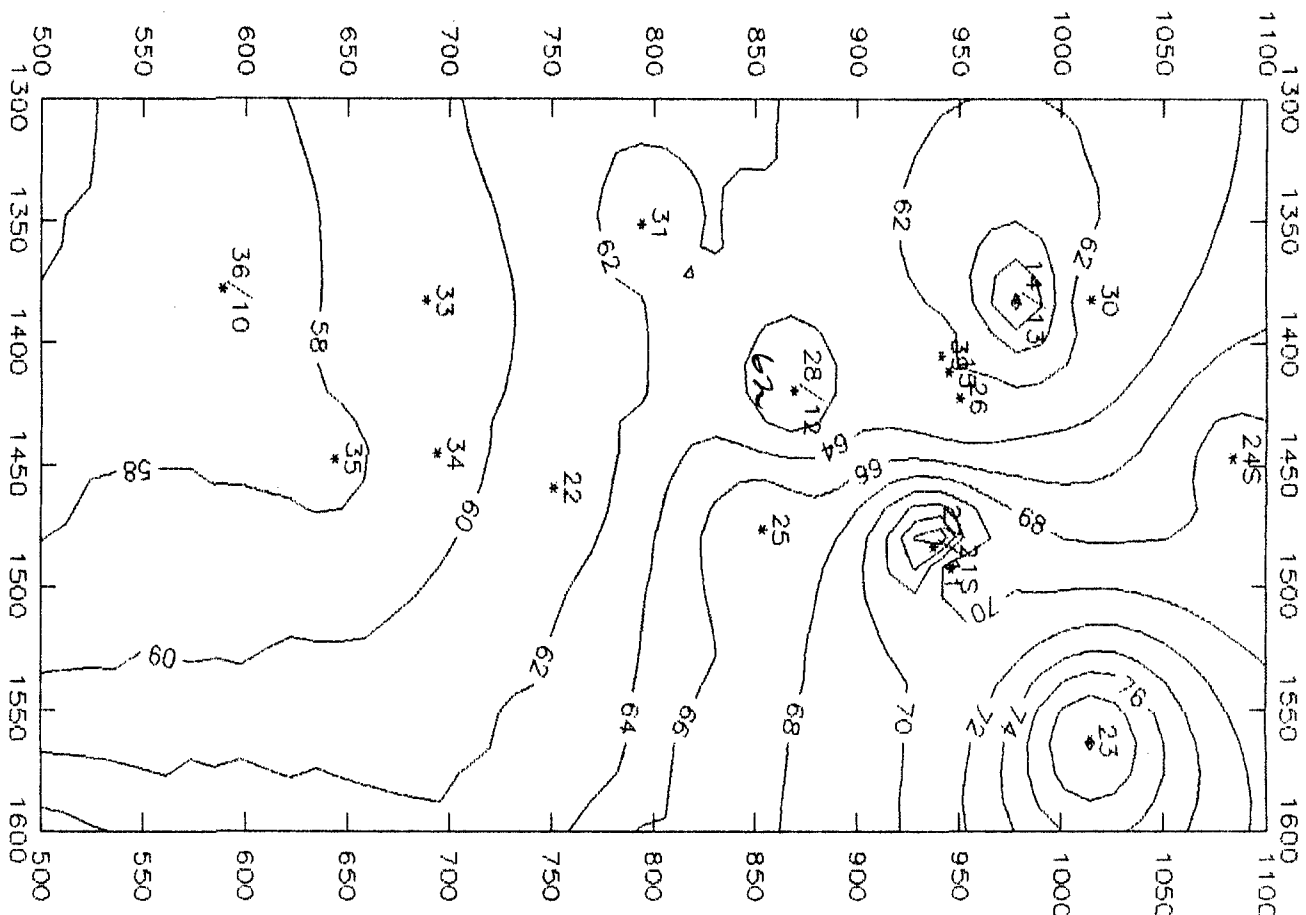
[Random] Input Output Duplicate GridSize Method Search Limits Begin
Begin creating a grid with the current settings

	DATA MINIMUM	DATA MAXIMUM	GRID MINIMUM	GRID MAXIMUM
X	1321.5300293	1713.6400146	1300	1600
Y	99.5400009	2021.6400146	500	1100
Z	45.9700012	101.7300034		

No. data points: 36	Search Method: Normal
Discard data: No	Search Radius: 2044.0596124
Duplicate points: Delete	Nearest Points: 10
Grid Method: Inverse Distance ^2	X Grid Size: 20 (12)
	Y Grid Size: 50 (12.244093)
Input file: GBR06098.DAT	
Output file: GBR06098.GRD	
Output format: Binary	

Gridding row 7 of 50

Press Esc to abort...



June 88

[Random] Input Output Duplicate GridSize Method Search Limits Begin
Begin creating a grid with the current settings

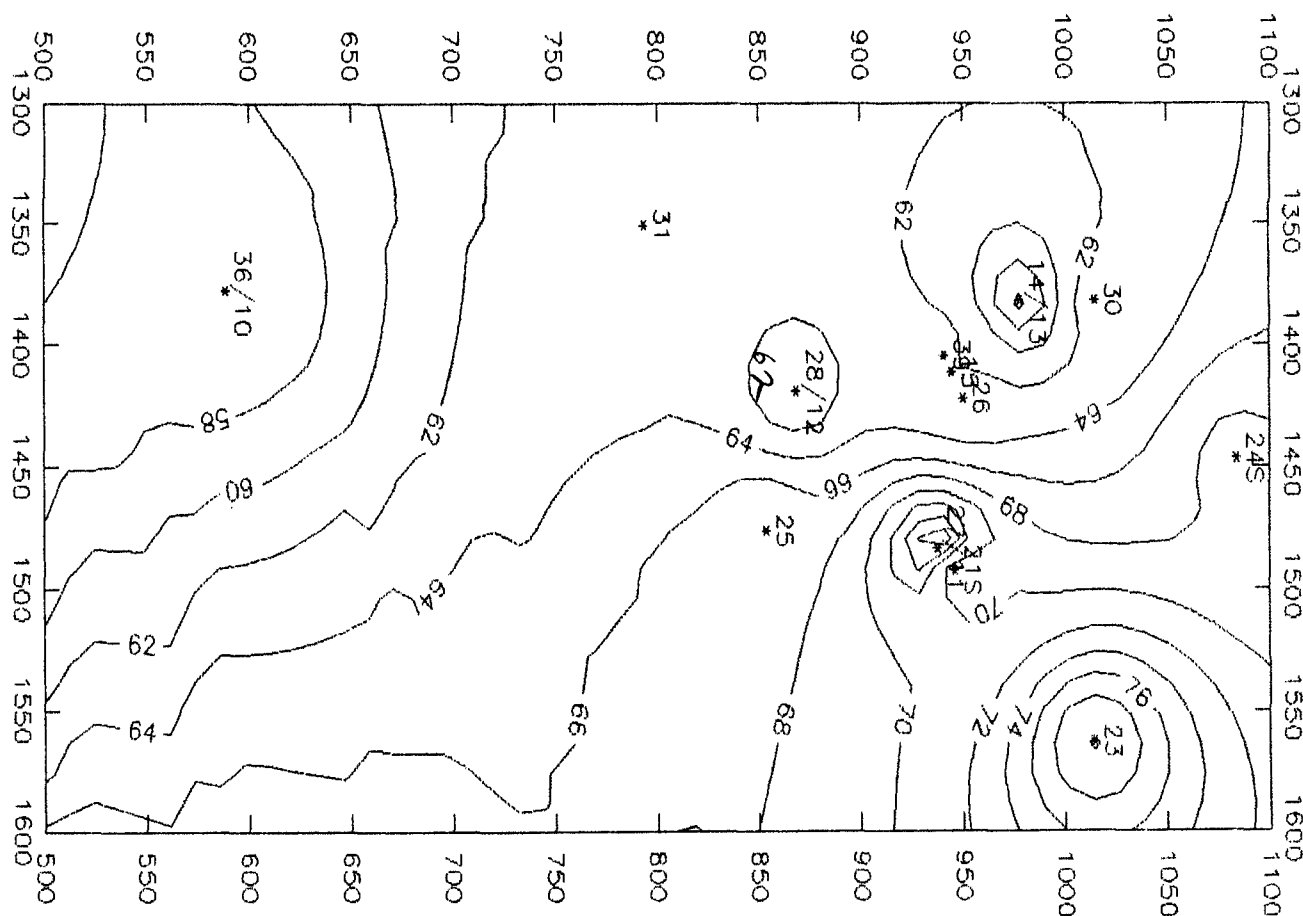
	DATA MINIMUM	DATA MAXIMUM	GRID MINIMUM	GRID MAXIMUM
X	1321.5300293	1713.6400146	1300	1600
Y	99.5400009	2021.6400146	500	1100
Z	45.9700012	101.7300034		

No. data points: 26	Search Method: Normal
Discard data: No	Search Radius: 2044.0596124
Duplicate points: Delete	Nearest Points: 10
Grid Method: Inverse Distance ¹ / ₂	X Grid Size: 26 (12)
	Y Grid Size: 50 (12.244898)

Input file: GBRU6098.DAT
Output file: GBRU6098.GRD
Output format: Binary

Gridding row 8 of 50

Press Esc to abort...



June 88

[Random] Input Output Duplicate GridSize Method Search Limits Begin
Specify search method used to locate data points

	DATA MINIMUM	DATA MAXIMUM	GRID MINIMUM	GRID MAXIMUM
X	1141.6899414	1713.6400146	1300	1800
Y	99.5400009	2061.9499512	90	490
Z	45.9700012	101.7300034		

No. data points: 40

Discard data: No

Duplicate points: Delete

Grid Method: Inverse Distance 2

Search Method: Normal

Search Radius: 200

Nearest Points: 10

X Grid Size: 50 (10.2040816)

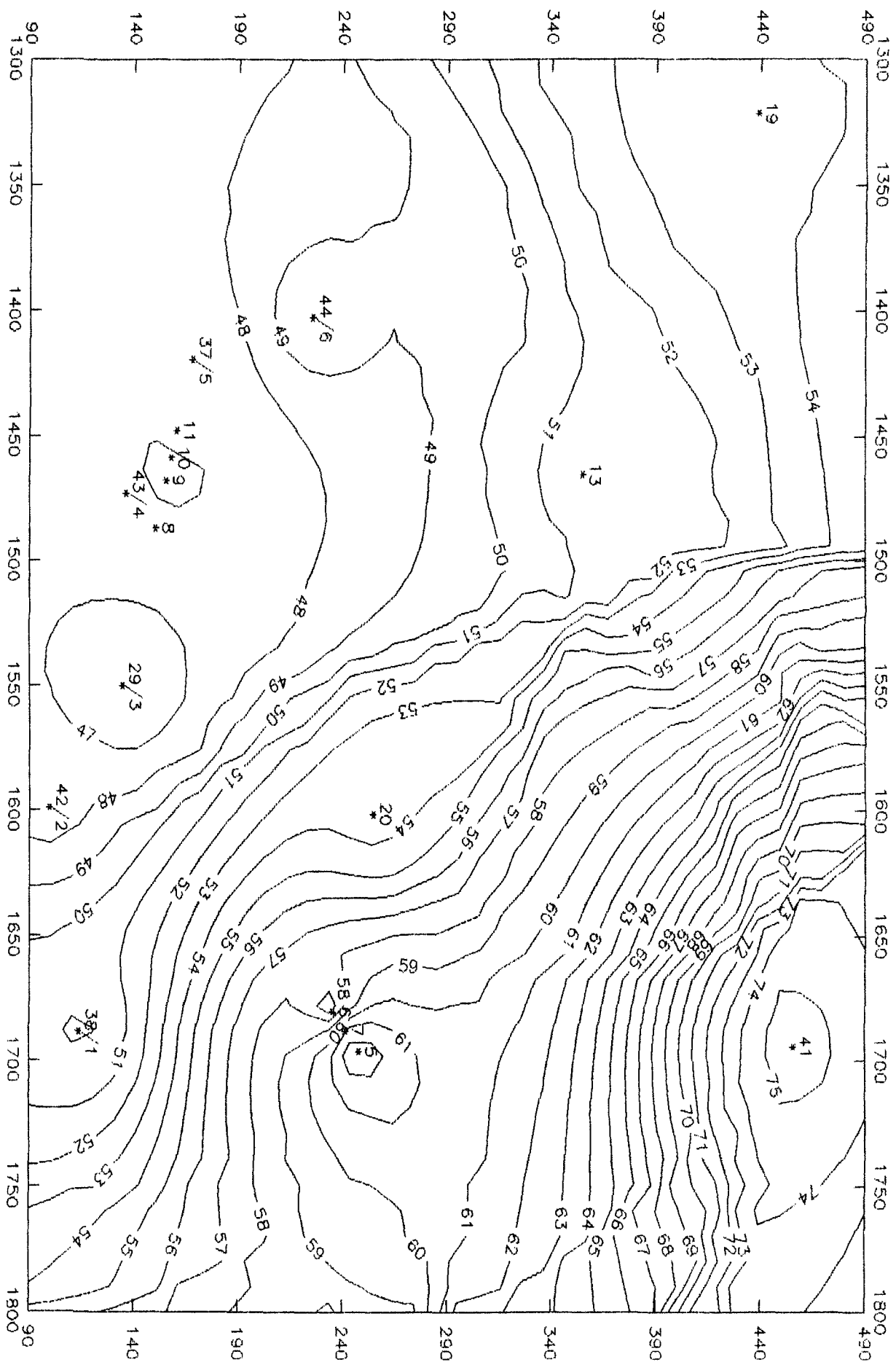
Y Grid Size: 40 (10.2564103)

Input file: GBR06098.DAT

Output file: GBR06098.GRD

Output format: Binary

F1=Help F3=Main F4=Store F5=Directory Esc=Backup Arrow keys=Move pointer



40 pfs, norm, SR=200, June 88

June 88

[Random] Input Output Duplicate GridSize Method Search Limits Begin
Specify coordinates of grid limits

	DATA MINIMUM	DATA MAXIMUM	GRID MINIMUM	GRID MAXIMUM
X	1141.6899414	1713.6400146	1300	1700
Y	99.5400009	2061.9499512	90	490
Z	45.9700012	101.7300034		

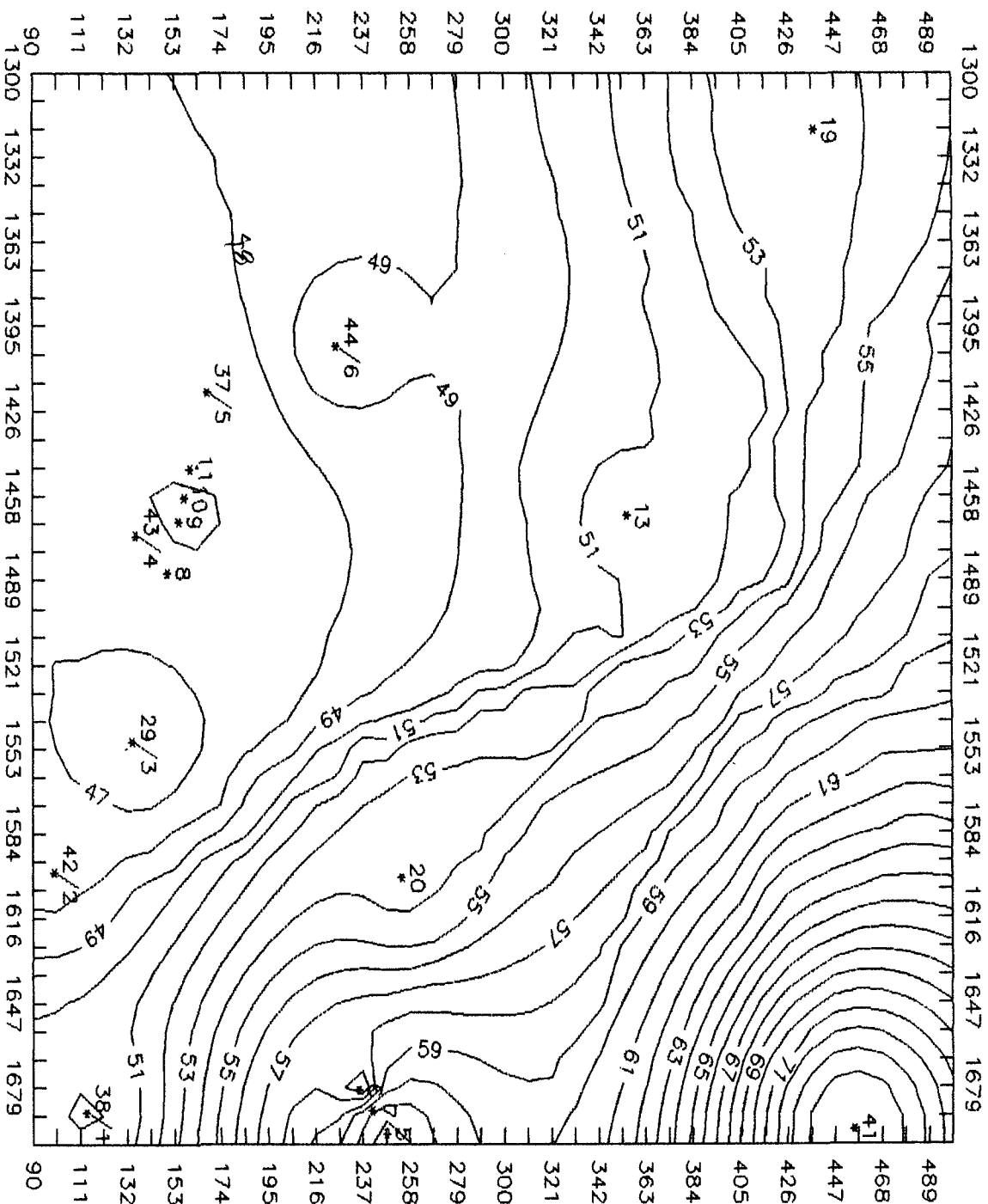
No. data points: 40
Discard data: No
Duplicate points: Delete
Grid Method: Inverse Distance

Search Method: Normal
Search Radius: 2044.0596124
Nearest Points: 10
X Grid Size: 40 (10.2564103)
Y Grid Size: 40 (10.2564103)

Input file: GBR06098.DAT
Output file: GBR06098.GRD
Output format: Binary

F1=Help F3=Main F4=Store F5=Directory Esc=Backup Arrow keys=Move pointer

GIANT-BLOOMFIELD WATER LEVELS, 06/09/88



SCALE 1:58,5714

June 88

[Random] Input Output Duplicate GridSize Method Search Limits Begin
Enter, edit, and transform irregularly spaced XYZ data

	DATA MINIMUM	DATA MAXIMUM	GRID MINIMUM	GRID MAXIMUM
X	1141.6899414	1713.6400146	1300	1800
Y	99.5400009	2061.9499512	90	490
Z	45.9700012	101.7300034		

No. data points: 30	Search Method: Normal
Discard data: No	Search Radius: 2044.0596124
Duplicate points: Delete	Nearest Points: 10
Grid Method: Inverse Distance ^2	X Grid Size: 50 (10.2040816)
	Y Grid Size: 40 (10.2564103)
Input file: GBRU6098.DAT	
Output file: GBRU6098.GRD	
Output format: Binary	

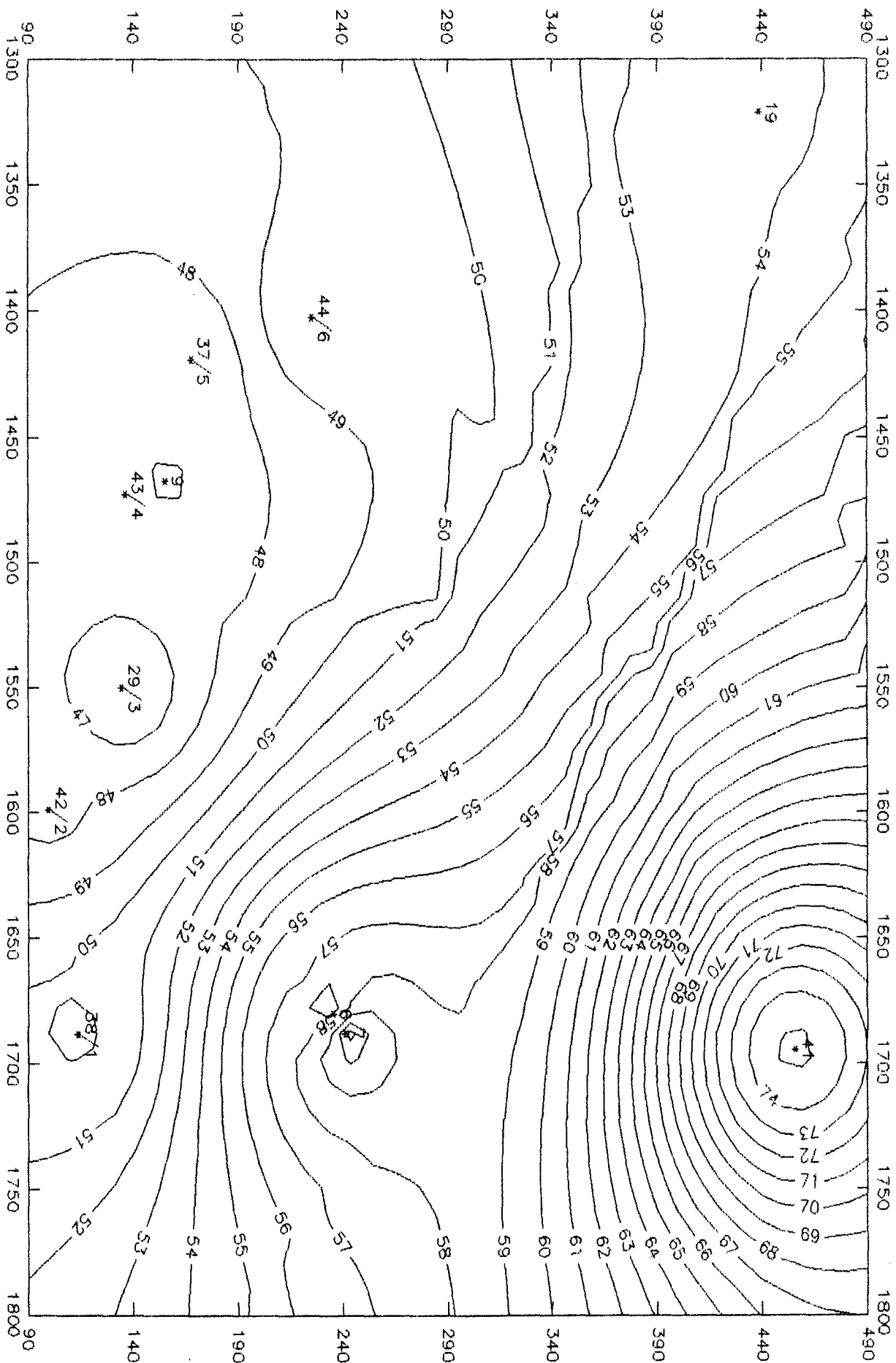
F1=Help F3=Main F4=Store F5=Directory Esc=Backup Arrow keys=Move pointer

[Main Menu] GRID TOPO SURF VIEW PLOT Quit
Run the TOPO program to create a contour map from a grid file

Filespec to pass to program (Enter if none):
/CMD=TOPOOUT GBRU6098

SURFER Access System Version 3.00
Copyright (C) Golden Software Inc. 1987

F1=Help Esc=Backup Arrows keys move pointer



30pts, Normal, SR-2044 June 88

June 88

[Random] Input Output Duplicate GridSize Method Search Limits Begin
Begin creating a grid with the current settings

	DATA MINIMUM	DATA MAXIMUM	GRID MINIMUM	GRID MAXIMUM
X	1141.6899414	1713.6400146	1300	1800
Y	99.5400009	2061.9499512	90	490
Z	45.9700012	101.7300034		

No. data points: 30
Discard data: No
Duplicate points: Delete
Grid Method: Inverse Distance ^2

Search Method: Normal
Search Radius: 250
Nearest Points: 10
X Grid Size: 50 (10.2040816)
Y Grid Size: 40 (10.2564103)

Input file: GBRU6098.DAT
Output file: GBRU6098.GRD
Output format: Binary

Gridding row 8 of 40

Press Esc to abort...

[Modify Smooth]: ~~Spline Matrix~~
Smooth grid using ~~a cubic spline~~

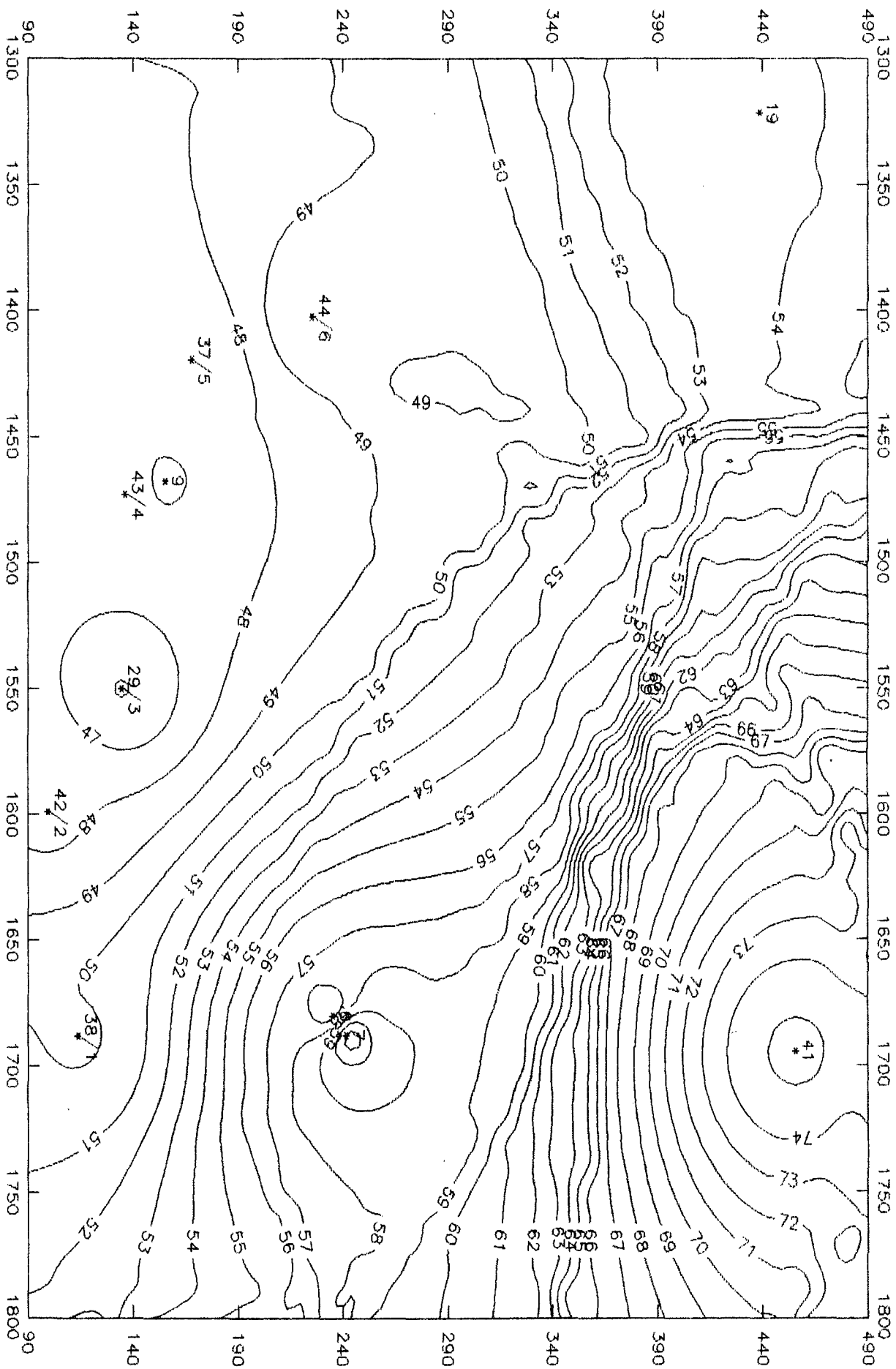
Input file: GBRU6098.GRD
Input rows: 1-32767
Input columns: 1-32767

Output file: GBRU6098.GRD
Output format: Binary

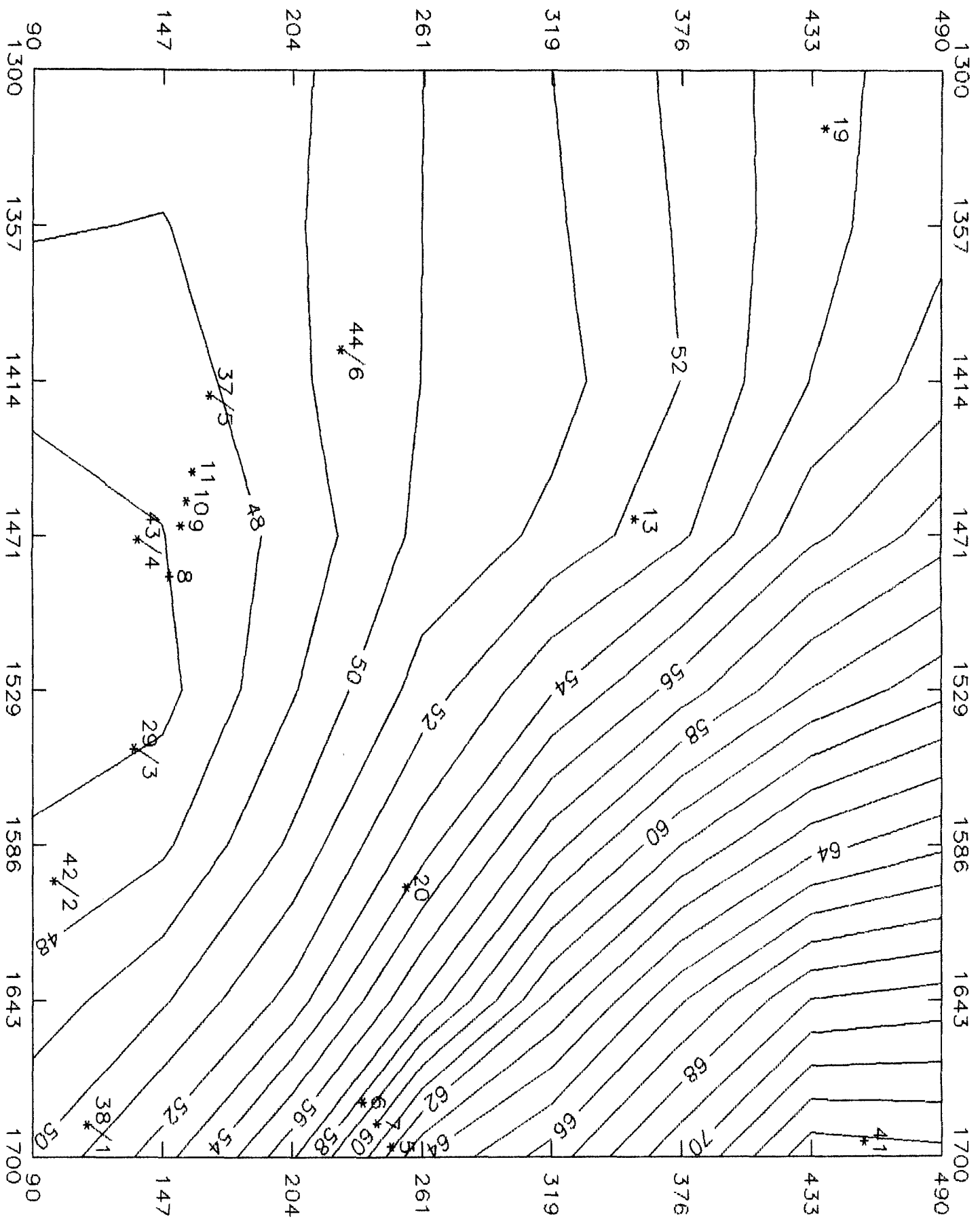
X expansion: 2
Y expansion: 2

Splining row 37 of 40

Press Esc to abort...



30P15, Normal, SR=256, Spine June 88



GBR 06098, LRB
40 x 40

Quad. Search
with Kriging

Minimize effect of
pumping wells - good
Soi ~~is~~ no info with-
drawal

GBR 06098

40 x 40 - 10 p / normal
with cubic spline

[Modify Smooth] ~~OpLine Matrix~~
Smooth grid with a user specified smoothing matrix

June 88

Input grid file [.GRD]: GBR06098.GRD
First row of input grid: 1
Last row of input grid: 32767
First column of input grid: 1
Last column of input grid: 32767

Output grid file [.GRD]: OUT.GRD
Output format (Binary or ASCII): Binary

Matrix method (Average or Weighted): Average
Distance weighting power: 2
Weight of matrix center: 2
Number of rows on either side of center: 2
Number of columns on either side of center: 2

F1=Help F3=Main F4=Store F5=Directory Esc=Backup Arrow keys=Move pointer

[Random] Input Output Duplicate GridSize Method Search Limits Begin
Enter, edit, and transform irregularly spaced XYZ data

	DATA MINIMUM	DATA MAXIMUM	GRID MINIMUM	GRID MAXIMUM
X	1321.5300293	1713.6400146	1300	1800
Y	99.5400009	2021.6400146	1490	1900
Z	45.9700012	101.7300034		

No. data points: 36	Search Method: Default
Discard data: No	Search Radius: 1961.6877181
Duplicate points: Delete	Nearest Points: 10
Grid Method: Inverse Distance 2	X Grid Size: 40 (12.8205128)
	Y Grid Size: 32 (12.9032258)
Input file: GBR06098.DAT	
Output file: GBR06098.GRD	
Output format: Binary	

F1=Help F3=Main F4=Store F5=Directory Esc=Backup Arrow keys=Move pointer

[TOPO] Input Level Scale ConLine Title Border XYLine Grid Post Output Equip
Plot original data points on map

Input grid file: OUT.GRD
Input grid size: 32 x 40

	GRID MINIMUM	GRID MAXIMUM
X	1300	1800
Y	90	490
Z	47.2452	72.5613

Minimum contour: 45
Maximum contour: 72.0000011
Contour interval: 1

F1=Help F2=View F3=Main F4=Store F5=Directory Esc=Backup Arrows=Move pointer

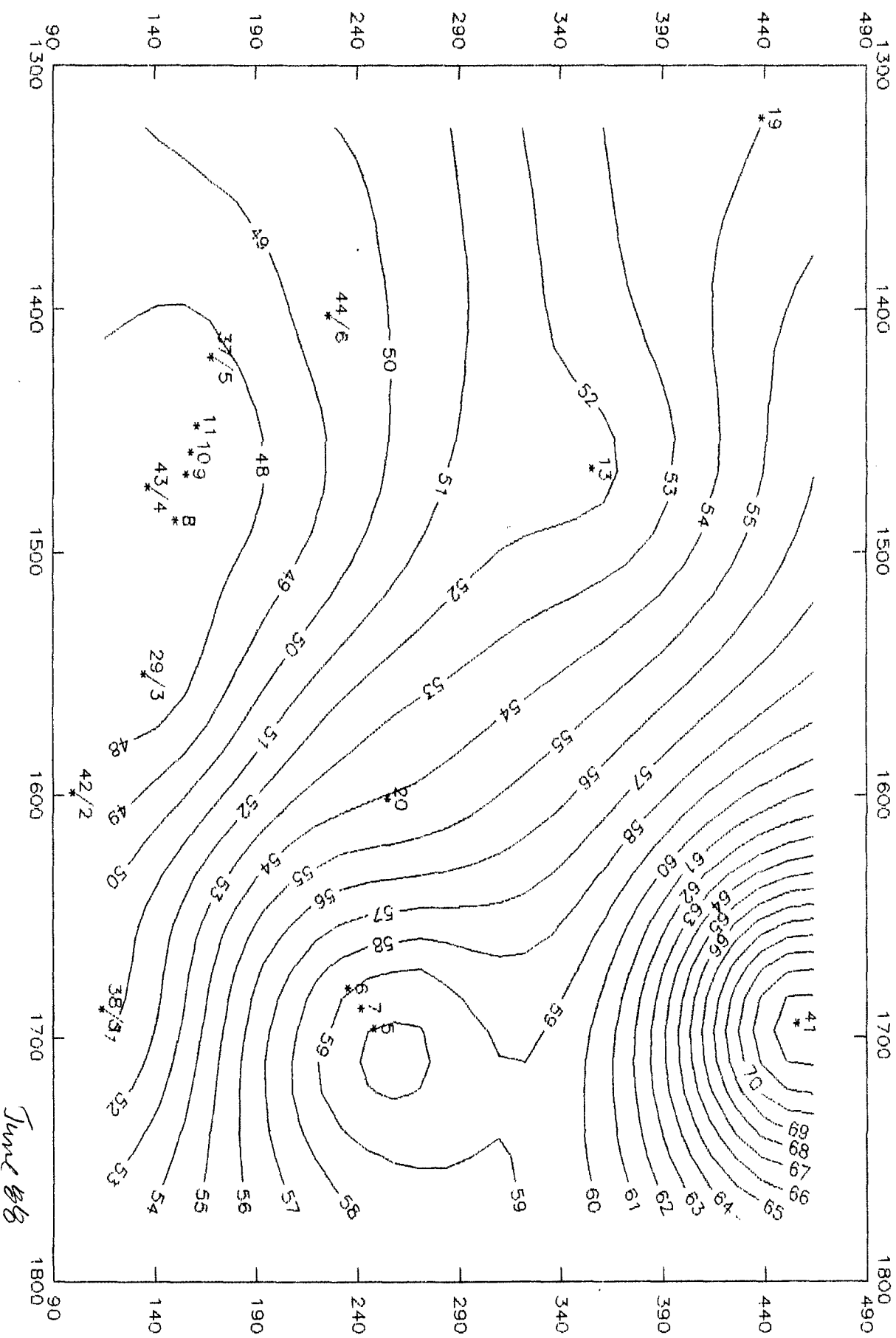
[TOPO] Input Level Scale ConLine Title Border XYLine Grid Post Output Equip
Plot original data points on map

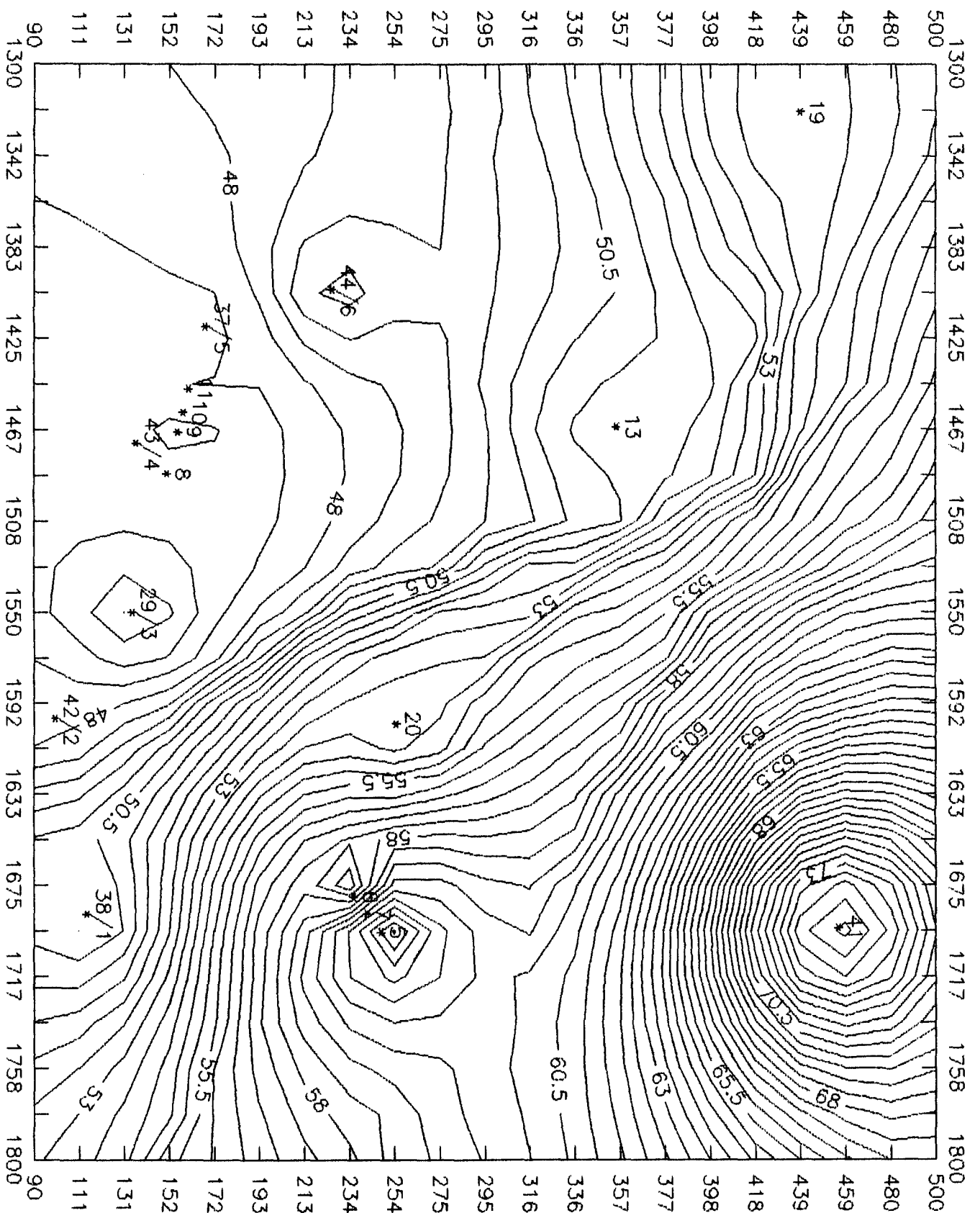
Post data points: Yes
Posting file [.DAT]: ~~OUT.DAT~~
X,Y,Label, and Symbol columns (0 if none): 1,2,4,0
Include points outside grid: No

Symbol code if not in file: 41
Centered symbol set [.SYM]: DEFAULT.SYM
 Centered symbol height: 0.1
 Centered symbol angle: 0
 Centered symbol color: 1

Label format (Char,Fix,Exp,Gen): Character
 Number of decimal digits: 2
 Label symbol set [.SYM]: DEFAULT.SYM
 Label height: 0.1
 Label angle: 0
 Label color: 1
Relative position (Auto or X,Y): Automatic

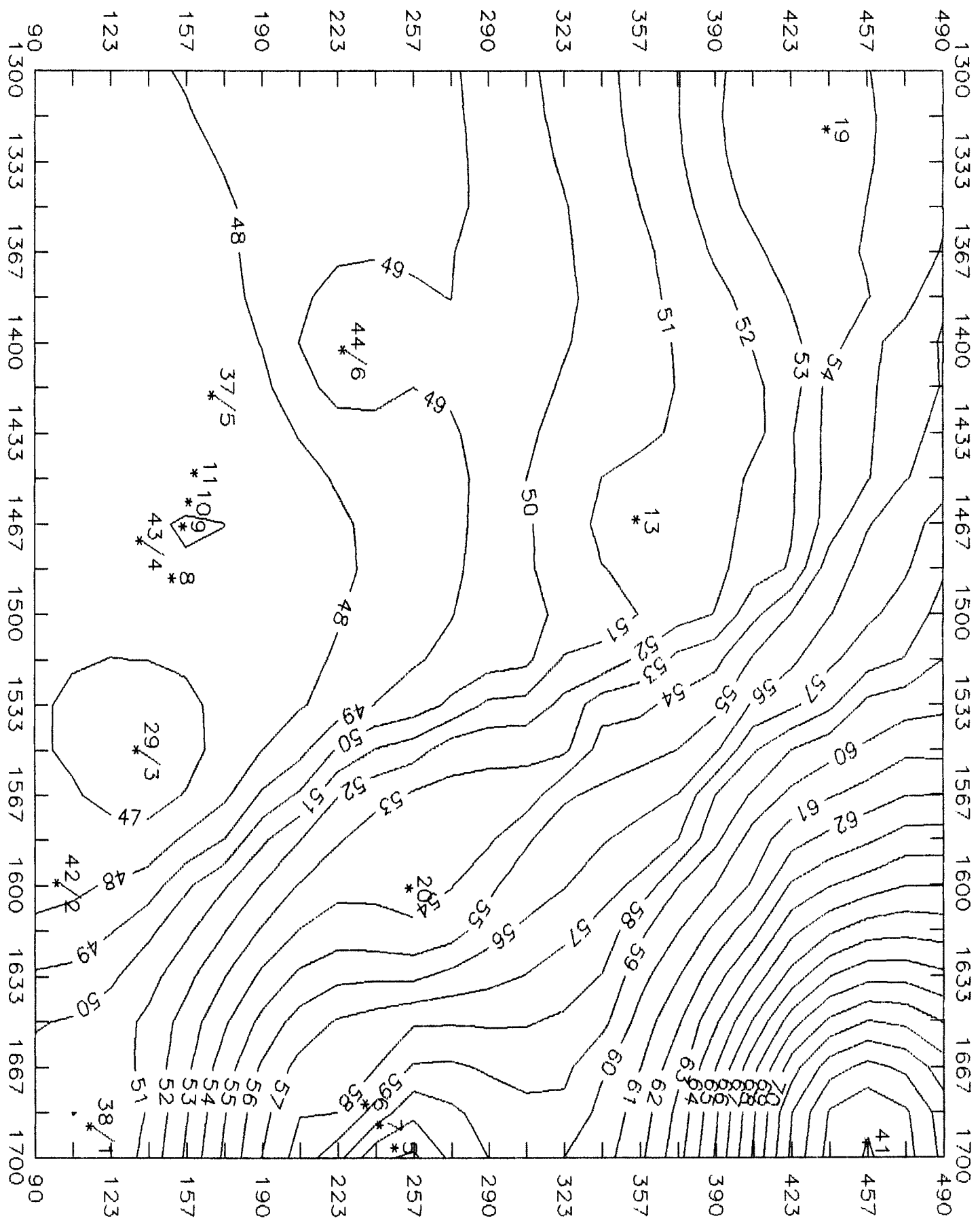
F1=Help F2=View F3=Main F4=Store F5=Directory Esc=Backup Arrows=Move pointer





GER#06098
25x25
10pt normal
0.5 computer

June 88



June 88

GBR06098.6R5
Grid size 25x25
10pt-Normal Search
Limits 1300-1700
90-490

June 88

[Random] Input Output Duplicate GridSize Method Search Limits Begin
Specify coordinates of grid limits

	DATA MINIMUM	DATA MAXIMUM	GRID MINIMUM	GRID MAXIMUM
X	1321.5300293	1713.6400146	1300	1800
Y	99.5400009	2021.6400146	90	500
Z	45.9700012	101.7300034		

No. data points: 839
Discard data: No
Duplicate points: Delete
Grid Method: Inverse Distance ^2
Input file: GBR06098.DAT
Output file: GBR06098.CRD
Output format: Binary

Search Method: Contour
Search Radius: 1901.6877181
Nearest Points: 10
X Grid Size: 40 (12.8205128)
Y Grid Size: 33 (12.8125)

F1=Help F2=Main F4=Store F5=Directory Esc=Backup Arrow keys=Move pointer

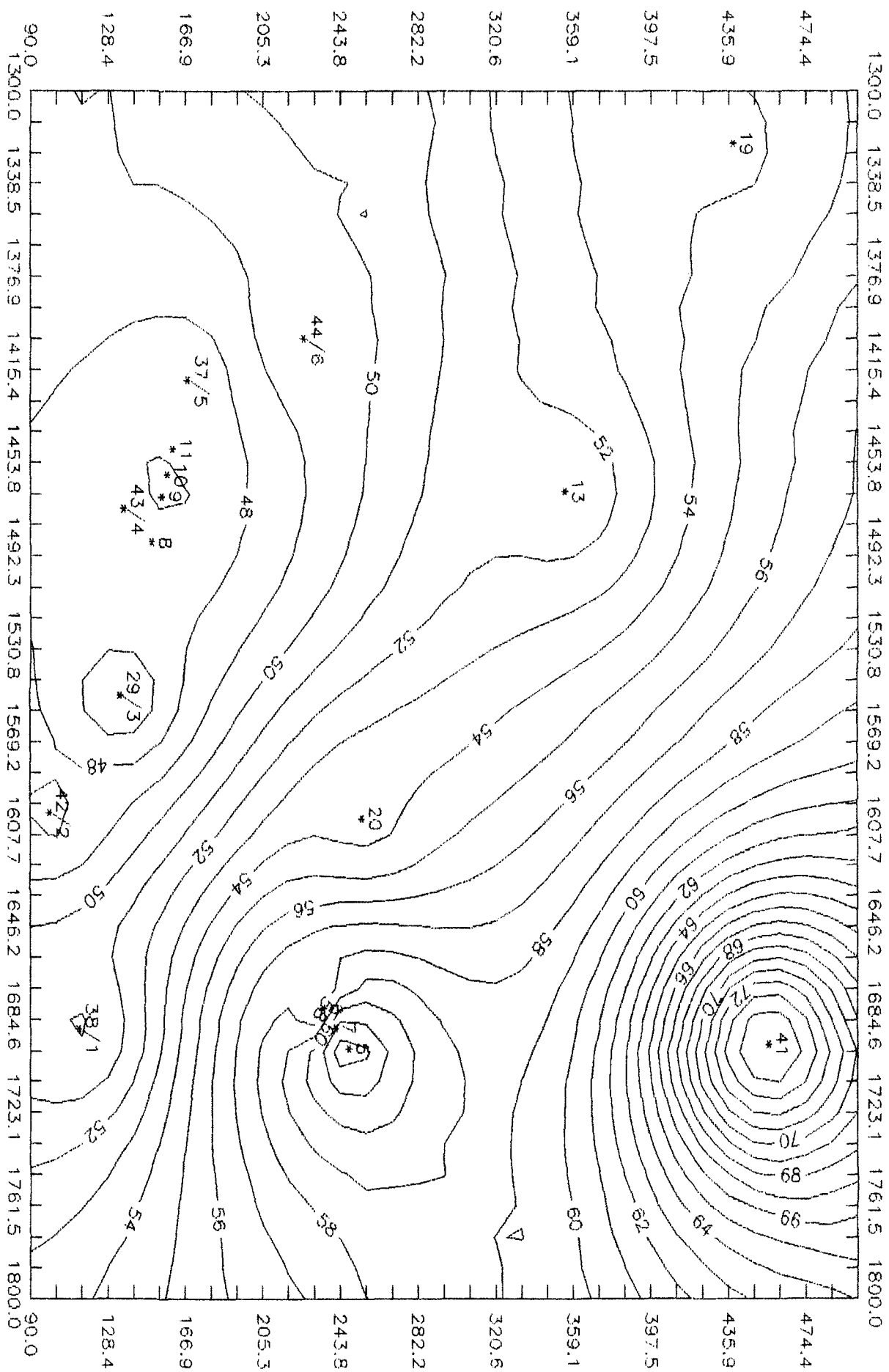
[TOP] Input Level Scale ConLine Title Border XYLine Grid Post Output Equip
Specify an input grid file to contour

Input grid file: GBR06098.GRD
Input grid: 33 X 40

	GRID MINIMUM	GRID MAXIMUM
X	1300	1800
Y	90	500
Z	46.2766	75.0097

Minimum contour: 46.0000007
Maximum contour: 74.0000011
Contour interval: 2

F1=Help F2=View F3=Main F4=Store F5=Directory Esc=Backup Arrows=Move pointer



June 88

[Random] Input Output Duplicate GridSize Method Search Limits Begin
Specify grid interpolation method

	DATA MINIMUM	DATA MAXIMUM	GRID MINIMUM	GRID MAXIMUM
X	1141.6399414	1713.6400146	1300	1700
Y	99.5400009	2061.9499512	90	490
Z	45.9700012	101.7300034		

No. data points: 40
Discard data: No
Duplicate points: Delete
Grid Method: ~~Kriging~~
Input file: GBR06098.DAT
Output file: GBR06098.GRD
Output format: Binary

Search Method: ~~Normal~~
Search Radius: 2044.0596124
Nearest Points: ~~10~~
X Grid Size: ~~40~~ (10.2564103)
Y Grid Size: ~~40~~ (10.2564103)

F1=Help F3=Main F4=Store F5=Directory Esc=Backup Arrow keys=Move pointer

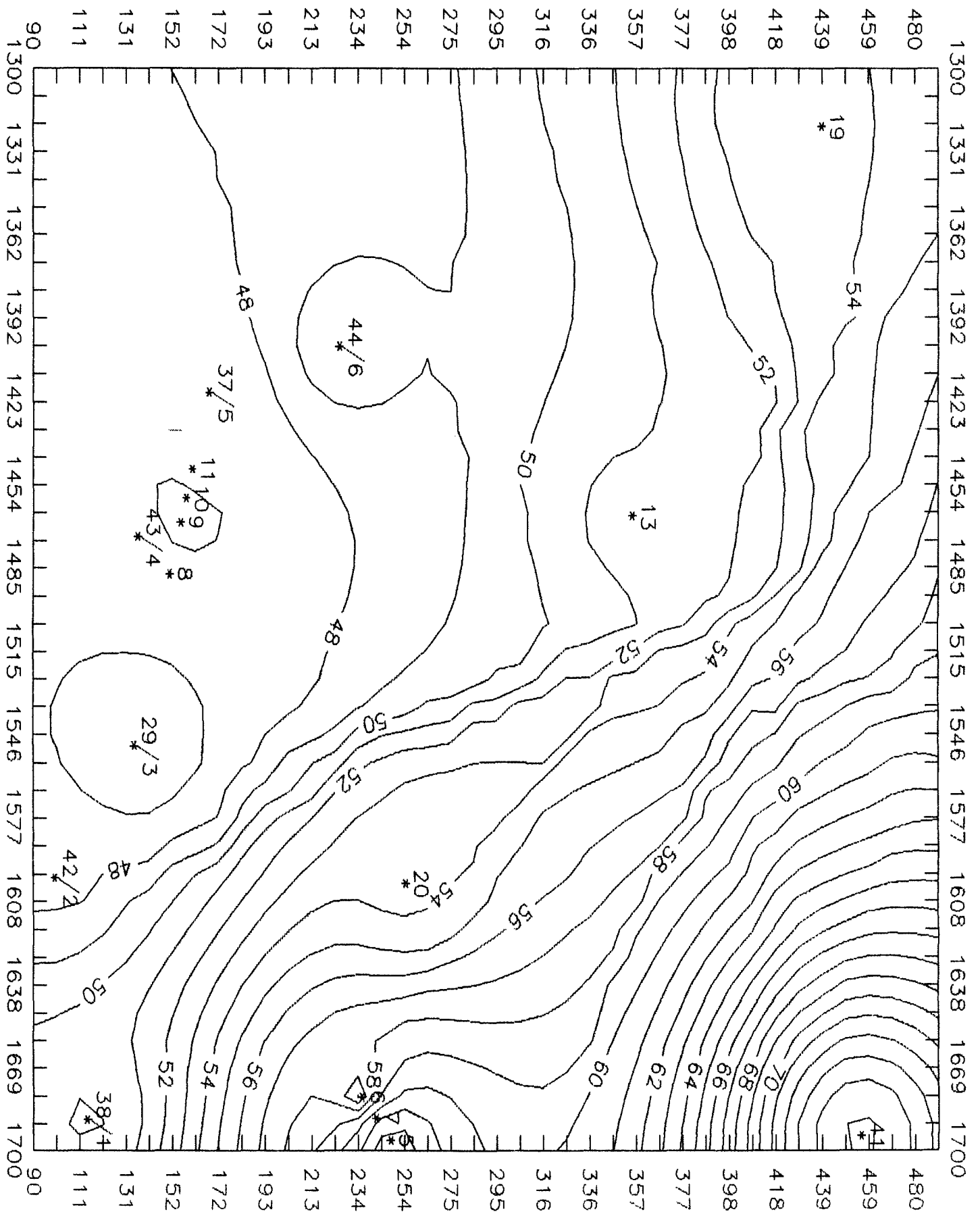
[TOPO] Input Level Scale ConLine Title Border XYLine Grid Post Output Equip
Plot original data points on map

Post data points: Yes
Posting file [.DAT]: GBR06098.DAT
X,Y,Label, and Symbol columns (0 if none) ~~1 2 4 0~~
Include points outside grid: No

Symbol code if not in file: 41
Centered symbol set [.SYM]: DEFAULT.SYM
Centered symbol height: 0.1
Centered symbol angle: 0
Centered symbol color: 1

Label format (Char,Fix,Exp,Gen): Character
Number of decimal digits: 2
Label symbol set [.SYM]: DEFAULT.SYM
Label height: 0.1
Label angle: 0
Label color: 1
Relative position (Auto or X,Y): Automatic

F1=Help F2=View F3=Main F4=Store F5=Directory Esc=Backup Arrows=Move pointer



June 88

May 88

[Random Input] Edit Xternal Insert Delete Copy Move Format Transform Save
Edit values in worksheet

	A	B	C	D	E
1	1698.18	248.00	83.47		5 P
2	1679.98	238.41	55.84		6
3	1697.30	241.55	61.65		7
4	1486.73	150.28	47.08		8 P
5	1467.59	155.35	46.64		9
6	1458.56	157.79	48.86		10 P
7	1447.98	160.42	48.00		11 P
8	1465.23	355.10	51.35		13 P
9	1382.00	977.84	54.62	14/13	
10	1411.38	944.47	63.27		15
11	1141.69	1240.19	68.30		17
12	1528.06	2021.84	108.60		18
13	1321.53	438.60	53.93		19
14	1601.00	254.66	53.93		20 P
15	1492.75	945.78	80.02	210	
16	1492.75	945.78	57.44	215	
17	1458.80	751.42	61.33	22 P	
18	1563.06	1014.34	80.26	23	
19	1447.00	1083.96	72.09	240	
20	1447.00	1083.96	68.65	245	
21	1421.89	949.97	62.72	25	
22	1483.66	937.41	63.28	27/11	

VALUE: 1419.18

	A	B	C	D	E
23	1419.18	868.86	60.13	28/12	
24	1550.03	104.61	44.09	→ 29/3 P	
25	1382.06	1014.84	63.09	30	
26	1350.85	794.15	59.53	31	
27	1143.06	2061.95	31.52	32	
28	1382.64	689.03	58.97	33 P	
29	1445.12	894.24	58.59	34 P	
30	1447.15	644.16	57.85	35 P	
31	1377.90	588.79	55.24	→ 36/10 P	
32	1419.53	167.89	44.60	37/5	
33	1688.26	114.02	50.22	38/1	
34	1404.59	940.69	62.97	39	
35	1713.64	534.07	69.45	40	
36	1694.52	455.92	67.69	41	
37	1598.80	99.54	47.75	42/2	
38	1472.88	136.32	47.30	43/4	
39	1402.59	225.60	49.64	44/5	
40					
41					
42					
43					
44					

May 88

May 88

[Random] Input Output Duplicate GridSize Method Search Limits Begin
Begin creating a grid with the current settings

	DATA MINIMUM	DATA MAXIMUM	GRID MINIMUM	GRID MAXIMUM
X	1141.6899414	1713.6400146	1300	1600
Y	98.5400009	2061.9499812	500	1100
Z	44.0900002	108.5999985		

No. data points: 37
Discard data: No
Duplicate points: Delete
Grid Method: Inverse Distance ²

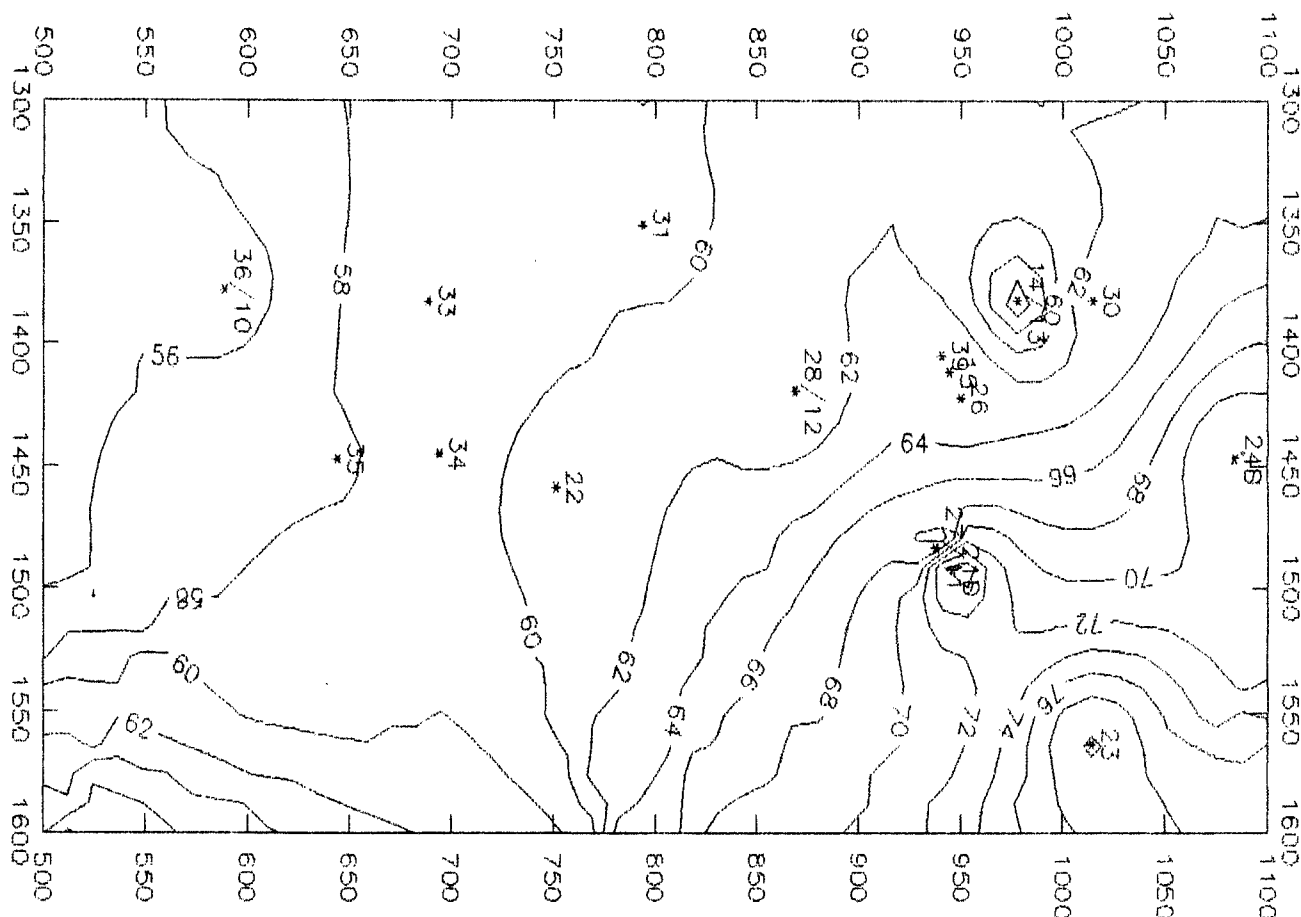
Search Method: Normal
Search Radius: 200
Nearest Points: 10
X Grid Size: 26 (12)
Y Grid Size: 50 (12.244899)

Input file: GBR05178.DAT
Output file: GBR05178.GRD
Output format: Binary

Gridding row 47 of 50

GBR 215 & 245 deleted

Press Esc to abort...



May 88

[Random] Input Output Duplicate GridSize Method Search Limits Begin
Begin creating a grid with the current settings

	DATA MINIMUM	DATA MAXIMUM	GRID MINIMUM	GRID MAXIMUM
X	1141.6899414	1713.6400146	1300	1600
Y	99.5400009	2061.9499512	500	1100
Z	44.0900002	108.5999985		

No. data points: 37
Discard data: No
Duplicate points: Delete
Grid Method: Inverse Distance ²

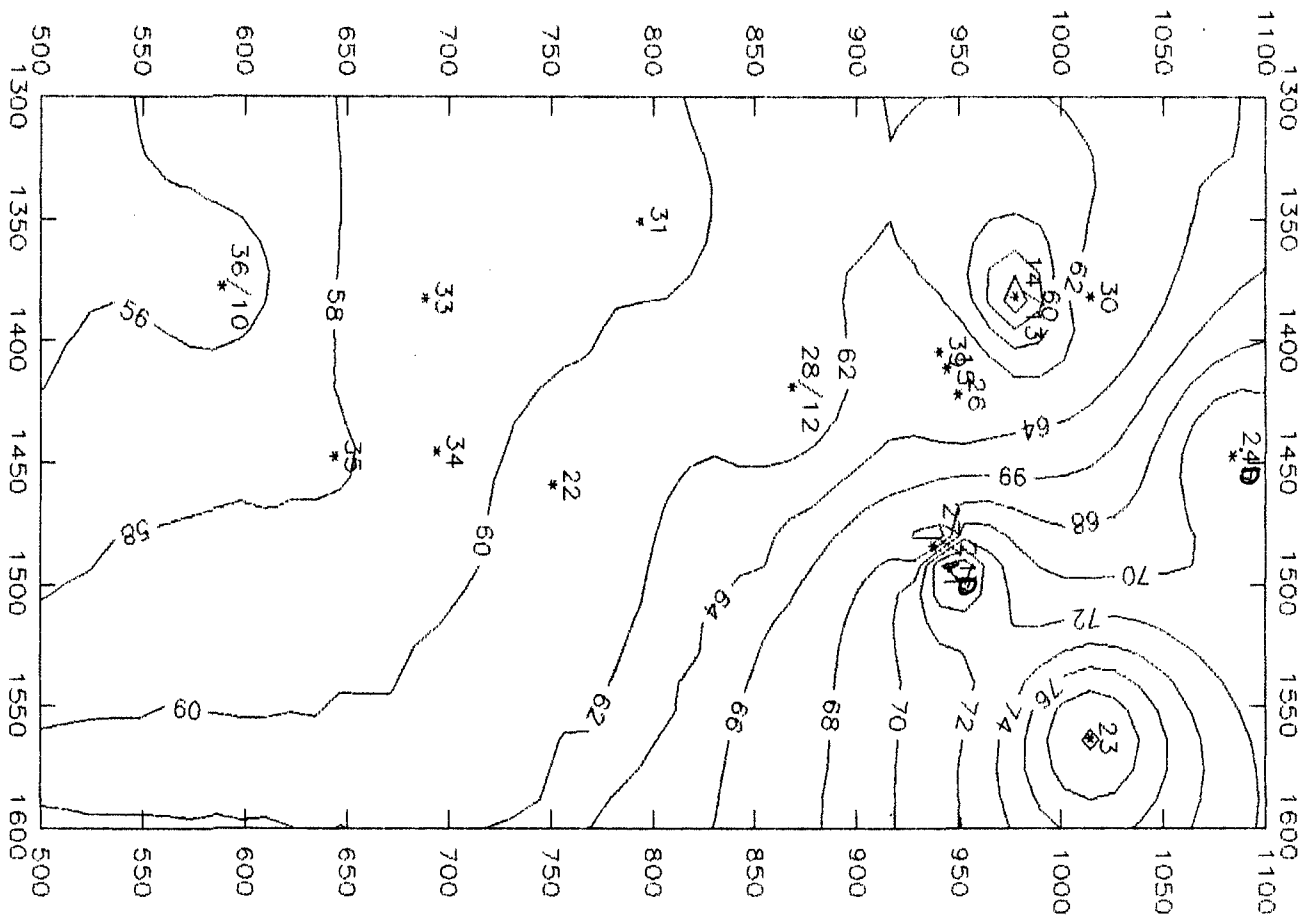
Search Method: Normal
Search Radius: 2044.0596124
Nearest Points: 10
X Grid Size: 26 (12)
Y Grid Size: 50 (12.244898)

Input file: GBR05178.DAT
Output file: GBR05178.GRD
Output format: Binary

Gridding row 9 of 50

Wells w/ product
GBR 21'S & 24'S deleted

Press Esc to abort...



may 88

[Random] Input Output Duplicate GridSize Method Search Limits Begin
Begin creating a grid with the current settings

	DATA MINIMUM	DATA MAXIMUM	GRID MINIMUM	GRID MAXIMUM
X	1141.6899414	1713.6400146	1300	1600
Y	99.5400009	2061.9499512	500	1100
Z	44.0900002	108.5999985		

No. data points: 27
Discard data: No
Duplicate points: Delete
Grid Method: Inverse Distance ^2

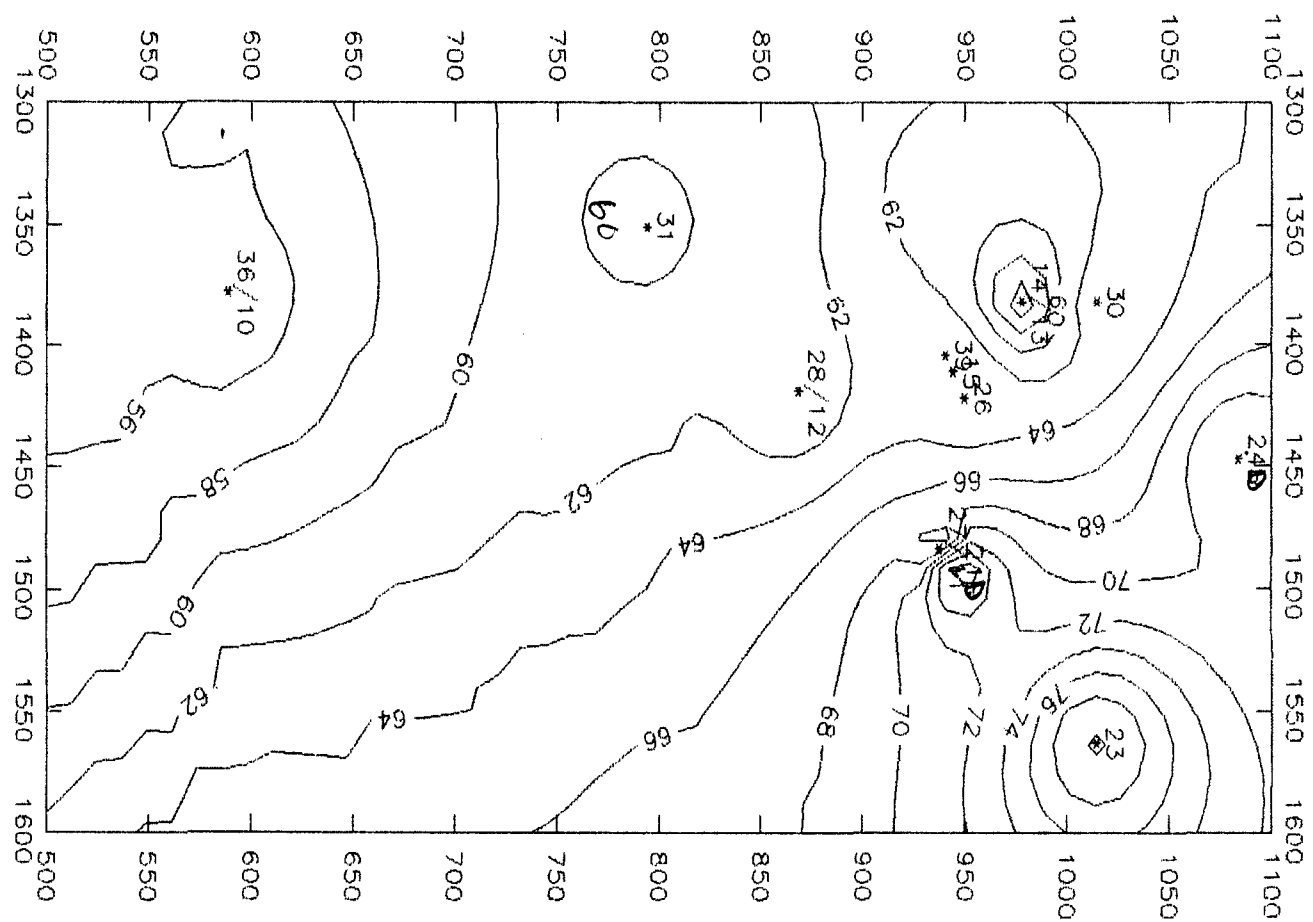
Search Method: Normal
Search Radius: 2044.0596124
Nearest Points: 10
X Grid Size: 26 (12)
Y Grid Size: 50 (12.244898)

Input file: GBRU5178.DAT
Output file: GBRU5178.GRD
Output format: Binary

Gridding row 4 of 50

*w/o wells w/product
GBR 25 & 24 deleted*

Press Esc to abort...



May 88

[Random] Input Output Duplicate GridSize Method Search Limits Begin
Begin creating a grid with the current settings

	DATA MINIMUM	DATA MAXIMUM	GRID MINIMUM	GRID MAXIMUM
X	1141.6899414	1713.6400146	1300	1800
Y	99.5400009	2061.9499512	90	490
Z	44.0900002	108.5999985		

No. data points: 129
Discard data: No
Duplicate points: Delete
Grid Method: Inverse Distance ^2
Input file: GBRU5178.DAT
Output file: GBRU5178.GRD
Output format: Binary

Search Method: Normal
Search Radius: 300
Nearest Points: 4
X Grid Size: 50 (10.2040816)
Y Grid Size: 40 (10.2564103)

Gridding row 23 of 40

Press Esc to abort...

[Modify] Smooth Blank Math
Blank specified portions of a previously created grid

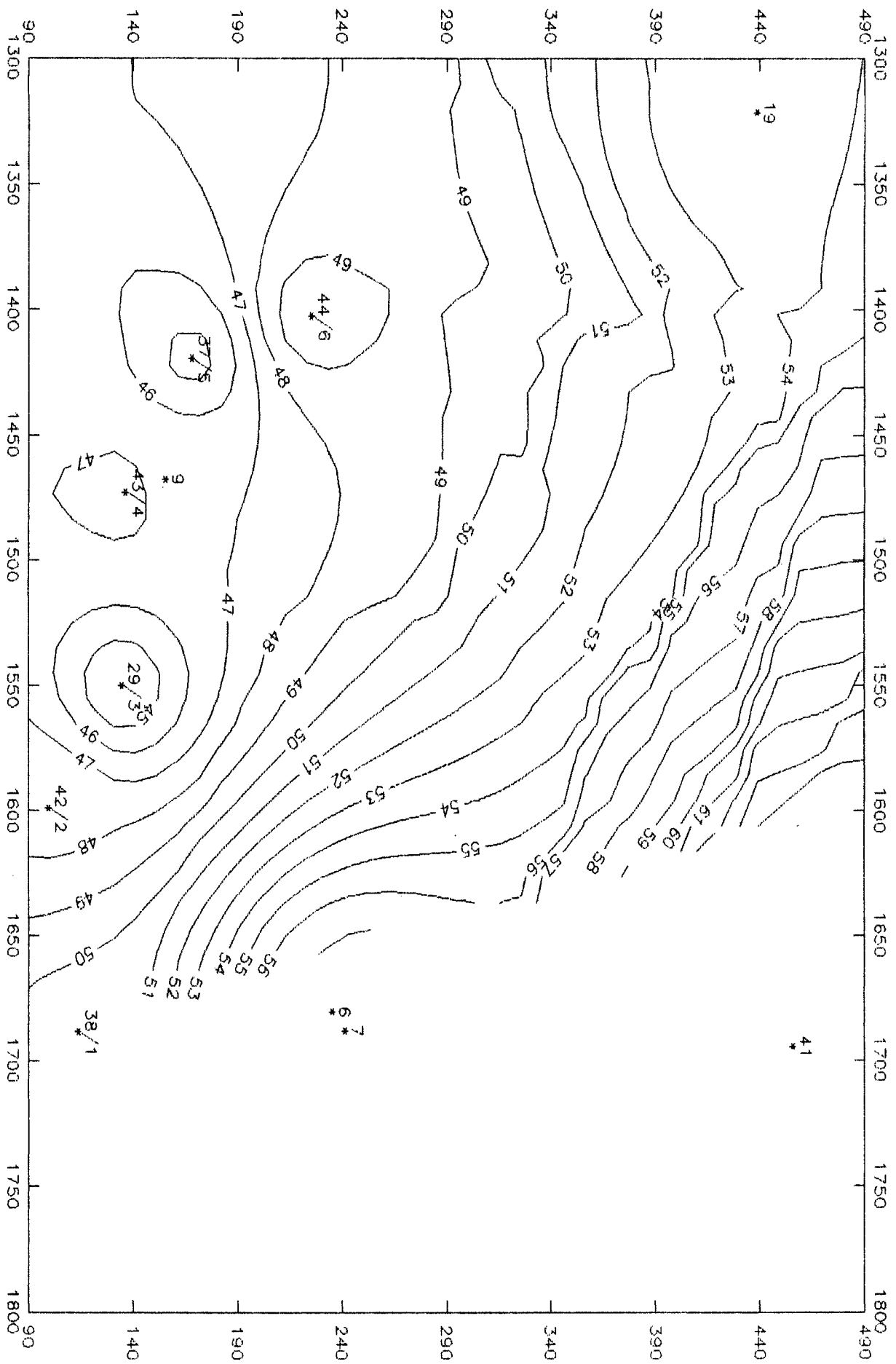
Input file: GBRU5178.GRD
Input rows: 1-32767
Input columns: 1-32767

Output file: OUT.GRD
Output format: Binary

Blank boundary file: GBRBLANK.BLN

Blanking row 22 of 40

Press Esc to abort...



270°s, Normal, SN=380, Blanking, May 88

May 88

[Random] Input Output Duplicate GridSize Method Search Limits Begin
Begin creating a grid with the current settings

	DATA MINIMUM	DATA MAXIMUM	GRID MINIMUM	GRID MAXIMUM
X	1141.6899414	1713.6400146	1300	1800
Y	99.5400009	2061.9499512	90	490
Z	44.0900002	108.5999985		

No. data points: 99
Discard data: No
Duplicate points: Delete
Grid Method: Inverse Distance 2

Search Method: Normal
Search Radius: 2044.0598124
Nearest Points: 10
X Grid Size: 40 (12.8205128)
Y Grid Size: 32 (12.9032256)

Input file: GBR05178.DAT
Output file: GBR05178.GRD
Output format: Binary

Gridding row 5 of 32

Press Esc to abort...

[TOPO] Input Level Scale ConLine Title Border XYLine Grid Post Output Equip
Specify screen type, screen colors, and output device

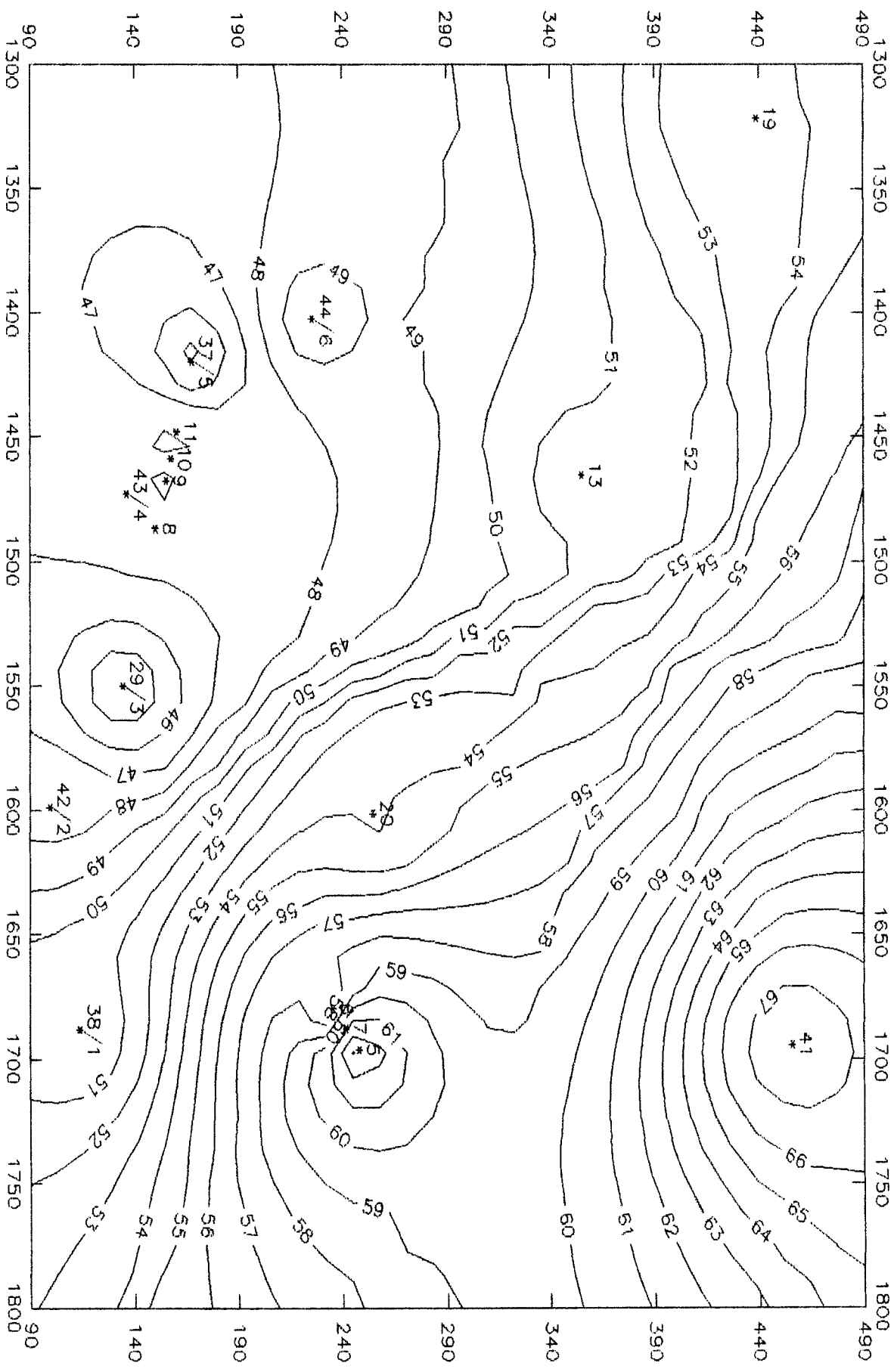
Input grid file: GBR05178.GRD
Input grid size: 32 x 40

	GRID MINIMUM	GRID MAXIMUM
X	1300	1800
Y	90	490
Z	44.3945	67.6515

Minimum contour: 45
Maximum contour: 75
Contour interval: 1

[TOPO] Input Level Scale ConLine Title Border XYLine Grid Post Output Equip
Plot original data points on map

Post data points: Yes
Creating file [GBR05178.DAT]
X,Y,Label, and Symbol columns (0 if none): 1,2,4,0
Include points outside grid: No
Symbol code if not in file: 41
Centered symbol set [SYMBOL]: DEFAULT.SYM
Centered symbol height: 0.1
Centered symbol angle: 0
Centered symbol color: 1
Label format (Char,Fix,Exp,Gen): Character
Number of decimal digits: 2
Label symbol set [SYMBOL]: DEFAULT.SYM
Label height: 0.1



35015, N01m, SR-2044

May 88

May 88

[Random] Input Output Duplicate GridSize Method Search Limits Begin
Begin creating a grid with the current settings

	DATA MINIMUM	DATA MAXIMUM	GRID MINIMUM	GRID MAXIMUM
X	1141.6899414	1713.6400146	1300	1800
Y	99.5400009	2061.9499512	90	490
Z	44.0900002	108.5999985		

No. data points: 39	Search Method: Quadrant
Discard data: No	Search Radius: 2044.0596124
Duplicate points: Delete	Nearest Points: 10
Grid Method: Inverse Distance	X Grid Size: 40 (12.6205128)
	Y Grid Size: 32 (12.9032250)

Input file: GBR05178.DAT
Output file: GBR05178.GRD
Output format: Binary

Gridding row 16 of 32

[TOPO] Input Level Scale ConLine Title Border XYLine Grid Post Output Equip
Create a plot file and optionally send to hard copy device

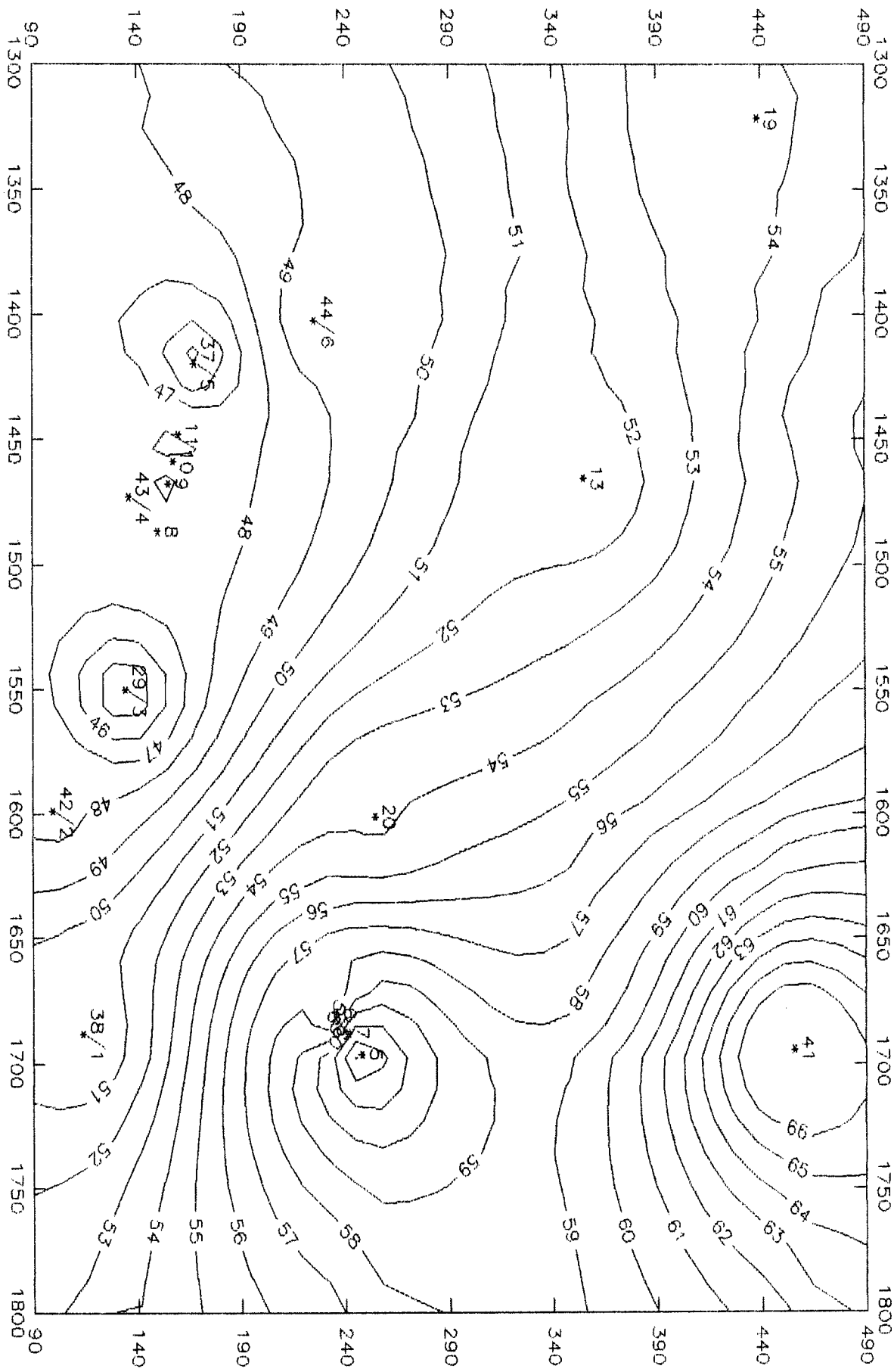
Press Esc to abort
Input grid file: GBR05178.GRD
Input grid size: 32 x 40

	GRID MINIMUM	GRID MAXIMUM
X	1300	1800
Y	90	490
Z	44.5475	67.6243

Minimum contour: 45
Maximum contour: 66.000001
Contour interval: 1

Plotting data point labels

F1=Help F2=View F3=Main F4=Store F5=Directory Esc=Backup Arrows=Move pointer



39P15, Qued, SR-2044 May 88

May 88

[Random] Input Output Duplicate GridSize Method Search Limits Begin
Begin creating a grid with the current settings

	DATA MINIMUM	DATA MAXIMUM	GRID MINIMUM	GRID MAXIMUM
X	1141.6899414	1713.6400146	1300	1800
Y	99.5400009	2061.9499512	90	490
Z	44.0900002	108.5999995		

No. data points: 5139
Discard data: No
Duplicate points: Delete
Grid Method: Inverse Distance ^2

Search Method: Delaunay
Search Radius: 10.3124337
Nearest Points: 10
X Grid Size: 60 (10.2040316)
Y Grid Size: 40 (10.2564103)

Input file: GBR05178.DAT
Output file: GBR05178.GRD
Output format: Binary

Gridding row 4 of 40

Press Esc to abort...

[TOPO] Input Level Scale ConLine Title Border XYLine Grid Post Output Equip
Specify border status and parameters

Plot map border: Yes
Map border color: 1
Tic sides (L,R,T,B): LRTB

X tic distance (Auto,Data units): 50
X labeled tic frequency (Auto,Value): Automatic
X label angle (0,90): 0
Y tic distance (Auto,Data units): 50
Y labeled tic frequency (Auto,Value): Automatic
Y label angle (0,90): 0

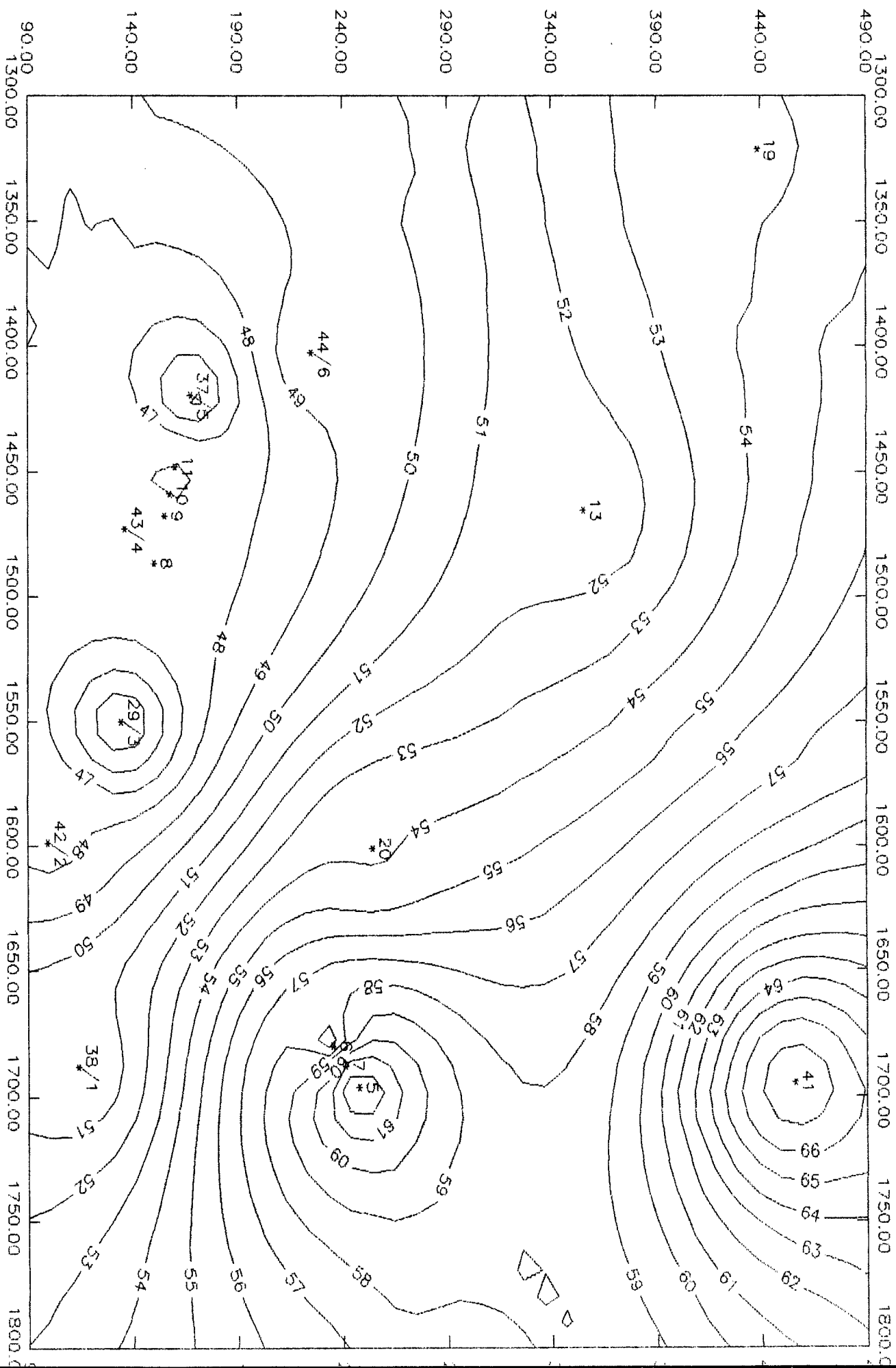
Label format (Fix,Exp,Gen): Fixed
Number of decimal digits: 2
Label character height: 0.1
Label color: 1
Label symbol set [.SYM]: DEFAULT.SYM

F1=Help F2=View F3=Main F4=Store F5=Directory Esc=Backup Arrows=Move pointer

[TOPO] Input Level Scale ConLine Title Border XYLine Grid Post Output Equip
Specify border status and parameters

Input grid file: GBR05178.GRD
Input grid size: 40 x 50

	GRID MINIMUM	GRID MAXIMUM
X	1300	1800
Y	90	490



39/15, Oct,

SR=640

May 88

[Random] Input Output Duplicate GridSize Method Search Limits Begin
Begin creating a grid with the current settings

	DATA MINIMUM	DATA MAXIMUM	GRID MINIMUM	GRID MAXIMUM
X	1141.6889414	1713.6400146	1000	1800
Y	99.5400009	2061.9499512	90	490
Z	44.0900002	108.5999985		

No. data points: 39
Discard data: No
Duplicate points: Delete
Grid Method: Inverse Distance ²
Input file: GBR05178.DAT
Output file: GBR05178.GRD
Output format: Binary

Search Method: Octant
Search Radius: 33044.0596124
Nearest Points: 10
X Grid Size: 50 (10.2040816)
Y Grid Size: 40 (10.2564103)

F1=Help F3=Main F4=Store F5=Directory Esc=Backup Arrow keys=Move pointer

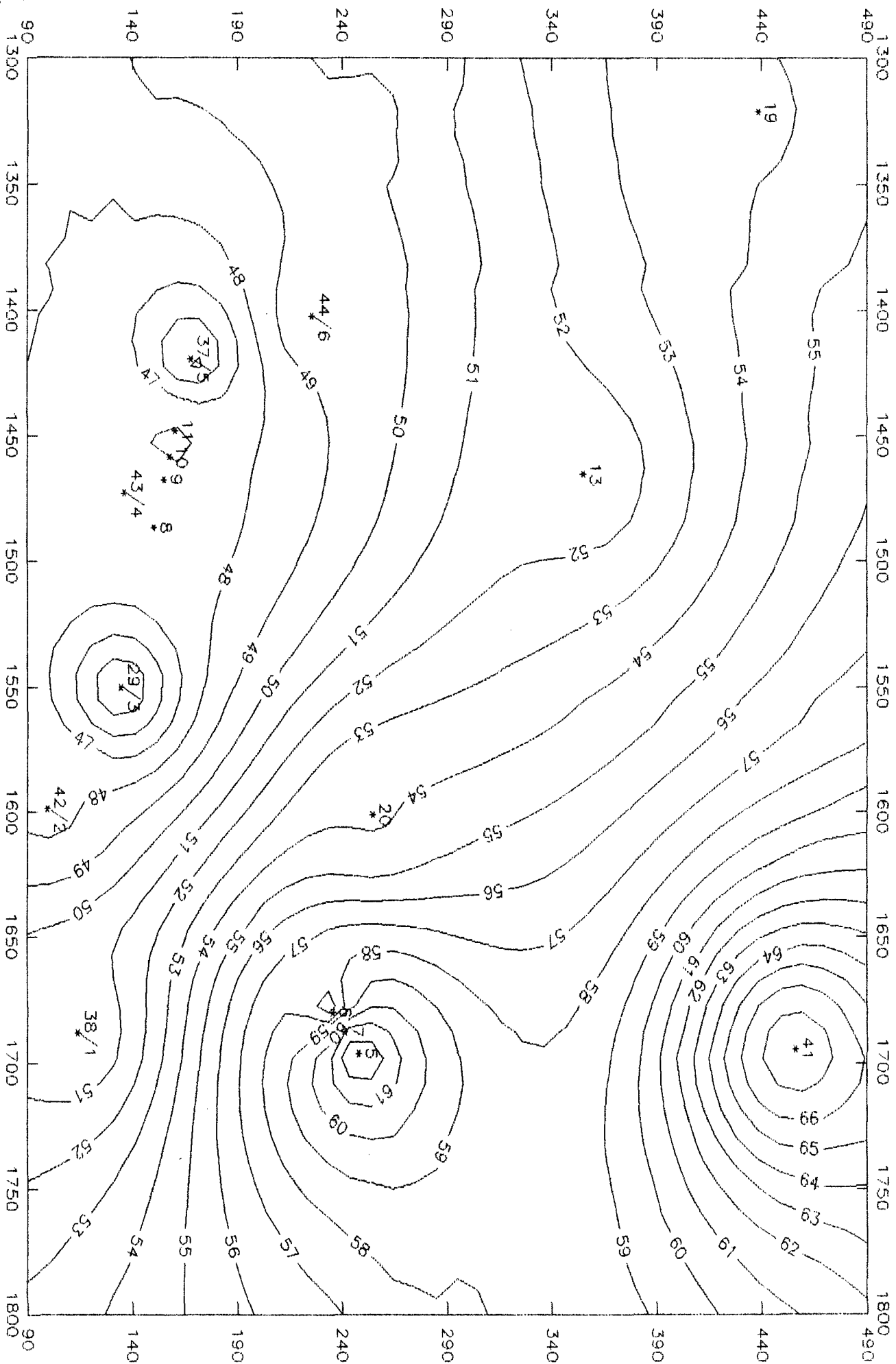
[TOPO] Input Level Scale ConLine Title Border XYLine Grid Post Output Equip
Specify border status and parameters

Plot map border: Yes
Map border color: 1
Tic sides (L,R,T,B): LRTB

X tic distance (Auto,Data units): 50
X labeled tic frequency (Auto,Value): Automatic
X label angle (0,90): 0
Y tic distance (Auto,Data units): 50
Y labeled tic frequency (Auto,Value): Automatic
Y label angle (0,90): 0

Label format (Fix,Exp,Gen): Fixed
Number of decimal digits: 0
Label character height: 0.1
Label color: 1
Label symbol set [.SYM]: DEFAULT.SYM

F1=Help F2=View F3=Main F4=Store F5=Directory Esc=Backup Arrows=Move pointer



May 88

[Random] Input Output Duplicate GridSize Method Search Limits Begin
Begin creating a grid with the current settings

	DATA MINIMUM	DATA MAXIMUM	GRID MINIMUM	GRID MAXIMUM
X	1141.6899414	1713.6400146	1300	1800
Y	99.5400009	2061.9499512	.90	490
Z	44.5999985	108.5999985		

No. data points: 39
Discard data: No
Duplicate points: Delete
Grid Method: Inverse Distance ²
Search Method: Normal
Search Radius: 2044.0596124
Nearest Points: 4
X Grid Size: 50 (10.2040016)
Y Grid Size: 40 (10.2564103)

Input file: GBR05178.DAT
Output file: GBR05178.GRD
Output format: Binary

*w/ deletion of heavy
pumping wells
37, 29, 6*

Gridding row 28 of 40

Press Esc to abort...

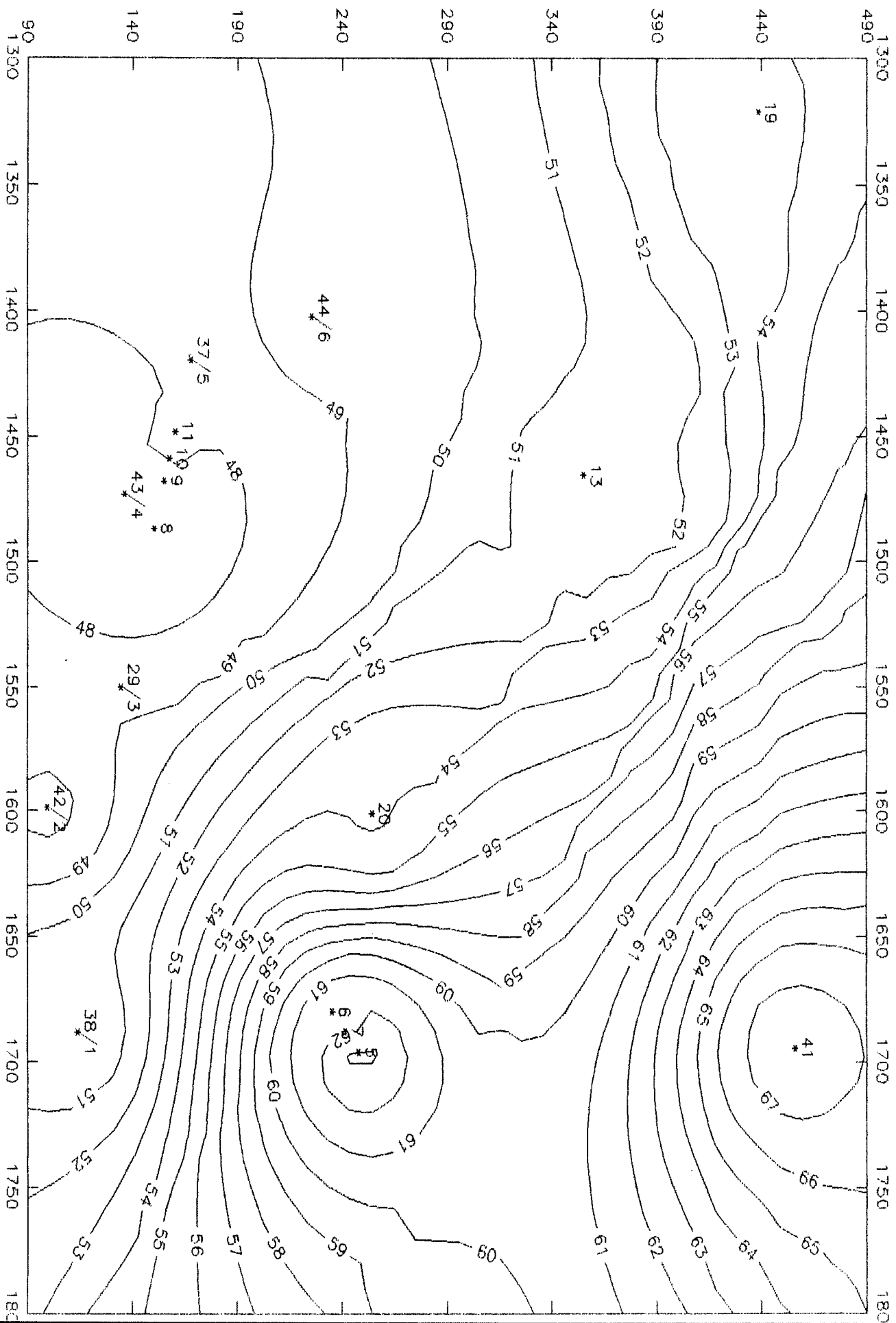
[TOPO] Input Level Scale ConLine Title Border XYLine Grid Post Output Equip
Plot original data points on map

Post data points: Yes
Posting file [.DAT]: GBR05178.DAT
X,Y,Label, and Symbol columns (0 if none): 1,2,4,0
Include points outside grid: No

Symbol code if not in file: 41
Centered symbol set [.SYM]: DEFAULT.SYM
Centered symbol height: 0.1
Centered symbol angle: 0
Centered symbol color: 1

Label format (Char,Fix,Exp,Gen): Character
Number of decimal digits: 2
Label symbol set [.SYM]: DEFAULT.SYM
Label height: 0.1
Label angle: 0
Label color: 1
Relative position (Auto or X,Y): Automatic

F1=Help F2=View F3=Main F4=Store F5=Directory Esc=Backup Arrows=Move pointer



May 88

May 88

[Random] Input Output Duplicate GridSize Method Search Limits Begin
Begin creating a grid with the current settings

	DATA MINIMUM	DATA MAXIMUM	GRID MINIMUM	GRID MAXIMUM
X	1141.6899414	1713.6400146	1300	1800
Y	99.5400009	2061.9499512	90	490
Z	44.0900002	108.5999935		

No. data points: ~~37~~ w/o #9, #5
Discard data: No
Duplicate points: Delete
Grid Method: ~~Inverse Distance~~

Search Method: ~~Normal~~
Search Radius: 2044.0596124
Nearest Points: 10
X Grid Size: 40 (12.8205128)
Y Grid Size: 32 (12.9032258)

Input file: ~~GBR05178.DAT~~
Output file: GBR05178.GRD
Output format: Binary

w/ deletion of wells with very high/low
water levels.

May 88

F1=Help F3=Main F4=Store F5=Directory Esc=Backup Arrow keys=Move pointer

[TOPO] Input Level Scale ConLine Title Border XYLine Grid Post Output Equip
Specify contour map scale

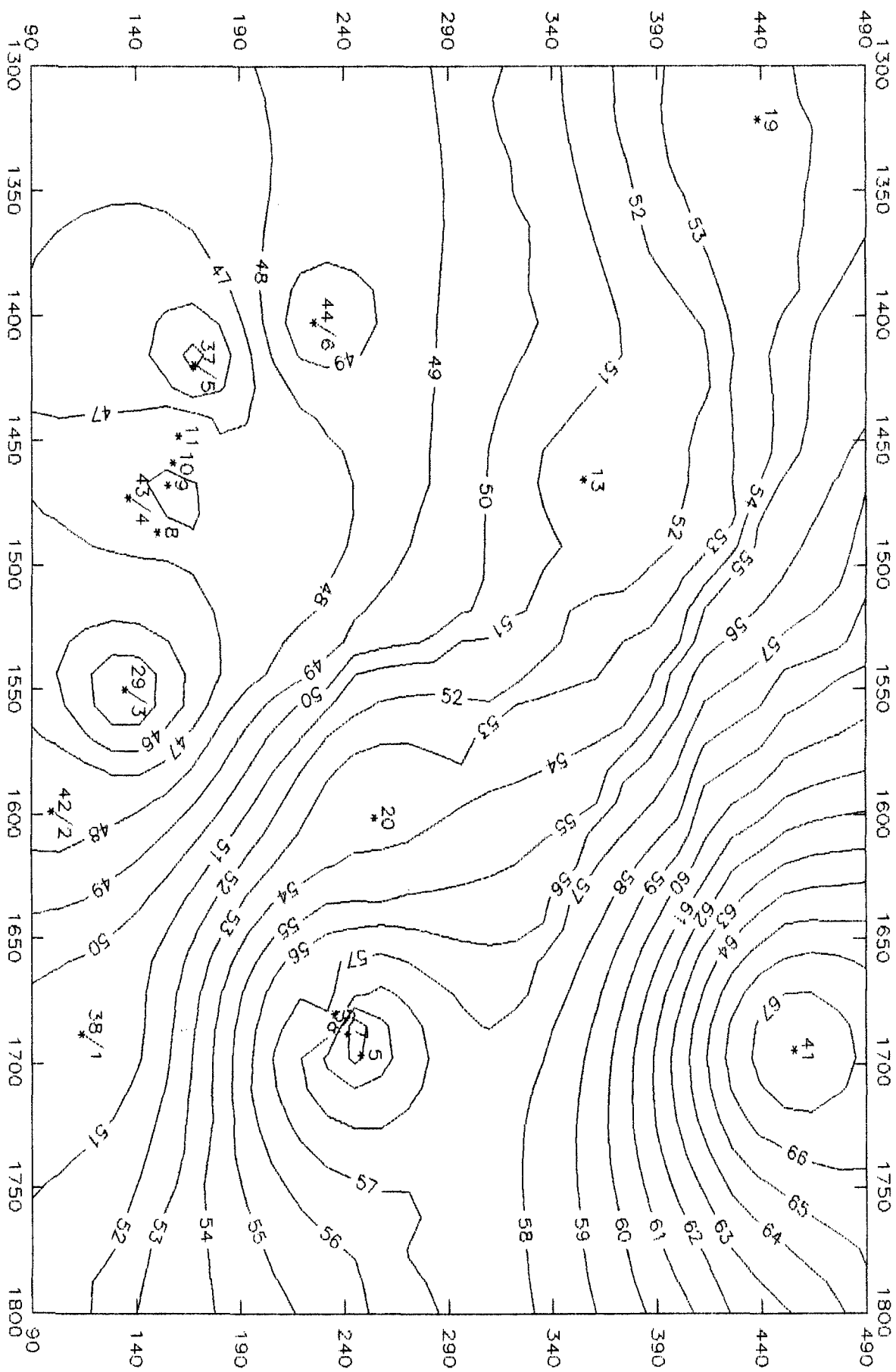
Input grid file: GBR05178.GRD
Input grid size: ~~32 x 40~~

	GRID MINIMUM	GRID MAXIMUM
X	1300	1800
Y	90	490
Z	44.383	67.6483

Minimum contour: 45
Maximum contour: 75
Contour interval: 1

F1=Help F2=View F3=Main F4=Store F5=Directory Esc=Backup Arrows=Move pointer

GIANT BLOOM. REF. WATER LEVELS, 5/17/88



May 88

[Random] Input Output Duplicate GridSize Method Search Limits Begin
Begin creating a grid with the current settings

	DATA MINIMUM	DATA MAXIMUM	GRID MINIMUM	GRID MAXIMUM
X	1141.6899414	1713.6400146	1300	1800
Y	99.5400009	2061.9499512	90	490
Z	44.5999985	108.5999985		

No. data points: 28
Discard data: No
Duplicate points: Delete
Grid Method: Inverse Distance ^2

Search Method: Normal
Search Radius: 2044.0596124
Nearest Points: 10
X Grid Size: 50 (10.2040316)
Y Grid Size: 40 (10.2564103)

Input file: GBRU5178.DAT
Output file: GBRU5178.GRD
Output format: Binary

Gridding row 12 of 40

*Deletion of wells with
> 0.5' product except
recovery wells*

Press Esc to abort...

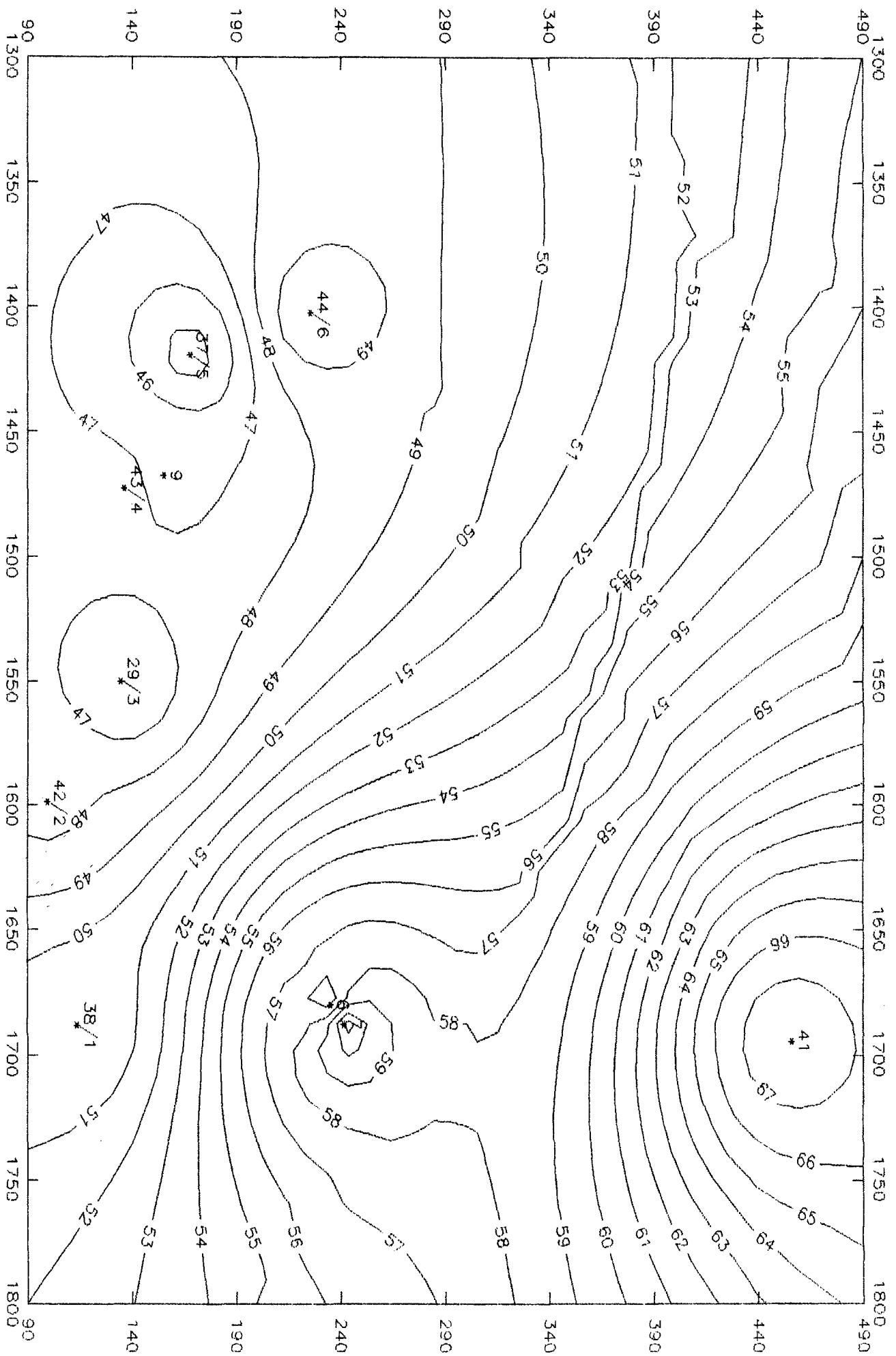
[TOPO] Input Level Scale ConLine Title Border XYLine Grid Post Output Equip
Specify screen type, screen colors, and output device

Input grid file: GBRU5178.GRD
Input grid size: 40 x 50

	GRID MINIMUM	GRID MAXIMUM
X	1300	1800
Y	90	490
Z	44.6981	67.6655

Minimum contour: 45
Maximum contour: 70
Contour interval: 1

F1=Help F2=View F3=Main F4=Store F5=Directory Esc=Backup Arrows=Move pointer



28p18, Normal, SR:2044 May 88

May 88

[Random] Input Output Duplicate GridSize Method Search Limits Begin
Begin creating a grid with the current settings

	DATA MINIMUM	DATA MAXIMUM	GRID MINIMUM	GRID MAXIMUM
X	1141.6899414	1713.6400146	1300	1800
Y	99.5400009	2061.9499512	90	490
Z	44.0900002	108.5999985		

No. data points: 29

Discard data: No

Duplicate points: Delete

Grid Method: Inverse Distance ^2

Search Method: Quadrant

Search Radius: 2044.0596124

Nearest Points: 10

X Grid Size: 50 (10.2040816)

Y Grid Size: 40 (10.2564103)

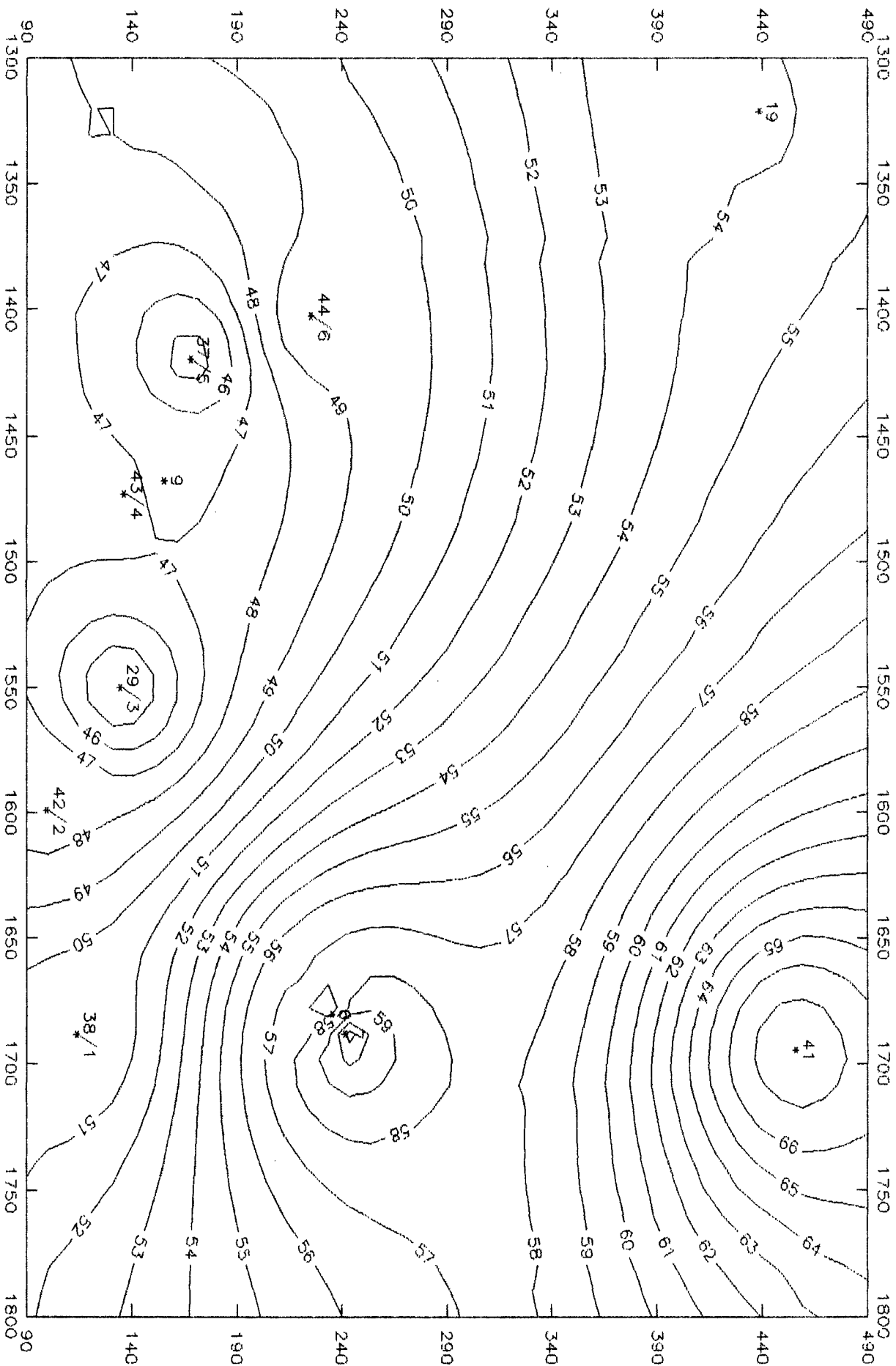
Input file: GBRU5178.DAT

Output file: GBRU5178.GRD

Output format: Binary

Gridding row 8 of 40

Press Esc to abort...



29PTS, Quad, SR=2044, May 88

May 86

[Random] Input Output Duplicate GridSize Method Search Limits Begin
Begin creating a grid with the current settings

	DATA MINIMUM	DATA MAXIMUM	GRID MINIMUM	GRID MAXIMUM
X	1141.6899414	1713.6400146	1000	1800
Y	99.5400009	2061.9499512	90	490
Z	44.0900002	108.5999985		

No. data points: 29	Search Method: Octant
Discard data: No	Search Radius: 12044.0596124
Duplicate points: Delete	Nearest Points: 10
Grid Method: Inverse Distance ^2	X Grid Size: 50 (10.2040816)
	Y Grid Size: 40 (10.2584103)
Input file: GBRU5178.DAT	
Output file: GBRU5178.GRD	
Output format: Binary	

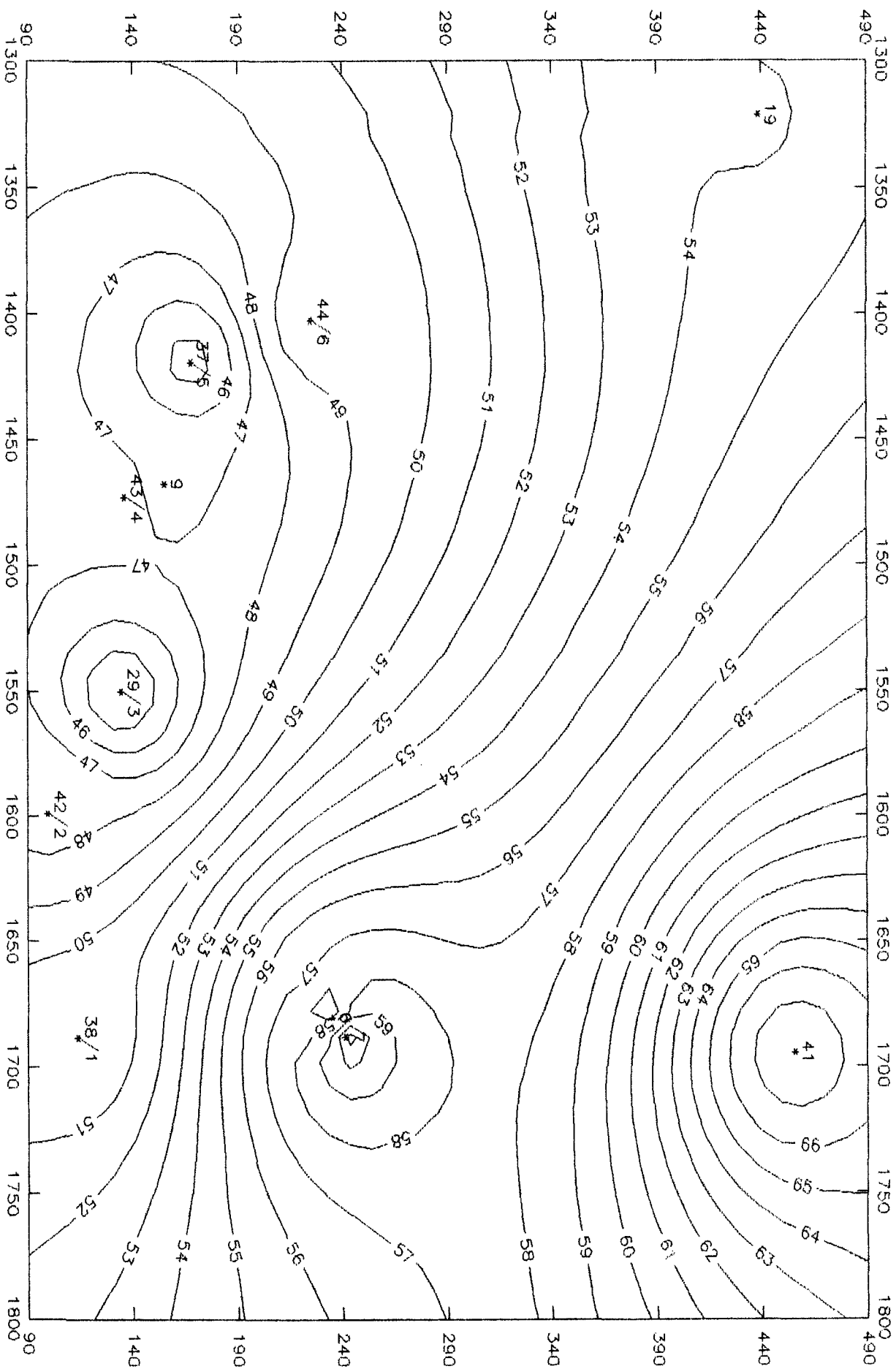
F1=Help F3=Main F4=Store F5=Directory Esc=Backup Arrow keys=Move pointer

[Main Menu] GRID TOPO SURF VIEW PLOT Quit
Run the TOPO program to create a contour map from a grid file

Filespec to pass to program (Enter if none):
/CMD=TOPOOUT GBRU5178

SURFER Access System Version 3.00
Copyright (C) Golden Software Inc. 1987

F1=Help Esc=Backup Arrows keys move pointer



29 P15, Oct, SR=2044, May 88

May 88

[Random] Input Output Duplicate GridSize Method Search Limits Begin
Begin creating a grid with the current settings

	DATA MINIMUM	DATA MAXIMUM	GRID MINIMUM	GRID MAXIMUM
X	1141.6899414	1713.6400146	1300	1000
Y	99.5400009	2061.9499512	90	490
Z	44.0900002	108.5999985		

No. data points: 39

Discard data: No

Duplicate points: Delete

Grid Method: Inverse Distance ^2

Search Method: Nearest

Search Radius: 200

Nearest Points: 10

X Grid Size: 50 (10.2040916)

Y Grid Size: 40 (10.2564103)

Input file: GBR05178.DAT

Output file: GBR05178.GRD

Output format: Binary

F1=Help F3=Main F4=Store F5=Directory Esc=Backup Arrow keys=Move pointer

[TOPO] Input Level Scale ConLine Title Border XYLine Grid Post Output Equip
Specify an input grid file to contour

Input grid file: GBR05178.GRD

Input grid size: 40 x 50

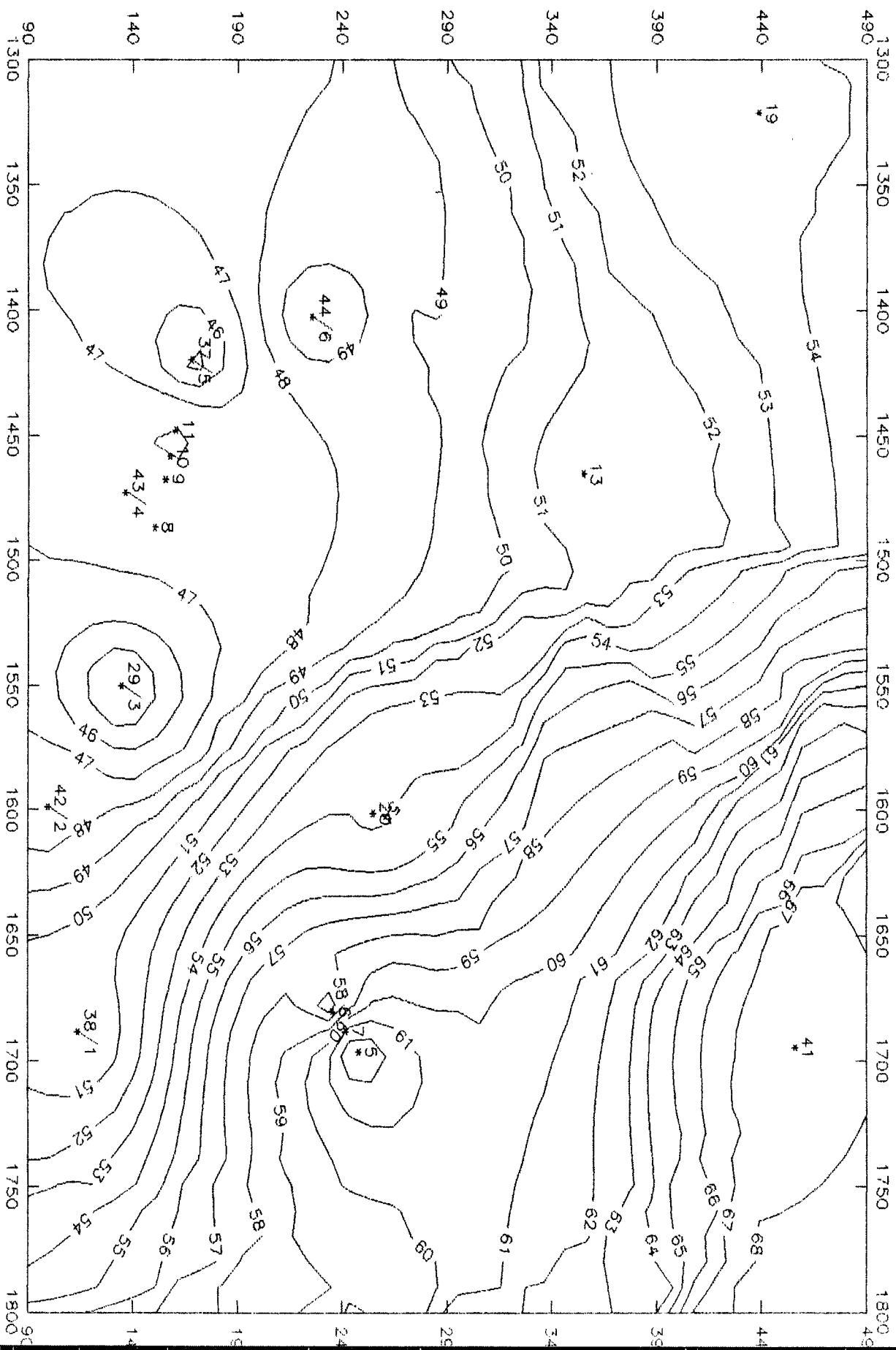
	GRID MINIMUM	GRID MAXIMUM
X	1300	1300
Y	90	490
Z	44.251	68.4463

Minimum contour: 40

Maximum contour: 104.0000015

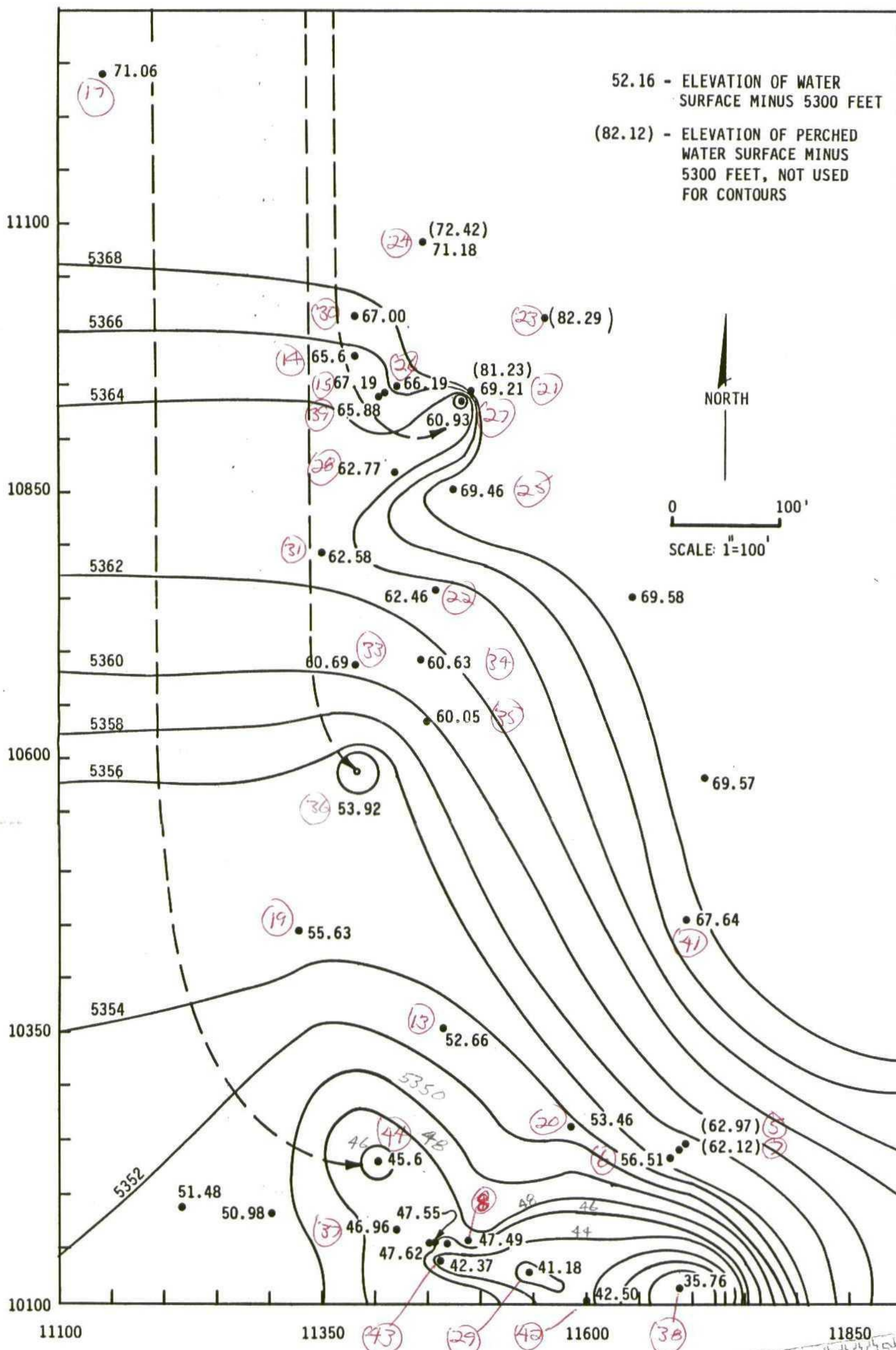
Contour interval: 1

F1=Help F2=View F3=Main F4=Store F5=Directory Esc=Backup Arrows=Move pointer



39 PTS, SR-200 May 88

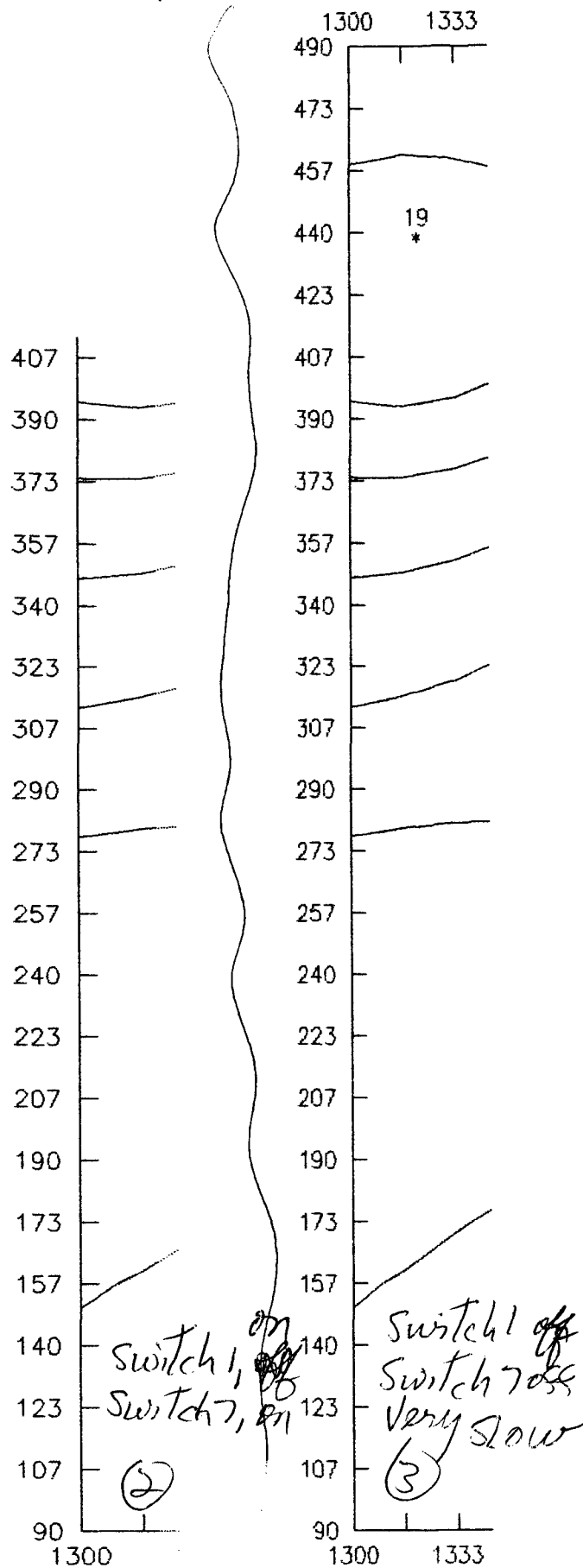
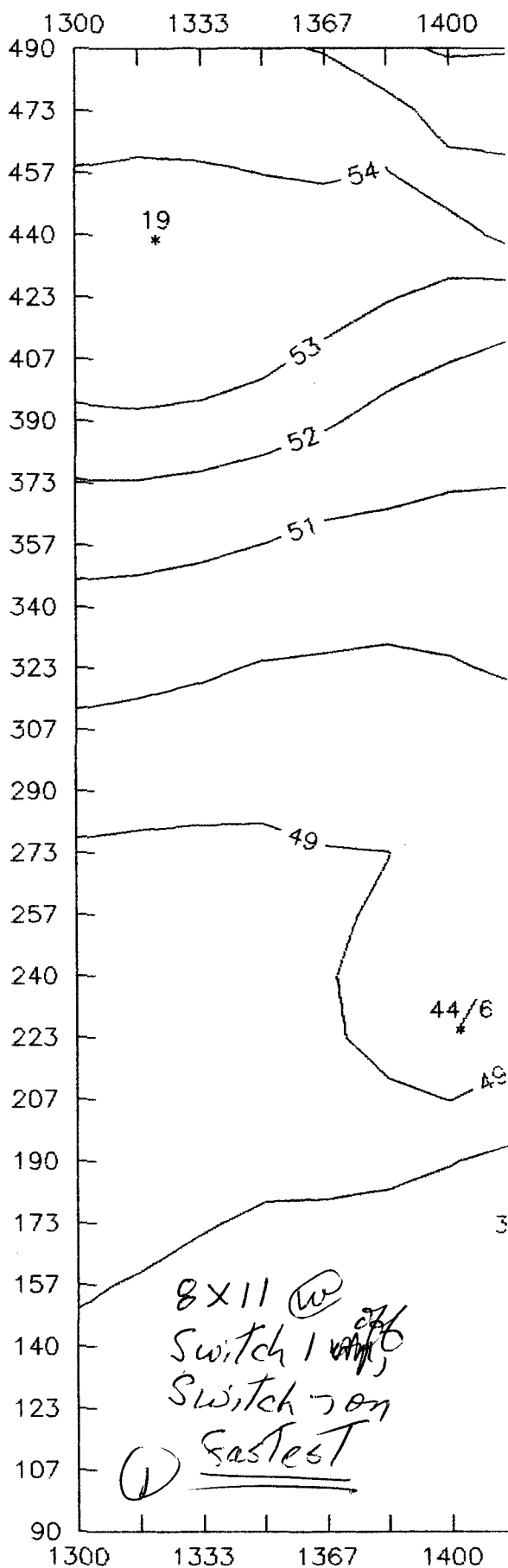
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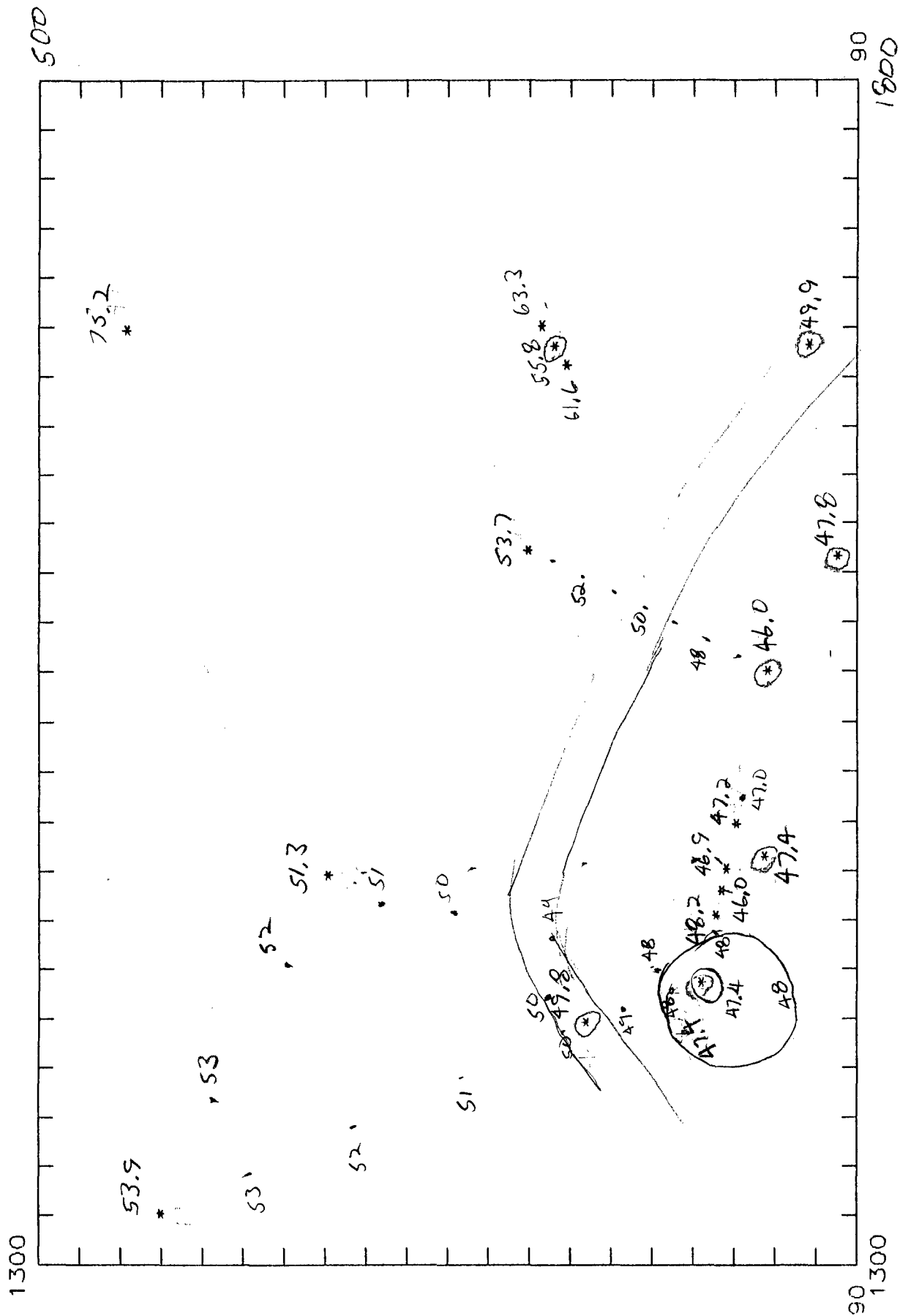
WATER LEVELS FOR OCTOBER 6, 1988

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SANTA FE

Plot using EPSON LQ-1500 configuration (#15)



June 88



present, to unconfined near GBR-29, where clay and shale may be intermittently present but do not significantly affect flow. Descriptions of the pump tests and an analysis of results are presented below and summarized in Table 4-3. A detailed description of these tests, of data collected and of calculations performed is presented in Appendix C.

4.1 HYDROGEOLOGIC CHARACTERISTICS OF THE DIESEL SPILL AREA

4.1.1 GBR-27 Pump Test

GCL conducted the first pump test using GBR-27, which is located in the center of the Diesel Spill Area plume. The well was pumped for 16 hours at a rate of 0.88 gpm on April 30 and May 1, 1986. A 24 hour test was planned but the well was pumped dry and the test was terminated early. The pumped well had a drawdown of 21 feet at the end of the test, and an observation well 85 feet away (GBR-25) had a drawdown of 8 inches.

Drawdown and recovery data for this pump test along with plots of drawdown and recovery versus time and a thorough analysis of the data are shown in Appendix C. The aquifer parameters that were obtained using the data from both GBR-27 and GBR-25, correcting for the effects of floating product in GBR-27, are shown in Table 4-3.

GCL considers the calculated values for transmissivity and storativity for GBR-25 to be more representative of these aquifer characteristics in the Diesel Spill Area than those for GBR-27 because floating product was not present in GBR-25. Storativities estimated on the basis of data from observation well GBR-25 are well within the range of storativities generally associated with confined or partially confined units. *but results from GBR-25 were questionable*

Values calc. from GBR-27 seem more indicative of true conditions and correspond with values I calculated for GBR-14

4.1.2 GBR-14 Pump Test

GCL conducted a pump test using GBR-14 on November 6, 1986, in order to better define the characteristics of the alluvial aquifer in the Diesel Spill Area. GBR-14 was step tested at 1 and 5 gpm and subsequently test-pumped at 2 gpm. Even at this low pumping rate, the well was pumped dry after 4 hours. Data obtained during the pump test, graphs of drawdown and recovery versus time, and a detailed analysis of the data are shown

TABLE 4-3

SUMMARY OF TRANSMISSIVITIES (T)
AND STORATIVITIES (S)
GIANT BLOOMFIELD REFINERY

<u>DIESEL SPILL AREA</u>	<u>T(gpd/ft)</u>	<u>S</u>
GBR 14	792 <i>high</i>	NA
GBR 15	128	0.0045
GBR 25	387	0.00016
GBR 27	126 <i>good</i>	NA

*Don't use these
values*

SOUTHERN REFINERY AREA

GBR 8	2340	0.051
GBR 29	1040 <i>good</i>	NA

shouldn't be used, bad data

NA = Not Applicable

(S cannot be estimated at pumped wells due to borehole storage effects)

in Appendix C. The analysis shows that the expanding cone of depression created by pumping GBR-14 encountered a less transmissive formation at the edge of the arroyo. The average transmissivity for GBR-14 was twice as large as the maximum transmissivity calculated for GBR-27 in the same area. Although transmissivity is only twice as large, the hydraulic conductivity of the alluvium could be an order of magnitude larger when differences in saturated thicknesses are considered. Thus, the sandstone acts as a low conductivity barrier when encountered by lateral stresses induced by pumpage of the adjacent alluvium.

Not true
for ~~alluvium~~
I calculated
for GBR-14

What
using GBR
S&H?

Characteristics of the alluvium near GBR-15, which was used to monitor the effects of this pump test, are also shown in Table 4-3. The estimated transmissivity of 128 gpd/ft. equals a hydraulic conductivity of 1.7 gpd/sq. ft., which is within the lower part of the range normally associated with silty sand. Storativity near GBR-15 was estimated as 0.0045, a value indicative of partially-confined conditions that may be encountered in the presence of extensive clay lenses.

Then
b = 75' ?
(end of GBR-14
pump test analysis)

4.1.3 Combined GBR-14, GBR-27 and GBR-28 Pump Test
GCL conducted a combined pump test utilizing GBR-14, GBR-27 and GBR-28 on November 19-21, 1986, for the purpose of identifying the combined effects of the three wells on the aquifer in the area of the floating product plume. The data from the test are presented in Appendix C along with plots of drawdown versus time for the three pumped wells and the six observation wells in the area. The closest observation wells were GBR-26, GBR-30 and the Steel Well.

Total Thickness
unlikely to exceed 70'
in area of GBR-14
see p. 53

No measurable drawdown response was observed in GBR-26, and only small drawdowns were observed in GBR-30 and the Steel Well even though they were each about 50 feet from the pumped well. These wells were screened within clayey sand or sandy clay located at the base of the alluvium in which GBR-14 was screened. Since there appears to be hydraulic communication between the coarser grained alluvium and the underlying clayey sand and sandy clay layers, as indicated by the response in well GBR-15, which was also screened in these layers, it is likely that silt has

steel well, GBR 26
had poor drawdowns
(see sig 6.6, p. 53)

migrated through the gravel pack and may be lodged in the screens of the unresponsive wells. Alternatively, there could be a higher incidence of clay or shale between GBR-14 and the unresponsive observation wells than between GBR-14 and GBR-15, but given the closeness of the responsive and unresponsive observation wells this does not appear likely.

4.2 HYDROGEOLOGIC CHARACTERISTICS OF THE SOUTHERN REFINERY AREA

GCL conducted a pump test using GBR-29 in the Southern Refinery Area November 4-7, 1986. The data from this test and a thorough analysis are presented in Appendix C.

It was expected from observations during drilling of the well and from the experience of other wells on the site that GBR-29 would probably have a capacity of only about 1 gpm. Test pumping at 1 gpm, however, produced almost no drawdown and a rate of 2 gpm was subsequently used for the test. At 2 gpm, GBR-29 exhibited a drawdown of 9 inches after 31 hours and the nearest observation well, GBR-8, had a drawdown of 2 inches.

Transmissivity calculated on the basis of data from GBR-29 was estimated as 1040 gpd/ft., while transmissivity and storativity from the observation well (GBR-8) were determined to be 2340 gpd/ft. and 0.051, respectively. Transmissivities calculated from the test can be viewed as overall transmissivities for the unconfined system occurring throughout the alluvium and sandstone in the absence of containing shale units. An average transmissivity of 1690 gpd/ft. can therefore be used to characterize the unconfined alluvial system underlying the Southern Refinery Area.

data defines no curve
because it averages the value calculated from GBR-8

*? High
yes*

GCL concludes that the alluvium and sandstone underlying the Southern Refinery Area are hydraulically connected in the vicinity of GBR-29 and GBR-8. This system is generally unconfined, but confined conditions may exist locally beneath shale units of limited areal extent.

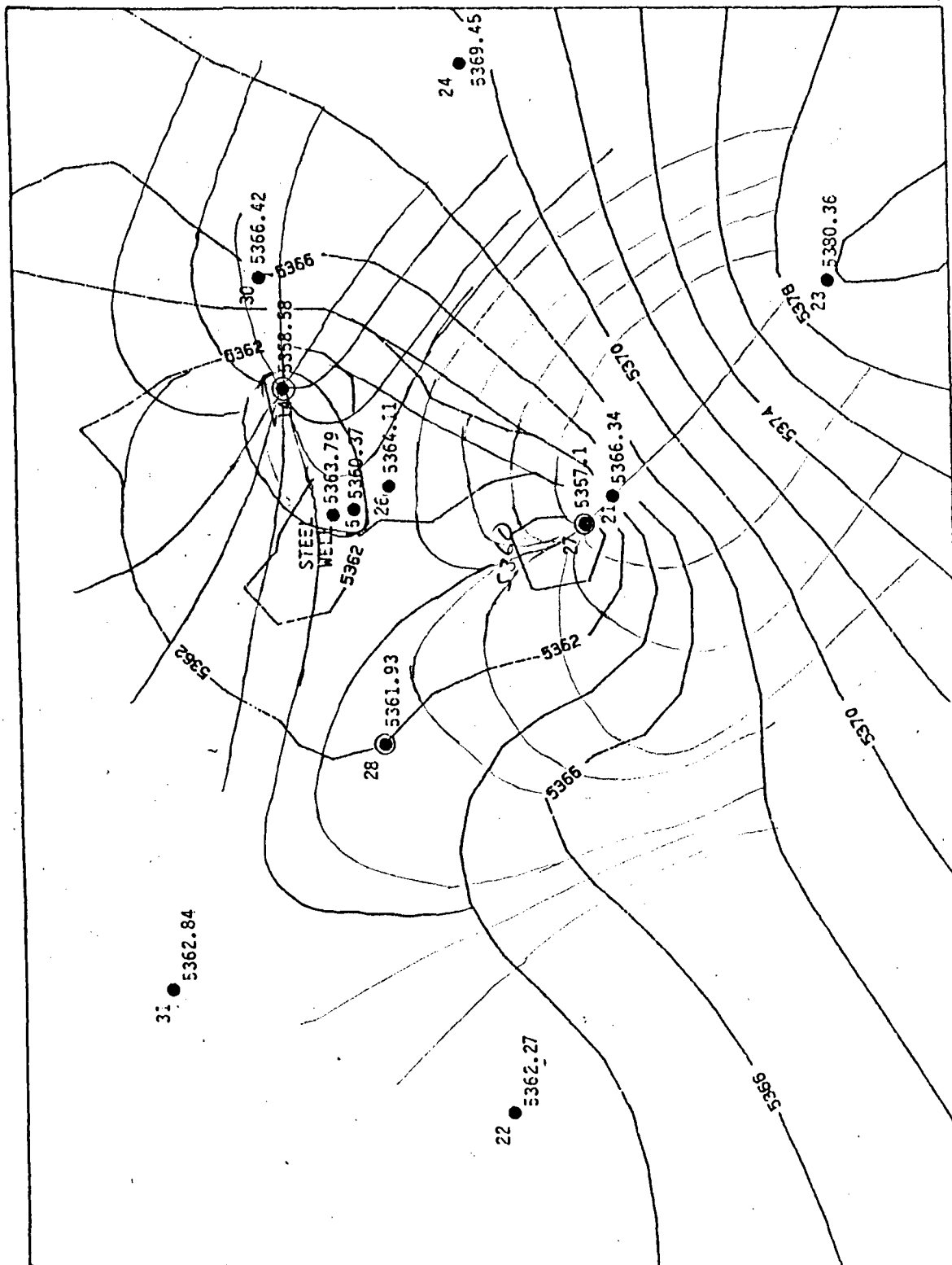
SURPRISE!

4.3 HYDROGEOLOGIC CHARACTERISTICS OF THE TRUCK FUELING AREA

GCL has drilled 5 exploratory boreholes in the Truck Fueling Area which are designated GBR-33, GBR-34, GBR-35, GBR-39 and GBR-40. Three of these were developed into 2-inch diameter observation wells (GBR-33, GBR-34 and GBR-35). GCL also installed a 6-inch diameter recovery well designated GBR-36. The lithologic logs of all the wells and boreholes are presented in Appendix B.

The hydrogeologic characteristics of the Truck Fueling Area area similar to those of the Diesel Spill Area which is nearby. Since an aquifer analysis was performed previously in the Diesel Spill Area, it was not necessary to perform such analysis in the Truck Fueling Area.

*Do
Not
necessarily
argue!*



Elevations in Feet above Sea Level, Measured in Monitor and Recovery Wells
and Corrected for Floating Product, if Present.

FIGURE 6-6

GROUND WATER LEVEL CONTOUR MAP - DIESEL SPILL AREA, NOV. 1986

(WELLS GBR 14, 27, AND 28 PUMPED FOR 2½ DAYS AT 1 GPM - COMPARE WITH FIGURE 6-2)

Memo

From

DAVID G. BOYER

Hydrogeologist

To Too much dependence on
Early Time - casing
Storage & delayed yield
are major cause of
deviations and not
boundary effects

Memo

From
DAVID G. BOYER
Hydrogeologist

3/17

To Bob McClenahan -

Attached are the results of our pump test analysis. In addition to the methods presented here, we tried a Theis analysis, but the problems with data, short time of most tests, and low yield of the wells precluded interpretation. The lessons of this exercise are that such tests must be properly planned and carried out to be useful. To that end, I enclose several pages from a USGS Publication.

Dave

Oil Conservation Division
P.O. Box 2088 Santa Fe, N.M. 87501

Summary of Giant Bloomfield Pump Test Analyses

I.) GBR-29 Pump Test

Data for this pump test was only measured to the nearest $\frac{1}{2}$ inch (0.04 ft) instead of to the nearest 0.01 ft. Therefore instead of yielding a continuous curve the data plots up as step increases in drawdown. The steps are especially pronounced in the plots of the observation well data.

Jacob analysis of the data from the pumping well yields a transmissivity of 928 gpd/ft which is indicative of fine sands or fine to med. grained sandstones. But this value could vary due to the limited precision with which the drawdown measurements were made. Such errors, particularly considering such small drawdowns, make determination of the exact slope of the resultant drawdown curve tenuous. Also, the early time data is questionable since the data from the pumping well shows no drawdown for the first 7 minutes of the test, possibly because the drawdown was less than $\frac{1}{2}$ inch or it may be because the test was performed on an operating product recovery well which may not have been shut off for a sufficient amount of time before beginning the pump test. The fact that the well log for GBR-29 shows 10 ft. of clays in the 22 ft. pumping zone indicates the transmissivity calculated is overestimated and therefore little confidence can be placed on the use of this value.

II.) GBR-14 Pump Test

The majority of the data for all six pump tests on GBR-14 (except pump test 1 & 2) were measured to only the nearest $\frac{1}{2}$ inch.

All of the test, due to the large drawdowns, were corrected for dewatering of the aquifer using Jacob's correction, $s' = s - \frac{s^2}{m}$ where s = drawdown in the well and m = thickness of the aquifer.

A.) At $Q = 1 \text{ gpm}$

1.) Pumping (Pump Test 1)

Jacob analysis of the pumping data yields $T = 17 \text{ gpd/ft}$. But the pumping period was very short, only 60 minutes, and since only early time data is represented the transmissivity value calculated will be low because of casing storage effects.

A discontinuous break also occurs in the pumping data at approximately 33 minutes with drawdown greatly increased after this time which is possibly due to a increase in the pumping rate.

2.) Recovery (Pump test 2)

Recovery data shows casing storage effects at early times where $T_1 = 32 \text{ gpd/ft}$ and response of the aquifer at late times where $T_2 = 96 \text{ gpd/ft}$.

The plotted data shows that casing storage effects are overcome at $t/t' = 3.9$ which corresponds with the value calculated using the technique of Schacter (Johnson Drillers Journal, Jan-Feb 1978).

B.) At $Q = 2 \text{ gpm}$

1.) Pumping (Pump test 5)

Jacob analysis shows casing storage effects at early times where $T_1 = 22 \text{ gpd/ft}$ and aquifer response at late times where $T_2 = 105 \text{ gpd/ft}$.

2.) Recovery (Pump test 6)

The recovery test was terminated at approximately 15 minutes and is too short to define even the extent of casing storage effects. No transmissivity could be calculated.

C.) At $Q = 5 \text{ gpm}$

1.) Pumping (Pump Test 3)

The data plotted using Jacob's analysis shows casing storage effects, where $T_1 = 52 \text{ gpd/ft}$, at early times and aquifer response at late times where $T_2 = 155 \text{ gpd/ft}$. But, as there is no well defined trend in the late time data the transmissivity value calculated for aquifer response quite probably

is in error.

2.) Recovery (Pump Test 4)

Recovery analysis shows only casing storage effects where $T_1 = 17 \text{ gpd/ft.}$

As the well was pumped dry in a relatively short period of time due to the higher pumping rate, an analysis for low yield formations, which accounts for the flow rate during recovery, was also used. This analysis produced erratic results and therefore no transmissivity value could be calculated using this method. The erratic results could be the result of the limited precision with which both the drawdown and time were measured. The data for this analysis needs to be highly accurate with time measured to the nearest second and drawdown measured to the nearest 0.01 ft. Small errors, especially in drawdown measurements, result in large cumulative errors in this analysis.

III.) 3 Well Pump Test

A.) Pumping Wells

As this test approximates a constant drawdown test, the relationship between pumping rate (Q) and time (t) must be known. Since only average pumping rates were determined at each

pumping well, no transmissivity values could be calculated. But, by using transmissivities calculated from the independent pump tests of GBR-14 ($T \approx 100 \text{ gpd/ft}$) and assuming a storage coefficient of 0.01, values of Q versus t were calculated for GBR-14 using constant drawdown assumptions. These calculations indicate that $Q \approx 1.1 \text{ gpm}$ for the first 10 minutes of the test and then decreased to an average of $Q \approx 0.575 \text{ gpm}$ for the majority of the test. This average of $Q \approx 0.575 \text{ gpm}$ is approximately 40% lower than the average Q given for this well and raises a doubt as to the method used to determine the average Q in the field. As the other pumping wells have different pumping rates and also appear to have the bailers set at different levels, no relationship between Q and t at pumping wells GBR-27 and GBR-28 could be inferred from the Q vs. t values calculated at GBR-14.

B.) Observation Wells

By making steady state assumptions using observation wells 24D & 21S and assuming that the 3 well pumping cell behaves as a single pumping well acting at the center of the pumping cell, transmissivity can be calculated using the Thiem equation. Assuming each of the pumping

wells were pumping at approximately 0.5 gpm (as back calculated for GBR-14 during the 3 well test), the 3 pumping wells would approximate a single well pumping at 1.5 gpm at the center of the 3 well system. Knowing the steady state Q at the center of the system, the radius to observation wells and the steady state drawdown at each observation well, a transmissivity of 192 gpd/ft was calculated. But, this figure should only be used as a very rough estimate of the transmissivity based on the numerous assumptions made in the calculations.

The other observation wells were not used for the steady state calculations since one of the observation wells recovered completely during pumping and 3 of the observation wells were inside the pumping cell.

IV.) Conclusions

The calculations for the independent pump test of GBR-14, using both recovery and pumping methods yielded a transmissivity of approximately 100 gpd/ft which is characteristic of a fine grained sandstone or a silty fine grained sand.

Analysis of the GBR-29 pump test yields a transmissivity of 928 gpd/ft, approximately 9 times greater than that for GBR-14. But no corroborating evidence of this transmissivity could be determined from

observation well data or recovery methods, as no recovery data was taken, and the well log of GBR-29 does not support such a value. Therefore this transmissivity is not thought to accurately represent the aquifer characteristics.

Although a rough estimate of 192 gpd/ft was determined, assuming steady state conditions at late times, the data from the 3 well pump test was insufficient to provide a transmissivity calculation that can be used with any confidence.

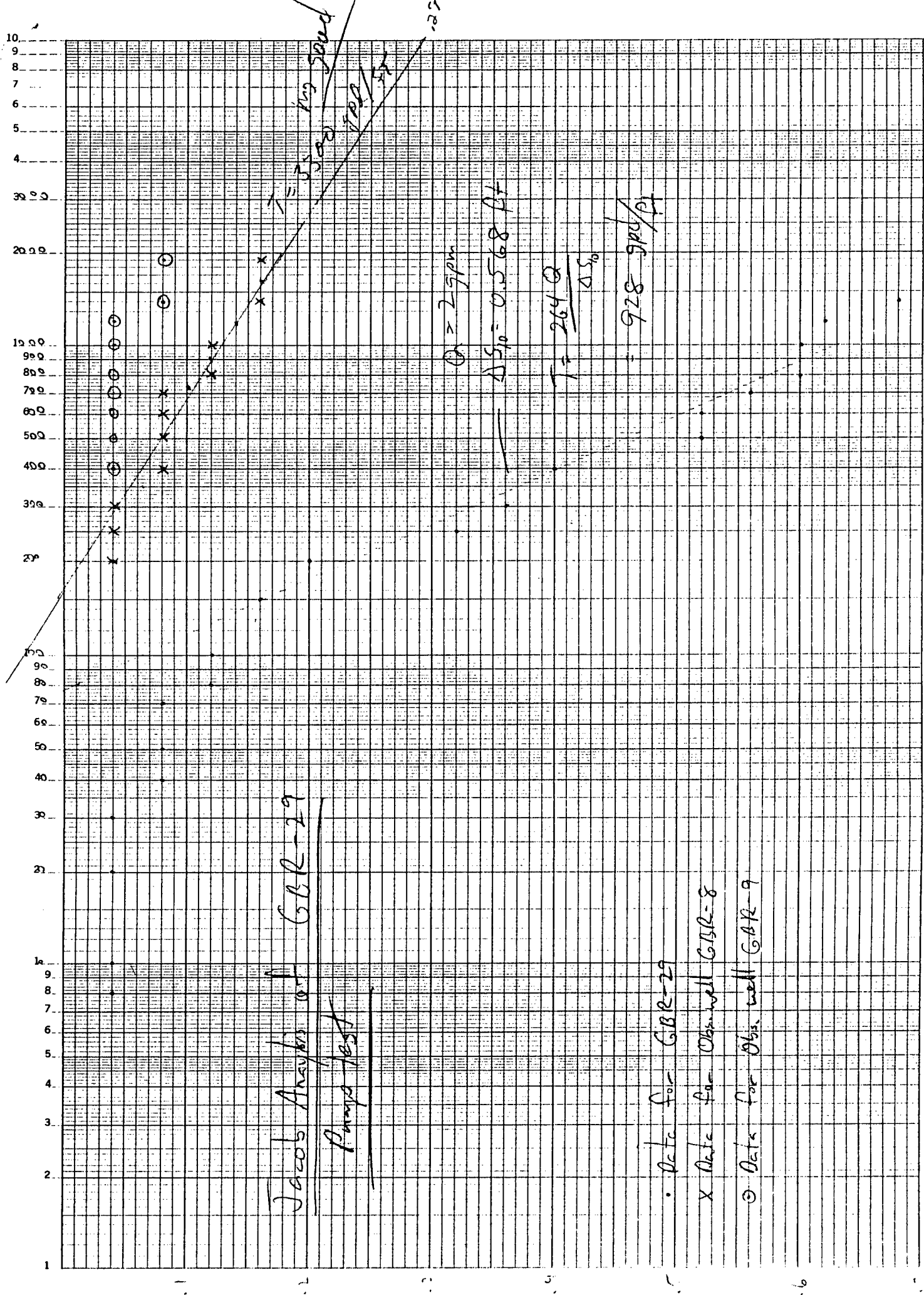
GBR 29 - 2 gpm
 GBR 27 - 1 gpm
 GBR 28 - 1 gpm
 GBR 29 - 2 gpm

DRAWDOWN IN FT.

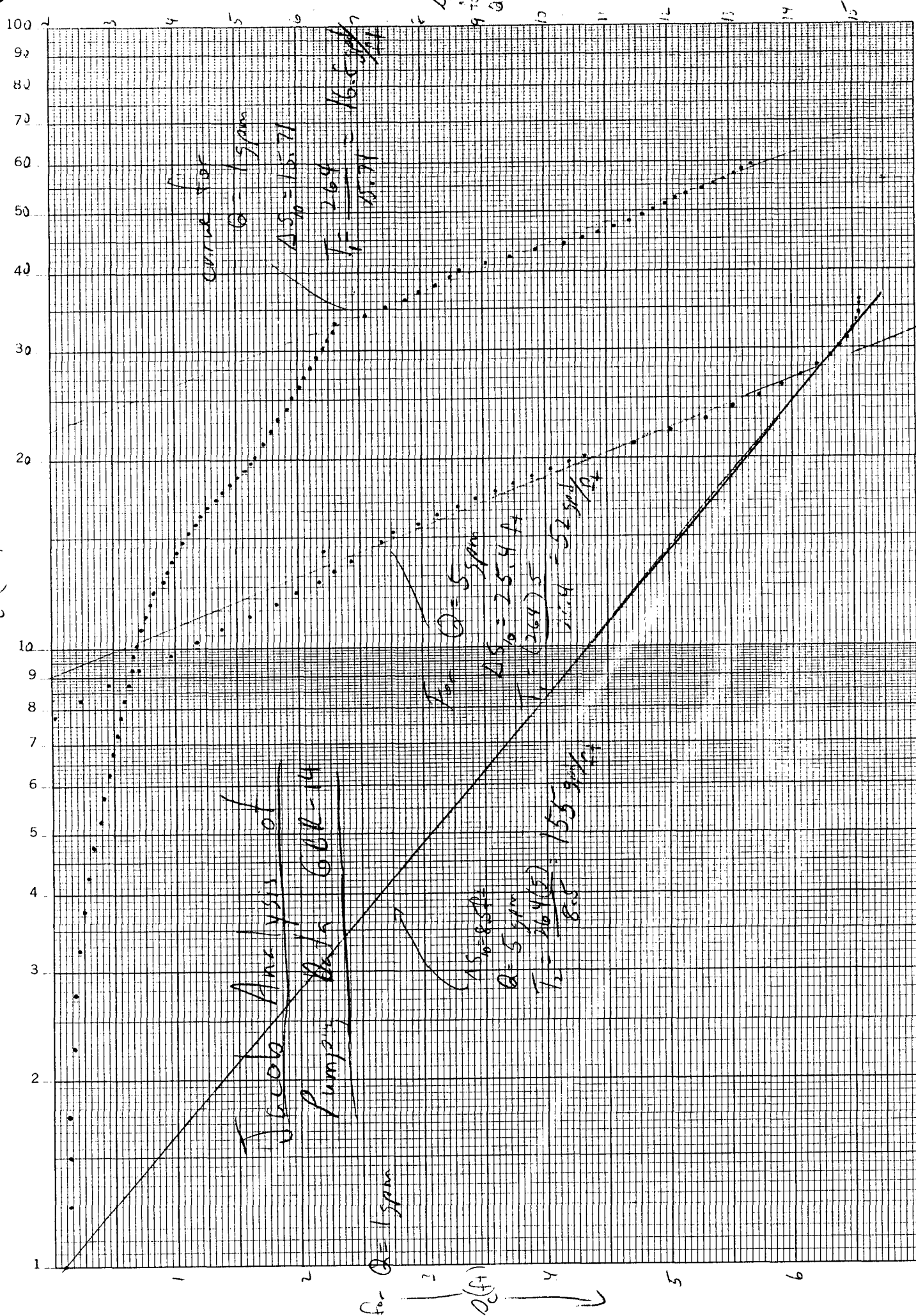
MIN. GBR 29 GBR 8 GBR 9

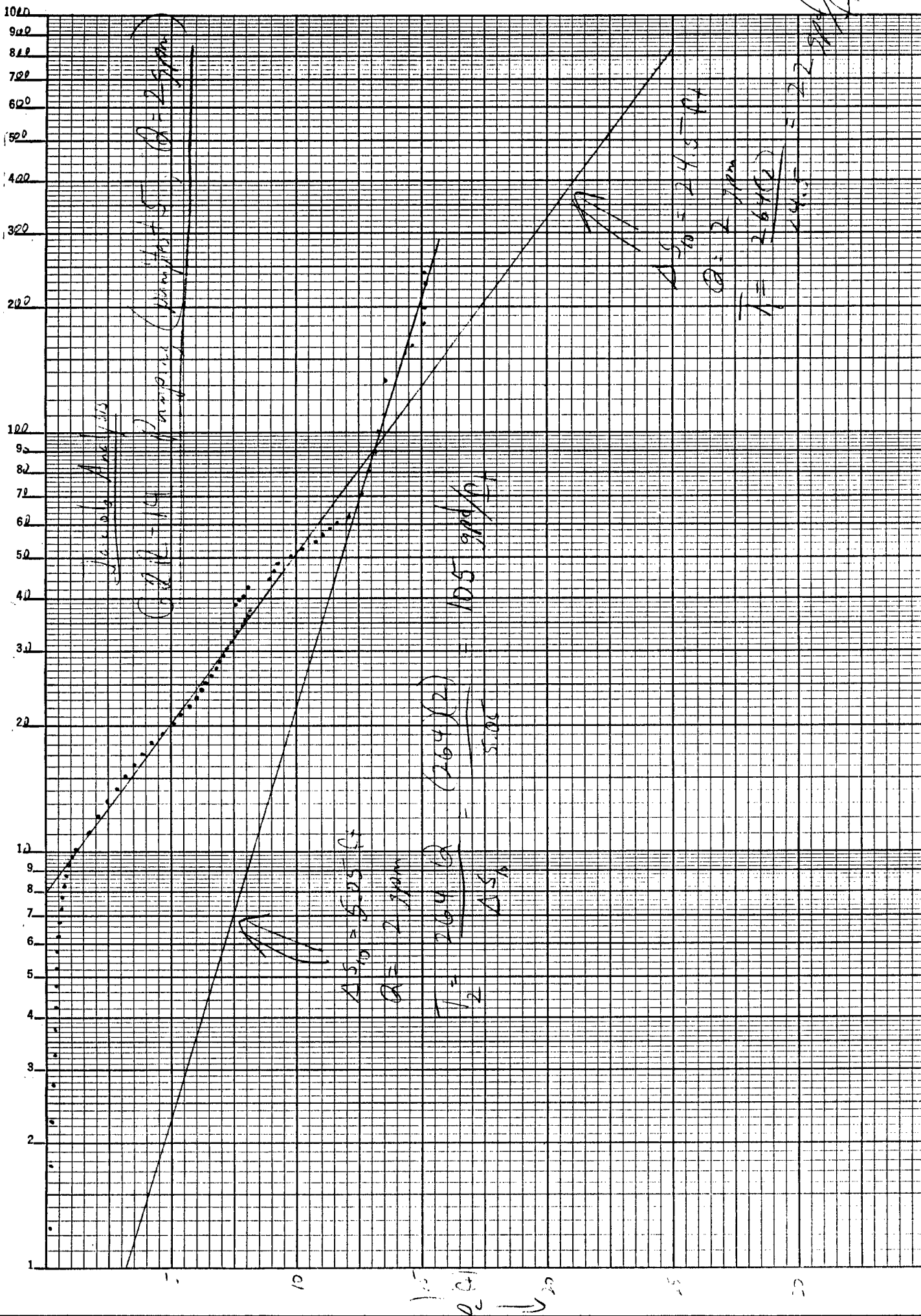
1	0		
2	0		
3	0		
4	0		
5	0		
6	0		
7	0		
8	.04		
10	.04		
20	.04		
30	.04		
40	.08		
50	.08		
70	.08		
80	.12		
100	.12		
150	.16		
200	.20	.04	
250	.32	.04	
300	.36	.04	.0
400	.40	.08	.04
500	.52	.08	.04
600	.52	.08	.04
700	.56	.08	.04
800	.60	.12	.04
1000	.60	.12	.04
1200	.64	.12	.04
1400	.68	.16	.08
1900	.76	.16	.08

All this data only
 measured to the
 nearest 1/2 inch. making
 a large error range in drawdown
 for such small measurements

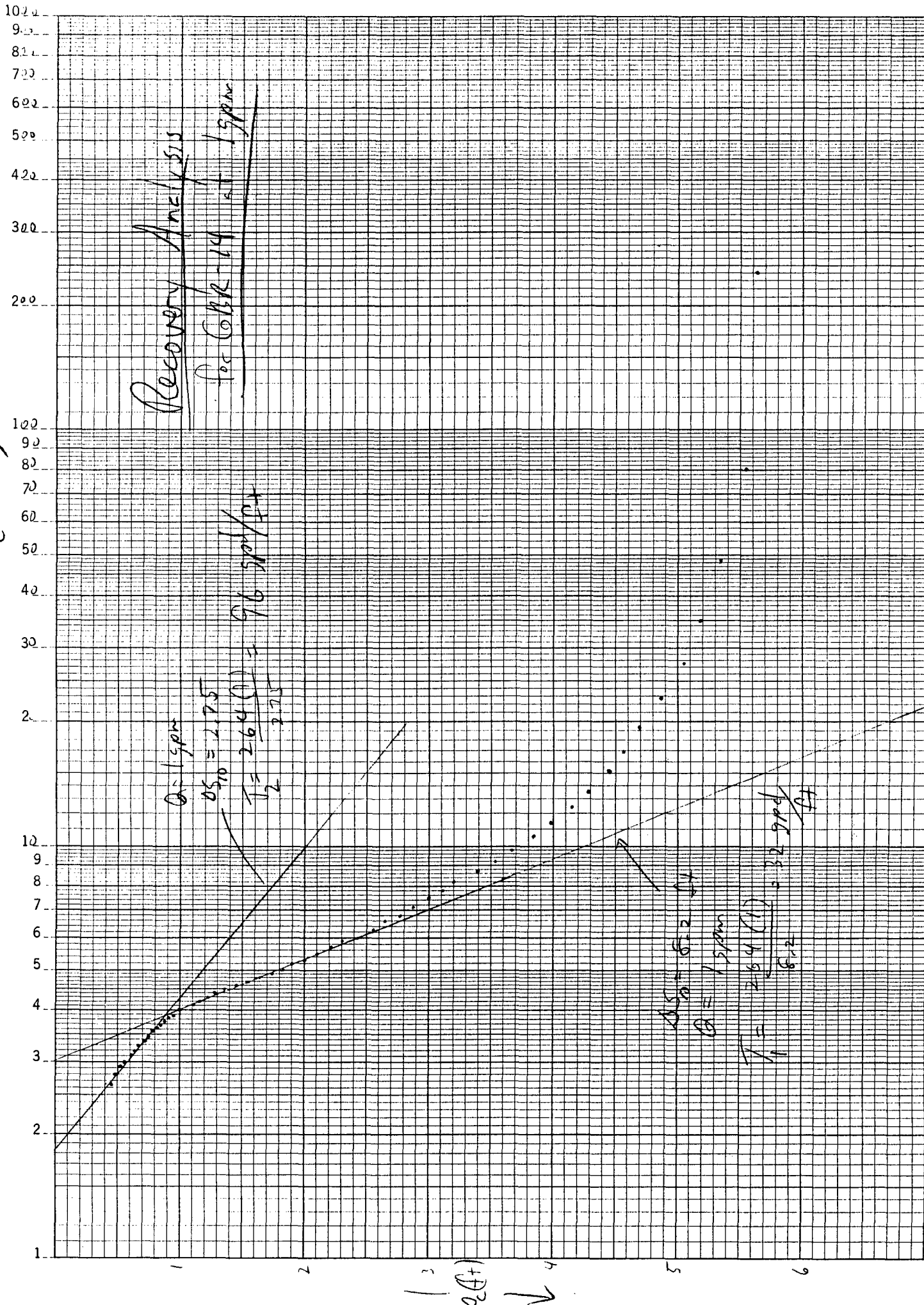


— t (min) —→

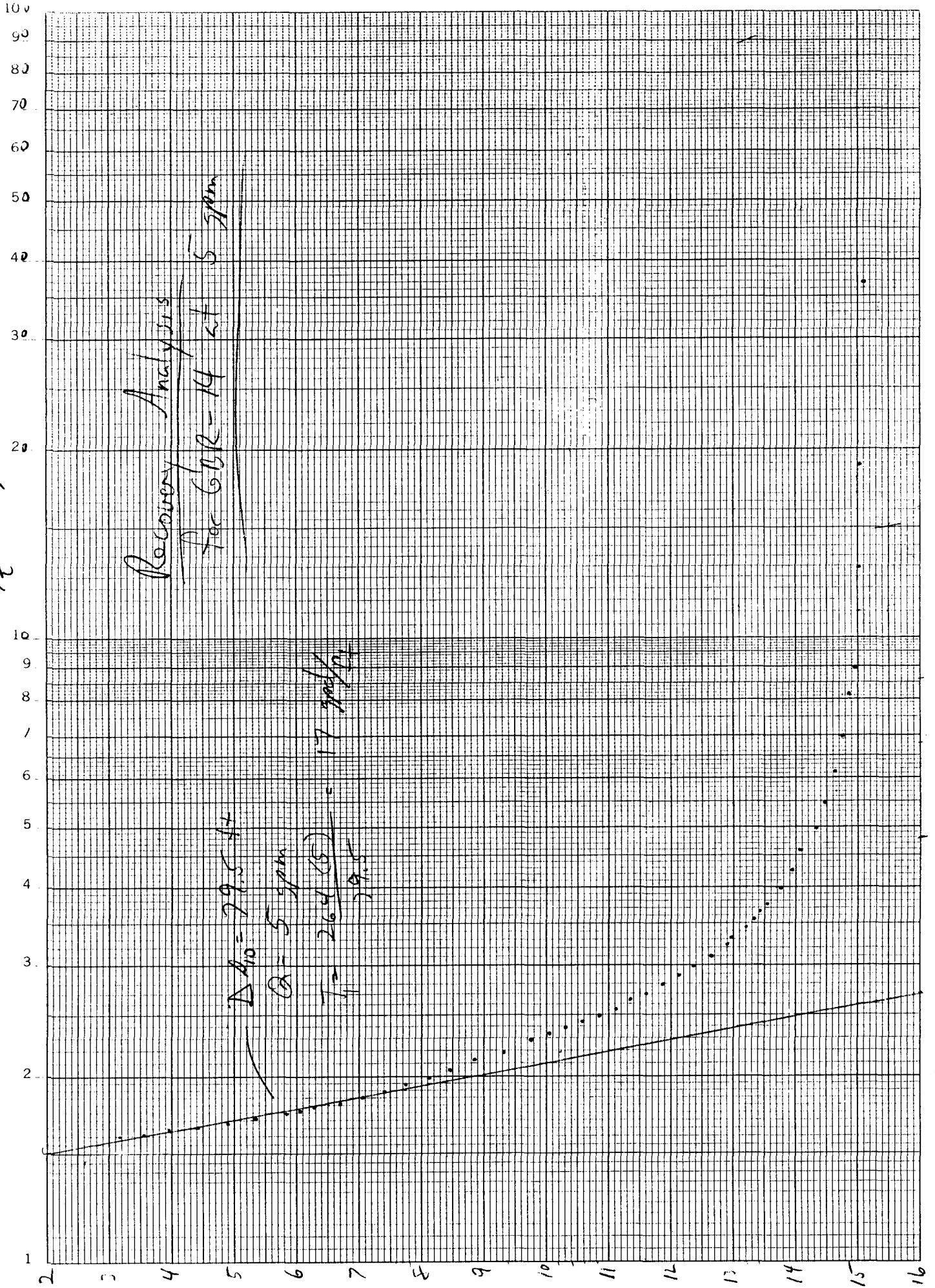




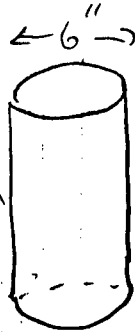
$\frac{1}{2}x' \rightarrow 46\ 5492$



t/t' →



Pump Test Analyses for Low Yield Formations



$$r = 3'' = 0.25'$$

$$\begin{aligned} Vol. &= \pi r^2 h \\ &= \pi (0.25 \text{ ft})^2 (1 \text{ ft}) \left(\frac{2.31}{0.1337 \text{ ft}^3} \right) = 1.47 \text{ ~~gal~~ / ft of pipe} \end{aligned}$$

$$Q = \frac{(\text{feet of casing filled}) (Vol. / ft)}{(\text{time to fill})}$$

using recovery data from GBR-14 pump test 4

pumping rate = 5 gpm

Pumping period = 35.75 min

Drawdown when pump shut down = 31.75'

Casing I.D. = 6"

Time (min)	s (ft)	feet of casing filled	time to fill (min)	Q (gpm)	s/Q (ft/gpm)
35.75	31.75	avg.		avg.	avg.
1	30.08	1.67	1.0	2.45	12.28
1.5	29.58	0.50	0.5	1.47	20.12
2.0	29.08	0.50	0.5	1.47	19.78
2.5	28.67	.41	.46	1.21	23.69
3.0	28.21	.46	.44	1.35	20.90
3.5	27.75	.46	.46	1.35	20.56
4.0	27.29	.46	.44	1.35	20.21
4.5	26.88	.41	.43	1.21	22.21
5.0	26.46	.42	.40	1.23	21.51
5.5	26.08	.38	.40	1.12	23.29
6.0	25.67	.41	.42	1.21	21.21
6.5	25.21	.46	.40	1.35	18.67
7.0	24.88	.33	.40	0.97	25.65
7.5	24.46	.42	.38	1.23	19.85
8.0	24.08	.38	.33	1.12	21.50
8.5	23.88	.20	.35	0.59	40.47
9.0	23.42	.46	.36	1.35	17.35
9.5	23.00	.42	.50	1.23	18.70
10	22.38	.62	.39	1.82	12.30
10.5	22.25	.13	.36	0.38	58.55
11.0	21.92	.33	.28	0.97	22.60
11.5	21.54	.38	.36	1.12	19.23
12.0	21.17	.37	.36	1.09	19.42
12.5	20.83	.34	.35	1.00	20.83
13.0	20.50	.33	.35	0.97	21.13
13.5	20.13	.37	.33	1.09	18.47
14.0	19.83	.30	.33	0.88	22.53
14.5	19.50	.33	.31	0.97	20.10
15.0	19.21	.31	.32	0.91	21.11
15.5	18.88	.33	.28	0.97	19.46
16.0	18.67	.21	.29	0.62	30.11
16.5	18.33	.34	.28	1.00	18.83
17.0	18.04	.29		0.85	21.22

Time	d(ft)	fat of casing filled	time to fill (min)	Q (gpm)	% Q (ft/gpm)	avg.
18.0	17.33	.81	1.0	1.19	14.56	
20.0	16.25	1.08	2.0	0.79	20.57	
22.0	15.17	1.08	1.05	0.79	19.20	19.70
24.0	14.17	1.00	1.03	0.74	19.15	18.64
26.0	13.17	1.00	.97	0.74	17.80	18.55
28.0	12.25	0.92	.89	0.68	18.01	18.85
30.0	11.50	0.75	.79	0.55	20.91	19.83
32.0	10.79	0.71	.69	0.52	20.75	21.16
34.0	10.17	0.62	.61	0.46	22.11	22.60
36.0	9.67	0.50	.55	0.37	26.14	24.18
38.0	9.13	0.54	.51	0.40	22.87	24.68
40.0	8.63	0.50	.51	0.37	23.32	23.32
42.0	8.13	0.50	.49	0.37	21.97	22.58
44.0	7.67	.46	.50	0.34	22.56	20.73
46.0	7.13	.54	.53	0.40	17.83	18.28
48.0	6.54	.59	.58	0.43	15.21	15.21
50.0	5.92	.62	.58	0.46	12.87	13.77
52.0	5.38	.54	.58	0.40	13.45	12.51
54.0	4.79	.59	.54	0.43	11.14	11.98
56.0	4.29	.50	.53	0.37	11.59	11.0
58.0	3.79	.50	.47	0.37	10.24	10.83
60.0	3.38	.41	"	0.30	11.27	

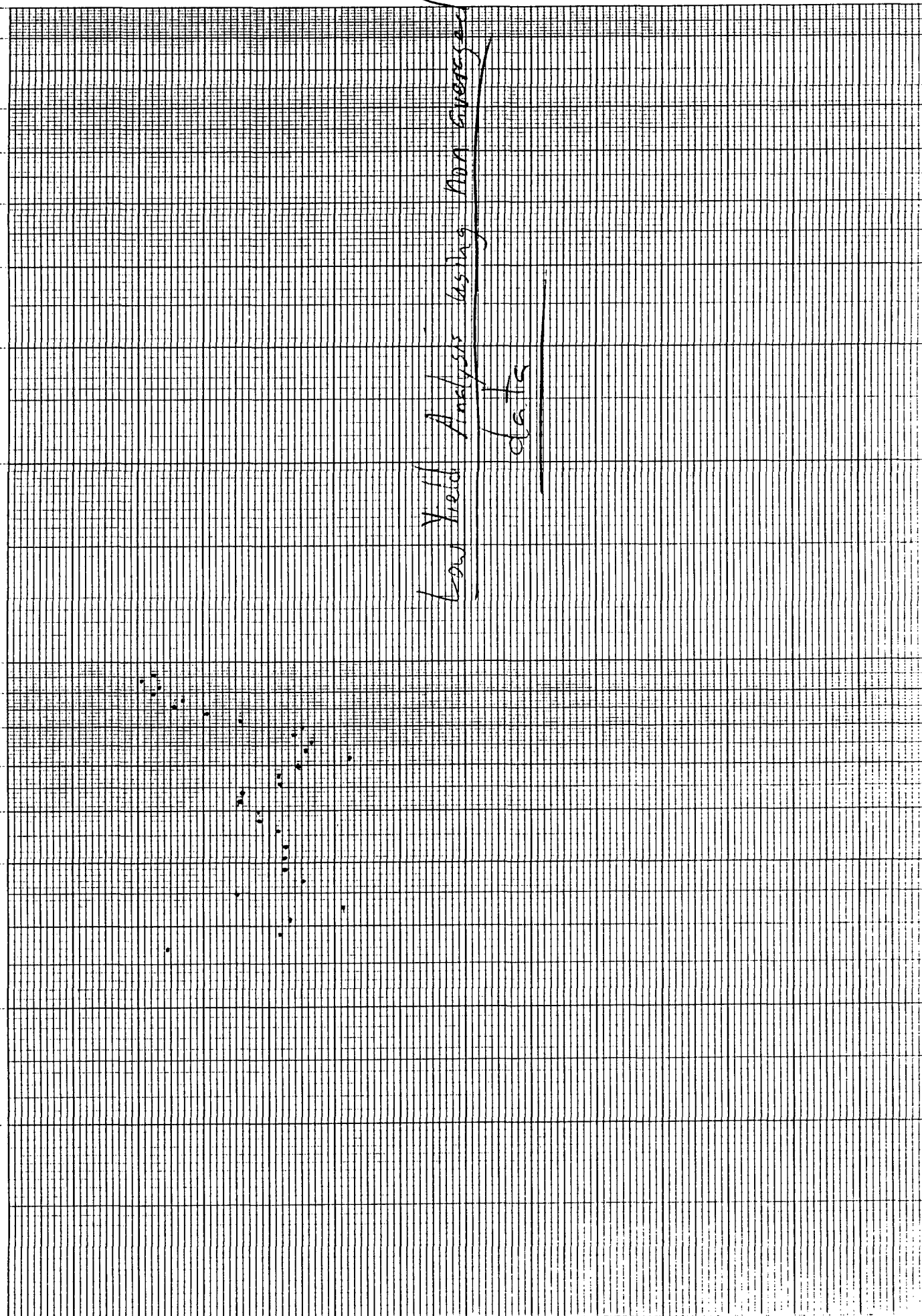


SEMI-LOGARITHMIC 2 CYCLES x 140 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 5130

Total time since pumping started

10
9
8
7
6
5
4
3
2
1

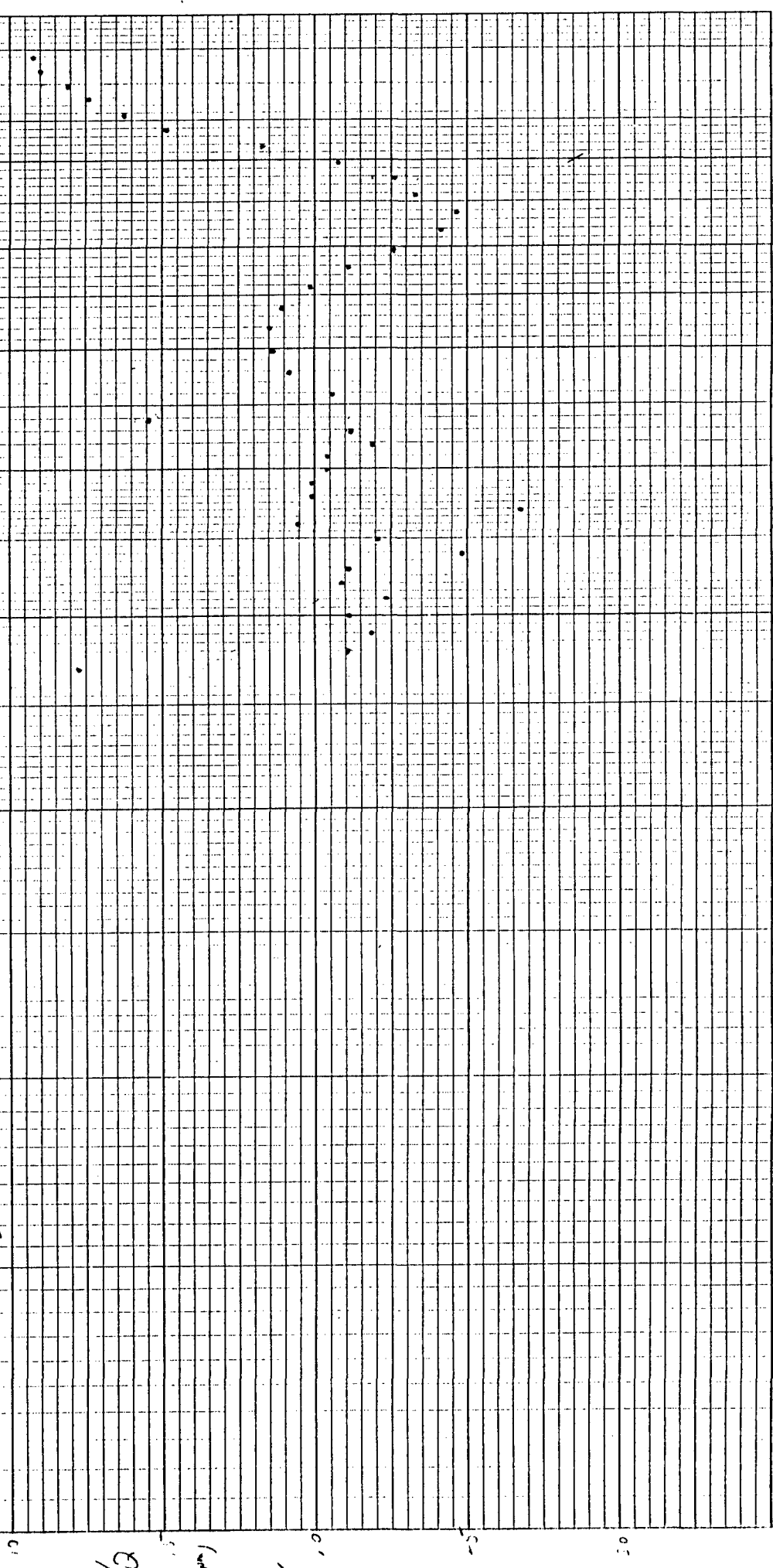


Time since Pumping Started (min) →

Pump Test Analysis for
Low Yield Formations
(using averaged data)

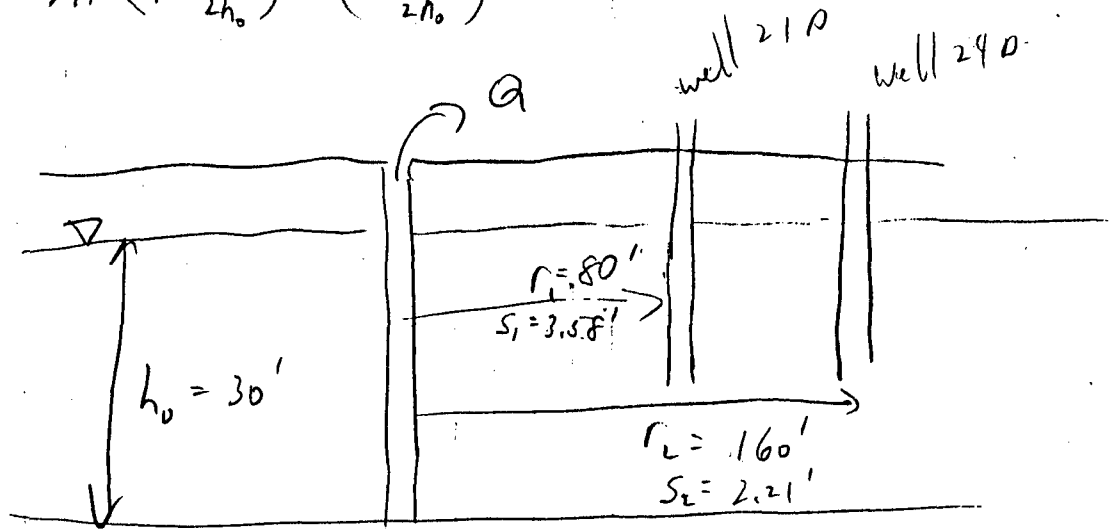
$$\Delta \frac{Q}{Q_0} = 89.25$$

$$T = \frac{264}{\Delta \frac{Q}{Q_0}} = \frac{264}{89.25} = 3.0 \text{ 96/9}$$



For 3 Well Pumps Test assuming steady state

$$T = \frac{Q}{2\pi \left(s_1 - \frac{s_1^2}{2h_0} \right) - \left(s_2 - \frac{s_2^2}{2h_0} \right)} \ln \frac{r_2}{r_1}$$



h_0 = saturated thickness of aquifer

s = drawdown at wells 1 & 2

r = radius of respective well

Q = pumping rate = 1.5 gpm (assume 0.5 gpm at each of the 3 pumps, wells)

$$T = \frac{(1.5 \text{ gpm})}{2\pi \left(3.58 - \frac{(3.58 \text{ ft})^2}{2(30 \text{ ft})} \right) - \left(2.21 - \frac{(2.21 \text{ ft})^2}{2(30 \text{ ft})} \right)} \ln \frac{160}{80} = 21337 \text{ gpm/ft}$$

or $T = 192 \text{ gpd/ft}$

Constant Drawdown Calculations

$$Q = 2\pi a T G(u)$$

$$u = \frac{Tt}{r_w^2 S}$$

where

$s_w =$ ^{constant} drawdown in the well = 7.45 ft.

$T =$ Transmissivity

$t =$ time

$r_w =$ radius of well = 3 inches = 0.25 ft.

$S =$ storage coefficient

procedure to back calculate Q

- 1) calc. u assuming a T calc. from pump tests 1-6
assume a value for S (max $S < 0.01$)
- 2) Determine $G(u)$ from u value calc. above by referring
Techniques of Water Resource Investigations of USGS - Type
Curves For selected Prob. of Flow to Wells in Confined Aquifers
Book 3, Chap 3, page 19 & plate 1(3.2)
- 3) calc. Q from above eqn.

$$\text{for } r_w = 3'' = 0.25'$$

$$\text{using } T \approx 100 \text{ gpd/ft} \quad (\text{from pump \& recovery calc. for GBR-14})$$

$$\text{For } S = 0.01$$

$$Q = 2\pi(7.45 \text{ ft})(100 \text{ gpd/ft}) \left(\frac{\text{day}}{24 \text{ hrs}} \right) \left(\frac{\text{hr}}{60 \text{ min}} \right) G(\alpha) = 3.251 G(\alpha) \quad (\text{in gpm})$$

$$\alpha = \frac{(100 \text{ gpd/ft}) (0.1337 \text{ ft}^2)}{(125 \text{ ft})^2 (0.01)} \left(\frac{\text{day}}{24 \text{ hrs}} \right) \left(\frac{\text{hr}}{60 \text{ min}} \right) t = 14.86 t \quad (\text{for } t \text{ in min})$$

t (min)	α	$G(\alpha)$	Q (gpm)
10	148.6	.329	1.07
50	743.0	.268	.87
100	1486	.240	.78
500	7430	.199	.647
1000	14860	.187	.608
1250	18575	.182	.592
1500	22290	.180	.585
1750	26005	.178	.579
2000	29720	.176	.572
2250	33435	.174	.566
2500	37150	.172	.559
2750	40865	.171	.556
3000	44580	.170	.553

$$\text{For } S = 0.001$$

$$Q = 3.251 G(\alpha)$$

$$\alpha = 148.56 t$$

t (min)	α	$G(\alpha)$	Q (gpm)
10	1486	.240	.780
50	7430	.199	.647
100	14865	.187	.608
500	74280	.164	.533
1000	148650	.158	.514
1250	185700	.153	.497
1500	222840	.151	.491
1750	259980	.149	.484
2000	297120	.148	.481
2250	334260	.147	.478
2500	371400	.145	.471
2750	408540	.144	.468
3000	445680	.143	.465

α

10⁵
10⁴
10³

10⁴

10³

10²

10¹

10⁰

10⁻¹

10⁻²

10⁻³

10⁻⁴

10⁻⁵

10⁻⁶

10⁻⁷

10⁻⁸

10⁻⁹

10⁻¹⁰

10⁻¹¹

10⁻¹²

10⁻¹³

10⁻¹⁴

10⁻¹⁵

10⁻¹⁶

10⁻¹⁷

10⁻¹⁸

10⁻¹⁹

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

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1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

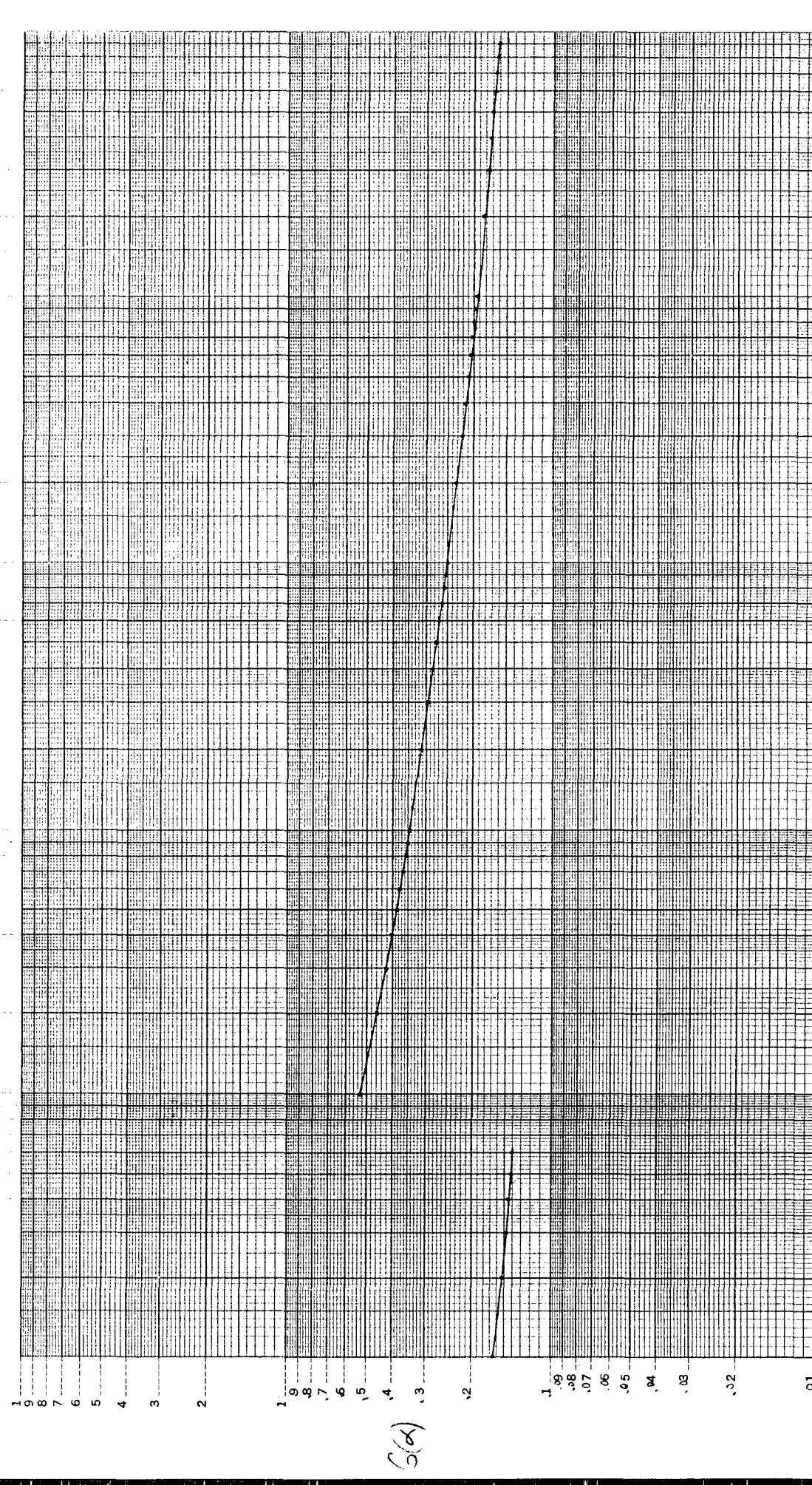
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1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10



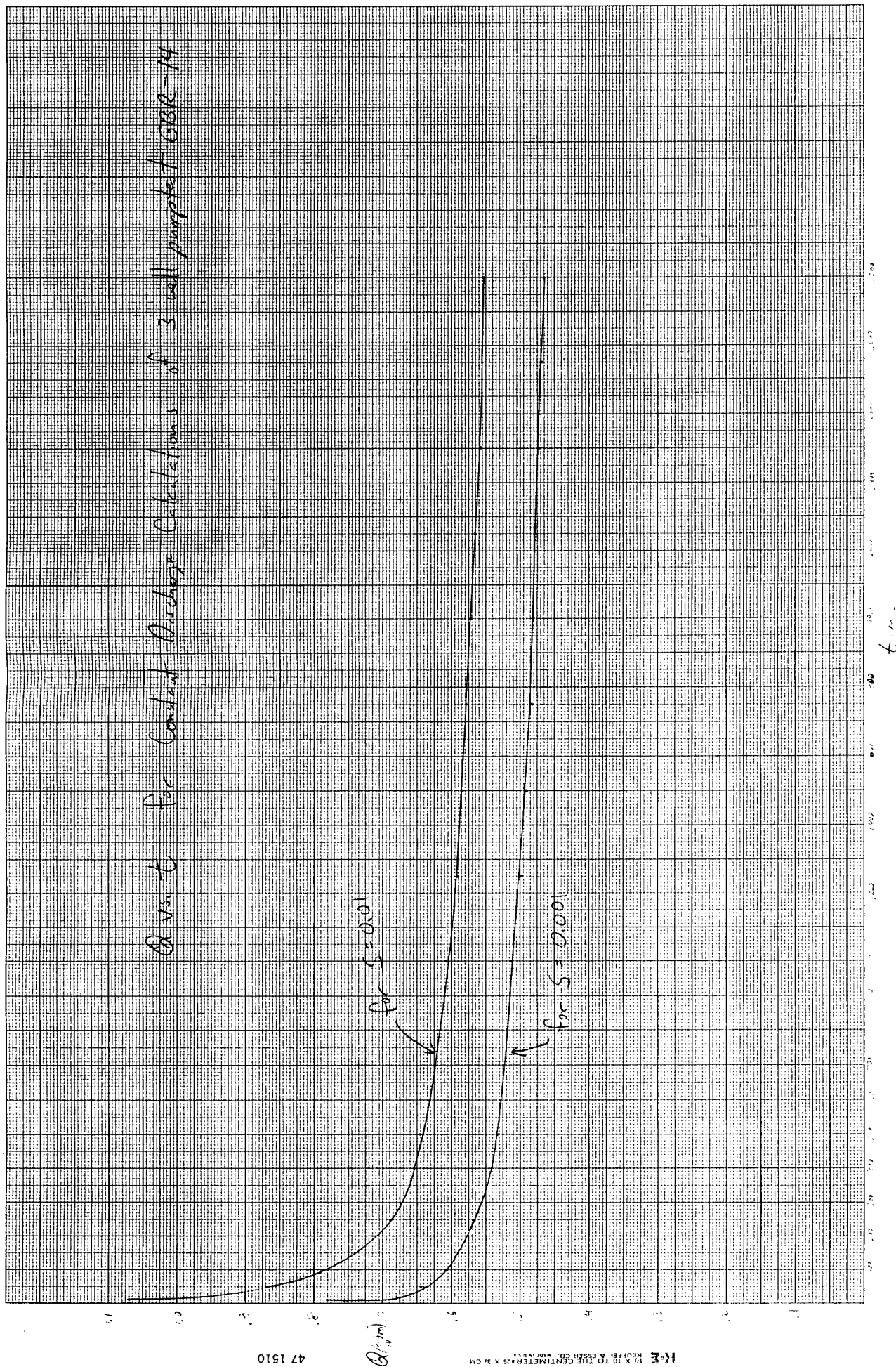
10⁶

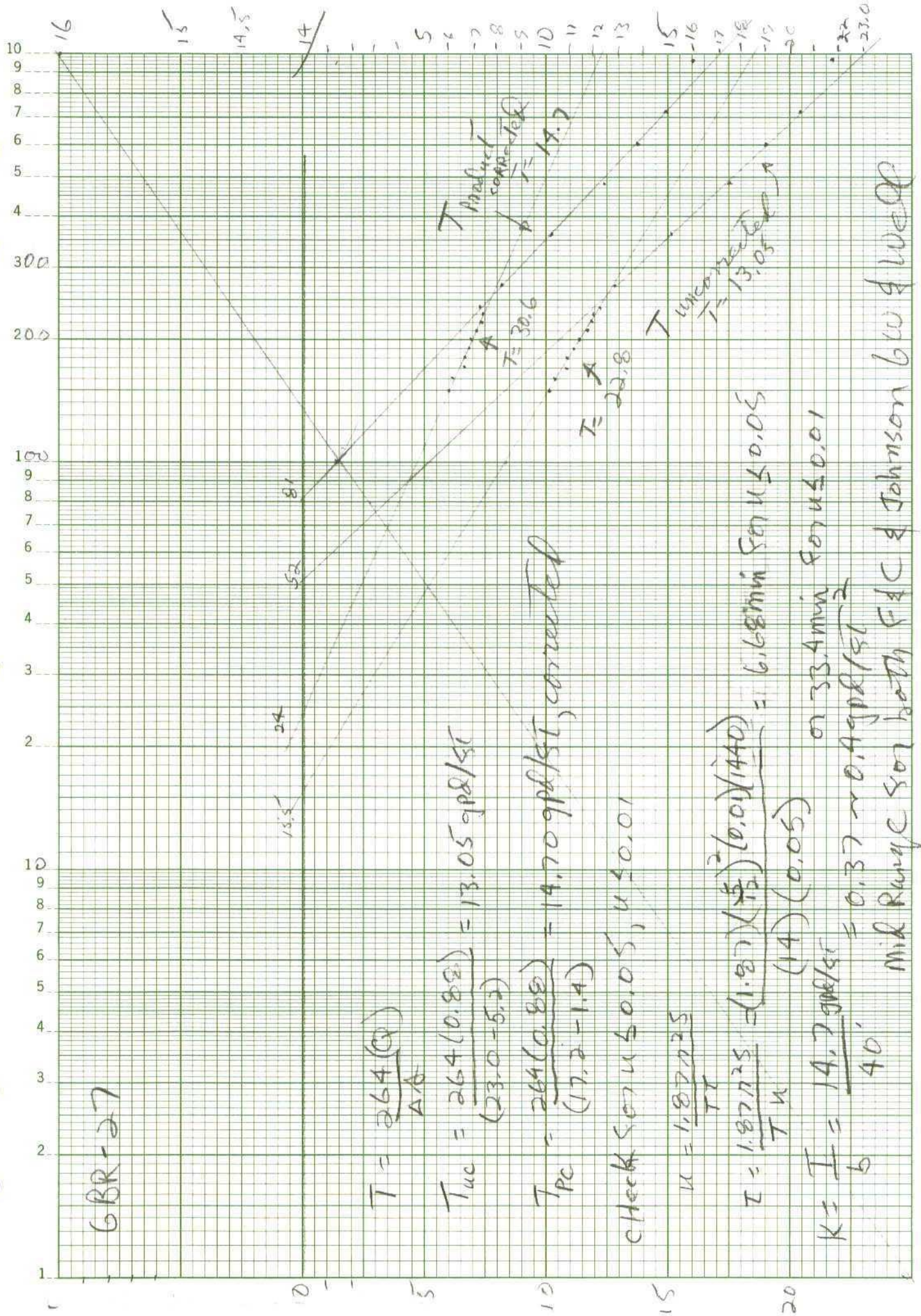
10⁵

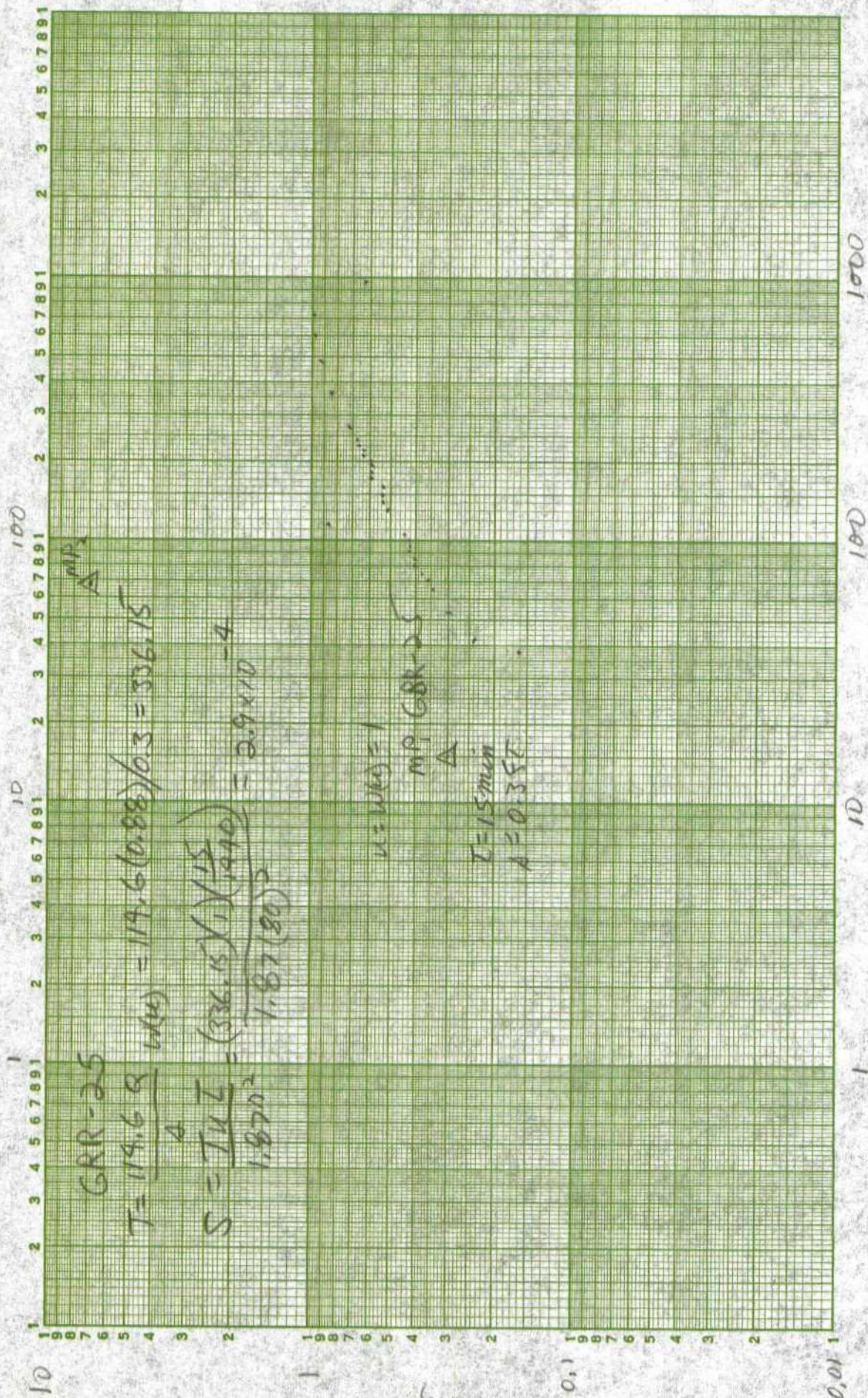
α

α

Q vs. t for Constant Discharge Calculations of 3 well pump test GBR-14







AP

0.1

0.01

I_{max}

GBR-27

$$I_c = \frac{0.6(d_c^2 - d_p^2)}{Q/4} \quad d_c = 5''$$

$$d_p = 1'', 2''$$

$$I_{c1} = \frac{0.6(25-1)}{0.88/4} = \frac{0.6(24)}{(0.88)} \Delta = 16.36\%$$

$$\text{or } I_{c2} = \frac{0.6(25-4)}{0.88/4} = \frac{0.6(21)}{(0.88)} \Delta = 14.32\%$$

I	I/Δ	I_{c1}	I_{c2}	I_{pc}
5.00	3.29	53.82	47.11	
10.00	4.70	76.89	67.30	
15.00	5.37	87.85	76.9	
20.0	5.83	95.38	83.49	
25.0	6.12	100.12	87.6	
30.0	6.37	104.2	91.2	
40.0	6.95	113.7	99.5	
50.0	7.37	120.6	105.5	
60.0	7.66	125.3	109.6	69.24
70.0	8.00	130.8	114.6	72.93
80	8.37	137.0	120	77.24
100	8.83	144.5	126.5	82.78
120	9.37	153.3	134.2	
130	9.66	158.0	138.3	
140	9.91	162.1	141.9	
150	10.18	166.5	145.8	93.16
160	10.37	169.7	148.5	100.12
176	10.81	177.8	155.7	
180	10.91	178.5	156.2	

$$\eta_c = \eta_n \sqrt{\frac{I_c}{I_n}} \quad \eta_c = 2.5'' \sqrt{\frac{52 \text{ min}}{15.5 \text{ min}}} = 4.6''$$

$$\eta_{ipc} = 2.5 \sqrt{\frac{81}{24}} = 4.6''$$

GBR-25 - Observation well
2" PVC, est. pump diam at 0.5"

$$Q = 0.88 \text{ gpm}$$

$$L_c = \frac{0.6(2^2 - .5^2)}{Q/A} = 2.56(A)$$

L	A	L _c
80	0.4	1.02
42	0.24	0.61

No casing storage effect

A = 0.97' for 720 min.
product layer makes analysis tough

GBR-14

$$Q = 29 \text{ gpm } d = 6''$$

$$L_c = \frac{0.6(36 - d_p^2)}{2/18}$$

A = 18' for 70 min

$$L_c = \frac{70}{5.4(36 - d_p^2)} = 70$$

$$36 - d_p^2 = 70/5.4$$

$$d_p^2 = 36 - 70/5.4 = 36 - 12.96$$

$$= 23.04, d_p = 4.8''$$

$$Q = 19 \text{ gpm } d = 6''$$

$$L_c = \frac{0.6(36 - 1)}{1} = 21 \text{ ft}$$

$$Q = 59 \text{ gpm}, d = 6$$

$$L_c = \frac{0.6(35)}{5} = 4.2 \text{ ft}$$

Casing storage so all not reached

GBR-27

$$I_c = \frac{0.6(d_c^2 - d_p^2)}{Q/\Delta} \quad d_c = 5''$$

$$d_p = 1'', 2''$$

$$I_{c1} = \frac{0.6(25-1)}{0.88/\Delta} = \frac{0.6(24)}{(0.88)} \Delta = 16.36(\Delta)$$

$$\text{or } I_{c2} = \frac{0.6(25-4)}{0.88/\Delta} = \frac{0.6(21)}{(0.88)} \Delta = 14.32(\Delta)$$

I	Δ	I_{c1}	I_{c2}	I_{pc}
5.00	3.29	53.82	47.11	
10.00	4.70	76.89	67.30	
15.00	5.37	87.85	76.9	
20.0	5.83	95.38	83.49	
25.0	6.12	100.12	87.6	
30.0	6.37	104.2	91.2	
40.0	6.95	113.7	99.5	
50.0	7.37	120.6	105.5	
60.0	7.66	125.3	109.6	69.24
70.0	8.00	130.8	114.6	72.93
80	8.37	137.0	120	77.24
100	8.83	144.5	126.5	82.78
120	9.37	153.3	134.2	
130	9.66	158.0	138.3	
140	9.91	162.1	141.9	
150	10.18	166.5	145.8	98.16
160	10.37	169.7	148.5	100.12
170	10.81	177.8	155.7	
180	10.91	178.5	156.2	

$$\eta_i = \eta_n \sqrt{\frac{I_i}{I_n}}, \quad \eta_i = 2.5'' \sqrt{\frac{52 \text{ min}}{15.5 \text{ min}}} = 4.6''$$

$$\Delta = 9.2$$

$$\eta_{ipc} = 2.5 \sqrt{\frac{81}{24}} = 4.6''$$

GBR-25 - Observation well.
 2" PVC, est. pump diam at 0.5"
 $Q = 0.88 \text{ gpm}$

$$T_c = \frac{0.6(2^2 - .5^2)}{Q/A} = 2.56(A)$$

T	A	T_c	
80	0.4	1.02	No casing storage effect
42	0.24	0.61	

$A = 0.97'$ for 720 min.
 product, ^{Thickness} layer makes analysis tough

GBR-14

$Q = 2 \text{ gpm}$ $d = 6"$ $A = 18'$ for 70 min

$$T_c = \frac{0.6(36 - d_p^2)}{2/18} = 70 / 5.4(36 - d_p^2) = 70$$

$$36 - d_p^2 = 70/5.4$$

$$d_p^2 = 36 - 70/5.4 = 36 - 12.96$$

$$= 23.04, d_p = 4.8''?$$

$Q = 1 \text{ gpm}$ $d = 6"$

$$T_c = \frac{0.6(36 - 1)}{1} = 21 A$$

$Q = 5 \text{ gpm}$, $d = 6$

$$T_c = \frac{0.6(35)}{5} = 4.2 A.$$

~~Casing storage so all not reached.~~

$$n = 2.5'', l = 5''$$

$$n_i = n_n \sqrt{\frac{L_i}{L_n}} = \left(\frac{2.5''}{1''}\right) \sqrt{\frac{70 \text{ min}}{2 \text{ min}}} = 2.4757$$

$$= 3.597$$

$$n_i = 2.5 \sqrt{\frac{52 \text{ min}}{1.55 \text{ min}}} = 4.6''$$

$$l = 9.2''$$

$$n_c = 2.5 \sqrt{\frac{81}{24}} = 4.6''$$

OCID comments

Technique

1. Correction for product thickness seems sound.
2. overemphasis on partial penetration
3. under emphasis on curing storage effects
4. poor hydraulic connections

lots more
Poor
Data

Deer

W.L. = WATER LEVEL
P.T. = PRODUCT THICKNESS
- = NO MEASUREMENT
0 = ZERO MEASUREMENT

TABLE 4-1 CONTINUED
CHRONOLOGY OF STATIC WATER LEVELS AND PETROLEUM PRODUCT THICKNESSES IN FEET CONT.
WELLS 17-25

DATE	WELL NO.-	GBR 17	GBR 18	GBR 19	GBR 20	GBR 21(S)	GBR 21(D)	GBR 22	GBR 23	GBR 24(S)	GBR 24(D)	GBR 25
		M.L.	M.L.	M.L.	M.L.	M.L.	M.L.	M.L.	M.L.	M.L.	M.L.	M.L.
		P.T.	P.T.	P.T.	P.T.	P.T.	P.T.	P.T.	P.T.	P.T.	P.T.	P.T.
4/3		-	-	-	-	-	-	-	-	-	-	-
4/15		-	-	-	-	-	-	-	-	-	-	-
4/16		-	-	-	-	-	-	-	-	-	-	-
4/23		-	-	-	-	-	-	-	-	-	-	-
4/30		-	-	-	-	-	-	-	-	-	-	-
5/2		-	-	-	-	-	-	-	-	-	-	-
5/9		-	-	-	-	-	-	-	-	-	-	-
5/28		-	-	-	-	-	-	-	-	-	-	-
5/29		-	-	-	-	-	-	-	-	-	-	-
5/30		-	-	-	-	-	-	-	-	-	-	-
7/1		-	-	-	-	-	-	-	-	-	-	-
7/15		-	-	-	-	-	-	-	-	-	-	-
7/31		-	-	-	-	-	-	-	-	-	-	-
8/12		-	-	-	-	-	-	-	-	-	-	-
10/7		-	-	-	-	-	-	-	-	-	-	-
10/8		-	-	-	-	-	-	-	-	-	-	-
10/9		-	-	-	-	-	-	-	-	-	-	-
10/9		-	-	-	-	-	-	-	-	-	-	-
10/16		-	-	-	-	-	-	-	-	-	-	-
10/17		-	-	-	-	-	-	-	-	-	-	-
10/17		-	-	-	-	-	-	-	-	-	-	-
11/4		-	-	-	-	-	-	-	-	-	-	-
11/5		-	-	-	-	-	-	-	-	-	-	-
(after Pumping GBR-29)		-	-	-	-	-	-	-	-	-	-	-
(after Pumping GBR-31)		-	-	-	-	-	-	-	-	-	-	-

M.L. = WATER LEVEL
P.T. = PRODUCT THICKNESS
- = NO MEASUREMENT
0 = ZERO MEASUREMENT

CHRONOLOGY OF STATIC WATER LEVELS AND PETROLEUM PRODUCT THICKNESSES IN FEET CONT.
WELLS 26-31

TABLE 4-1 CONTINUED

DATE	WELL NO.	GBR 26	GBR 27	GBR 28	GBR 29	GBR 30	GBR 31	STEEL WELL
		W.L.	W.L.	W.L.	W.L.	W.L.	W.L.	W.L.
4/13		-	-	-	-	-	-	-
4/15		-	-	-	-	-	-	-
4/16		-	-	-	-	-	-	-
4/23		5362.65	-	-	-	-	-	-
4/30		5362.92	5357.04	-	-	-	-	-
5/2		5362.85	5360.16	7.17	-	-	-	-
5/9		5362.75	-	-	-	-	-	-
5/28		-	8.08	-	-	-	-	-
5/29		5361.29	5357.67	8.67	5345	0	-	-
5/30		-	8.98	0.13	-	0	-	-
7/1		-	9.000	-	-	1.6	-	-
7/15		5362.62	-	5361.95	0.5	5342.85	-	-
7/31		5362.93	5364.75	2.91	5341.02	4.5	-	-
		-	(after being pumped)	0.58	5341.02	7.34	-	-
8/12		5362.305	-	5360.427	1.223	5341.607	6.4997	-
10/7		5363.72	5367.25	0.42	5362.18	0	5362.3	0
10/8		-	-	-	-	5366	0	5363.71
10/9		-	-	-	-	-	-	-
10/9		-	-	-	-	-	-	-
(After Pumping GBR-31)		5363.56	5367.08	0.38	5361.47	-	5362.21	0
10/16		5363.33	-	-	-	5365.92	0	5363.56
10/17		5361.26	-	5358.43	-	5365.79	0	5362.79
(after purging)		-	-	-	-	5365.83	0	5363.04
11/4		-	-	-	5343.02	5.58	-	-
11/5		-	-	-	5345.94	2.04	-	-
(After Pumping GBR-29)		5364.93	5368.08	0.29	5362.26	0.02	5362.42	0
		-	-	-	-	5367	0.25	5364.21

W.L. = WATER LEVEL
P.T. = PRODUCT THICKNESS
- = NO MEASUREMENT
0 = ZERO MEASUREMENT